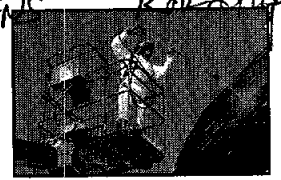




National Aeronautics and Space Administration
 Lyndon B. Johnson Space Center
 Houston, Texas



Rocket redo
 The Saturn V rocket gets a complete makeover and engineers find a few surprises. Story on Page 3.



Rockets in MCC
 World champion Houston Rockets' coaches film a sequence in Mission Control. Photo on Page 4.

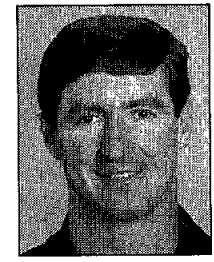
Space News Roundup

Vol. 34 October 13, 1995 No. 41

STS-78 crew complete for '96 mission

By Kyle Herring
 Tom Henricks and Kevin Kregel have been named commander and pilot, respectively, for a 16-day life and microgravity science mission aboard the *Columbia* scheduled for launch in June 1996.

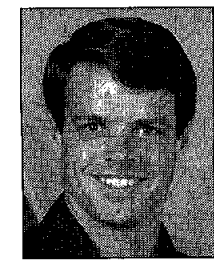
Henricks and Kregel join five others named in May for the mission designated STS-78. Mission Specialists will be Susan Helms, Richard Linnehan and Charles Brady. Payload Specialists will be Jean-Jacques Favier, of the French Atomic Energy Commission and astronaut of the French Space Agency and Robert Brent Thirsk, of the Canadian Space Agency. Pedro Duque of the European Space Agency and Luca Urbani of the Italian Space Agency are alternates to Favier and Thirsk.



Henricks

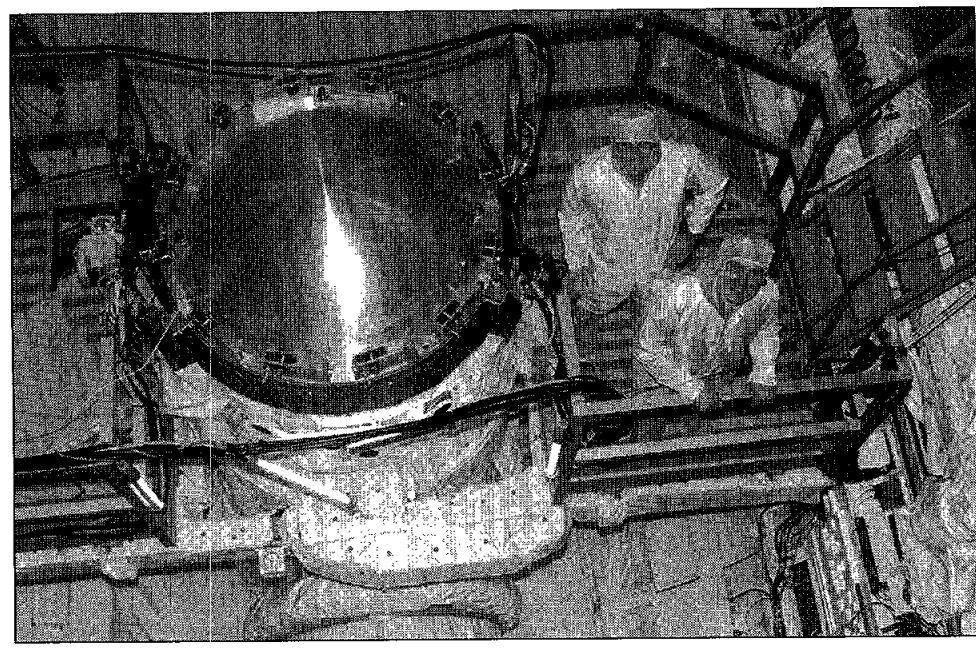
STS-78's experiments will build on previous space shuttle spacelab flights dedicated to life sciences and microgravity investigations. The 16-day flight will include around-the-clock operations with crew members working in two shifts.

Henricks, 43, flew on the STS-44 mission of *Atlantis* in November 1991 and STS-55 on *Columbia* in April 1993 before he commanded this year's STS-70 flight. He earned a master's degree in public administration from Golden Gate University in 1982 after graduating from the Air Force Academy in 1974 with a bachelor of science degree in civil engineering.

