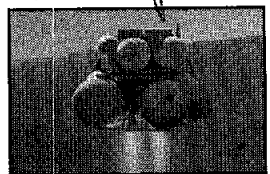


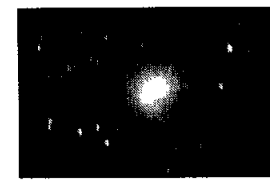


National Aeronautics and Space Administration
Lyndon B. Johnson Space Center
Houston, Texas



Mars manufacturing

A new JSC test-bed will test living off the land in space by using planetary resources. Story on Page 3.



Pinwheel pattern

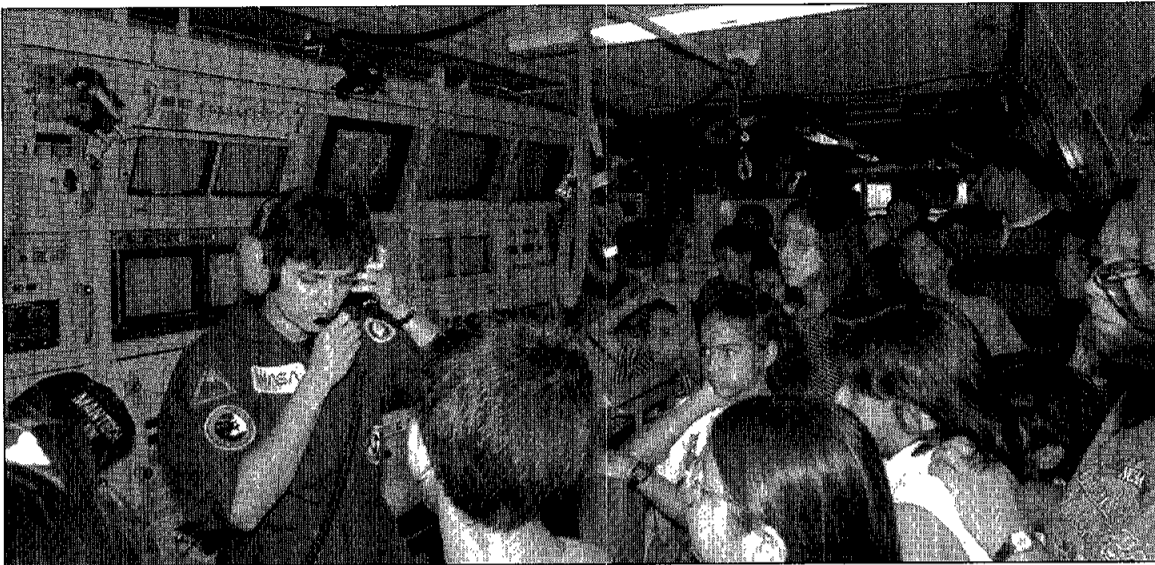
The Hubble Space Telescope captures debris spiraling out of the Hale-Bopp comet. Story on Page 4.

