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.

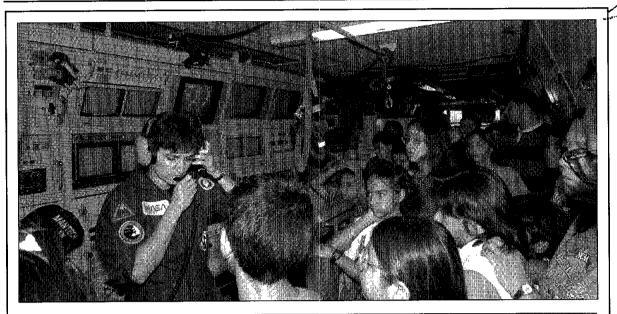


Pinwheel pattern

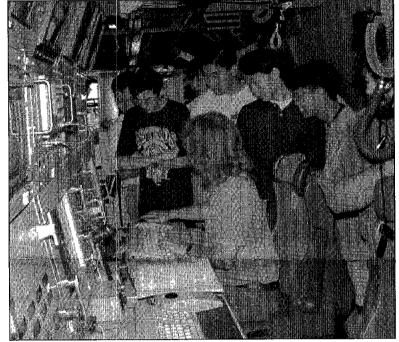
The Hubble Space Telescope captures debris spiraling out of the Hale-Bopp comet. Story on Page 4.

Space News Roundup

Vol. 34



Top: Kuiper Airborne Observatory Mission Director Wendy Whiting demonstrates for students how the scientists and air 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.



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 patters from stars, planets and other celestial normally sources-radiation absorbed by atmospheric water vapor before reaching the Earth's

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 Rig Nebual-a place where a star has died in spectacular fashion—Saturns 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.

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 Bower-

sox, 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

Nominations now due for quality recognition awards

COLUMBIA

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 program 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 Sovuz 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 respect in the Russian system would be unacceptably reduced.

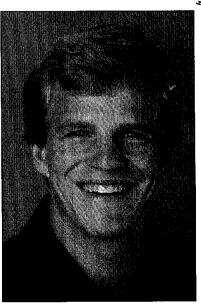
"At the time Scott was assigned, we understood there were modifications that could be made that would allow him to use the descent vehicle if that became necessary," said Frank Culbertson, acting director of the Phase I Program. "After discussing all our options and reviewing the available data with 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

After a review of the data. NASA and the RSA made a joint decision to discontinue Parazynski's training. Parazvnski 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

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

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. For more information,

Houston Rockets Basketball: Houston Rockets vs. Minnesota Timberwolves 7:30 p.m. Nov. 11 at the Summit. Tickets cost \$16.50 and \$22.50.

Texas Renaissance Festival: Sept. 30-Nov. 12. Tickets cost \$10.50 for adults and

Texas Renaissance Festival Bus Trip: Nov. 11. Tickets cost \$17 for adults and \$12

for children 5-12. Deep Sea Fishing: Nov. 5. Fishing tickets cost \$40 for adult and \$20 for children. Ride

tickets cost \$20 for adults and children under 12 free.

Halloween Dance: Oct. 28. Tickets cost \$15 per person.

Children's Halloween Party: 10 a.m.-noon Oct. 28. Tickets cost \$4 for children and \$2 for adults

Wurstfest: Nov. 4. Tickets cost \$17 for adults and \$12 for children. Children 12 and under free. University of Houston vs. University of Texas football: Nov. 11, Astrodome, \$15.50.

Houston Aeros Hockey: Houston Aeros vs. Atlanta Knights at 7 p.m. Nov. 17 in the Summit. Tickets cost \$12.50.

Sea World: Tickets cost \$23.50 for adults and \$16.25 for children 3 -11. Space Center Houston: Discount tickets, adult, \$8.75; child (3-11), \$7.10.

Metro tickets: Passes, books and single tickets available.

Movie discounts: General Cinema, \$4.75; AMC Theater, \$4; Sony Loew's Theater,

Stamps: Book of 20, \$6,40.

JSC history: Suddenly, Tomorrow Came: A History of the Johnson Space Center. Cost

Upcoming events: Book Fair 9 a.m.-3 p.m. Oct. 24-26 in Bldg. 3 cafeteria.