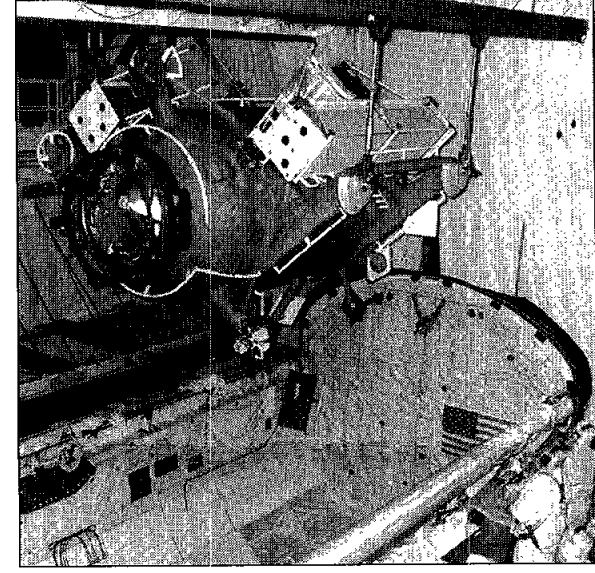


Kregel

Kregel, 39, will be making his second shuttle flight following the STS-70 mission where he was pilot. He received a bachelor of science degree in astronautical engineering from the Air Force Academy in 1978 and a master's degree in public administration from Troy State University in 1988.



Top: STS-74 Mission Specialists Bill McArthur, left, and Jerry Ross review the configuration of payload elements in *Atlantis*' payload bay. The astronauts were at Kennedy Space Center recently conducting the Crew Equipment Interface Test to prepare them for the upcoming docking of *Atlantis* with the Russian Mir Space Station. Left: The Russian-built docking module is lowered for installation into *Atlantis*' payload bay. The module will be attached to the Kristall module as a permanent part of Mir for future shuttle dockings.



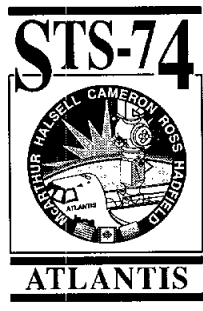
NASA Photos

Shuttle, Mir teams ready to dock again

Following in the footsteps of the first shuttle/Mir docking mission in June, Phase 1 managers and officials of the Russian Space Agency conducted a review this week of preparations for the second docking flight, STS-74, targeted for launch next month.

Representatives of all 10 joint working groups involved in the U.S.-Russian cooperative space effort reported they were ready to support the planned eight-day mission.

"I am pleased that all elements of this international program are prepared for our



return to the Russian Mir Space Station," said Frank Culbertson, acting director of the Phase 1 Program. "A lot of people have undertaken a lot of hard work to put us in our current position to launch *Atlantis*."

The Phase 1 Flight Readiness Review was conducted in Houston and at the offices of RSC Energia in Moscow by a videoconferencing system. Culbertson and Valery Ryumin, the head of Mir operations for RSC Energia, and other

Please see **COOPERATIVE**, Page 4

Columbia ready to try liftoff again

By James Hartsfield
 The countdown clock is ticking toward *Columbia*'s next launch attempt on STS-73 scheduled for 8:46 a.m. CDT Saturday, following a scrubbed attempt last week due to a failed master events controller on the shuttle.

Last Saturday's scrub came at T-minus 20 minutes after a standard test of the master events controllers on *Columbia* showed one of the devices failed. The units control such functions as firing explosive bolts that separate the solid rockets and external fuel tank from *Columbia* during ascent.

The failure was in one core of one MEC. Each MEC has two cores and there are two MECs, providing a quadruple backup for the vehicle. However, launch rules require all four cores to be working properly to proceed with liftoff. Technicians removed the faulty MEC from *Columbia*'s aft engine compartment, replaced it and successfully tested the new unit on Tuesday. *Columbia*'s countdown began at 3 a.m. Wednesday.

The STS-73 crew, split into two teams to allow around-the-clock operations in orbit, traveled back to Houston during the delay, but returned to KSC Wednesday afternoon. With a launch on time, the Red Team—Commander Ken Bowersox, Pilot Kent Rominger, Payload Commander Kathy Thornton and Payload Specialist Albert Sacco—will keep approximately the same schedule as had been planned last week, working a day shift in Houston time during the mission. The Blue Team—Mission Specialists Cady Coleman and Mike Lopez-Alegria and Payload Specialist Fred Leslie—will work what approximates a night shift in Houston.

The weather forecast for a launch on Saturday calls for a 60 percent chance of acceptable weather during the two and a half-hour launch window. On Thursday, technicians were planned to complete servicing of experiments in the United States Microgravity Lab aboard *Columbia*, and fueling of the external tank with liquid hydrogen and oxygen is planned to begin at 12:26 a.m. CDT Saturday.

Elsewhere, the planned launch of *Atlantis* on STS-74 may now be set for Nov. 8 due to the delays experienced by *Columbia*. However, work on the vehicle is progressing smoothly enough to allow a launch as early as Nov. 1 if such an attempt becomes possible. STS-74 will be the second shuttle mission to dock with the Mir Space Station. *Atlantis* was moved to Launch Pad 39A Wednesday morning, following a one-day delay due to bad weather at KSC.