Space News Roundup

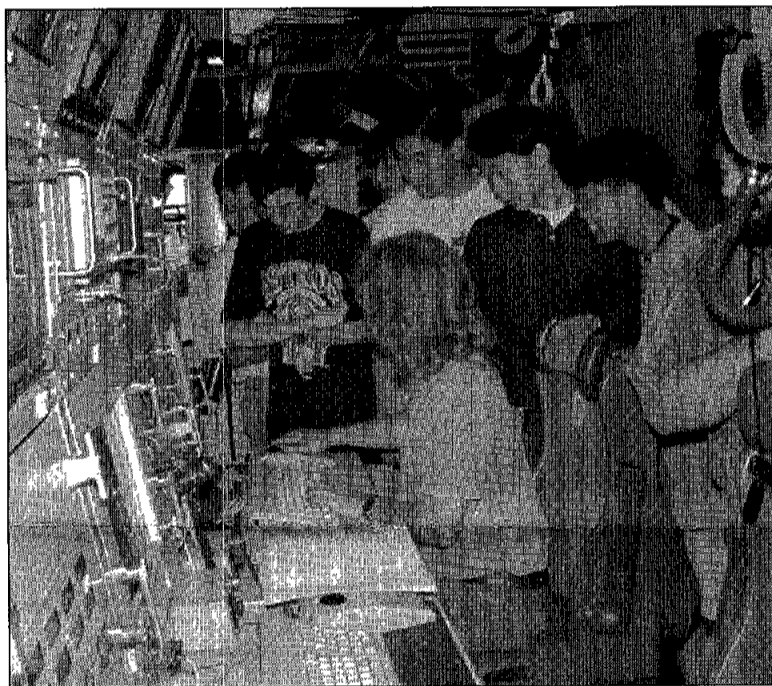
Vol. 34

October 20, 1995

No. 42



Top: Kuiper Airborne Observatory Mission Director Wendy Whiting demonstrates for students how the scientists and air crew communicated with ground-based students during last Thursday's mission to observe the planet Jupiter. **Left:** Science students get up close and personal with one of the control consoles used for the KAO's astronomical observation missions. Students from Seabrook Intermediate Science Magnet School, Bellaire High School, the High School for the Engineering Professions, E. E. Worthing High School, all of Houston, Mae Smith Elementary School, Pasadena, and Savala Elementary School, Austin, toured the observatory at Ellington Field.



JSC Photos by Andrew Patnesky

Columbia tries for lucky seven

By James Hartsfield

Columbia is now scheduled for its seventh launch attempt at 8:50 a.m. CDT today on STS-73 following a scrubbed launch attempt last Sunday due to weather and a four-day delay to allow a commercial Atlas rocket to attempt launch.

The Atlas Centaur, carrying a Navy communications satellite, was unsuccessful in launch attempts Tuesday and Wednesday mornings due to weather.

Columbia's launch attempt Sunday was scrubbed at about 12:25 p.m. CDT after a cold front stalled above Kennedy Space Center, creating rain showers and low cloud ceilings unacceptable for launch. The crew—Red Team members Commander Ken Bowersox, Pilot Kent Rominger, Payload Commander Kathy Thornton and Payload Specialist Albert Sacco and Blue Team members Mission Specialists Cady Coleman and Mike Lopez-Alegria and Payload Specialist Fred Leslie—remained at KSC during the delay this week. The crew's around-the-clock inflight schedule remains the same for a launch today, with Red Team members approximating a Houston day shift and the Blue Team working what would be a night shift here.

For today's launch, the countdown was scheduled to resume at

the T-minus 11 hours mark at 6:30 p.m. CDT Thursday. Fueling of the external tank with liquid hydrogen and oxygen was planned to begin at 12:30 a.m. CDT today.

If unsuccessful today, *Columbia* could try to launch Saturday as well. After Saturday, however, the Atlas-Centaur again moves to the front of the Eastern Test Range line for a launch attempt on Sunday. Shuttle managers would meet following a Saturday scrub to determine the future plans for *Columbia*, including a possibility of rescheduling the mission to launch after STS-74 completes its November flight to the Mir station.



An on-time launch of *Columbia* today would lead to a landing at KSC at 5:45 a.m. CDT Nov. 5.

Prior to the weather scrub last Sunday, *Columbia* also had been delayed 24 hours from what had been a scheduled launch attempt on Saturday, Oct. 14, while technicians replaced a faulty general purpose computer in the spacecraft and inspected welds on the main engines. The main engine inspections were due to a crack that developed in a main engine being tested at the Stennis Space Center last week. The crack, in an outlet duct of a high pressure oxidizer turbopump, was caused by a defective weld. The ultrasound

Please see *ATLANTIS*, Page 4

Students tour airborne observatory

By Billie Deason

Following their virtual trip aboard Ames' Kuiper Airborne Observatory via live television downlinks and real-time Internet connections, local area students were treated to a tour last Friday of the KAO at JSC's Ellington Field. Visiting the KAO were about 200 science students from Seabrook Intermediate Science Magnet School, Bellaire High School, the High School for the Engineering Professions, E. E. Worthing High School, all of Houston, Mae Smith Elementary School, Pasadena, and Savala Elementary School, Austin.

On Thursday, the students had participated in the "Live from the Stratosphere" interactive astronomy education program. During Thursday's flight to observe the

planet Jupiter, two-way contact with the astronomers aboard the C-141 airborne astronomy observatory enabled students to work real-time with the scientists and flight crew and to interact with each other. Student participants at the Houston Museum of Natural Science joined students and teachers from schools, planetariums and museums in North Dakota, Mississippi, Georgia, Illinois, New York and Washington, D.C.

