



Photo frenzy

The STS-47 crew brought back a wealth of photographs from its eight-day Spacelab-J mission. Photos on Page 3.



Hanging loose

Training for the upcoming STS-53 Department of Defense mission continues at JSC. Photo on Page 4.

Space News Roundup

Vol. 31

October 2, 1992

No. 38

NASA satellite records largest ozone hole on record

Preliminary results from NASA's Total Ozone Mapping Spectrometer onboard the Nimbus-7 satellite show that the 1992 Antarctic ozone hole is the largest on record.

The previous surface area covered by low total ozone values, less than 220 Dobson Units, typically has reached near 7.7 million square miles. Last Wednesday, the surface area covered reached 8.9 million square miles, an increase in size from 1991 of approximately 15 percent.

By comparison, the surface area of the North America continent is 9.4 million square miles. Antarctica has 5.1 million square miles.

Since the mid-1980s, the region covered by

low total ozone values begins to grow in early August. The region covered usually reaches its greatest extent in early-October. This is the fifth year since 1986 that large seasonal ozone reductions over the Antarctic have been observed.

The minimum total ozone value on Sept. 23 was 131 Dobson Units. A record low of 111 Dobson Units was set on Oct. 6, 1991, near the South Pole. A Dobson Units level of 100 equals a layer of gas one millimeter thick at its surface. The lowest 1992 value probably will not be observed for several weeks, report



Earthwatch

scientists at NASA's Goddard Space Flight Center.

Scientists believe man-made chlorine is the primary cause for ozone hole formation. This year's hole also may have been affected by the continued presence of sulfuric acid droplets in the upper atmosphere created by the eruption of Mount Pinatubo in the Philippines in June 1991.

Goddard scientists noted that middle stratospheric temperatures, recorded by the National Oceanic and Atmospheric Administration's National Meteorological

Center, were colder than normal. These colder temperatures would contribute indirectly to larger ozone losses.

Further research is required to determine the role of these phenomena with respect to the low total ozone values seen this year, according to Goddard scientists.

Ozone, a molecule made up of three atoms of oxygen, comprises a thin layer of the upper atmosphere which absorbs harmful ultraviolet radiation from the sun. "Ozone hole" is a term used to describe a large area of intense ozone depletion that occurs over Antarctica typically during late-August through early-October and breaks up in mid-November.



JSC Photo by Andrew Patnesky

The STS-52 crew — from left, Payload Specialist Steve MacLean, Mission Specialists Tammy Jernigan, Bill Shepherd and Lacy Veach, Pilot Mike Baker and Commander Jim Wetherbee — meets the news media in JSC's Bldg. 2. *Columbia* is scheduled for launch around Oct. 22. Shuttle managers will meet Tuesday for a final flight readiness review, following which an official launch date will be announced. This past week, technicians at Kennedy Space Center exchanged one of *Columbia's* three main engines due to imperfections in a weld on the engine's nozzle. The welds on *Columbia's* other engines were double-checked and found to be in good shape.

Veteran crew likes mixture of experiments

The veteran crew of the upcoming STS-52 mission to deploy Laser Geodynamics Satellite-II and test a new system for control of the space shuttle's robot arm is ready to begin its challenging grab-bag of technology evaluations.

Commander Jim Wetherbee; Pilot Mike Baker; mission specialists Lacy Veach, Bill Shepherd and Tammy Jernigan; and Payload Specialist Steve MacLean traveled to Kennedy Space Center on Thursday to participate in the countdown rehearsal, which ends today.

"We are doing a little bit of everything and that makes us happy," Wetherbee said. "We go into space to work and collect data and bring it back and come up with questions, not always answers. And that's good because it will keep us thinking in the future, it will keep us advancing."

