

## In this issue



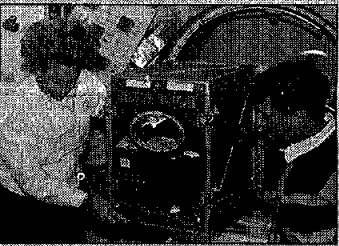
NASA's Hubble Space Telescope uncovers a gravitationally lensed galaxy.

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In honor of Respiratory Health Week, tips on respiratory protection.

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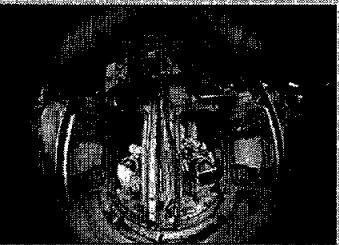
Highlights of the STS-94 mission aboard the Space Shuttle Columbia.

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The plaque for STS-94 is hung by a special team that developed new techniques.

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## JSC issues first strategic implementation plan

*All employees should relate their work to center's plan*

By Doug Peterson

After several months of work, a team from across the center has completed the first JSC Implementation Plan that identifies "how" JSC will implement the "what and why" of NASA programs as described in the agency's higher level strategic plans.

The plan is part of agencywide management improvements and strategic planning efforts, and it links the work done by individuals at JSC to agency strategic plans and government legislation. JSC

Director George Abbey and other top NASA leaders recently approved the plan, which will be distributed shortly and followed by meetings to discuss its impact.

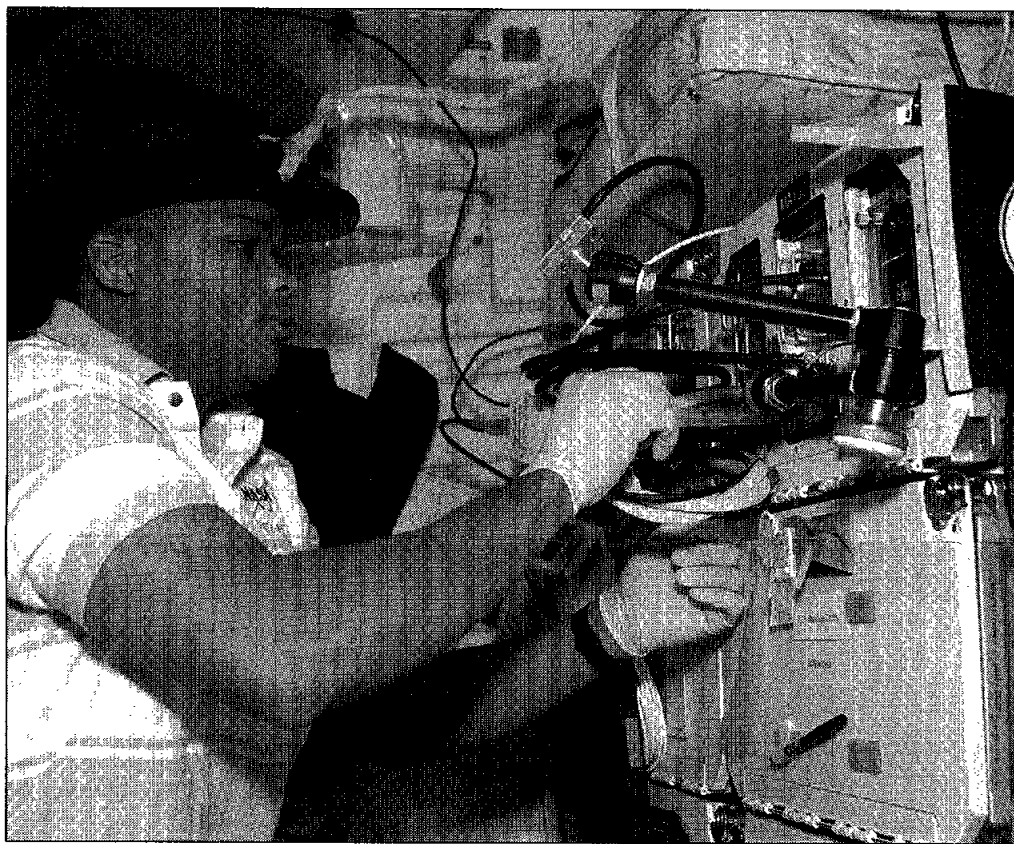
Beginning with a senior staff briefing Aug. 11, the plan's rollout includes briefings and training for managers, followed by briefings to all employees by Sept. 12. Individual NASA employees will receive their copies in group meetings. Posters that emphasize JSC roles and top level strategic links will be distributed to center offices

and organizations.

The JSC Implementation Plan, unlike previous strategic planning efforts, provides an approach for planning specific center actions to reach goals expressed in the Human Exploration and Development of Space enterprise, other enterprises, and NASA strategic plans. For the first time, the new plan establishes a center commitment to begin directing efforts toward leaving low-Earth orbit—setting the stage for a possible return to the Moon and traveling to Mars.

Most of NASA's management initiatives over the last few years are incorporated into the agency planning efforts in documents that flow down from the agency's Strategic Plan and Strategic Handbook, to the enterprise strategic plans and then to each center's implementation plan. Significant changes, such as naming lead centers with expanded roles, identified in the Zero-Based Review and other documents are imbedded in the new plans.

The JSC Implementation Plan Please see **PLAN**, Page 8



NASA Photo S85E5010

STS-85 Mission Specialist Robert Curbeam tends the Bioreactor Demonstration System on *Discovery's* middeck. The experiment is taking advantage of the microgravity environment to grow cancer tissue samples that are larger than any that can be grown on Earth. The research may help scientists develop new ways of killing the cells in patients suffering from the disease.

## STS-85 crew eyes ozone, station tools

By Ed Campion

Following the successful launch of Space Shuttle *Discovery* on Aug. 7, the six-person crew onboard is nearing the end of its work to support studies of the Earth's atmosphere and tests of space station tools.

Commander Curt Brown, Pilot Kent Rominger, Payload Commander Jan Davis, Mission Specialists Robert Curbeam and Steve Robinson along with Canadian Payload Specialist Bjarni Tryggvason are working with payloads and experiments that investigate Earth's middle atmosphere and demonstrate operations important to the future International Space Station.

A little more than seven hours after reaching Earth orbit, Davis used the shuttle's mechanical arm to grapple and deploy the Cryogenic Infrared Spectrometers and Telescopes for the Atmosphere-Shuttle Pallet Satellite-2 payload. The German-built satellite, being carried as part of a cooperative program between NASA and the German Space Agency DARA, is flying free for more than 200 hours and using three telescopes and four spectrometers to measure infrared radiation emitted by the Earth's middle atmosphere. Data gathered will help investigators from 15 countries understand how small-scale tracer "filaments" in the stratosphere contribute to transport of ozone and chemical compounds that affect the distribution of ozone.

If things go as planned, the crew will retrieve the SPAS satellite Saturday, Aug. 16. As part of the effort to retrieve CRISTA-SPAS, Brown and Rominger will use a velocity bar or V-bar approach in the rendezvous with the SPAS satellite as part of an evaluation of the close proximity operations that will be done by a shuttle approaching the International Space Station.

Other payload activities during *Discovery's* mission relate to future ISS operations. One of those is the Manipulator Flight Demonstration payload. The MFD is a prototype of the Small Fine Arm that will be at the end

Please see **DISCOVERY**, Page 8



## Open house activities set

JSC employees are rolling out the red carpet to welcome the public for the third annual JSC Open House on Saturday, Aug. 23.

More than 15 buildings around the center will be open to display, demonstrate and showcase the programs and projects currently in work. Visitors also will have the opportunity to view the new Neutral Buoyancy Laboratory at the Sonny Carter Training Facility and the various aircraft at JSC's Ellington Field. The Teague Auditorium will feature children's activities, Internet demonstrations and presentations from experts around the center.

"Our employees have gone all out to make this open house an event to remember," said John Lawrence, chairman of the open house committee.

Other highlights include astronaut autographs in both cafeterias and photo opportunities in the JSC's television studio and in the cockpit of a T-38 jet trainer.

Nearly 200 employees have signed up to help visitors during the seven-hour event, with more needed to make the open house a success. JSC and contractors may volunteer by calling Kacy Carraway at x35045.

## Mir 24 crew arrives; Wolf to replace Foale

The human population aboard Space Station Mir rose to five last week when the Mir 24 cosmonauts successfully docked their Soyuz capsule to the Russian outpost while NASA managers decided to replace Astronaut Wendy Lawrence as the next long duration U.S. crew member on Mir.

With first-time Flight Engineer Pavel Vinogradov at his side, veteran Mir 24 Commander Anatoly Solovyev guided his Soyuz TM-26 to a docking at shortly after noon CDT on Thursday, Aug. 7—two days after their launch from the Baikonur Cosmodrome in Central Asia. The hatches between the two

vehicles were opened an hour and a half later, and the new residents were greeted by Mir 23 Commander Vasily Tsibliev, Flight Engineer Alexander Lazutkin, and U.S. Astronaut Mike Foale.

Recent activities aboard Mir focused principally on troubleshooting an apparent problem with a new Elektron oxygen-generating unit in the Kvant-1 module. Tsibliev and Lazutkin changed components on the Elektron with similar elements from another unit, but it still could not be activated. At weeks



end, Russian engineers were still considering other options. In the meantime, the temporary shutdown of Elektron poses no problem or threat to crew safety or mission goals. Oxygen generating canisters are being burned periodically to provide ample oxygen for Mir.

There is about a two-month supply of the canisters on board. The Vozdukh carbon dioxide removal system remains on and is functioning normally.

The Mir 24 crew is expected to

perform several space walks during its tour, designed to effect repairs to the Mir's damaged Spektr module and restore power from Spektr's solar panels. Plans called for Tsibliev and Lazutkin to conduct one-week handover with Solovyev and Vinogradov before their scheduled departure on Aug. 14 in their Soyuz TM-25 capsule. Their return to Earth will come after 185 days in space.

Lawrence's replacement by her backup, David Wolf, for the next long duration stay on the Russian station will enable Wolf to act as a backup crew member for space

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# Sometimes, there just isn't enough time in a day

By Kelly Humphries

When a shuttle mission is as jam-packed as STS-85 with experiments that need to be pointed at their targets, there just isn't enough time in the crew's day to get everything done.