Participants in the live education activities prepared for their astronomy work by tuning in to a briefing from Ames Research Center, and by completing hands-on classroom activities prior to the Jupiter mission.

The world's only airborne astronomical research facility, the KAO is a modified C-141 aircraft carrying a 36-inch reflecting telescope. On a typical mission, the KAO flies at

41,000 feet, above 85 percent of the Earth's atmosphere and more than 99 percent of the Earth's water vapor. In this clear, dry environment, astronomers can study radiant heat patterns from stars, planets and other celestial sources—radiation normally absorbed by atmospheric water vapor before reaching the Earth's surface.

The KAO ended its Texas visit with a late Friday night departure for a five-hour live flight observing the star-forming regions M17 and W51, the Ring Nebula—a place where a star has died in spectacular fashion—Saturn and its moon, Titan and the face-on spiral galaxy, M33.

Following that mission, the KAO returned to home base at Ames Research Center in California.

Nominations now due for quality recognition awards

Nominations are now being accepted for the Quality Assurance Special Achievement and Recognition Program.

This program recognizes NASA contractor and government employees who demonstrate and exhibit exemplary performance in contributing to high quality products and services in their assigned position. Recipients will be presented a certificate, lapel pin and coffee mug with the QASAR logo.

The following criteria should be used in nominating individuals for the recognition:

- Recommendations that significantly improve the product process, quality methods, procedures, and/or result in significant quality cost savings and/or significant pro-

gram dollar savings.

- Recognizes outstanding performance in promoting/fostering NASA contractor "teamwork" relationships.
- Extended to those who have excelled in contributing actively to support the goals of the NASA center and its programs.
- Recognize exceptional performance including finding problems that were undetected, and provided extraordinary effort in bringing about a corrective action.
- Recognize personnel who are distinguishing themselves in the quality area by: teaching quality relation courses in colleges/universities, serving on technical advisory committees and participating in self-improvement training courses

Please see *NOMINATIONS*, Page 4

Parazynski too tall for Soyuz capsule

By Kyle Herring

Astronaut Scott Parazynski, who has been training as backup to Jerry Linenger for a four-month stay on the Russia Mir Space Station, will discontinue his training due to concerns over his ability to safely fit in a Soyuz descent vehicle for landing.

At the time Parazynski was assigned, both NASA and the Russian Space Agency understood he was slightly outside the nominal height to fly on the Soyuz capsule that could be used as a contingency vehicle for returning the Mir crew to Earth. Even though a preliminary evaluation cleared him for training, it was shown during a recent detailed discussion between U.S. and Russian experts on deceleration loads and sitting height issues, that

the safety margins against injury would be unacceptably reduced.

"At the time Scott was assigned, we understood there were modifications that could be made that would allow him to use the descent vehicle if that became necessary," said Frank Culbertson, acting director of the Phase I Program. "After discussing all our options and reviewing the available data with the Russians, it is clear that they do not have the latitude or sufficient modification capability on the Soyuz to allow Scott to return to Earth in the vehicle with a level of risk we would be comfortable with. Our Russian colleagues share our disappointment in this situation since Scott has achieved such a high level of performance and

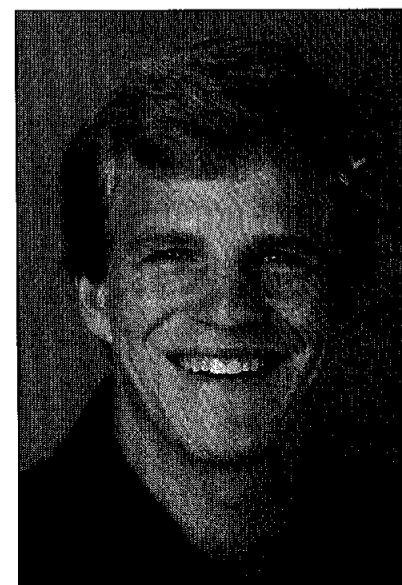
respect in the Russian system."

After a review of the data, NASA and the RSA made a joint decision to discontinue Parazynski's training. Parazynski has returned to the U.S. Parazynski also was scheduled for a later mission aboard Mir.