Other milestones for *Atlantis* as it is readied for STS-74 include a dress rehearsal of the launch countdown, called the Terminal Countdown Demonstration Test, on

Please see **ENDEAVOUR**, Page 4



Space Exploration '95 closer

Sixth NASA Alumni League event moves to Space Center Houston

Space Exploration '95, the sixth annual conference and exhibition sponsored by the NASA Alumni League, moves closer to home this year with a change of venue to Space Center Houston.

Organizers want to make the conference more accessible to JSC employees because the agenda includes a number of topics of interest to the JSC community. The move means that the exhibits area will be open to employees and the general public as well as conference attendees and industry guests.

Space Exploration '95 will open with a reception at 6:30 p.m. Oct. 23. Program sessions will begin at 8 a.m. Oct. 24-26.

The speaker for this year's banquet will be U.S. Rep. Robert Walker, R-Pa., who is chairman of the House of representative Science

Committee. The banquet will be at 8 p.m. Oct. 25 at SCH; tickets may be purchased separately for \$50.

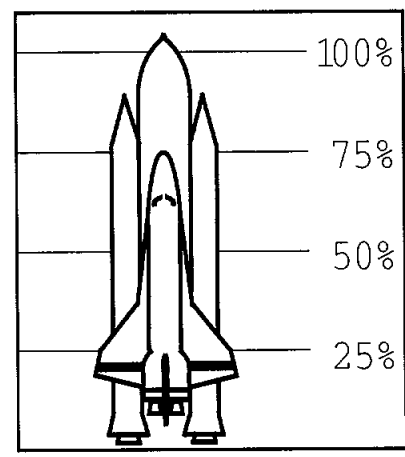
On Oct. 24, conference sessions will focus on reusable launch vehicles, with an 8 a.m. discussion of DC-XA, X-33 and X-34 featuring Gary Payton, director of the Space Transportation Division of NASA's Space Access and Technology. At 3 p.m., Greg Reck will moderate a Space Technology Panel.

Also on that day, tours of the Sonny Carter Training Facility and the new Mission Control Center will be available. The tour of the Sonny Carter Training Facility will be self-guided with a formal presentation set for 5:30 p.m. The MCC presentations will take place in the viewing room at 5:15, 5:30 and 5:45 p.m.

On Oct. 25, sessions will emphasize joint shuttle/Mir missions, driv-

ing technologies and the International Space Station. STS-71 Commander Hoot Gibson will provide an overview of his crew's historic docking at the luncheon. At 10:30 a.m., John O'Neill will moderate a panel "Pathway to Exploration" looking at stepping stones to future exploration. At 1:30 p.m., a panel discussion focusing on "Phase 1: Building Block to Space Station" will be conducted. Panelists will include a representative from the Phase 1 Program Office, Norm Thagard discussing his stay on the Mir space station; and Milt Heflin discussing space walks. At 3 p.m., a panel discussion entitled "Enriching Life on Earth" will look at telemedicine advances, the Left Ventricle Assist Device and the Bioreactor. The day's sessions will end with a discussion of technology

Please see **TECHNICAL**, Page 4



1995 GOAL: \$460,000



CFC lifts off this month

JSC will kick off its 25th annual Combined Federal Campaign on Monday, establishing a goal of \$460,000 for 1995.