That's why flight controllers in the Mission Control Center are working together on the ground during this mission to routinely maneuver the shuttle during the crew's sleep shift using what are called Display Electronic Unit equivalents.

More than 160 attitude maneuvers that control the position of the shuttle in relation to its orbit and the Earth will be executed during the 10-day flight to support observations by instruments associated with the Technology Applications and Science-1 and International Extreme Ultraviolet Hitchhiker-2, and to help track the location of the co-orbiting Cryogenic Infrared Spectrometers and Telescopes for the Atmosphere-Shuttle Pallet Satellite-2. Of

those, more than 137 "DEU equivalent" loads, as they are called, are being sent to the shuttle to execute 31 maneuvers by the Planning Shift in Mission Control.

"The choice was to either do them when the crew was asleep, extend the flight, or make it a dual shift mission," said Keith Lawson, the lead STS-85 pointer for the Flight Activities Officer discipline, a United Space Alliance worker. "By being able to maneuver during the crew sleep period, we can accomplish all the inertial pointing requirements we have on the flight and still keep it as short as possible so it maximizes payload return."

This is not the first flight on which such maneuvers have been uplinked by the ground, but it is the first time this magnitude of DEU equivalent maneuvers have been

planned preflight as part of the normal mission.

"We've actually done those pretty routinely in a contingency sense," said STS-85 Lead Flight Director Bryan Austin. "What we haven't done very much is a series of chained maneuvers, four and five and six maneuvers through a shift that will take the focus of a number of people and keep them in a real-time execution focus while at the same time their planning shift job is going on."

When the flight control team uplinks the commands, it is in effect mimicking the process that a crew member on board would go through on its computer command keypad, said Terri Murphy, lead Data Processing Systems officer for STS-85.

"I think it's going to be really challenging for

DPS," Murphy said before the flight. "It's going to keep us busy."

The process starts with the Flight Activity Officer and the payload customers finding what blocks of the flight are going to be dedicated to each payload. FAO has to come up with block of time for each activity and then find specific targets and times to build an attitude timeline. FAO builds a prospective DEU command timeline which the Guidance, Navigation and Control Officer reviews for technical correctness. The Instrumentation and Communications Officer reviews it and inserts tones to wake up the crew if any maneuver move the shuttle out of a good communications attitude and has to get their attention. The DPS officer converts these scratch pad entries into command loads in the Mission Operations Computer. The command is reviewed again

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## Parker takes reins of JPL management

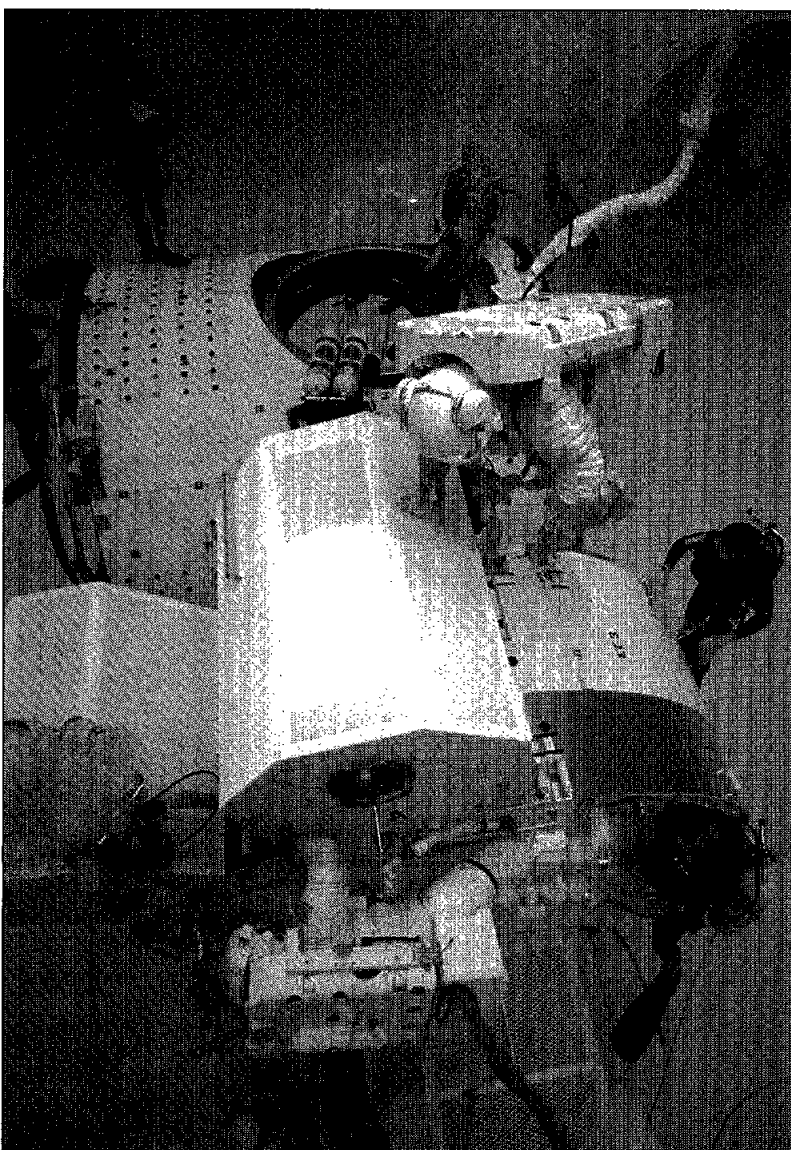
Robert Parker has been selected as the new director of the NASA Management Office at NASA's Jet Propulsion Laboratory.

Currently director of Space Operations and Utilization in the Office of Space Flight at NASA Headquarters, Parker 60, is a former astronaut who flew aboard STS-35 in December 1990 and STS-9 in November 1983. He was selected as a NASA astronaut in 1967, serving as a member of the support crew for Apollo 15 and Apollo 17, and as the program scientist for the Skylab Program Director's Office. Subsequent to his flight career, Parker served in senior management positions in the Office of Space Flight.

The director of the JPL NASA Management Office provides on-site oversight of the NASA contract with JPL, and leadership in negotiations of NASA contract requirements with JPL and the California Institute of Technology, the organization that operates JPL. The director also enables management and technical support for NASA field centers and Headquarters offices that have work performed at JPL.

"Dr. Parker is a perfect fit for this post," said NASA's Associate Administrator for Space Science, Wesley Huntress. "His experience as a scientist and science manager is vital to interacting with JPL and Caltech, and his experience in the Office of Space Flight will help bring NASA's robotic and human space flight programs even closer together."

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JSC Photo 97-09514 by Mark Sowa

**WATER WALK**—Astronauts Mike Gernhardt and Claude Nicollier evaluate space walk tasks that will be performed in August 1999 to connect an airlock to the International Space Station. Astronaut James Reilly is slated to make the actual space walk with Gernhardt on the seventh assembly mission. The airlock will enable the station to support both U.S. and Russian space walks without a shuttle present.

## Telescopes team up to discover farthest galaxy seen in universe

An international team of astronomers has discovered the most distant galaxy found in the universe to date, by combining the unique sharpness of the images from NASA's Hubble Space Telescope with the light-collecting power of the W. M. Keck Telescopes—with an added boost from a gravitational lens in space.

The results show the young galaxy is as far as 13 billion light years from Earth, based on an estimated age for the universe of approximately 14 billion years. This would place the galaxy far back in time during the "formative years" of galaxy birth and evolution, less than a billion years after the birth of the universe in the Big Bang.

The detailed image shows that bright dense knots of massive stars power this object. Due to the firestorm of star birth within it, the galaxy is intrinsically one of the brightest young galaxies in the universe, blazing with the brilliance of more than ten times the Milky Way.

"We are fascinated to be witnessing the very early stages of the construction of what could well become a massive galaxy like our own Milky Way," said Garth Illingworth of the

University of California in Santa Cruz. "This object is a pathfinder for deciphering what is happening in young galaxies, and offers a rare glimpse of the powerful events that transpired during the formation of galaxies."

"We were excited by the possibility that we may have found a unique example of a galaxy in formation at the time of the earliest quasars," said Marijn Franx of the University of Groningen in the Netherlands.

Predicted by Einstein's theory of general relativity, gravitational lenses are collections of matter (such as clusters of galaxies) that are so massive they warp space in their vicinity, allowing the light of even more-distant objects to curve around the central lens-mass and be seen from Earth as greatly magnified.

The object is so far away, observing it in such detail would tax the capabilities of both Hubble and Keck without the magnification of the gravitational lens, provided by a foreground cluster of galaxies that is much closer to us at five billion light-years.

Due to a rare and fortunate alignment of the young galaxy behind

the foreground cluster, astronomers gain a magnified view that is five to ten times better than Hubble alone can yield for an object at such a great distance. A telltale sign of the lensing is the smearing of the remote galaxy's image into an arc-shape by the gravitational influence of the intervening galaxy cluster.

The smeared image of the galaxy stood out because of its unusual reddish color. "Such magnified galaxies had been observed before, but never with such a color. The special color of the galaxy in the arc is due to absorption by the matter in the universe between us and the galaxy, and suggested to us that it was at a great distance," Franx said.

The suspected remoteness of the lensed object was confirmed when the team of astronomers made spectroscopic observations with one of the twin 10-meter Keck telescopes on Mauna Kea, Hawaii to measure its redshift, and therefore its distance, based on the shifting of its light towards the red end of the visible light spectrum. The resulting high redshift corresponds to a very early era when the universe was just beginning to form galaxies.

## Mars Pathfinder completes main mission goals

NASA's Mars Pathfinder spacecraft—a novel mission to send an inexpensive lander and roving prospector to the surface of Mars—has concluded its primary mission, fulfilling all of its objectives and returning a wealth of new information about the red planet.

The robotic lander, which continues to explore an ancient outflow channel in Mars' northern hemisphere, completed its milestone 30-day mission on Aug. 3, capturing far more data on the atmosphere, weather and geology of Mars than scientists had expected. In all, Pathfinder has returned 1.2 gigabits (1.2 billion bits) of data and 9,669 tantalizing pictures of the Martian landscape to date.