"Based on the new parameters recently provided concerning the Soyuz capsule, we will be reviewing all crew members currently assigned for training in Russia," Culbertson said.

Another astronaut will soon be nominated to replace Parazynski as Linenger's backup.

Parazynski, 34, was a member of *Atlantis'* STS-66 crew which flew in November 1994. He completed medical school at Stanford University in 1989.



Scott Parazynski

Galileo's tape can't rewind

Engineering data returned from NASA's Jupiter-bound Galileo spacecraft last week indicates a problem with the spacecraft's tape recorder, project officials reported.

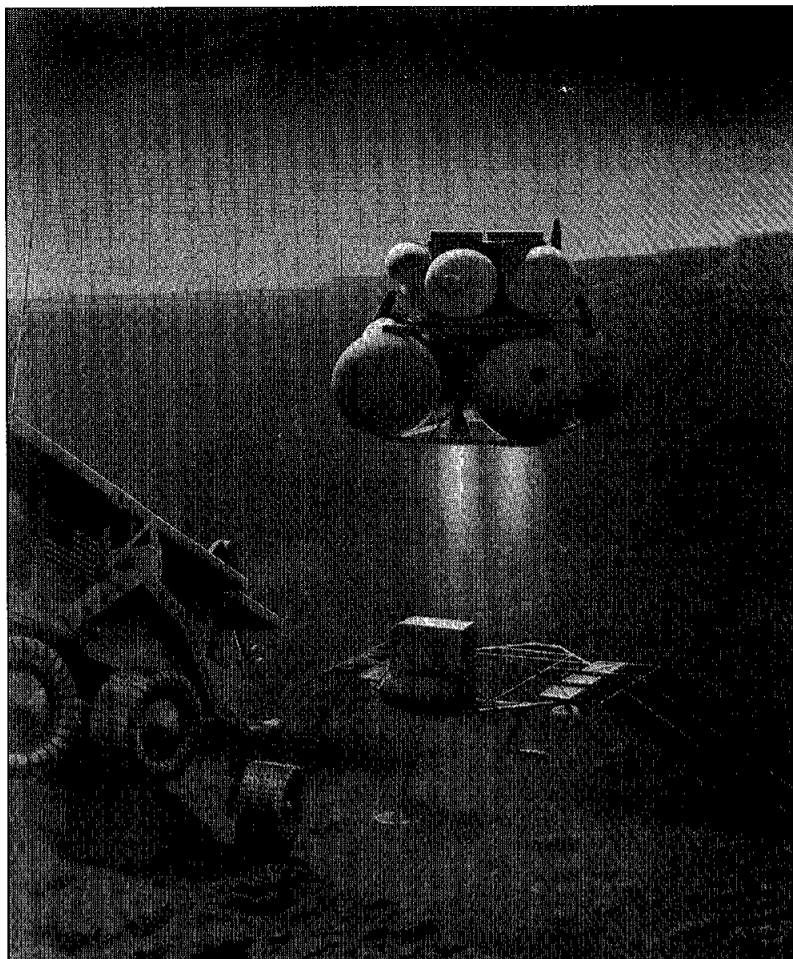
Project officials say a week or more may be required for the problem to be isolated or well-understood, but that the spacecraft remains otherwise healthy and in contact with controllers on Earth.

The problem was detected shortly after Galileo took an image of Jupiter and its major moons from 22 million miles away. After taking the three images required for a color photograph to be produced, the tape

Please see *GALILEO*, Page 4

Technical Test Bed

New JSC testbed to study 'living off the land' in space



Top: The Mars ISRU Sample Return mission is proposed to send a small, robotic lander to Mars in order to collect Martian rock, soil, and atmospheric samples, and then return those samples to Earth using propellants manufactured while on Mars. The picture shows the return vehicle ascending from Mars as it begins its journey homeward. **Bottom left:** Standing on the steps of the proposed Mars environmental test chamber is the team of engineers and technicians supporting the MIST testbed. From top to bottom, left to right are Todd Peters of the Power and Propulsion Division; David Kaplan of the Earth Science and Solar System Exploration Division; Victor Spencer, Jerry Sanders, Scott Burge, Mark Falls and Leah Pate of the Power and Propulsion Division; Noah Blizzard, Bobby Kidd and Barry Allen of Lockheed Martin; and Jack Hensley, Dennis Miller, Lonnie Ray, Jimmy Potts, Booker Canty, Tony Parish, Rudy Molina, Mike Kocurek and Robert Fulmer of GB Tech. Not shown are Scott Baird and Howard Wagner of the Power and Propulsion Division. **Bottom left:** Shown with the first MIST testbed hardware to be procured from left are Pate, Spencer, Sanders, Falls, Peters, Blizzard and Burge.