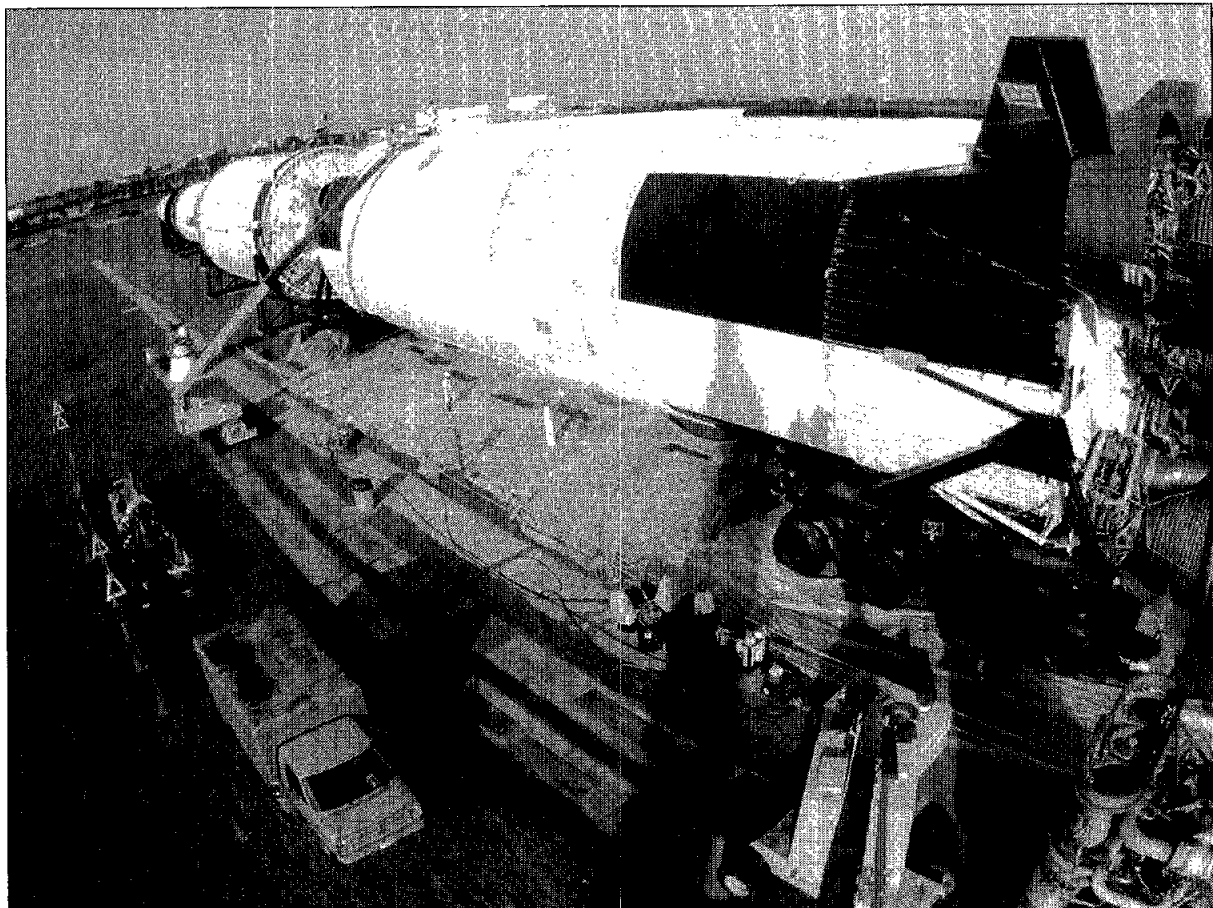
The theme for this year's 1995 CFC of the Texas Gulf Coast, of which JSC's efforts are a part, is "Change Lives: Share the Spirit."

The CFC, which runs through Nov. 17, is a once-a-year voluntary fund-raising effort that gives JSC employees a chance to contribute to local, national and international health and welfare charities.

Last year, JSC employees gave \$459,000 of the \$2.3 million contributed by federal employees throughout the Houston area. This year's CFC goal is \$2.4 million.