"The data returned by the Sagan Memorial Station and Sojourner has been nothing short of spectacular, and it will help provide a scientific basis for future Mars missions, including a sample return, for years to come," said Dr. Wesley Huntress, NASA associate administrator for space science. "The Pathfinder team's 'can do' attitude not only was critical to overcoming several complex technical challenges during development and cruise, but has carried through the uncharted territory of operating a solar powered lander and mobile rover on the surface of a planet millions of miles from Earth."

"This mission demonstrated a reliable and low-cost system for placing science payloads on the surface of Mars," said Brian Muirhead, Mars Pathfinder project manager at NASA's Jet Propulsion Laboratory.

A new portrait of the Martian environment has begun to emerge in the 30 days since Pathfinder and its small, 23-pound rover began to record weather patterns, atmospheric opacity and the chemical composition of rocks washed down into the Ares Vallis flood plain. The rover's alpha proton X-ray spectrometer team, led by principal investigator Dr. Rudolph Rieder, has been able to analyze the first-ever in-situ measurements of Mars rocks.

"We are seeing much more differentiation of volcanic materials than we expected to see," said Dr. Matthew Golombek, Mars Pathfinder project scientist at JPL. "The high silica content of one of the rocks we've measured, nicknamed Barnacle Bill, suggests that there was more crustal activity—heating and recycling of materials—early in Mars' history than we thought."

In addition, sweeping color panoramas of the Martian landscape, created by the imager for the Mars Pathfinder team are revealing clear evidence that the surface of Mars has been altered by winds and flowing water.



**A NASA Hubble Space Telescope image of the galaxy cluster CL1358+62 has uncovered a gravitationally-lensed image of a more distant galaxy located far beyond the cluster. The gravitationally lensed image appears as a crescent to the lower right of center. The galaxy's image is brightened, magnified and smeared into an arc-shape by the gravitational influence of the intervening galaxy cluster, which acts like a gigantic lens.**

## Community News

### Contractor volunteers receive 'Heart of the Community Awards'

*Volunteer Center lauds business cooperation*

Four JSC contractors took home "Heart of the Community" awards this week for giving back to the community.

The Volunteer Center of the Texas Gulf Coast, Bay Area Satellite Center, presented the awards in a special presentation at South Shore Harbour Resort to GHG Corp.; Lockheed Martin Science, Engineering and Analysis; MRI Computer Services and Northrop Grumman Corp. The companies were honored for their work on either a special project or for continued support throughout the year.

"The growing desire of our local companies to seek and to develop and restore the human spirit through volunteerism is a profound example of 'heart' in the community," said Kathleen Holt, director of the Bay Area Satellite Office of the Houston Volunteer Center. "Bay Area businesses give, and in giving, make a life of value for their employees and a life of hope for those who are the recipients of their generosity."

GHG Corp., received its special project award for repairing the home of a League City widow. Employees spent more than 220 hours renovating the home and removing unsafe and unsanitary conditions in the yard.

Northrop Grumman Corp., also received a special project award for its partnership with James F. Bay Elementary School in Seabrook.

Twenty-one volunteers tutored "at risk" students, spending at least one hour per week from October through April. These volunteers logged more than 2,200 hours of tutoring. Since the program began, grade scores have improved, affirming the success of the program.

"By tutoring students at Bay Elementary, your company exemplifies the spirit of volunteerism," Holt said. "By helping nonprofit agencies, your organization has distinguished itself as a leader in contributing to the welfare of our community."

MRI Computer Services received an overall "Heart of the Community Award" for its contributions to community charities and educational organizations. The company provided financial support to the YMCA, Boy Scouts of America and scouting for the disabled. Throughout the year, MRI Computer Services are active in food drives, charity runs, and youth services in local schools.

"I commend you for your leadership in empowering your employees to make an impact on the problems facing your community," wrote Robert Goodwin, president of the Points of Light Foundation to MRI Computer Services. "Together we can make a connection through community service—a powerful force—to bridge the differences that divide us: to remind all Americans of what we can accomplish when we work together and to get things done

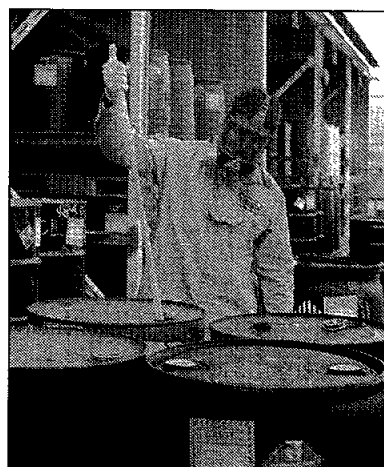
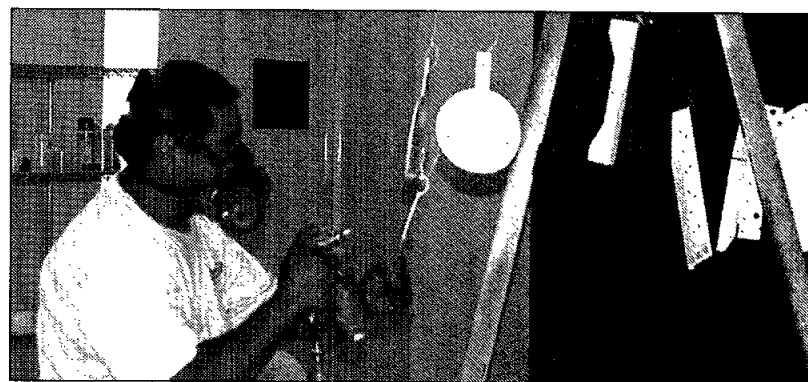
for the next generation."

GHG Corp., also received an overall award for its efforts around the Bay Area. Employees have collected clothing, food, toys and household items for the disadvantaged. During the holidays, volunteers package and deliver gift bags to children. GHG also provides 120 free Internet accounts to non-profit organizations.

Lockheed Martin Science Engineering and Analysis was recognized for their efforts to target hunger, homeless and juvenile crime. Volunteers have built wheelchair ramps, picnic tables and repaired playground equipment at youth centers. Employees have worked bi-monthly in soup kitchens preparing food and have walked for the March of Dimes. More than 700 employees donate 2,000 hours to various company sponsored community service activities.

"Lockheed has given their heart as a positive influence in the lives of lonely children housed at the Harris County Youth Village in Seabrook," said Joy Mills, coordinator of Crossroads. "This detention center has active Lockheed volunteers. They make a real difference in the lives of neglected youth."

In addition to the JSC contractor, Sterling Chemicals of Texas City and Weststar Construction of League City also took home the special award.



JSC Photos 97-09731, 97-09732  
Above: Sal Anguiano of DynCorp uses a respirator while spray painting. Left: Keith Arnone of BRSP protects his respiratory system while handling hazardous chemicals. JSC's Environmental Health Services Office says employees might be required to use a respirator in maintenance operations that liberate dusts, mists, fumes, vapors or gases. In areas that employees must process, handle, store or dispose of substances that could result in exposures over the OSHA permissible exposure limits, employees should wear protection.

### Respirators can help prevent lung disease

By Julie Stone

August has been designated respiratory protection awareness month and JSC's Environmental Health Office has tips for employees to help protect their respiratory system while on the job.

"In most industries today, under normal operating conditions, there are few routine manufacturing tasks that require the use of respiratory protection," said Gary Caylor, JSC's occupational health officer. "Achieving employee protection through the use of engineering controls, well-designed work practices, the use of materials with lower toxicities, administrative controls, or some combination of these is more practical and cost-effective."

Steve Hulka, a certified industrial hygienist in the Environmental Health Services Office said that

employees might be required to use a respirator in maintenance operations that liberate dusts, mists, fumes, vapors or gases.

If respiratory protection must be used for any activity, a written respiratory protection program must be developed and implemented, as required by the Occupational Safety and Health Administration's Respiratory Protection Standard 29 CFR 1910.134.

"An effective respiratory protection program requires careful planning and diligent execution," Caylor said. "There's no room for guesswork when the health and safety of employees are at stake."

Employees who don't have a program and would like to receive information on how to implement one, May contact the Environmental Health Services Office at x36726.

### Government travel services to be consolidated agencywide this month

On Aug. 30, American Express Travel Related Services, Inc., will be providing travel services for all NASA centers including JSC.

The acquisition of this new contract was led by Goddard Space Flight Center in accordance with a lead center agreement, which transferred responsibility for acquisition, operations and management of the agency-wide travel services contract from NASA Headquarters to Goddard.

The Transportation Branch is handling the transition to ensure travelers continue receiving the highest quality of service," said Jim

Hickmon, director of Center Operations. "Bobby Boyd and Rose Gardner-DeLapp will be responsible for the transition at JSC and the White Sands Test Facility."

Services to be provided by American Express Travel include air, rail and hotel reservations; car rental reservations; passport/visa processing; seminar/conference arrangements; bus arrangements and more. When travel assistance is needed, employees may contact an American Express Travel representative using the same telephone numbers at JSC.

The new contract is a perfor-

mance based contract with an incentive rebate structure. Performance standards will be incorporated into the contract and carefully monitored, Hickmon said. Travelers and travel arrangers will periodically receive written and/or telephone surveys asking to assess the quality of service. Focus groups and a performance assessment board also will be used to assess performance.

For more information call Boyd at x36526 or Gardner-DeLapp at x30331. White Sands employees may contact Vernon Brown at (505) 524-5134 for information.

### Thermal, fluids workshop set for September at UHCL

The eighth annual thermal and fluids analysis workshop will be held from Sept. 8-11 at the University of Houston - Clear Lake.

The purpose of the workshop is to bring together members of industry, academia and government to share information and exchange ideas about applications of analysis tools and methods.

On Monday, Sept. 8, after opening registration, Steven Rifai from Centric Engineering Systems Inc., will discuss "Multiphysics Simulation of Coupled Fluid and Thermal and Structural Analysis on High Performance Parallel Computing Platforms."

Fluids seminars will be conducted from 8-11:30 a.m. Tuesday and Wednesday and 8-11 a.m. Thursday. Thermal seminars will be conducted from 1-4 p.m. Monday, Tuesday and Thursday. Special training sessions also will be available. General Aerodynamics Simulation Program training will be held from 1-5 p.m. Monday and Tuesday. Systems Improved Numerical

Differing Analyzer training and SINAPS Plus training will be from 8 a.m.-noon Tuesday and Wednesday. Thermal Synthesizer System training will be from 1-5 p.m. on Wednesday and 8 a.m.-noon on Thursday. Parabolic Hyperbolic or Elliptic Numerically Integrated Code Series training will be from 1-5 p.m. Wednesday and 1-4:30 p.m. Thursday.