Artist concept by Pat Rawlings
JSC Photos by Robert Markowitz

If the pioneers had been forced to carry all of their raw materials—water, food and fuel for fires—in their covered wagons, they probably wouldn't have made it over the Appalachian Mountains.

For the same reason, scientists and engineers at JSC are beginning key research into how to use extraterrestrial resources in the same way that the pioneers gathered firewood. That research has led to the formation of a new JSC technology testbed called the Mars In-Situ Resource Utilization System Technology Breadboard Program.

The new testbed is springing from the study of a mission that would send a small robotic spacecraft to Mars to collect rock, soil and atmosphere samples and bring them back to Earth. That mission, called the Mars ISRU Sample Return, provides one potential answer to NASA Administrator Daniel S. Goldin's challenge to look for new technologies and management approaches that would significantly reduce the cost of human exploration of the Moon and Mars.

"JSC is rising to that challenge," said MISR Study Manager David Kaplan, of Space and Life Sciences' Earth Science and Solar System Exploration Division. "One new technological approach that may lead to dramatic reductions in mission costs and risks is In-Situ Resource Utilization. Basically, ISRU encompasses any process which uses indigenous resources on an extraterrestrial surface as feedstock to manufacture needed products."

JSC has had a long-term interest in the processes associated with extracting oxygen from the lunar soil, Kaplan said. Only recently, however, has Mars become the focus of attention for ISRU technology.

The MISR study was conducted over the past year by a team from the Engineering and the Space and Life Sciences Directorates. The 30-person team came up with a mission that would land on Mars with

essentially empty propellant tanks and then use Martian resources to manufacture its Mars-ascent and Earth-return propellants.

"To minimize the complexity of this small, robotic lander, we chose not to require it to dig into the soil for raw materials," Kaplan said. "Rather, MISR will use carbon dioxide taken from the Martian atmosphere. From the Viking Mars lander missions of 1976, we know that the atmosphere is 95 percent carbon dioxide."

Scott Baird of Engineering's Power and Propulsion Division said there are three facets to the propellant production plant: (1) carbon dioxide is extracted from the atmosphere and properly conditioned; (2) this carbon dioxide is fed into a chemical reactor; and (3) the resultant products are liquefied and cryogenically stored for later use in the Mars-ascent and Earth-return stage engines.

Based on the initial results of the MISR mission study, Kaplan approached the Mission From Planet Earth Study Office and the Solar System Exploration Division at NASA Headquarters and obtained funding for the Power and Propulsion Division to initiate the MIST breadboard testbed.

The purpose of the MIST facility is three-fold. One, it allows the ISRU processes and hardware to be examined at a system level so that interactions, capabilities and limitations of the total ISRU propellant production process can be understood. Two, it provides a central location for ISRU technologies being worked elsewhere to be tested and compared under realistic Mars environmental conditions. Three, it provides "hands on" experience for engineers so that future testbed improvements and flight system designs will benefit from the testing performed and the problems solved.

Incremental upgrades, hardware swap-outs, and configuration modifications are currently planned for the testbed. Eventually,

full-scale testing inside a vacuum chamber configured to duplicate Mars environmental conditions will be performed.

"With several viable options to consider, such a testbed is essential in order to compare and test the different ISRU propellant production components," Baird said.

In addition to the propellant production applications, the testbed can be expanded to explore general ISRU enabling technology and scaling issues applicable to human exploration missions. During the same time when the MISR mission study was occurring, NASA Headquarters was writing the Human Exploration and Development of Space Enterprise Strategic Plan. In that plan, it states:

"Use of extraterrestrial resources is critical for human exploration and settlement of the solar system. We will plan a coordinated ground program of prototype hardware development leading to technology flight demonstrations. A central aim will be incorporating the use of extraterrestrial resources into mainstream solar system exploration mission planning. Accordingly, initial emphasis will be on working with the Space Science Enterprise to enhance the science return of near-term missions."