The international flight includes not only a Canadian payload specialist and a set of Canadian experiments that will look at machine vision systems, but the Italian-built LAGEOS-II satellite that will help scientists on the ground measure the drift of Earth's crustal plates, a French-built experiment called Materials for the Study of Interesting Phenomena of Solidification on Earth and in Orbit, the European Space Agency's Attitude Sensor Package and a host of materials processing and physiological experiments put together by various American companies and academic institutions.

The primary payload is the LAGEOS satellite, a two-foot-diameter sphere made of brass and aluminum and covered with 426 reflectors. After Jernigan checks out the satellite and its Italian-built deployment system, she will

release it from *Columbia's* payload bay on Flight Day 2.

From its initial 296 kilometer (160 nautical mile) orbit, LAGEOS-II will be boosted to an elliptical transfer orbit and then its final 5,900-kilometer (3,185 nm) orbit by two booster firings. Scientists on the ground will bounce lasers off the satellite's reflectors to measure the movement of tectonic plates and map variations in Earth's surface gravity. These precise measurements are expected to corroborate measurements being taken by LAGEOS-1, launched by NASA on an expendable launch vehicle 16 years ago.

"It just astounds me that the LAGEOS satellite can help measure the speed of the drift of the continental shelf to an accuracy of 4 centimeters a year," Wetherbee said.

After releasing LAGEOS-II, the crew will turn its attention to U.S. Microgravity Payload-1, a collection of materials processing experiments that includes MEPHISTO, a joint French Space Agency, French Atomic Energy Commission and NASA look at the behavior of metals and semiconductors as they cool and solidify; the Lambda-Point Experiment, which will study fluid behavior in microgravity; and the Space Acceleration Measurement System; which will measure and record low-level acceleration.

"This is really the only place in the known universe where we can see and study this phenomenon," Shepherd said of MEPHISTO, which requires temperatures of only 2.17 degrees Kelvin.

Next, Veach and MacLean will work
Please see **STS-53**, Page 4



Blackshear earns Hughes Award

Honored for contributing to advancement of women

Donna Blackshear of the Administration Directorate received the Virginia B. Hughes Equal Opportunity Award on Wednesday for her contributions toward the advancement of women at JSC.

JSC Acting Director Paul J. Weitz presented the award, sponsored annually by the Federal Women's Program, at the Gilruth Center. The award ceremony capped two days of workshops that looked at managing conflict and change, using stress positively and improving memory skills. About 300 men and women attended the workshops.

Blackshear, who came to JSC in 1981 as a Presidential Management Intern after graduating from Harvard's Kennedy School of Government, is the manager of the Exploration Program Resources Management Office.

She earned the Hughes Award for being a mentor

and role model for women in terms of achieving both personal and career success by demonstrating outstanding personal performance.

The selection was made by the 10-member Federal Women's Program working group.

"It was a difficult decision from the five people that we had this year," said Federal Women's Program Manager Pam Adams. "Even though they were not selected as the recipient, they deserve recognition for all of their contributions to women here at JSC."

This year's other nominees were Harvey Hartman of the Human Resources Office, Alice Lee of the Safety, Reliability and Quality Assurance Office, Carla Lattier of the Office of the Comptroller and Denise Baisden of the Space and Life Science Directorate.



Blackshear

Nicholson earns Gilruth Trophy

Space Shuttle Program Manager Leonard Nicholson received the 1992 Gilruth Trophy at Thursday night's fifth annual Spaceflight Banquet hosted by the North Galveston County Chamber of Commerce.

The award, named for JSC founding director Robert Gilruth, recognizes U.S. space program leaders.

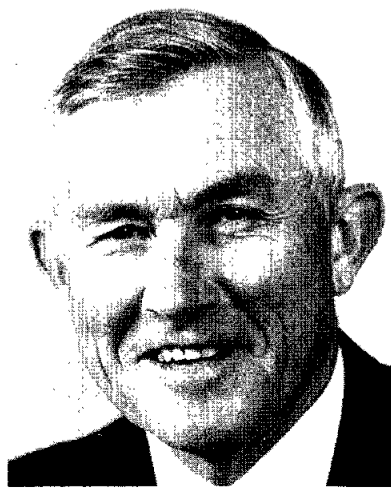
The 54-year-old Dickinson resident began his career at JSC in 1963, immediately after receiving a master's degree in mechanical engineering from West Virginia University.