The cost of the series is \$25 for students and \$350 for all non-government individuals. This price includes continental breakfast, lunches and dinner program as well as all classroom materials. Registration is due by Aug. 22. Registration will be accepted after that date on a first come, first served basis at an increased cost: \$30 for students and \$450 for all others.

JSC civil service employees may contact Glen VanZandt at x33069 to register. Employees must register before Aug. 22 to attend. For more information contact Carlos Ortiz, conference chairman, x38879 or e-mail: crotiz@ems.jsc.nasa.gov.

JSC Safety Alert

### Uninterruptible Power Source Battery Failure

#### What Happened

Operations personnel in a test and training facility reported hearing a loud bang followed by the alarm on the Uninterruptible Power Source self-monitoring system.

#### Outcome of Investigation

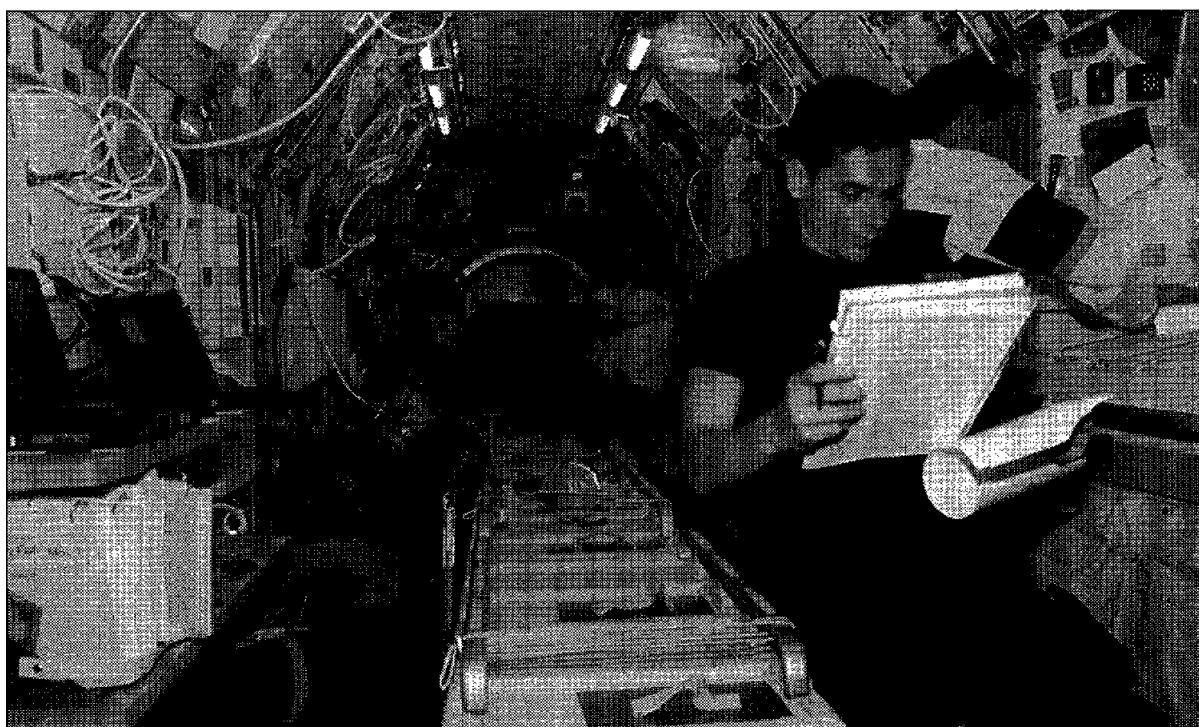
It was determined, after the Uninterruptible Power Source chassis access panel was removed, that one out of the 20 batteries had experienced a rupture. The battery had apparently been allowed to dry out in most, if not all, of its cells. This dry state allowed a large ullage volume to form inside the battery over the remaining liquid electrolyte. This volume created a condition within the battery in which hydrogen gas, a normal by-product of these batteries, was able to collect and form an explosive mixture. Hydrogen gas is a very explosive and easily ignitable gas. The Uninterruptible Power Source owner's manual did not require that the fluid levels be checked. The facility performed a biannual battery test as part of its preventative maintenance program.

#### What You Can Do

Uninterruptible Power Source systems are devices that can vary greatly in size and complexity. Some use solid state batteries, gel-acid types and others use the liquid-acid type. Facility users of Uninterruptible Power Source systems should assure that the systems remain in good working order. Facility representatives should review Uninterruptible Power Source manuals to determine the types of batteries used, and their required preventative maintenance. Steps should be taken to determine the condition of the batteries if they are subject to electrolyte depletion and hydrogen gas generation. The levels should be checked if the batteries are of the lead-acid type with removable caps for fluid addition. Maintenance-free batteries should be reviewed for service life constraints. Don't assume that they will operate indefinitely. These batteries degrade over time and should be replaced. Consult your Uninterruptible Power Source vendor or manufacturer for the recommended maintenance and replacement schedule.

# Superior Science

## The STS-94 crew spends 16 days in space exceeding scientists' expectations



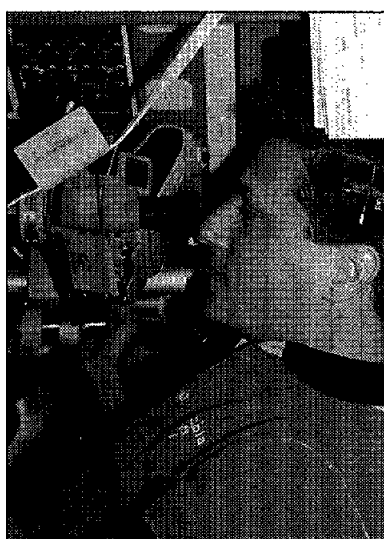
JSC Photo STS094-372-008

↑ Most of the STS-94 crew performs operations in the Spacelab Science Module. Payload Specialist Greg Linteris, right foreground, looks over flight plan data as Mission Specialist Don Thomas, upper right, works nearby. Mission Specialist Mike Gernhardt, nearer camera on left, and Payload Specialist Roger Couch share an Inflight Maintenance chore while Payload Commander Janice Voss oversees the work. These tasks are necessary to repair or troubleshoot a minor malfunction with an experiment. Procedures are often time consuming and would detract from scheduled science gathering so the entire crew pitches in to keep the experiments and activities on a tight timeline for maximum science acquisition.



JSC Photo S94E5021

↑ STS-94 Commander Jim Halsell checks on an experiment in the Astro-Planet Generic Bioprocessing Apparatus during the 16-day mission. A plant growth experiment in the Astro-Planet Generic Bioprocessing Apparatus examined the production of lignin—essential for the formation and joining of woody cell walls in plants; the production of secondary metabolites—essential to generating energy needed to sustain vital life processes.



JSC Photo STS094-344-027

↑ Astronaut Don Thomas records his observations of an experiment in the middeck glovebox. A camera inside the glovebox gave scientists a number of different viewing angles when the images were downlinked.

Halsell uses a camcorder to videotape the Hand Held Diffusion Test Cells. Each test cell has three chambers containing a protein solution, a buffer solution and a precipitant solution chamber. →

JSC Photo STS094-365-012



← Astronaut Mike Gernhardt performs an observation at the Expedite Processing of Experiments to Space Station, or EXPRESS, rack. The EXPRESS rack accommodates experiments compatible with the shuttle's mid-deck.

JSC Photo STS094-389-022



JSC Photo S94E5009

↑ Astronaut Mike Gernhardt works on *Columbia's* flight deck during Flight Day 6 activities. During the 16-day mission the seven-member crew worked in two shifts so science work could be performed around the clock. Gernhardt was a member of the blue team with Voss and Couch, while Halsell, Still, Thomas and Linteris made up the red team.

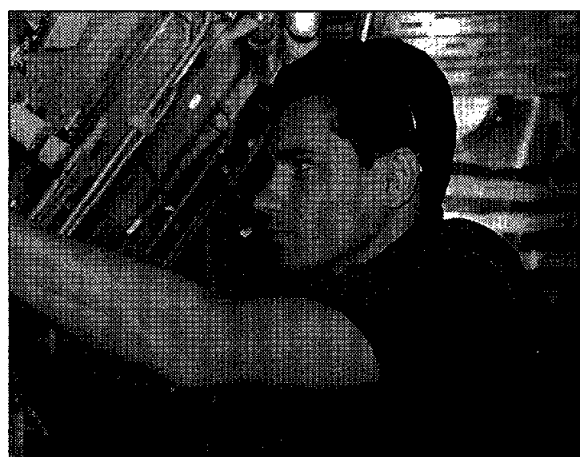
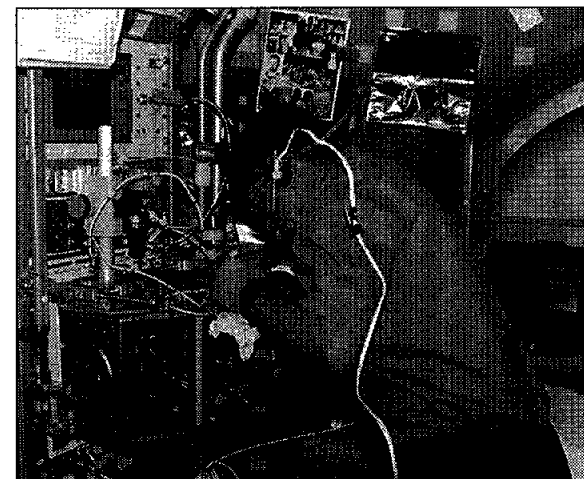


JSC Photo STS094-388-036

↑ Payload Commander Janice Voss works at the Combustion Module experiment. Using a video monitor, Voss observes a flame during one of the many burns in this facility.

Payload Specialist Roger Couch prepares to run one of the many experiments requiring use of the glovebox. The glovebox is designed to allow for specimen manipulation in an environment that will protect the science module from any spillage or contamination. →

JSC Photo STS094-335-026



← Payload Specialist Greg Linteris performs operations at the Droplet Combustion Experiment. The Droplet Combustion Experiment examines combustion of fuel droplets.