A subsequent briefing about MISR and the JSC MIST breadboard testbed to personnel in the Advanced Projects Office resulted in that office's decision to support the testbed work in FY'96.

The JSC MIST testbed will be located in the Power and Propulsion Division's Energy Systems Test Area. Initial testing of various breadboard elements will occur in the ESTA Fluid Systems and Propulsion Test Facilities, with eventual simulated Mars atmospheric testing of the entire system occurring in the subsystem test chamber at ESTA. The engineering team for the research is still being assembled and will combine a variety of internal JSC expertise

with external government, academic and industry expertise. Although JSC will lead the systems test effort, involvement from other organizations, including the Jet Propulsion Laboratory, Lewis Research Center, the University of Arizona and Lockheed Martin in Denver, is presently being developed. Inclusion of other organizations will occur as appropriate to the program's objectives of enhancing and developing ISRU processes into viable operating systems.

Current plans for the build-up of the MIST system breadboard will allow testing to begin by the end of the year.

"The breadboard will allow us to be very flexible. Other organizations can develop technologies in parallel and we can drop them into the testbed when they become available," Baird said. "As we do the testing, we're going to find out all kinds of surprises. That's what this project is all about. We want to find all the surprises before we build the flight system."

The capabilities to be provided at JSC via the testing breadboard may also have payoffs outside of NASA.

The MIST facility development has just been initiated. Hardware components are being procured, borrowed or loaned from other programs. Contacts with other industry, academic and NASA organizations working on ISRU technologies are under way. Laboratory space has been allocated and is being cleared. Vacuum chamber facilities for future Mars environment simulation tests have been identified. Codes X, S, M and U are watching closely.

ISRU is a technology which is emerging as a key element to answering Goldin's challenge to explore the solar system "for an order of magnitude less cost." And JSC is positioning itself to be the preeminent leader in this newly emerging field for human exploration. □



Hubble captures ejection from comet

New pictures from NASA's Hubble Space Telescope of the recently discovered comet, Hale-Bopp, show a remarkable spiral "pinwheel" pattern and a "blob" of free-flying debris near the comet's nucleus.

Although this comet is still well outside the orbit of Jupiter it looks surprisingly bright, fueling predictions that it could become the brightest comet of the century in early 1997. The Hubble observations will help scientists determine if Hale-Bopp is really a giant comet or rather a more moderate-sized object whose current activity is driven by outgassing from very volatile ice which will "burn out" over the next year.

The bright clump of light along the spiral may be a piece of the comet's

icy crust that was ejected into space by a combination of ice evaporation and the comet's rotation, which then disintegrated into a visible cloud of particles.

Although the ejected "blob" is about 3.5 times fainter than the brightest portion of the nucleus, the clump appears brighter because it covers a larger area.

Ground-based observations conducted over the past two months have documented at least two separate episodes of jet and pinwheel formation and fading. By coincidence, the first Hubble images of Hale-Bopp, taken Sept. 26, immediately followed one of these outbursts and allow researchers to examine it at unprecedented detail. For the first time, they saw a clear separation

between the nucleus and some of the debris being shed.

By putting together information from the Hubble images and those taken during the recent outburst using a telescope at the Teide Observatory in Spain, astronomers found that the debris is moving away from the nucleus at a speed of about 68 miles per hour.

Even more detailed Hubble images will be taken with the Planetary Camera in late October to follow the further evolution of the spiral, look for more outbursts, place limits on the size of the nucleus, and use spectroscopy to study the enigmatic comet's chemical composition.

Comet Hale-Bopp was discovered on July 23, by amateur astronomers Alan Hale and Thomas Bopp.



This Hubble Space Telescope image shows debris from the Hale-Bopp comet follows a spiral pattern because the solid nucleus is rotating like a lawn sprinkler, completing a single rotation about once per week.

UH graduate on-site sign-up begins soon

In cooperation with the Cullen School of Engineering at the University of Houston, JSC is again offering graduate engineering courses on-site via satellite for Spring 1996.