During the 1960s, Nicholson worked as an aerospace engineer in JSC's Spacecraft Integration Branch,

senior engineer in the Earth Resources Office, and technical assistant to the manager of the Advanced Missions Office.

In the 1970s, he became technical assistant to the Apollo Program manager, and manager of the Shuttle Payload Integration and Development Program in the STS Operations Office. In 1982, he served as technical assistant to the JSC director.

Nicholson became the manager for NSTS Integration and Operations in 1985, and in 1989 he became deputy director of the Space Shuttle Program. Recently, he was named manager of the shuttle program.



Leonard Nicholson

Mars Observer begins journey, deploys booms

The Mars Observer spacecraft partially deployed its two science booms Tuesday and began science operations Thursday.

Mars Observer rose from its Cape Canaveral Air Force Station launch pad at 12:05 p.m. CDT Friday. Mars Observer spacecraft is more than 1.3 million kilometers (820,000 miles) from Earth, traveling at a speed of about 12,600 kilometers per hour (7,900 miles per hour) with respect to Earth.

The first boom carrying the

gamma ray spectrometer was successfully deployed at 6:20 p.m. CDT. The command to partially extend the 6-meter (20-foot) boom to 1.6 meters (5 feet) took three minutes and 36 seconds. The second deployment to partially extend the magnetometer boom occurred at 8:45 p.m. CDT. Deployment lasted 10 minutes and the 6-meter (20-foot) boom was extended to 4.3 meters (14 feet).

Both booms will remain partially
Please see **MARS**, Page 4

Photo Frenzy

Spacelab-J crew returns treasure trove of pictures



The crew of STS-47 took what may be a record number of photographs for a mission of its duration, documenting the important research of the first cooperative U.S.-Japanese science flight. A small sampling is displayed from top down, left to right:

1) The STS-47 crew poses for its on-orbit portrait in the Spacelab module. Clockwise from left are Mission Specialist Jan Davis, Commander Hoot Gibson, Pilot Curt Brown, Mission Specialist Mae Jemison, Payload Specialist Mamoru Mohri and Mission Specialist Mark Lee. In the center is Mission Specialist Jay Apt.

2) Mohri communicates with students on Earth from the aft flight deck of *Endeavour*. The communications were an extension of the Space Shuttle Amateur Radio Experiment, in which crew members talked with "ham" radio operators.

3) Mohri follows a flickering target light with his eyes as part of the Comparative Measurement of Visual Stability in Earth and Cosmic Space experiment. He is in a slant inverted position, one of several used to study head and eye movements in microgravity.

4) Apt responds to a crewmate's question during a shift handover in the Spacelab-J science module. In the background are Jemison and Davis, his coworkers on the STS-47 blue team.

5) Lee, who also served as payload commander, floats through the tunnel that connects the Spacelab module to *Endeavour's* crew cabin. Lee is pointing to a sign in Japanese that translates to "EXIT-ENTRANCE" during a televised tour of the shuttle and its research facilities.

6) Jemison levitates among the experiment racks that kept the crew busy for seven days in the Spacelab module.

7) Davis talks to scientists in the Payload Operations Control Center at Marshall Space Flight Center as she works with the Free Flow Electrophoresis Unit in the Spacelab module.