JSC Photo STS094-362-009

← The traditional in-flight crew portrait features top row from left, Mission Specialist Don Thomas and Payload Specialist Roger Couch; middle row from left Mission Specialist Mike Gernhardt, Commander Jim Halsell and Payload Specialist Greg Linteris; bottom row from left Pilot Susan Still and Payload Commander Janice Voss. As *Columbia* glided to a smooth landing at 5:47 a.m. CDT July 17 on Kennedy Space Center's Shuttle Landing Facility, scientists around the world were tallying up the wealth of information the crew collected during the 16-day flight. Halsell eased *Columbia* onto the runway to end the STS-94 mission after 15 days, 16 hours and 44 minutes.

JSC Photo STS094-307-001

# Space Showcase

## JSC Open House, Ballunar Festival offer variety of activities



### A Sampling of Open House Activities

**Saturday, Aug. 23** — 9 a.m.-4 p.m.

- Bldg. 2
- Teague Lobby — Educational exhibits, children's activities, Shuttle Home Page demonstrations.
  - Teague Auditorium — Presentations by experts in their fields on JSC programs and activities.
  - TV Studio — Digital prints of children in space suits, Earth observations.
  - Rm. 122: Space Shuttle Program — Orbiter panel and manifest displays, shuttle stack model, EVA gloves, videos, orbiter tires.
  - Rm. 122: Phase 1 Program — models, hardware, pop-up displays, Russian language and culture exhibits, flown artifacts, Spacehab booth, Videos, Sign in on wall mural.
- Bldg. 3
- JSC workforce photos display, astronaut autographs, food, gift shop, budget authority and benefits to Texas displays.
- Bldg. 5
- Shuttle simulator, shuttle training, benefits, history displays.
- Bldg. 7
- Advanced closed-loop life support chambers, EVA tools.
- Bldg. 9
- Manipulator Development Facility — Robotic systems demonstrations, space education handbook, high school robot demonstration.
  - Mockup Fabrication Facility — Shuttle souvenirs made by stereolithography, NASA meatballs made from plastic, vacuum former, computerized engraving, clean room, metal finishing and engraving, autoclave, resin transfer mold workstation, hot tile furnace, composite materials.
  - Mockups — mockups, trainers.
- Bldg. 10
- Machine Manufacturing Facility — water knife cutting techniques, welding techniques, space fabrics, T-38 wiring harness fabrication, milling/turning and lathe demonstrations, simplified aid for EVA rescue, shuttle seat display, electrical discharge machine.
- Bldg. 11
- Astronaut autographs, food, gift shop.
- Bldg. 13
- Spacecraft Mechanisms and Thermal Control — demonstrations of analysis and test equipment, orbiter tires, brakes, parachute, thermal displays, seat, vibration pole, X-38 fin folding, orbiter nose landing gear and vertical tail test.
- Bldg. 14
- Space Communication System — space to space radio exhibit, superconducting magnets, metal detectors, microwave catheters, microgravity measurement device, tour of antenna test chamber.
- Bldg. 15
- Human Spacecraft Energy Systems — pyrotechnics, auxiliary power unit hydraulics, batteries, automated cable analyzer system, Mars in-situ resource utilization system technology program, advanced propulsion, orbiter upgrades.
  - Receiving Inspection and Test Facility — Fastener tensile testing, scanning electron microscope, chemical evaluation of materials.
- Bldg. 16
- Aerospace Testing and Simulations.
  - Simulation of Mir/shuttle docking and orbiter landing, computer flow visualizations, global positioning systems, wind tunnel models, playback of actual STS-71 Mir/shuttle docking.
- Bldg. 17
- Food Lab.
- Bldg. 30
- Mission Operations — White flight control room, Apollo 11 mission operations control room, Spaceflight Meteorology Group weather room, Emergency Operations Center, films in 30 auditorium.
  - Lobby — Photos of Department of Defense payloads, video presentations, flight hardware.
- Bldg. 31
- Exploration — 3-D Mars panorama, Mars exploration exhibit, Mars rock, simulated soil.
- Bldg. 32
- Space Simulation Laboratory — Chamber A, space suit, Launch entry suit, advanced life support and space suit concepts.
- Bldg. 37
- Medical Sciences — Neurolab displays on biotechnology, nutrition, physiology and biophysics.
- Bldg. 220
- X-38 facility.
- Sonny Carter Training Facility
- Neutral Buoyancy Lab — Visitor viewing area.
- Ellington Field
- Shuttle training aircraft, crew equipment, T-38 ejection seat, aircraft displays, avionics upgrade and J-85 engine displays, T-38 cockpit photo opportunity and electronic flight instrumentation system demonstration.

### Ballunar Liftoff Activities

**Friday** — 6-10 p.m.

- RE/MAX American Flag Skydive
- Grand Parade of Balloon Pilots
- Balloon Glow at Dusk
- Live Entertainment
- Aviation Displays
- Arts and Crafts Booths
- Food Booths
- Midway Attractions
- Sponsor Exposition

**Saturday** — 6 a.m.-10 p.m.

- Live Entertainment
- Aviation Displays
- Arts and Crafts Booths
- Food Booths
- Midway Attractions
- Sponsor Exposition
- Balloon Flight Competitions
- Great American Skydiving Competition
- Hang Glider Flight Demonstrations
- Model Rocket Demonstrations
- Confederate Air Force Flyover
- Remote Control Model Aircraft Flights
- UFO Invasion Balloon Glow at Dusk
- "E-Team" Skydivers
- Key Grab Balloon Competition

**Sunday** — 6 a.m.-6 p.m.

- Live Entertainment
- Aviation Displays
- Arts and Crafts Booths
- Food Booths
- Midway Attractions
- Sponsor Exposition
- Balloon Flight Competitions
- Great American Skydiving Competition
- Hang Glider Flight Demonstrations
- Model Rocket Demonstrations
- Confederate Air Force Flyover
- Remote Control Model Aircraft Flights



# 31 Years Ago at MSC

## Gemini X topples records, achieves basic flight goals

Reprinted from July 22, 1966 Space News Roundup.

The faultless countdown of Gemini X and its Agena rendezvous vehicle to on-time liftoffs seemed to have set a trend for the rest of the mission. Except for crew eye irritation from an as yet unexplained toxic substance in the spacecraft suit circuit which cut short the stand-up extravehicular activity and a low quantity of attitude control fuel which caused umbilical extravehicular activity to be shortened by several minutes, the Gemini X mission was completed according to plan.

A Roundup press time, Gemini X was scheduled for retrofire at 2:31 p.m. CST yesterday for landing some 34 minutes later in Area 44-1 in the West Atlantic.

Among Gemini X's accomplishments was a dual rendezvous with two Agena rendezvous vehicles using the primary propulsion system of the first vehicle after docking to set up the orbital conditions for rendezvousing with the second vehicle. The combined maneuvering of Gemini/Agena X was the first time in spaceflight history that a manned spacecraft has accomplished orbital maneuvering through power supplied by a second vehicle, setting thereby a new manned spaceflight altitude record of 413 nm. Gemini X is also the first mission to have two periods of extravehicular activity. Pilot Michael Collins twice opened

the hatch to the hard vacuum of space to further explore manned operations outside the spacecraft and to conduct experiments.

### Exact Timing

Liftoff of Gemini X was precisely on time at 4:20:26 CST to place the spacecraft in the proper phasing with the Agena X which had been launched at 2:39:44 CST and in proper relation to Agena VIII. Both launches were nominal and the systems aboard both spacecraft functioned smoothly throughout the mission. Cutoff velocity was 25,711 feet per second and an adjustment spacecraft thruster burn of 27 feet per second was added after insertion.

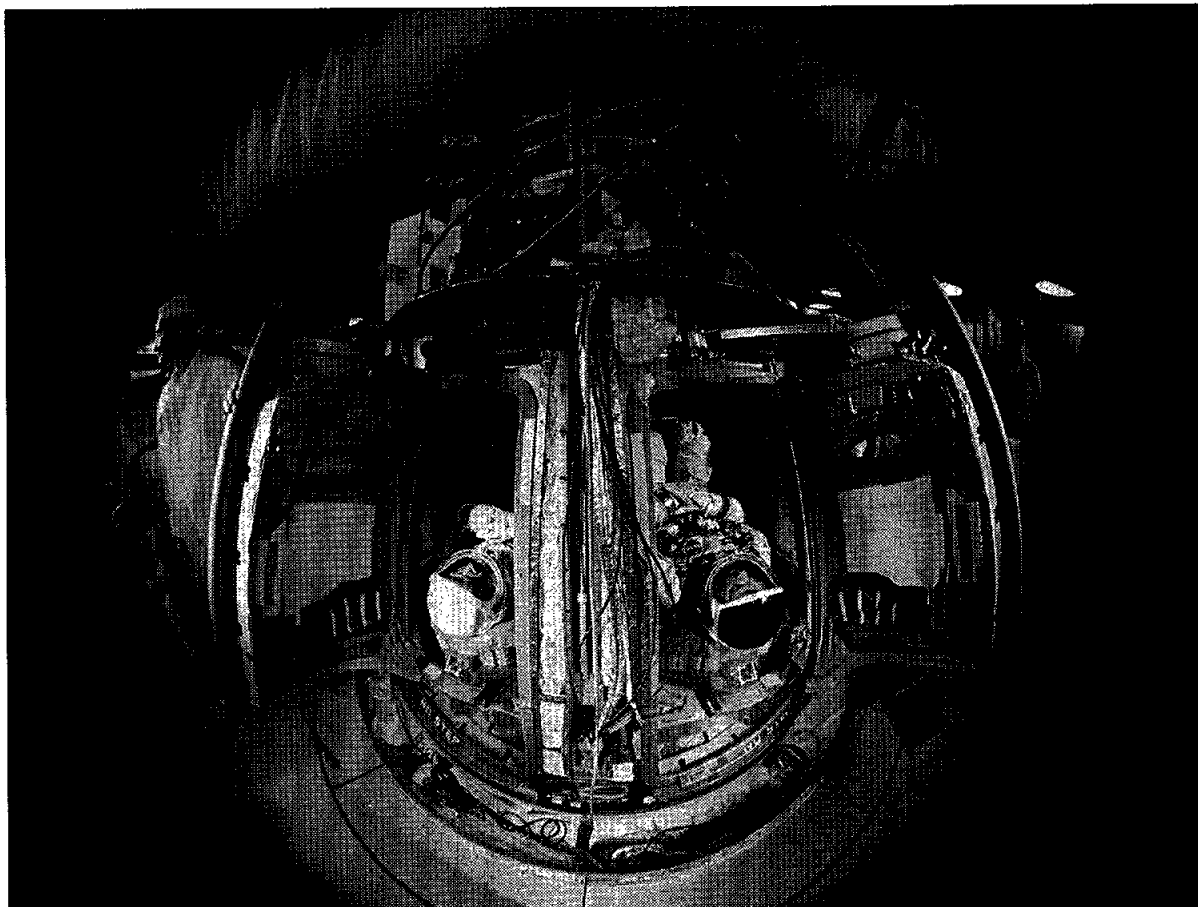
A series of maneuvers by the crew of Gemini X placed the spacecraft within visual contact of Agena X by 4 hrs 6 min after liftoff and docked with the Agena at about 5 hrs 50 min after liftoff over the Pacific Southwest of Hawaii. Gemini X's thruster fuel remaining after the rendezvous maneuvers was some 380 pounds instead of the pre-mission estimate of 680 pounds, and flight controllers in Mission Control Center-Houston immediately began shuffling experiments to optimize usage of the fuel left.