JSC

Filruth Center News

Sign up policy: All classes and athletic activities are first come, first served. Sign up in person at the Gilruth Center and show a NASA badge or yellow EAA dependent badge. Classes tend to fill up two weeks in advance. Payment must be made in full, in exact change or by check, at the time of registration. No registration will be taken by telephone. For more information, call x30304.

EAA badges: Dependents and spouses may apply for photo identification badges from 7 a.m.-9 p.m. Monday-Friday; and 8 a.m.-4 p.m. Saturdays. Dependents must be between 16 and 23 years old.

Women's self defense: Martial Arts training for women only from 5-6 p.m. Tuesdays and Wednesdays. Cost is \$25 a month.

Weight safety: Required course for employees wishing to use the weight room is offered from 8-9:30 p.m. Oct. 26 and Nov. 14. Pre-registration is required. Cost is \$5.

Exercise: Low-impact class meets from 5:15-6:15 p.m. Mondays and Wednesdays. Aikido: Martial arts class meets from 5-7 p.m. Wednesday. Cost is \$25 per month. New classes begin the first of each month.

Ballroom dancing: Cost is \$60 per couple. For additional information call the Gilruth Center at x33345.

Country and Western dancing: Beginner class meets 7-8:30 p.m. Monday. Advance class meets 8:30-10 p.m. Monday. Cost is \$20 per couple.

Fitness program: Health Related Fitness Program includes a medical examination

screening and a 12-week individually prescribed exercise program. For more information, call Larry Wier at x30301.

Dates & Data

Today

NMA meets: The Texas Gulf Coast Council of the National Management Association, will sponsor a joint chapter meeting at 5:30 p.m. Oct. 20 at the South Shore Harbour Resort and Conference Center. Local NMA chapters including the Bay Area Community chapter, Hernandez Engineering, HTI-Link, Johnson Controls, Krug Life Sciences, Lockheed Martin, Loral Space Information Systems, JSC, Rockwell, Grumman, Unisys and the U. S. Postal Service will gather for the presentation of the prestigious Gold Knight of Management Award. Bryan Townsend will discuss "Life is an Adventure." For more information, call Kyle Brantley at 212-1375, or Rhea Ann Saylor at x32412.

Cafeteria menu — Special: meat sauce and spaghetti. Total Health: baked potato. Entrees: rainbow trout, liver and onions, beef cannelloni, ham steak, fried cod fish, Reuben sandwich. Soup: seafood gumbo. Vegetables: steamed broccoli, breaded okra, cut corn, black-eyed peas.

Monday

Cafeteria menu — Special: turkey and dressing. Total Health: herb flavored steamed pollock. Entrees: breaded veal cutlet, chicken fajitas, steamed pollock, beef, French dip sandwich. Soup: beef and barley. Vegetables: Brussels sprouts, mixed vegetables, egg plant casserole, winter blend vegetables.

Tuesday

Space Exploration conference: The NASA Alumni League will host its sixth annual Space Exploration Conference Oct. 24-26 at Space Center Houston. For more information call Al Richmond at 280-7777.

Photo club meets: The Bay Area Photo Club will meet at 7:30 p.m. Oct. 24 at the Faith Covenant Church. For more information call Kelly Prendergast at x37655.

Cafeteria menu — Special: pepper steak. Total Health: barbecue chicken. Entrees: baked lasagna, pork chop and fried rice, turkey a la king, baked chicken, fried cod fish, French dip sandwich. Soup: black bean and rice. Vegetables: breaded squash, steamed spinach, baby carrots, navy beans.

Wednesday

Toastmasters meet: The Spaceland Toastmasters will meet at 7 a.m. Oct. 25 at House of Prayer Lutheran Church on Bay Area Blvd. For additional information, contact Elaine Trainor, x31034.

Astronomy seminar: The JSC Astronomy Seminar will meet at noon Oct. 25 in Bldg. 31, Rm. 129. An open discussion meeting is planned. For more information, call Al Jackson at 333-7679.

Cycle club: The Space City Cycle Club will meet for a 25-mile ride beginning at 6 p.m. Oct. 25 at the University of Houston Clear Lake soccer field. For more information on this ride and weekend rides call Mike Prendergast at x45164.