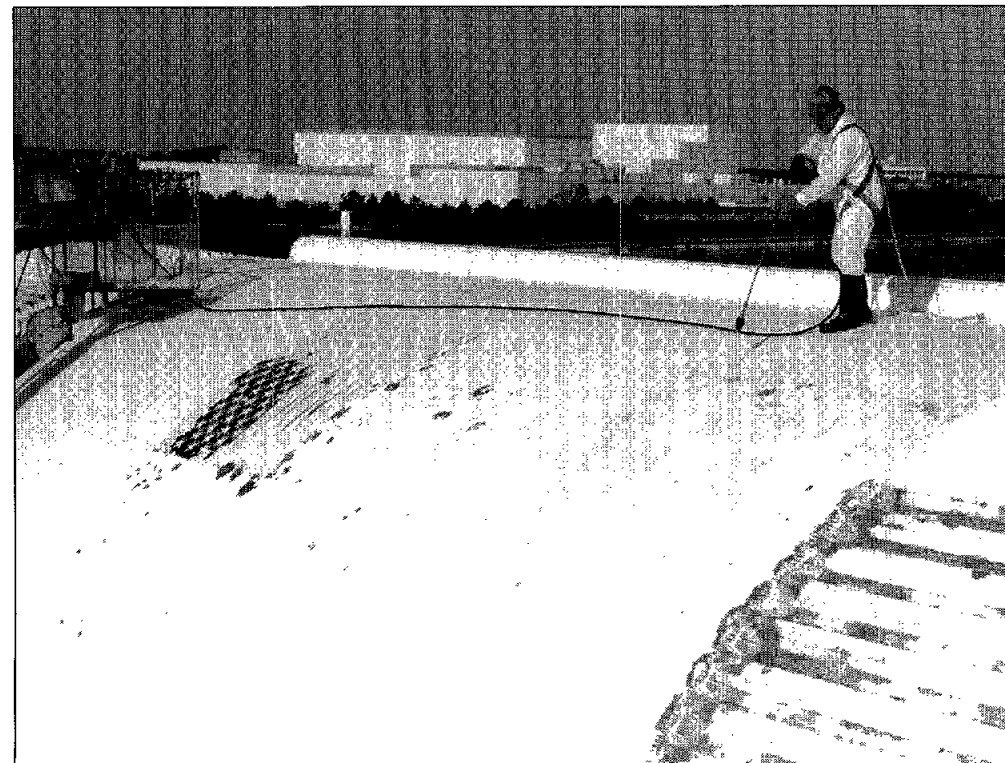
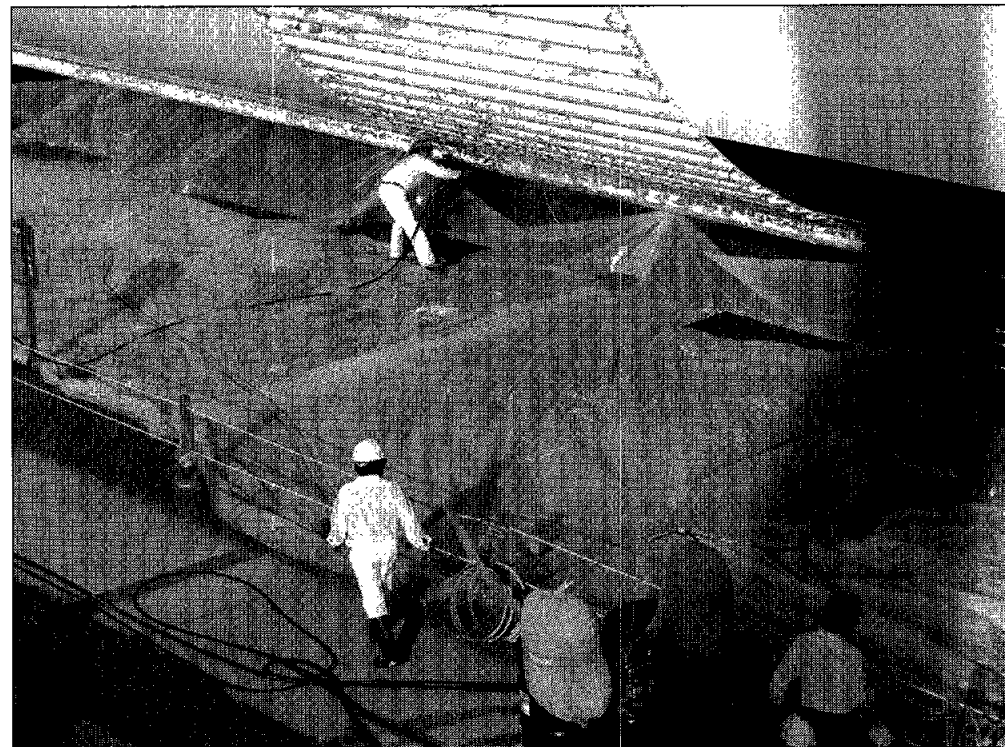
JSC CFC Coordinator Teresa Sullivan said there are some additional incentives this year for

Please see **CFC**, Page 4



Sprucing Saturn V

Rocket makeover vast after engineers found a few surprises



It's been about 12 years since the Saturn V was totally repainted and a considerable amount of deterioration had taken place since that effort.

The mildewed and flaking paint looked bad, but after the Plant Engineering Division started examining the structure, it became obvious that the vehicle was never designed to rest for 25 years in a horizontal position, especially in the Houston climate.

All routes of interior drainage are from end to end, not from side to side. Subsequently, considerable moisture, as well as hundreds of pounds of souvenirs left by pigeons, owls and a variety of rodents, had accumulated within the confines of the aluminum outer skin of the rocket.

"When we opened an access hatch on the upper end of the second stage, we found mouse and small bird skeletons piled a foot deep," said Mike Scott, branch chief for the special purpose maintenance and services. "There were also several very plump and happy owls."

Once the owls and the moisture-laden debris had been removed, all openings large enough to allow bird passage were covered with screens. Several new penetrations were also made to enhance ventilation. The insides of electrical panels and control boxes on the transporter (the black cradle under the rocket) had to be treated with phosphoric acid to kill the severe oxidation, then the panels were permanently sealed shut.

Aside from the relatively severe oxidation of the aluminum skin, the only other real surprise engineers found was atop the second stage, the only stage that is covered with a layer of spray applied polyurethane foam insulation. At ground level, that insulated stage of the rocket appeared to be in better condition than the rest.

"Once we took a bird's eye view, we realized

that the sun's UV rays had taken their toll," Scott said. "There were large pieces of the insulation completely missing, as well as numerous 'pock-marks' all over the top. It looked like the surface of the moon up there."

A putty-like insulation filler material was used to fill the many voids, then a layer of a special butyl-epoxy was used to seal the patched surface.

Once the structural modifications and repairs were completed, the painting began.