### 'Really Something'

Over Hawaii at an elapsed time of 7 hrs 38 min the 16,000-pound thrust engine of Agena X's primary propulsion system was fired to boost the

### Gemini X 'Firsts'

- New manned altitude record of 413 nm. (previous record: USSR Voshkod II, 268 nm).
- First mission with two EVAs.
- First mission to use target vehicle for maneuvering thrust.
- First double rendezvous-Agena X and Agena VIII.
- First mission to achieve in one night all of the basic objectives of the Gemini program: rendezvous, docking, combined vehicle maneuvering, extravehicular activity and controlled reentry.



NASA Photo 66-H-963

Gemini X astronauts John Young, command pilot, left, and Michael Collins, pilot, right, are in the Gemini X spacecraft during the Simultaneous Launch Demonstration at the White Room Level at KSC's Complex 19, in preparation for NASA's Gemini X mission. The primary mission objective is successful rendezvous and docking of the Gemini 10 spacecraft with the Agena X target vehicle.

combined vehicles into an orbit with an apogee of 413 nm to set a new altitude record for manned spaceflight. The earlier record was 268 nm set March 18, 1965 by USSR's Voshkod II.

"That was really something," said Gemini X command pilot John Young as the burn was completed. "Pretty wild, huh?" replied Hawaii spacecraft communicator Ed Fendell. "When that baby lights," said Young, "there's no doubt about it!"

Shortly after the Agena engine burn, the crew went into an eight-hour sleep period at 1 a.m. Houston time.

Additional burns with the Agena's big engine on the second day placed Gemini X in the proper phasing with the Gemini VIII Agena from which Michael Collins would retrieve a meteorite experiment package during his umbilical EVA.

### Stand up EVA

Cabin depressurization and hatch opening for Collins' stand-up EVA took place at an elapsed time of 23 hrs 27 min over the Canary Islands tracking station. "It's really a beautiful view out here," said Collins as he stood in his seat attached to a short tether.

"Body positioning has been absolutely no problem," he continued in his conversation with Houston Spacecraft Communicator C. C. Williams remoting through the Tananarive station. "As a matter of fact, I sort of have to struggle to move up or down in the hatch. The suit is pressurized and fills the available space with plenty of points of suspension."

Stand-up EVA was cut short when fumes in the spacecraft environmental control systems caused the crew's eyes to water to the

point where they could not see.

Further maneuvers the next day using the Agena's engine and the Gemini docking thrusters after the undocking brought Gemini X to within a few feet of Agena VIII and to the planned time of Collins' umbilical EVA. Collins retrieved the micrometeoroid experiments package from Agena VIII.

A low level of thruster fuel remaining caused the umbilical EVA also to be cut short before a full evaluation of the nitrogen-powered hand-held maneuvering unit could be made.

Yesterday's mission activities prior to retrofire and splashdown were centered mainly around conducting scientific and engineering experiments. A complete wrap-up of the Gemini X mission will appear in the August 5 Roundup.

## Gilruth Center News

**Hours:** The Gilruth Center will now remain open until 2 p.m. Saturday and close at 9 p.m. Friday.

**Sign up policy:** All classes and athletic activities are first come, first served. Sign up in person at the Gilruth Center and show a yellow Gilruth badge or weight room. 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.

**NASA Fitness Challenge:** Runs through Aug. 31. Call x30301 for more information.

**Hatha Yoga:** A stress relieving, stretching and breathing exercise routine to unite body, mind and spirit. Classes meet from 5:30-6:30 p.m. Thursdays. Cost is \$40 for eight weeks.

**Nutrition intervention program:** A six-week program to learn more about the role diet and nutrition play in health, including lectures, private consultations with a dietitian and blood analysis. 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. Pre-registration required. Cost is \$25. Call for next available class.

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

**Weight safety:** Required course for employees wishing to use the weight room will be offered from 8-9:30 p.m. Next class is Aug. 28. 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. Cost is \$35 per month. New classes begin the first of each month.

**Aerobics:** Classes meet from 5:15-6:15 p.m. Monday, Tuesdays and Thursdays. Cost is \$32 for eight weeks. Kristen Maidlow, instructor.

**Ballroom dancing:** Beginner classes meet from 7-8:15 p.m. Thursdays. Intermediate and advanced classes meet from 8:15-9:30 p.m. 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.

**Loving Feelings Concert:** 8 p.m. Sept 27 at the Summit. Tickets are \$38.

**EAA Texaribbean Cruise:** Nov. 22-30. \$200 deposit per person, final payment by Sept. 15

**Astroworld:** \$22.75. Season pass \$56.75. Multi-visit \$37.50

**Waterworld:** \$11.50.

**Astroworld:** \$19 Blue Light Special, valid for 1997 season only.

**Moody Gardens:** Tickets are \$9.50 for 2 of 4 events.

**Space Center Houston:** Adult \$8.95; children (4-11) \$6.40 JSC civil service employees free.

**Seaworld:** Adult \$27.25; children(3-11)\$18.25.

**Schlitterbahn:** Adult \$20.25; children \$17.50.

**Splashtown:** Adult \$14.50; children (3-9) \$11.50.

**Movie discounts:** General Cinema, \$5.25; AMC Theater, \$4.50; Sony Loew's Theater, \$4.75.

**JSC logo shirts:** T-shirt, \$10, Polo style, \$23, Mars shirts starting at \$14.

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

**Metro:** Tickets available.

**Orbit:** The book *Orbit* by Jay Apt, Mike Helfert and Justin Wilkinson is on sale for \$28.

## People on the Move

Human Resources reports the following personnel changes as of August 2:

### New Management Assignments

David Petri was named Deputy of the Guidance, Navigation and Control Development and Test Branch in the Engineering Directorate.

### Reassignments Between Directorates

Roberto Moolchan moves from the Safety Reliability and Quality Assurance Office to the Mission Operations Directorate as a emergency operations engineer. Susan J. Anderson moves from the Engineering Directorate to the Office of the Chief Financial Officer as a voucher examiner. Patsy LeBlanc moves from the Engineering Directorate to the Space Shuttle Program as a secretary. Deana Hackfeld moves from the Information Systems Directorate to the International Space Station Program Office as a configuration management engineer. Matt Leonard moves from the EVA Project Office to the International Space Station Program Office as a launch package engineer. Jeffrey Theall moves from the International Space Station Program Office to the Space and Life Sciences Directorate as a space scientist.

### Additions to the Workforce

Brad Files joins the Manufacturing, Materials, and Process Technology Division in the Engineering Directorate as a materials research engineer. Christopher Johnson joins the Structures and Mechanics Division in the Engineering Directorate as an aerospace engineer. Deborah Stephens joins the Flight Systems Safety and Mission Assurance Office in the Safety Reliability and Quality Assurance Office as an aerospace engineer. Patricia Hilliard joins the Medical Sciences Division in the Space and Life Sciences Directorate as a medical officer. David Baumann joins the Science Payloads Management Office in the Space and Life Sciences Directorate as an aerospace engineer.

### Reassignments to Other Centers

Julie Bassler of the International Space Station Program Office moves to Marshall Space Flight Center.

Edward Stanton of the International Space Station Program Office moves to Ames Research Center.

### Resignations

Carol Sanders of the Business Management Directorate. Mark Villemarette of the Engineering Directorate. Donna Lee of the Space Shuttle Program Office.



JSC Photo

From left, STS-94 Lead Flight Director Rob Kelso congratulates Shuttle Pointer Scott Patano, Ray Barrington of Draper Labs and Guidance Navigation and Control Officer Kevin Dunn for their work on a special team that developed a new technique to minimize the impacts to the microgravity science lab in the event a vernier thruster became cold.

## Special thruster team hangs STS-94 plaque

The delicate nature of *Columbia's* microgravity science experiments led a special team to develop new techniques that earned it the honor of hanging the STS-94 plaque in Mission Control.

"During the first flight of the Spacehab payload on STS-83, one of the forward vernier thruster began cooling off since the software did not require it to fire very often in holding attitude," said Lead Flight Director Rob Kelso. "There was concern that this thruster may get cold enough where it might begin to leak and the larger, primary thrusters would have to be used. Use of the primary thrusters would certainly impact science for the orbiting lab."

Kelso appointed a special team after STS-83 to look at options for STS-94.

The team—Shuttle Pointer Scott Patano, Ray Barrington of Draper Labs and Guidance Navigation and Control Officer Kevin Dunn—developed a new technique to minimize the impacts to the microgravity science lab in the event vernier thruster became cold. Barrington performed a pre-flight analysis on a new technique in which two aft, side-firing vernier thrusters would be deselected to increase the frequency of vernier thruster firings...keeping this forward thruster warmer.

"This new technique was used for most of the flight on STS-94 with great success, resulting in great science for STS-94," Kelso said.