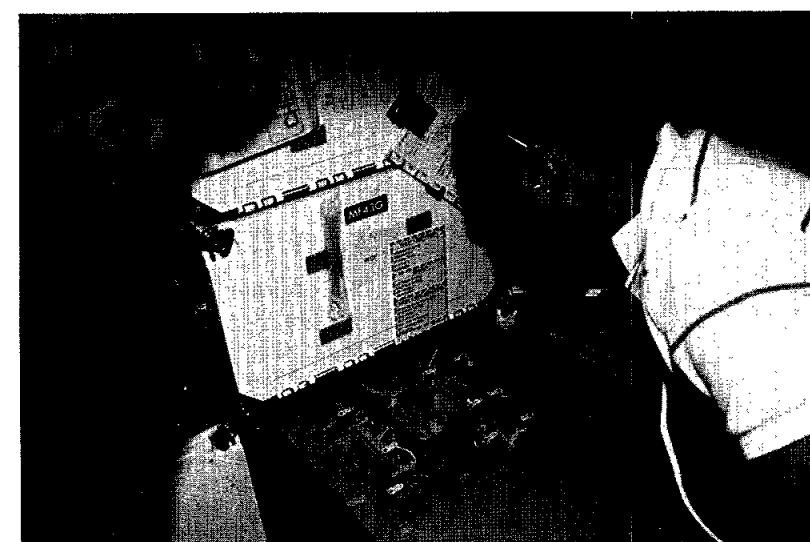
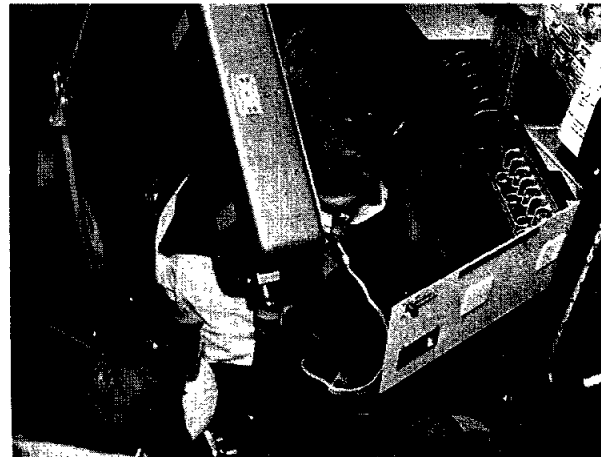
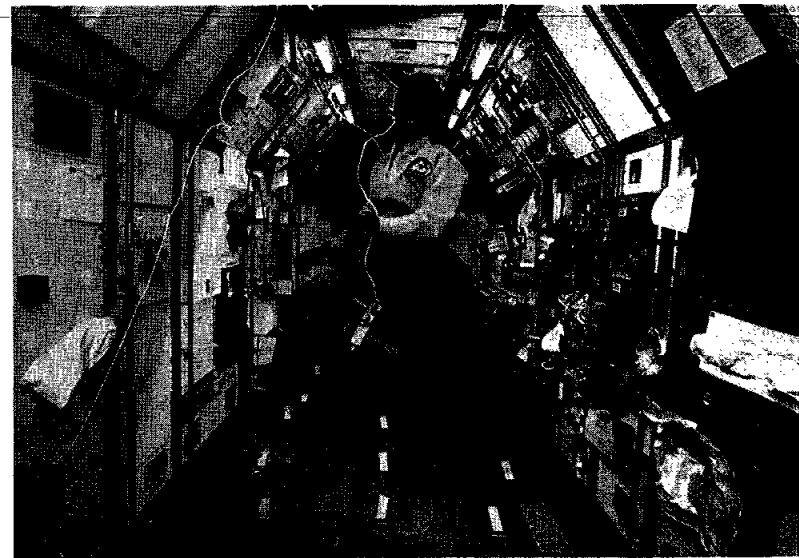
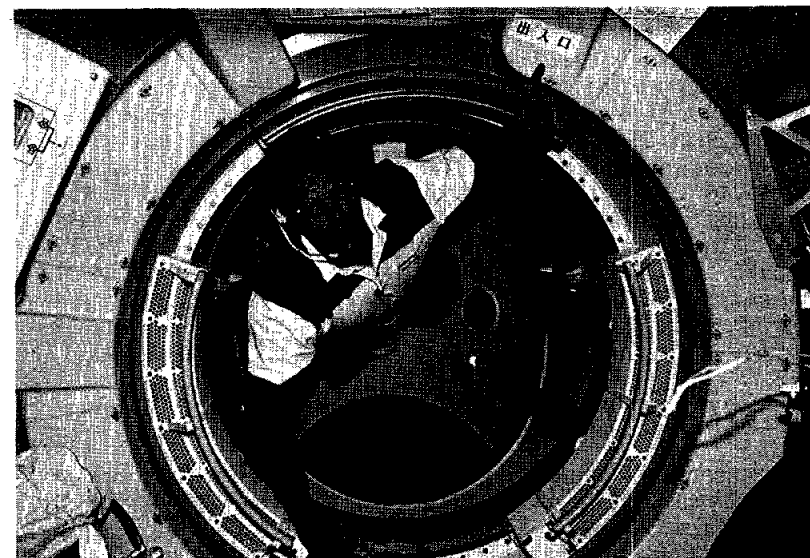
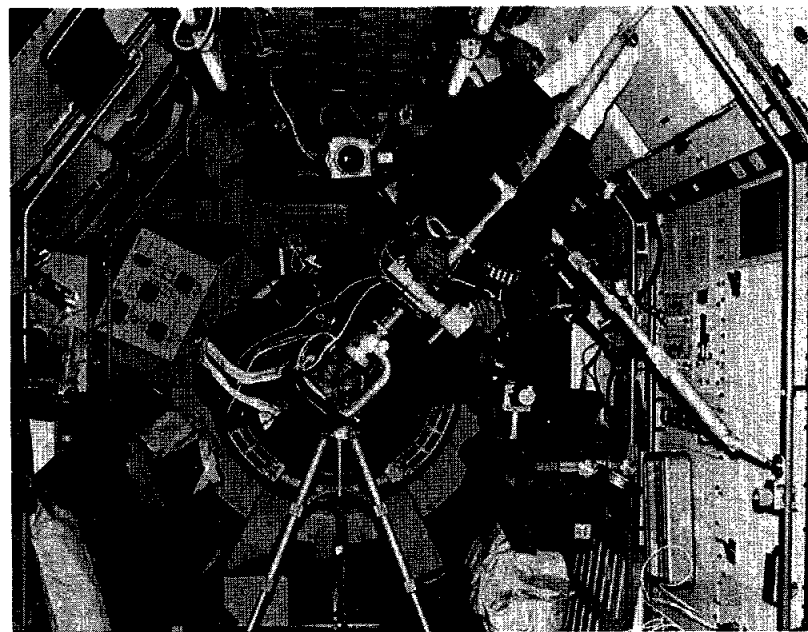
8) One of the four female frogs that donated eggs to the Spacelab-J crew receives attention from a crew member in the glove box facility. The Frog Embryology Experiment returned more than 100 tadpoles that were conceived and hatched in zero-gravity to study how embryos develop in weightlessness. So far, the majority of the tadpoles appear to be developing normally.