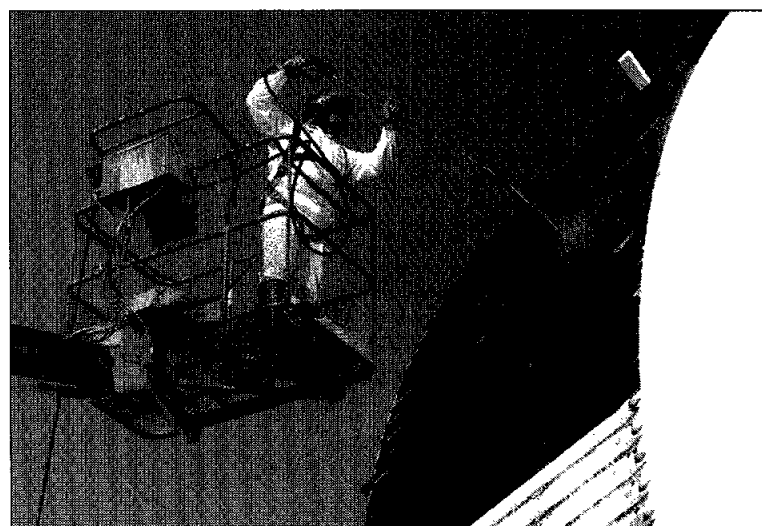
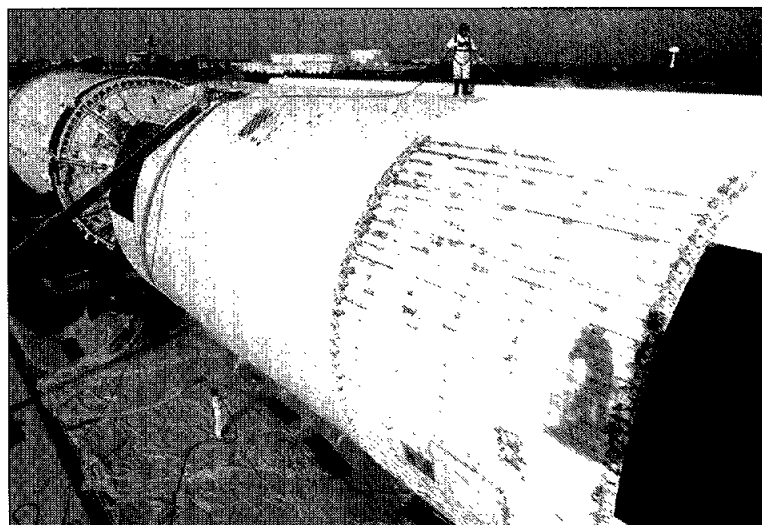
"We did a considerable amount of research on coating materials, as we knew this might be the last paint job this rocket ever gets," Scott said. "We finally found a product that should afford optimum durability, while requiring only minimal surface preparation."

That was an important factor, as environmental considerations could have made the typical surface prep cost prohibitive.

Subsequently, workers from Anchor, Inc. and Johnson Controls were able to perform a high pressure water blast to remove loose paint, capture that water and paint residue on large sheets of plastic, then filter the contaminants from that residue Scott said.

This process drastically reduce waste disposal costs and minimized the overall labor involved. Engineers also were able to procure vinyl flag decals, which significantly reduced the amount of labor required to lay out and hand paint the graphics.

"All in all, the weather was as cooperative as one could expect, Scott said. "We really hoped to finish the project before the Ballunar Liftoff, but that goal was a bit too ambitious. Nevertheless, it turned out looking great, and we feel it should stay that way for many years to come. Once again, it should serve as an inspiration to those of us that pass it each day." □



From left to right, top to bottom: 1) Anchor Inc. and Johnson Control employees begin the painting stage of the Saturn V rocket after completion now wears a long-term coating material and more ventilation holes to help reduce deterioration. 2) The Saturn V after completion. 3) Workers use high pressure water blast to remove loose paint. 4) Painters Ramon Rosales and Ken Hawley blast the first stage of the rocket, while David Arcemant and Gary Landry of Johnson Controls patch the foam insulation atop the second stage. 5) Rosales finds the loose paint on the top of the rocket. 6) Rosales blast paint from the sides of the Saturn V rocket.

Hubble may have discovered recent shattered satellites

NASA's Hubble Space Telescope has discovered several orbiting clumps of icy rubble that could be the remnants of recently shattered moonlets orbiting near the outer edge of Saturn's ring system.

Astronomers say this could represent the discovery of a new class of ephemeral, transitional object in the solar system which provides new clues to the origin and evolution of Saturn's spectacular rings.

This startling conclusion is based upon Hubble's observation of Saturn made as Earth crossed the plane of the ring system on Aug. 10, which provided a rare opportunity to seek out faint satellites in and near the ring plane. "Ring plane crossing" refers to the brief interval when the Earth crosses the plane of Saturn's rings, allowing them to be seen edge on. At such times, the usually bright rings are seen only as a faint, thin line, and Saturn's smaller

satellites become visible. These events are rare, occurring in groups of two or four at intervals of about 14.5 years.