On-site registration for these and all other UH engineering courses will be from 10:30 a.m.-2 p.m. Nov. 9 in Bldg. 45, Rm. 128.

Payment is required at the time of registration. JSC employees may submit a completed Form 75 as payment for their courses. Contractor employees will receive an invoice from the university.

Applications will be available for those interested in applying for admission to UH. All applicants for admission and new students must bring their undergraduate transcript with the degree posted. New students should keep in mind that only six hours taken as a post-baccalaureate student may be transferred to UH for graduate credit.

The satellite course that will be offered on-site include, Computer Networks, from 5:30-7 p.m., Monday and Wednesday; Advanced Computer Architecture, from noon-1:30 p.m., Monday and Wednesday; Parallel Architectures, 11:30 a.m.-1 p.m., Tuesday and Thursday; Management Issues in Systems Engineering, 4-5:30 p.m., Tuesday and Thursday; and Legal Aspects of Engineering, 5:30-7 p.m. Tuesday and Thursday.

For additional information, contact Kazuko Hall of the Human Resources Development Branch at x33075.

Galileo's tape recorder on standby mode

(Continued from Page 1)

recorder used to store the data was commanded to rewind. Data received from Galileo suggest the tape recorder did not stop as expected after rewinding.

"Galileo engineers have commanded the tape recorder to a standby mode while they investigate further," said Galileo Project Manager William O'Neil of the Jet Propulsion Laboratory.

Project engineers are proceeding slowly and cautiously to understand the problem, according to O'Neil, and are avoiding sending unnecessary commands to the spacecraft. In addition to analyzing spacecraft telemetry, engineers are working with an identical tape recorder in a laboratory spacecraft mockup on the ground.

Atlantis' engines checkout

(Continued from Page 1)

inspections of *Columbia's* similar equipment found no problems.

Meanwhile, the crew of STS-74 — Commander Ken Cameron, Pilot Jim Halsell and Mission Specialist Chris Hadfield, Jerry Ross and Bill MacArthur—traveled to KSC this week for dress rehearsal launch countdown for *Atlantis*.

Atlantis, on Pad 39A, completed the Terminal Countdown Demonstration Test at 10 a.m. CDT Wednesday. Other activities to prepare *Atlantis* for launch this week included a health check of the Russian-built Docking Module in the cargo bay.

Also, ultrasound checks of *Atlantis* three main engines identical to those performed on *Columbia*, were completed and found no problems with

the oxidizer turbopump discharge duct welds.

Elsewhere, *Endeavour* is in KSC's Number 3 shuttle processing hangar being readied for an early 1996 launch on STS-72. Work on *Endeavour* this week included preparations to install the Remote Manipulator System mechanical arm aboard the spacecraft. Also, stacking continues on the STS-72 solid rockets in the Vehicle Assembly Bldg. with work this week focused on the right hand booster.

To round out the shuttle fleet, *Discovery* is at Rockwell's Palmdale, Calif., shuttle factory beginning a nine-month series of inspections and upgrades that will include modifications to allow the orbiter to dock with the International Space Station.

Space Exploration '95

Tuesday, Oct 24

- 8:10 - 10 a.m. Reusable Launch Vehicles – DC-XA, X-33 and X-34 Programs
- 10:30 - 11:30 a.m. High Speed Research and the Advanced Subsonics Technology Program
- 1:30 - 2:30 p.m. X-31 Results and Lessons Learned
- 3 - 5 p.m. Space Technology panel discussion
- 5 - 6 p.m. Self-guided tours: the Sonny Carter Training Facility with formal presentation at 5:30 p.m. and the new Mission Control Center with formal presentations in the MCC viewing room at 5:15, 5:30 and 5:45 p.m.

Wednesday, Oct 25

- 8:30 - 10 a.m. Pathway to Exploration panel
- 10:30 - 11:30 a.m. The View From the Bridge
- 12:30 - 1:25 p.m. Lunch
STS-71 Mission Overview
• Hoot Gibson, commander of the STS-71 mission
- 1:30 - 2:30 p.m. Mir Phase 1: Building Block to Space Station
- 3:00 - 4 p.m. Enriching Life on Earth
- 4 - 5 p.m. The day's sessions will end with a discussion of technology transfer and utilization lead by Hank Davis, director of JSC's Technology Transfer and Commercialization Office.