9) Brown, left, and Lee repair a water leak in Spacelab Experiment Rack 10 using an in-flight maintenance procedure developed by the POC with the cooperation of flight controllers at JSC. The repair allowed several materials processing furnaces, which needed a functioning coolant loop, to complete their experiments.

10) Davis and Brown oversee the progress of some of the 180 female Oriental Hornets carried aboard *Endeavour* as part of the Israeli Space Agency Investigation About Hornets. The crew also carried out an in-flight maintenance repair that reduced high humidity in the ISIAH middeck locker. The hornets' ability to build their combs in the direction of gravity was being tested in microgravity.

11) Gibson, left, and Brown power down *Endeavour* following landing at Kennedy Space Center. The two are in the midst of a series of checklist procedures to complete the eight-day mission.

The STS-47 crew will present more photos, video and film during a post-flight briefing for employees at 2 p.m. Tuesday in Teague Auditorium. All employees are encouraged to attend. □



Brandenstein earns prestigious awards

Astronaut Office Chief Dan Brandenstein recently received two prestigious awards for his work as the commander of the STS-49 mission to capture and repair the Intelsat VI satellite.

Brandenstein was presented the Ivan C. Kincheloe Award for test pilot of the year.

The award, presented Saturday at the Society of Experimental Test Pilots Annual Awards Symposium and Banquet in Beverly Hills, Calif., recognized his piloting and leadership on STS-49.

Test pilots from 20 countries attended the symposium, and Brandenstein presented a technical paper on the STS-49 rendezvous.

Brandenstein also will receive the 1993 Haley Space Flight Award presented by the American Institute of Aeronautics and Astronautics for

"outstanding leadership and bravery during the maiden voyage of the *Endeavour* space shuttle mission."

The award will be presented Jan. 12, 1993, at the AIAA's Aerospace Science Meeting and Exhibit in Reno, Nev.

JSC

People

McCluney earns STS-47 plaque hanging honors

Kevin McCluney, the ascent/entry Maintenance, Mechanical, Arm and Crew Systems officer for STS-47, earned the honor of hanging the mission plaque in Flight Control Room 1 at the end of the flight.

McCluney represented the entire

MMACS team, which was recognized for its work in maintaining orbiter tire pressures and overseeing crew in-flight maintenance work. The team tracked tire pressures based on thermal conditions relative to the orbiter's attitude, forestalling the need to maneuver and disturb sensitive microgravity experiments. It also helped the Payload Operations Control Center at Marshall Space Flight Center in developing repair procedures for several experiments.

"This flight had several IFMs critical to the success of Spacelab experiments and the MMACS/IFM team performed superbly during time-critical situations," said Lead Flight Director Milt Heflin.

Former JSC worker dies

Douglas Broome Jr., 55, deputy director for NASA's Solar System

Exploration Division in Washington, D.C., and a former JSC employee, died Sunday.

He began his career at Langley Research Center as an in 1959, designing power systems for the early Mercury spacecraft.

During the 1960s at JSC, Broome worked on the Apollo program in various engineering management positions. He moved to NASA Headquarters in 1974 to manage a number of environmental programs, later serving as chief of the Small Explorers Branch and the Observatories Development Branch. He was directly responsible for the Hubble Space Telescope program, and worked with the HST science



Brandenstein



McCluney



Stokes

community to develop computer software that now minimizes the affects of spherical aberration, an error discovered in HST's main mirror after launch.

Stokes is top secretary

Karen Stokes, secretary for ISD's Software Technology Branch, recently earned the Marilyn J. Bocking Award for Secretarial Excellence.

She was honored for having "provided the highest quality of service to the Software Technology Branch."

Engineering trio receives quality award

Three Engineering Directorate workers received the JSC Quality Partnership Award last month for their contributions to product assurance for Space Station *Freedom* Integration, Test and Verification Environment development.

Robert Ling, Deborah Buscher and Susan Morgan of the Flight Data Systems Division accepted the award from JSC Acting Director Paul J. Weitz last week.

The trio's work ensured the maintenance of software development folders that provide data needed for the on-going *Freedom* software reliability analysis and helped McDonnell Douglas Space Systems Co. workers compile the testing log that contributed to the ITVE quality process control and reliability study.

They also arranged for the McDonnell Douglas resources to perform the product assurance work and initiated a software complexity study to improve the quality of the code structure. Throughout the process, they emphasized the need to practice risk management in ITVE development.

By example, Ling, Buscher and Morgan drove home to their Engineering coworkers the importance of software product assurance, setting the standards for Central Test Facilities, Central Software Facilities and Central Avionics Facilities.