Patano was the honored team member who climbed the ladder and hung the STS-94 plaque while Barrington and Dunn held the ladder.

## Akers leaves, Precourt joins Director's staff

Astronaut Tom Akers has returned to the Air Force and Charlie Precourt will take his place as JSC's acting assistant director, technical.

Akers a four-time shuttle veteran has returned to the Air Force after a 10-year career with NASA. Akers has been named commander of the U.S. Air Force ROTC Detachment 442 at the University of Missouri, Rolla. He is an alumnus of the University, graduating in 1975 with a master of science degree in applied mathematics.

Dave Leestma, director of Flight Crew Operations said: "We will miss him from both a personal and professional standpoint."

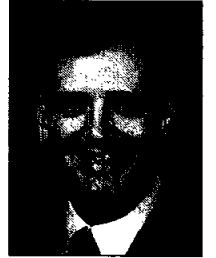
Selected as an astronaut in 1987, Akers has accumulated more than 800 hours of space flight, including 29

hours performing space walks. His first flight was on board *Discovery* for STS-41 in October 1990. On his second flight—STS-49 in May 1992—Akers performed two space walks, including a three-person space walk to rescue the

stranded Intelsat VI satellite. He flew next on STS-61 in December 1993 as a space walking crew member on the first mission to service the

Hubble Space Telescope. His most recent flight on board *Atlantis*, on the STS-79 Mir docking in September 1996. Following STS-79, Akers joined the JSC Director George Abbey's staff.

Charlie Precourt earned a bachelor of science degree in aeronautical engineering from the U.S. Air Force Academy and masters degrees in engineering management and national security affairs/strategic studies. He joined NASA as an astronaut in July 1991 and has flown as a mission specialist on STS-55, as pilot on STS-71 and commander on STS-84.



Akers



Precourt

## Parker heads JPL management

(Continued from Page 2)

"I'm extremely pleased to be able to be a part of the exciting projects at this outstanding institution," said Parker, who will serve as director for a nominal three-year term.

Born in New York City, Parker received an undergraduate degree in astronomy from Amherst College in 1958 and a doctorate in astrono-

my from the California Institute of Technology in 1962. Before joining NASA, Parker was an assistant/associate professor of astronomy at the University of Wisconsin in Madison from 1963 to 1967. Parker is the author of more than a dozen technical papers on astrophysics, and has received three major NASA leadership medals.

## Tight game decides Gilruth Center soccer championship

The Bimbos employed a stifling defense to capture the Gilruth soccer title for the third straight season.

The title came after a shoot-out victory over the Photon Torpedoes in the semi-final and a tight 1-0 win over Liverpool in the title game.

In the semi-final, both the Bimbos and Torpedoes played defensively, allowing few

scoring chances and resulting in a 0-0 score after regulation. A scoreless overtime resulted in a shoot-out between the two teams. Both teams made two of five penalty shots—with Bimbos goals by Todd Hinkel and Mike McFarlane and Torpedoes goals by Jason Mendell and Kevin Holt—sending the shoot-out into sudden death. Shannan Staats, captain of the Bimbos, then convert-

ed her penalty shot, and Mike McFarlane, who played keeper for the Bimbos during the shoot-out, stopped his fourth straight shot to seal the victory.

The title game was a defensive battle throughout. Fatigue was a factor due to the intense heat and the fact that both teams had just come off of semi-final victories. Neither team was able to mount a sustained

offensive attack, but Matt Lindsey converted for the Bimbos on a free kick just outside of the 18-yard line midway through the second half.

The Bimbos held off a couple of late scoring chances by Liverpool, but the Bimbos defense, anchored by keeper Derek Kirby, recorded their second straight shut-out to seal the championship.

## Dates & Data

### Aug. 16

**NTA meets:** The National Technical Association will meet at 10 a.m. Aug. 16 at Texas Southern University, School of Technology, Rm. 316. For more information, contact Pam Denkins x35272.

### Aug. 18

**ISO seminar:** The Victoria Group, Inc. presents a seminar on ISO 9000 at 8 a.m. Aug. 18 at the Silver Moon Café at Space Center Houston. Lee Norbraten, JSC's director of the ISO 9000 office, will discuss: "ISO 9000: Building a System for Life." For more information call 1-800-845-0567.

### Aug. 20

**Spaceland Toastmasters meet:** The Spaceland Toastmasters will meet at 7 a.m. Aug. 20 at the House of Prayer Lutheran Church. For details, call Jeannette Darcy at x45752.

**Communicators meet:** The Clear Lake Communicators will meet at

11:30 a.m. Aug. 20 at the Lockheed Martin, 555 Forge River Road. For detail, contact Richard Lehman at (281) 538-1854.

**Spaceteam Toastmasters meet:** The Spaceteam Toastmasters will meet at 11:30 a.m. Aug. 20 at United Space Alliance, 600 Gemini. For details, call Patricia Blackwell at 282-4302 or Brian Collins at x35190.

**Scuba club meets:** The Lunarfinns will meet at 7:30 p.m. Aug. 20 at the Redfish Restaurant under the Kemah/Seabrook bridge, Seabrook side. For more information call Fred Toole at x33201.

### Aug. 21

**Directors meet:** The Space Family Education board of directors will meet at 11:30 a.m. Aug. 21 in Bldg. 45, Rm. 712D. For more information on this open meeting call Gretchen Thomas at x37664.

**Reservations due:** The Space City-Houston Chapter of the National Contract Management

Association will host a luncheon workshop at 10:30 a.m. Aug. 21 at the Gilruth Center. Cost is \$8 for members and \$10 for nonmembers. Reservations are due Aug. 15. For more information call Linda Dunn at x45351.

### Aug. 23

**Open house:** JSC will open its doors to the public from 9 a.m.-4 p.m. Aug. 23. For more information call John Lawrence at x35111.

### Aug. 27

**Spaceland Toastmasters meet:** The Spaceland Toastmasters will meet at 7 a.m. Aug. 27 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. Aug. 27 at the Lockheed Martin, 555 Forge River Road. For more information, contact Richard Lehman at (281) 538-1854.

**Spaceteam Toastmasters meet:**

The Spaceteam Toastmasters will meet at 11:30 a.m. Aug. 27 at United Space Alliance, 600 Gemini. For details, call Patricia Blackwell at 282-4302 or Brian Collins at x35190.

### Aug. 28

**Radio club meets:** The JSC Amateur Radio Club will meet at 7 p.m. August 28 at Piccadilly Cafeteria, 2465 Bay Area Blvd. For details call Larry Dietrich at 39198.

### Sept. 4

**Warning system test:** The site-wide Employee Warning System will undergo its monthly audio test at noon Sept. 4. For more information call Bob Gaffney at x34249.

### Sept. 8

**Thermal and fluids workshop:** The Engineering Directorate will host the eighth annual Thermal and Fluid Analysis Workshop from Sept. 8-13 at the University of Houston Clear Lake. For more information call Carlos Ortiz at x38879.

### Sept. 9

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

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

### Sept. 10

**MAES meets:** The Society of Mexican American Engineers and Scientists will meet at 11:30 p.m. Sept. 10 in the Bldg. 3 cafeteria. For more information call G.D. Valle at x38835.

**PSI meets:** The Clear Lake/NASA Chapter of Professional Secretaries International will meet at 5:30 p.m. Sept. 10 at the Holiday Inn, NASA Road 1. Dinner costs \$15. For details call Elaine Kemp at x30556.

## News Briefs

### NASA selects ISO 9001 registrar

NASA has selected a third-party registrar, Det Norske Veritas Certification, Inc., located in Houston to provide detailed compliance audits of NASA's Ames Research Center, Dryden Flight Research Center, Goddard Space Flight Center, Jet Propulsion Laboratory, Kennedy Space Center, Langley Research Center, Lewis Research Center, Stennis Space Center and NASA Headquarters. This selection is a key milestone in moving towards NASA Administrator Daniel S. Goldin's challenge to have the Agency ISO 9001-certified by September 1999. NASA is the first federal agency to commit to ISO 9001 certification. Once certified, NASA will demonstrate its commitment to excellence in aeronautics and spaceflight technology, as well as in internationally accepted quality management practices.

### NASA, FAA announce aviation design winners

Winners of the 1997 National General Aviation Design Competition were named by NASA and the Federal Aviation Administration. The first place award was presented to a student team from the University of Kansas, Wichita State University, and Kansas State University. The team's design offers a four-passenger, kit plane "for the pilot with limited resources." The design claims payload, range, cruise velocity, take-off and landing field lengths, rate of climb, and handling qualities comparable to a Cessna 172R for about half the cost, or \$75,000. The team calls its aircraft "Adagio" in honor of its potential for graceful flight reminiscent of the adagio musical movement of a symphony. The design uses a Zoche AeroDiesel Engine Z0 02A and features an unusual, inverted "V" tail. The team believes that its design can be built in about 200 hours, a fraction of the time required for current kit planes.

### New aircraft makes debut at airshow

NASA Administrator Daniel S. Goldin joined Williams International Chairman Sam Williams at Oshkosh, Wis., in the debut of the V-JET II, an all-composite, turbofan-powered light aircraft designed for future flight testing of modern turbofan engines. Provided by Williams for use in the agency's General Aviation Propulsion program, the aircraft will demonstrate breakthrough, low-cost turbine-engine propulsion systems for light, general aviation aircraft with cruising airspeeds greater than 200 knots.

# Sleep-shift maneuvers keep ground team busy

(Continued from Page 2)

by the Flight Director and the team, and is then uplinked. The flight controllers verify that the correct command was loaded on the shuttle's computers, and everyone sits back and watches the shuttle maneuver.

"It encompasses probably a fourth of the front-room team resources to put this together," Austin said.

STS-85 Lead FAO Alan Bartos said accomplishing these maneuvers allows the ground team to take an active part in acquiring the science. "Years ago we used to be against this idea, but we've proven on other flights as well as this one again that the ground is capable of maneuvering and can get good sci-

ence for some of these instruments that have pointing requirements," said Bartos, another USA employee.

Roger Galpin, lead Payloads Officer, said the flight is so "packed" with payloads that all the observations barely fit into the timeline.

"We have solar instruments, we have celestial instruments, we have Earth-viewing instruments. Then in addition to that, we have requirements to point the payload bay antennas directly at CRISTA-SPAS during periods of its free flight to guarantee communications."