6:30 - 8 p.m. Reception and Banquet at Space Center Houston

Thursday, Oct 26

- 8 - 10 a.m. International Space Station
- 10:30 - 12 a.m. Enabling Steps to the Future
- 12:30 - 1:25 p.m. Lunch
• Astronaut Bonnie Dunbar is the featured speaker
- 1:30 - 2:30 p.m. Understanding and Using Space
- 3 - 4:30 p.m. NASA Science Strategies
- 4:30 - 5 p.m. Wrap Up Round Robin
• Nancy Holland of KHOU-TV

Tram shuttle service will be available during the three-day conference. Trams will run every 20 minutes from Bldgs. 1 and 30 beginning at 7:30 a.m. until 5 p.m.

Complete conference registration is \$150 for three days, and \$45 a day for government employees and students. Retired NASA Alumni League members may attend free.

For more information, contact Gotthard Jansen at 280-2708, or Jennifer Casey at 244-2133.

Quality forum to air on NTV

The Safety, Reliability and Quality Assurance Directorate is sponsoring the Quality Forum XI on NASA Television from 10 a.m. to 12:30 p.m. Thursday.

The Quality Forum XI is the highlight event of National Quality Month, attracting over 250,000 participants nationwide.

The theme for the Forum is "Quality Happens Through People." and will be broadcast live from the Westin Hotel O'Hare in Chicago to over 1000 sites, including JSC.

Leaders from a broad spectrum of business sectors will discuss the latest issues and trends in the quality field and talk about what it means to stay competitive in today's market.

Gary Tooker, vice chairman and chief executive officer of Motorola and chairman of National Quality Month, will present the keynote address to kick off the program that will focus on Leadership, Life-Long Learning and Empowerment.

All civil servant and contractor employees are encouraged to follow this broadcast as work load permits. Consult the daily television schedule for channel information.

Franklin planners available

Although the JSC Supply will not be providing Franklin Planners for the next calendar year, employees may order them through the JSC Exchange Store.

Compact prices are: \$15.80 for Standard; \$22.00 for Seasons; and \$22.00 for the Monticello. Classic prices are: \$17.60 for Standard; \$24.20 for Seasons; and \$24.20 for Monticello. These prices are about \$5 cheaper than the Franklin Catalog price.

Employees may want to order early due to a six week delivery date. The Exchange Store is open from 9 a.m.-1 p.m., Monday through Friday. For more information call x35350.

Nominations due soon

(Continued from Page 1)

above and beyond what would normally be expected.

Nominations must include name, organization, paragraph describing the candidate's qualifications for the award, nominator name, organization, phone number and signature of approving manager.

Submit nominations to Jeff Evans, mail code NA. The nominations must be received by Nov. 15. For more information call, Evans at x39295.

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.

The Roundup office is located in Bldg. 2, Rm. 181. The mail code is AP2. The main Roundup telephone number is x38648 and the fax number is x45165.

Electronic mail messages should be sent to the editor, khumphri@gp301.jsc.nasa.gov or the associate editor, kscheidt@gp301.jsc.nasa.gov.

EditorKelly Humphries
Associate EditorKaren Schmidt

MCC open for viewing of STS-73

The Mission Control Center viewing room will be open to JSC and contractor badged employees and their families during portions of the STS-73 mission.

Employees will be allowed to visit the MCC from 1-5 p.m. Oct. 22 and 11:30 a.m.-2:30 p.m. Nov. 1.

Employees must wear their badges and escort family members through the lobby of Bldg. 30

South. Children under five will not be permitted. No flash photography or loud talking will be permitted at any time.

Because of the dynamic nature of shuttle missions, viewing hours may be changed or canceled without notice.

For the latest information on the schedule, call the Employee Information Service at x36765.

New dates available for flu shots

The 1995 flu season is fast approaching and the JSC Clinic will offer vaccinations for all NASA-badged and on-site contractor personnel for a limited time this fall.

The clinic will offer influenza shots from 10 a.m.-noon and 1:30-

3 p.m. the week of Oct. 23; Nov. 6; Nov. 20; and Nov. 27. Other weeks will be available during December and January and will be printed in the Daily Cyber Space Roundup. For information, call the clinic at x34111.