The JSC Quality Partnership Award is presented twice a year by JSC's Safety, Reliability and Quality Assurance Office. It recognizes individuals outside SR&QA who play key roles in helping JSC employees and support contractors reach a common goal of excellence.

Public Affairs sets up SCH point of contact

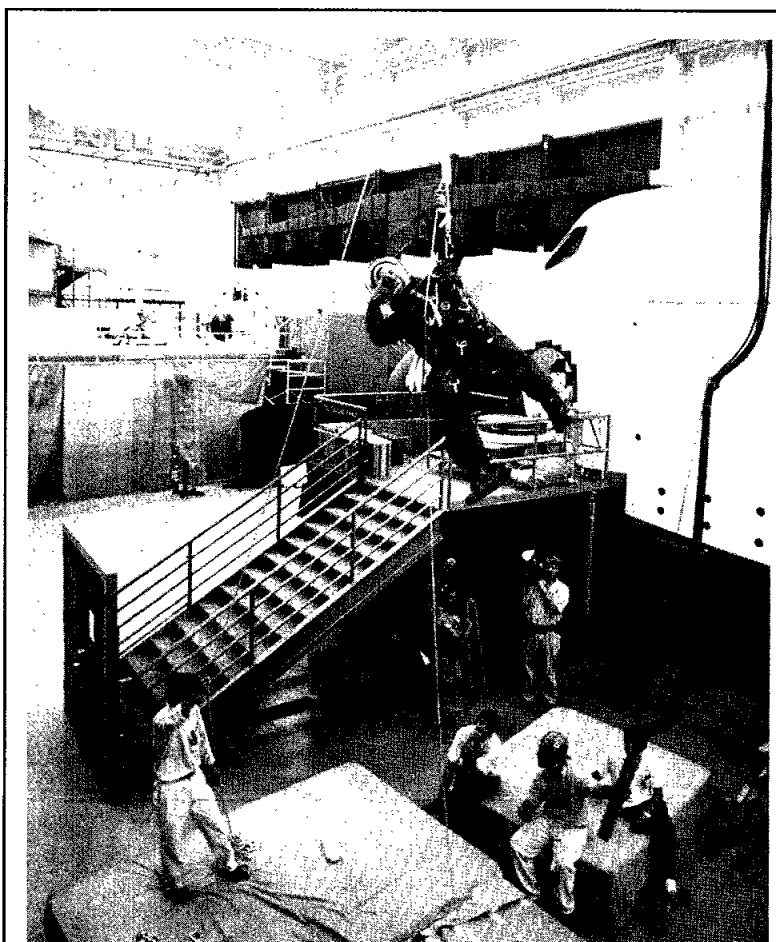
JSC's Office of Public Affairs has set up an official point of contact to help JSC employees an organizations with special requests involving Space Center Houston.

Steve Nesbitt, chief of the Public Services Branch, is the designated point of contact for requests such as VIP visits and other official use of Space Center Houston facilities. Public Services personnel will process these requests, and employees and organizations are asked not take their requests directly to Space Center Houston. Nesbitt may be reached at x34241.

Discount tickets for JSC employees to visit Space Center Houston are available through the JSC Exchange Store in Bldg. 11.

Also this week, the Center Operations Transportation Section announced that JSC taxis will no longer pick up passengers at Bldg. 30S, the new Space Station Control Center. The pick-up and drop-off point for that building will be at Bldg. 12.

The change became necessary when the Space Center Houston tram routes became operational.



JSC Photo by Andrew Patnesky

HANGING LOOSE—STS-53 Mission Specialist Jim Voss gives an Army salute during emergency egress training in JSC's Bldg. 9. Trainers monitor his progress from below. *Discovery* is now scheduled for a mid-November launch following the restacking of one of its solid rocket boosters, which was found to have a pinhole leak between two joint segments.