Cafeteria menu — Special: Mexican dinner. Total Health: steamed pollock. Entrees: broccoli cheese quiche, spare ribs and sauerkraut, steamed fish, Reuben sandwich. Soup: seafood gumbo. Vegetables: Spanish rice, pinto beans, peas, broccoli.

Thursday

Radio club meets: The JSC Amateur Radio Club will meet at noon Oct. 26 in Bldg. 16 Rm. 253. For more information call Larry Dietrich at x39198.

NASACOM meets: The NASA Commodore's User's Group will meet at 7:30 p.m. Oct. 26 at the Clear Lake Park Bldg. For information call Glenda Souliere at x31764.

AIAA meets: The American Institute of Aeronautics and Astronautics will meet at 6 p.m. Oct. 26 at the Gilruth Center. Steve Lombardi will discuss "Hot Air Ballooning." Tickets cost \$10 for members and \$11 for nonmembers. For information call Tanya Bryant at x31175 or Sarah Follett at 282-3160.

Cafeteria menu - Special: hamburger steak with onion gravy. Total Health: baked potato. Entrees: corned beef, cabbage and new potatoes, chicken and dumplings, meat ravioli, French dip sandwich. Soup: broccoli cheese and rice. Vegetables: navy beans, cabbage, cauliflower, green beans.

Friday

Chili cookoff: Center Operations will hold its annual chili cookoff at 4 p.m. Oct. 27 at the Gilruth Center. Tickets cost \$5. For more information call Ginger Gibson at x30596.

Cafeteria menu — Special: tuna noodle casserole. Total Health: broiled chicken breast. Entrees: deviled crabs, broiled pollock, liver and onions, broiled chicken with peach half, Reuben sandwich. Soup: seafood gumbo. Vegetables: Italian green beans, cauliflower au gratin, steamed rice, vegetable sticks.

Oct. 28

Halloween dance: The JSC Employee Activities Association's annual Halloween dinner/dance will be at 7:30 p.m. Oct. 28 at the Gilruth Center. Tickets are \$15 per person. For additional information contact Mavis Ilkenhans, 244-9644.

Star gazing: The JSC Astronomical Society invite the public to view the autumn skies through telescopes from dusk till 10 p.m. Oct. 28 at Challenger 7 Memorial Park. For more information call Bill Williams

Property

Sale: Clear Lake Forest, 4-2.5-2, glass walled den family room, FPL, w/hi ceiling, formals, new roof & paint/carpet/paper. 326-2307

Sale: Holly Hall townhome, 2-2.5-2, security 1649 sq ft, immediate occupancy, \$79.9k. Jack Cohen, 488-3171. Sale: Santa Fe, 2 acres, owner finance, low equi-

ty. 409-943-5232. Rent: Clear Lake City, Oakbrook, on golf course,

4-2-2, \$975/mo. 488-7860. Sale: Taylor Lake Estates wooded lot 90' x 135' can finance, \$39.5 obo. Don, x38039 or 333-1751.

Rent: Crystal Beach cabin, 2-1, unfurnished, prefer handyman, \$300/mo. 902-1168. Rent: Beach house, Crystal Beach, Galveston

county, furnished, sleeps 10, wkend/wkly rates. Rent: Galveston condo, furn, sleeps 6, Seawall Blvd & 61st ST, wknd/wkly/dly rates. Magdi Yassa,

333-4760 or 486-0788 Rent: South Lake Tahoe cabin, 3-2, modern kitchen, W/D, TV/VCR, microwave, sleeps 8, \$75/ nightly except holidays. 244-1065 or 326-2866.

Rent: beach front condo, Cancun Mexico, full bath, sleeps 4, kitchenette, daily maid service,

available year round, \$300/wkly. x37990 or 33185. Rent: Cancun Sunset Club, 1-2, sleeps 6 kitchen, jacuzzi, swimming pool, tennis courts, boating avail, beachfront, avail 11/18-11/25 or

other weeks, \$750. Paul, x41063 or 338-4535. Rent: Ski condo, Winter Park, CO, 2-2, sleeps 6, hot tub/heated pool, ski season & spring break available. 488-4453.