Galpin said that TAS-1 instruments directly affected include the Solar Constant Experiment from Belgium, which is looking at the

solar disk and measuring the solar constant; the Space Laser Altimeter and the Infrared Spectral Imaging Radiometer, which look at the Earth; the Shuttle Laser Altimeter, which shines a laser into the Earth's atmosphere and looks at the ultraviolet return signal.

On IEH, he said, the Ultraviolet Spectrograph Telescope for Astronomical Research needs to look over the starboard wing at Jupiter, stars and Comet Hale-Bopp; the Distribution and Automation Technology Advancement—Colorado Hitchhiker and Student Experiment of Solar Radiation, the Solar Extreme Ultraviolet Hitchhiker-2 and the Shuttle Glow Experiments

also have pointing needs.

"We've got so many payload instrument pointing requirements from the different payload customers," Austin said, "that to accommodate everything and to fit it in a 24-hour cycle, it extends our activities over into the crew sleep period."

The pace becomes more intense as the mission goes on until the last day of the flight, when the ground-commanded maneuvers reach a crescendo.

"The night before entry, we're doing a tweak to the attitude about every 45 minutes during a 5 hour period and those are time critical," Austin said.

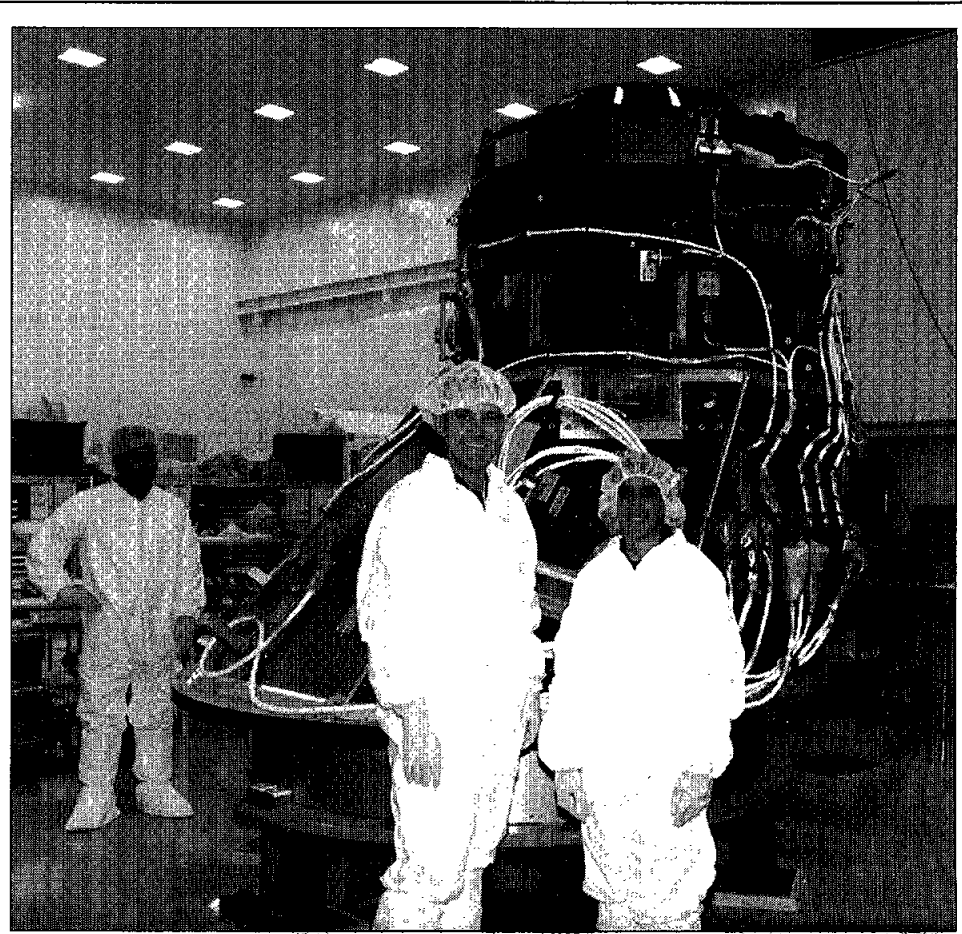
## Plan links JSC work to agency goals, objectives

(Continued from Page 1)

has an easily read format with illustrations that address JSC activities in relation to the four major HEDS goals and each objective. While all goals and objectives are important, the second HEDS goal, "Advance Human Exploration of the Solar System," provides a good example of the tight linkage of goals to objectives to JSC implementation. The HEDS Objective "Establish a human presence on the Moon, in the Martian system, and elsewhere in the inner solar system," is being implemented at JSC by developing—with involvement around the agency—the architectures, technology road maps, critical and breakthrough technologies, vehicles, and space operations and communications infrastructure to support human mission to the Moon, Mars, and asteroids. Similar relationships are clearly identified for objectives such as "Expand human presence in space by assembling and operating the International Space Station."

Within the plan, the Exploration Strategic Roadmap, developed at JSC and approved by the HEDS Management Council and NASA Administrator Daniel S. Goldin, features the integrated initiatives of International Space Station, Human Research and Support Technology, Space Operations, Shuttle upgrades, In-Situ Resource Utilization, and Revolutionary Interplanetary Transportation and Power, leading ultimately to lunar and Mars missions.

Every individual and organization should be able to relate their functions to the center's plan and then ultimately to the agency's top level goals. The plan provides guidance for decision-making throughout JSC's organizations.



JSC Photo 97-09591

**HARDWARE INSPECTION**—Astronauts Bob Cabana, commander of STS-88, the first International Space Station assembly mission, and Nancy Currie, mission specialist, inspect the first of two station mating adapters at the McDonnell Douglas factory in Huntington Beach, Calif. The pressurized mating adapter, called PMA-1, and its companion will be attached to a station connecting module called Node 1 and launched aboard *Endeavour* in July 1998. PMA-1 was shipped from California to Kennedy Space Center in late July to join the node and begin launch preparations.

## Discovery set to land Monday after jam-packed flight

(Continued from Page 1)

of the mechanical arm on the Japanese Experiment Module as part of the space station. The MFD mechanical arm was put through a series of tests on four different flight days. Davis and Robinson, along with ground controllers, tested the MFD arm's capabilities using a small orbital replacement unit and a small door that are located on the MFD platform in the cargo bay.

Also giving a preview of future ISS operations is the Microgravity vibration isolation mount payload flying as an ISS Risk Mitigation Experiment and two Detailed Test Objectives—the Orbiter Space

Vision System and the AutoTRAC Computer Vision System

The MIM payload is a platform that can be magnetically levitated to isolate sensitive microgravity experiments from vibrations created by shuttle operations. The MIM hardware will be used to determine what level of microgravity quality is obtainable using the MIM system. This knowledge will be used to design experiments for the International Space Station requiring a motion-isolation system. The MIM payload has already flown on the Mir space station. STS-85 is MIM's first shuttle flight.

The OSVS system, developed in

Canada, and the ACVS system, developed at JSC, use existing shuttle payload bay cameras and other payload bay hardware to provide precise relative position, attitude, and rate cues in a concise graphical and digital format. The orbiter crew uses these cues to perform remote manipulator system operations and/or proximity operations.

Two other payloads being carried in *Discovery's* cargo bay are the Technology Applications and Science-01 and the International Extreme Ultraviolet Hitchhiker-02 payloads. TAS holds seven separate experiments providing data on the Earth's topography and atmo-

sphere, studying the Sun's energy and testing new thermal control devices. The four experiments comprising the IEH payload are studying ultraviolet radiation from the stars, the Sun and other sources in the solar system.

Payload and experiments flying in the crew cabin area include the Southwest Ultraviolet Imaging System, a 7-inch imaging telescope that was pointed out of the orbiter's side hatch window to observe the Hale-Bopp comet.

The STS-85 crew is scheduled to conclude its mission Monday, Aug. 18, with a landing at Kennedy Space Center just after 6 a.m. CDT.

## Wolf undergoes Russian space walk training

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walks planned over the next several months.

Lawrence does not fit in the Orlan suit which Russian cosmonauts use for space walk tasks and never underwent space walk training. Wolf fits in the Orlan suit. Lawrence will continue training in the backup role according to normal procedures, in the unlikely event that she is needed.

To enable Wolf to complete space walk training at the Gagarin Cosmonaut Training Center outside Moscow, the launch of *Atlantis* on the next shuttle-Mir docking mission, STS-86 in September, could be delayed approximately 10 days. Wolf had been scheduled for launch in January on STS-89 as the prime crew member for the final

long duration increment on Mir.

NASA will be conducting its normal safety reviews in preparation for the transfer of a U.S. astronaut to Mir as was done before the last shuttle docking mission. This review will include an evaluation of all the events that have occurred aboard Mir since the last docking mission. That final determination is expected at the conclusion of the formal U.S. review process at the shuttle program Flight Readiness Review in September.

NASA and Russian space officials have discussed a variety of options for backup space walk capability since the Spektr module was damaged in the collision of a Progress resupply craft on June 25. It was jointly agreed by both sides that it would be mutually ben-

eficial to have all three crew members on the Mir qualified for space walks in the event additional assistance is needed from the U.S. astronaut on the station.

"The Russians usually only fly two people trained for space walks," said Frank Culbertson, manager of the Shuttle-Mir Phase 1 Program. "Because of the number and the nature of space walks under consideration by the Russians to repair the Spektr, we have discussed at length the advantage of having another astronaut qualified for those tasks."

"The fact that Wendy does not fit in an Orlan suit is not unusual. When first selected to fly on the Mir, it was absolutely normal that she would not be considered to be a space walk qualified crew mem-

ber. Only because of subsequent events have requirements on board the Mir changed. As a result, the joint decision was made to have all three crew members on board qualified to handle space walking tasks," Culbertson said.

Lawrence was informed of the decision by Culbertson, who was in Russia for meetings with Russian space officials.

Because of her knowledge and experience with Mir systems and crew transfer logistics for the Mir, and her Russian language proficiency, NASA will fly Lawrence on STS-86. The mission will launch aboard the Space Shuttle *Atlantis* in September and will deliver Wolf to the Russian station. Wolf is fully trained on both Mir and Soyuz capsule systems.



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