STS-52 crew has variety of duties on 10-day mission

(Continued from Page 1)

together on the CANEX-II set of experiments that are led by the Space Vision System Experiment. SVS is a machine vision system for robotic devices such as the Canadian-built remote manipulator system designed to enhance human vision in the unfavorable viewing conditions of space. It will use all six payload bay cameras to develop a precise synthetic view of the Canadian Target Assembly, a pallet that Veach will put through a series of maneuvers on the end of the robot arm while MacLean

evaluates SVS performance.

"We'll also be using the Space Vision System to evaluate the structural dynamics of the robot arm to improve control algorithms and understand how to build better robot arms," Veach said.

The maneuvers the CTA is put through will evaluate all of the critical events expected in Space Station *Freedom* construction, MacLean said. At the end of the test, CTA will be discarded and tracked as it drifts away to reenter the atmosphere four days later.

"What we're striving to do is mirror

the assembly of space station," MacLean said. "Canada has a major role to play with respect to the assembly of space station with the mobile servicing station."

Baker will be involved with a number of extended duration orbiter medical experiments during the 10-day flight, and Jernigan will perform intense exercise. Wetherbee also will participate in a Lower Body Negative Pressure test.

A host of other middeck experiments will look at plastics and composite materials for the external surfaces of

spacecraft, shuttle glow, Earth atmosphere measurements and phase partitioning in liquids.

"Twenty years ago, we thought going up in space and doing experiments and coming up with things that made space pay for itself was going to be easy," Shepherd said. "We're finding out that's not the case. I'm very hopeful that if we keep banging on the door we're going to get it open and figure out what the material is, what the application is and what the process we need to invoke in space."

JSC Clinic joins breast cancer awareness campaign

One out of nine women develop breast cancer in their lifetime. More than 46,000 American women will die of breast cancer in 1992.

Such alarming statistics are increasing awareness about breast cancer so that the JSC Clinic is joining the nationwide observance of National Breast Cancer Awareness Month.

ness Month.

The campaign focuses on educating women and their families about the importance of early detection, the best opportunity to treat breast cancer successfully.

The JSC Clinic recommends a three step early detection program which includes regular mammograms, self-examination and regu-

lar check-ups.

Women should have an initial mammogram screening by age 40 and one every two years until age 49. After age 50, mammograms should be taken every year.

Self examinations should be done monthly, regardless of age, and physician examinations should be done at least every three years

until age 40 and every year thereafter.

Due to advances in early detection as well as improved surgical procedures, hormonal therapy and chemotherapy, the five-year survival rate for breast cancer patients has risen to 92 percent.

For more information, contact the JSC Clinic at x37783.

Center Ops plans fourth annual Chili Cook-off

The Center Operations Directorate will hold its fourth annual Chili Cook-off starting at 4:01 p.m. Oct. 16 at the Gilruth Center.

Fourteen teams of COD personnel and support contractors are entered. Judges are JSC's Dan Nebrig, Harvey Hartman, Bill Kelly, Don Puddy, Charles Harlan and Lorna Onizuka, Al Lu of NASA Headquarters, Steve Phelps and Missy and Mike Murphy of Northwest

Airlines, and Jim Thomasen of Lake Office Supply.

Public tasting begins at 7 p.m.; tickets are \$3 through Oct. 13 and \$5 thereafter; they may be purchased from COD employees. Tickets include admission, a souvenir button, refreshments, a tasting kit, entertainment and a door prize drawing.

Proceeds from the "People's Choice Worst Chili" monetary votes will go to Crimestoppers Bay Area.

Space News Roundup

The **Roundup** is an official publication of the National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Texas, and is published every Friday by the Public Affairs Office for all space center employees.

Mars Observer craft on its way

(Continued from Page 1)

deployed during the 11-month cruise to Mars. Once the spacecraft has entered orbit in late August 1993, the booms will be fully extended.

The Titan III launch vehicle and Transfer Orbit Stage upper-stage booster appear to have performed well, although telemetry was not received from TOS during launch.