The latest Hubble pictures gave astronomers an opportunity to confirm the presence of two new satellite first discovered by the telescope in images taken during the May 22 ring plane crossing. Rather than solving the moon question, however, the August observations presented astronomers with a new mystery.

"We realized these moons are too bright to have gone undetected when the Voyager spacecraft flew by Saturn in 1980 and 1981," said Philip Nicholson of Cornell University.

A further complication is that the August pictures seem to show at least three new objects, and in different orbits from the two May objects.

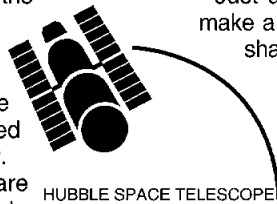
"They also appear to be very elongated or arc-like, unlike a satellite should be," Nicholson said. "One possibility is that they are large clouds of debris from small satellites shattered by impacts with chunks of space debris."

Just as a small handful of chalk dust can make a large dust cloud if tossed in the air, a shattered moonlet would be much brighter and more visible than when all of its mass is compressed into a single solid body.

The discovery of objects in this transitional phase is not totally unexpected, Nicholson said, because one scenario for the origin of Saturn's ring system is that it is made up of countless fragments from several pulverized moons. This idea is reinforced by the fact the new objects orbit Saturn near the narrow F ring, which is a dynamic transition zone between the main rings

and the larger satellites. Moonlets in this region can easily be disrupted by Saturn's tidal pull if they are fractured by an impact, forming a cloud of debris.

The dynamics of this zone also are evident in Hubble's observations of the satellite Prometheus. Although a third object seen in the May images was first suspected to be another new satellite because its location did not match the predicted position for any of the known satellites charted by Voyager, it now appears that this body is in fact Prometheus, which has slipped in its orbit by 20 degrees from the predicted position. Nicholson suggests that this may be a consequence of a "collision" with the F ring, which is believed to have occurred in 1993. The moon may have passed close enough to one of the denser, lumpy regions of the F ring to change its orbit. The researchers plan to obtain further observations on Nov. 21.



HUBBLE SPACE TELESCOPE

COD hosts 7th annual chili cook-off

The Center Operations Directorate will host its 7th annual COD chili cook-off on Oct. 27 at the Gilruth Center.

Fourteen award-winning teams are signed up to compete in this year's cook-off.

Notable judges for this year's cook-off are Acting JSC Director George Abbey and his executive assistant Sue Garman; Safety, Reliability and Quality Assurance Director Charles Harlan; Equal Opportunity Office Director Estella Gillette; Human Resources Director Harvey Hartman; Information Systems Director Jane Stearns; JSC Russian Project Office Special Assistant Don Puddy; Special Assistant for Biomedical Research Planning Carolyn Huntoon; Richard Tuttle of Continental Airlines, Constable Bill Bailey; Amanda Hoefling, Human Resources administrator at Space Center Houston; and Ed Schroeder, of Galveston Party Boat.

Last year more than 2,000 chili-loving employees, family, and friends attended. Showmanship skits begin at 5:30 p.m. and public chili tasting at 7 p.m. Tickets are \$3 through Oct. 20, then ticket prices increase to \$5. Tickets are available from all COD personnel. For information contact Ginger Gibson, x30596.

CFC contributors draw for reserved parking space

(Continued from Page 1)

employees who pledge one hour's pay or more. Those who pledge one hour's pay per month will receive a CFC lapel pin. Those who pledge two hours' pay will earn a lapel pin and coffee mug. Those who pledge \$600 or more per year will receive a lapel pin, coffee mug and a personalized certificate of appreciation signed by George Bush, former President of the United States. In addition, those employees contributing one hour's pay per month or more will be eligible for the drawings for a one-month reserved parking space. The drawing will be held at the conclusion of the campaign.

Cooperative planning making great strides

(Continued from page 1)

officials participated in the FRR. The Phase 1 conclave preceded NASA's Flight Readiness Review by top agency managers this Thursday, during which an early November launch date was expected to be ratified for *Atlantis'* second journey to Mir. *Atlantis'* launch date is dependent on when *Columbia* begins its delayed 16-day microgravity research mission.

The Phase 1 Flight Readiness Review occurred a little more than two weeks after Culbertson led a team of NASA officials to Moscow for three days of technical discussions with Russian management counterparts in a series of "Team Zero" meetings.

The Sept. 25-28 meetings focused



ROCKET LIFTOFF—The world champion Houston Rockets' Head Coach Rudy Tomjanovich pronounces the Rockets' season "ready for liftoff" in Mission Control on Oct. 4. Tomjanovich and his staff of assistant coaches were filming part of an opening sequence that will air on Rockets games televised on UPN Channel 20 this season. Also at the Flight Director's console are, assistant coaches Carroll Dawson, seated, and Bill Berry, standing. The TV opener will feature the Rockets coaches and players in many JSC and Space Center Houston locations.

Native American forum set for next week

In observance of Native Americans, the Equal Opportunity Programs Office is sponsoring an All Indian Nations Forum from 8-4:30 p.m. Oct. 19 at the Gilruth Center.

The theme for the forum is "The Economic Empowerment Through Telecommunication Technology." This forum will bring Native Americans together as a group to focus on the beneficial applications of telecommunications and other technologies in the lives of Native people.

Featured speakers include Ruth Pinney, director of Intertribal Technology Network; Gary Coulter, professor at Colorado University;

Jerry Elliott High Eagle of the Technology Transfer and Commercialization Office; Paulette Hansen from the Center for the New West; and Robert Holkan, chief of Simulation Operations and Technology Division.

A luncheon program will be held from 11:30-1 p.m. Luncheon tickets are available for \$10. Tickets must be purchased by close of business on Monday.

All JSC civil service employees and contractors are invited to attend as their workloads permit.

For additional information or to purchase tickets, contact Pat Burke at x30606.

Technical sessions to focus on station

(Continued from Page 1)

transfer and utilization lead by Hank Davis, director of JSC's Technology Transfer and Commercialization Office.

On Oct. 26, sessions will focus on the space station, future exploration and using space. The space station discussion, set for 8 a.m., will feature Program Manager Randy Brinkley; Boeing Program Manager Doug Stone; and Deputy Program Manager Bill Shepherd. Planetary exploration is the focus of "Enabling Steps to the Future" at 10:30 a.m. Panelists include John Young, "Living and Working on the Moon and Beyond"; Paul Spudis, "Clementine Results"; Nigel Packham; "Closed

ECLSS Experiment"; and Franklin Chang-Diaz, "Thermal Propulsion Prototype." "Understanding and Using Space" is scheduled for 1:30 p.m. and will focus on Wake Shield Facility, Earth observations and crystal growth.

Conference registration is \$150 for three days, and \$45 a day for government employees and students. Retired NASA Alumni League members may attend free. JSC employees who want to attend technical sessions should contact their training coordinators for passes. There is no limitation on the number of employees who may attend. For information, contact Gotthard Jansen at 280-2708, or Jennifer Casey at 244-2133.

New seminars offered

Recent "special topic" seminars presented by JSC's Career Transition Assistance Program were well received and will be offered again due to popular demand.

"Starting a Business" and "Becoming a Consultant" will be scheduled for presentation in October. Another new seminar, "Networking", will be offered for the first time. The CTAP has been designing new seminars as necessary to meet the special demands of its customers.

JSC's CTAP was set up in April to help civil servants interested in learning more about a variety of topics including resume preparation, interviewing skills and salary negotiations. The CTAP has been offering seminars regularly since and offers use of a reference library and job database.

Civil service employees are welcome to drop by and visit the CTAP in Bldg. 45, Rm. 308, or call at x34300.

MCC open for viewing

The Mission Control Center viewing room will be open to JSC and contractor employees during STS-73.

Based on an on-time Saturday launch, employees will be allowed to visit the MCC from 1-5 p.m. Oct. 21 and 11:30 a.m.-2:30 p.m. Oct. 25.

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.

JSC host business expo

Small, disadvantaged, and women-owned businesses may discuss their companies' capabilities with JSC's technical and procurement organizations, as well as major support contractors at an upcoming Small Business Expo to be held from 9 a.m.-2 p.m. Nov. 3 at the Gilruth Center.

The free expo will offer a number of educational briefings including ISO 9000—The NASA Plan; Mentor-Protégé Pilot Program; Doing Business with NASA; Setting Up a Basic Accounting System for Government Contracting; and Introduction to Internet—The New Path to NASA Procurements.

For information, contact Barbara Kirkland at X34512.

Endeavour in processing

(Continued from Page 1)

Tuesday and Wednesday, and a final Flight Readiness Review by shuttle managers on Thursday.

Endeavour is being readied for an early 1996 launch on STS-72 in KSC's number 3 shuttle processing hangar. This week, the main engines were removed, checks were begun of the auxiliary power units and the orbital maneuvering system and stacking operations began on the STS-72 solid rockets in the Vehicle Assembly Bldg.

Franklin Planners not available for '96

It is time to order 1996 calendars and Franklin Planners are not available to be ordered this year.

"No Franklin Planners are available through JSC Supply or Center Procurement due to budget restrictions," said Joel Walker, chief of the Support Operations Division.

Calendars will be carried in JSC stock for general use through normal supply system requisition procedures. These are similar to those used at JSC during 1995.

Calendar items available include calendar pads; loose-leaf appointment book refill; wall calendar; weekly appointment book; one-monthly minder, wire-o-wound for flat opening and level writing surface; and day and month schedule at a glance.

Space News Roundup

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