Cars & Trucks

'88 Dodge Aries wagon, 2.2L, 5 spd, TBI, PS/PB, rear wiper/defrost, cruise, new clutch, A/C evap, water pump, 7.9k mi, \$2.8 obo. Lane, 280-0437.

'85 Pontiac Bonneville, 4dr, A/C, P/W, P/S, new tires and battery, 100k+ mi, \$995. Jim, x38624 or '92 Toyota MR2, black, w/black leather interior.

fully loaded, T-tops, CD player, new tires, \$15k OBO. Luis, 335-5415.

'66 Mustang, 289, 4 spd, dual exhaust, good cond, \$3.5k, 331-9255,

'86 Chevy Sprint, 4 dr, 5 spd, AM/FM/cass, A/C, runs great, \$990. Marco, x39593 or 212-1490. '88 BMW 325IS, ex cond, black w/tan interior,

sunroof, PW/PS, AM/FM/cass, 85k mi, \$11k obo. 549-7311. '84 Toyota Celica, 80k mi, red, ex cond, new

tires, \$3.5k. Melissa, x41928 or 338-6798. '86 Jeep Cherokee Laredo, 5 spd, 4 WD, 4 cvl, A/C, 100k mi, AM/FM/cass, wht/tan, 1 owner, ex

cond, \$5.4k obo. x48541 or 538-3444. '85 Pontiac GrandAm, 89.k mi, auto, pwr dr, clean, \$1.7k; '87 Chrysler New Yorker, 81k mi, auto, pwr, new tires, \$2.8k, 212-1474 or 996-6735. '79 Datsun 280 ZX, Coupe, 5 spd, 97k mi,

\$2.8k. Jeff, x30715 or 280-8606. '89 Mazda Cab Plus truck, B2200 series, red w/charcoal int, auto, A/C, AM/FM/cass, sliding back wind, bedliner, new batt/tires, \$5.8k. 482-8820.

'84 Mazda BX-7 GSL-SE, blk/red, 5 snd, sunroof, AM/FM/ cass, good cond, \$2,950. 582-0415. '88 Jeep Wrangler, 83k mi, 6 cyl, 5 spd, A/C, new soft top, ex cond, \$7.5k. 334-7143.

'88 GMC C1500 PU, burgundy, 350 LWB, ex cond, \$6k obo. Cory, 280-9274 or 814-3580. '55 Chevy Belaire, 396 big block, ex int, auto,

Posi-Track, AM/FM/cass, red & wht. 334-2908. '91 Olds Cutlass Ciera, 4 dr sedan, V6, auto. A/C, pwr windows, cruise, 63k mi, good cond, \$5.5k. Andy, x31596.

'70 Chevrolet CST/10 PU, 350 V8, auto, PS/PB, factory A/C, tint, ex cond, \$3.5k. 923-4301. '88 Merkur XR4TI, white, turbo, leather int, load-

ed, 83k mi, 1 owner, \$5.5k. 474-2146. '85 Camaro body, race setup, \$350. Toriy, 946-9090.

'90 Mustang GT, 5.0L, 79k mi, 5 spd Hurst, white, A/C, PL/PW, ex cond, \$7.5k. Warren, x45714 or 949-5675.

'91 Explorer, Eddie Bauer, leather int, CD, sunroof, kill switch, tinted windows, ex cond, x38281 or 486-5503

'88 Honda Accord LX, 4-dr, auto, A/C, cruise, PW, stereo, \$5,950. 488-7771.

'78 Granada, new engine, ex cond, good work car, \$1k. x32993 or 486-5478. '87 Nissan Pulsar NX, pwr. tilt.

needs A/C compressor, runs great, \$2.6k. Merrell, x37570 or 286-9123.

Cycles

'86 Honda Magna 700cc, low mi, ex cond, \$2.5k. 488-6526.

'86 Honda Elite 80cc scooter, red/white, ex cond, electric starter, \$600 obo. 488-6521 or 488-7437

'79 Harley Sportster, very good cond, many new parts, \$5k. 479-4463.

Boats & Planes

Sailboat, 18' Hobbie catamaran w/trailer, all access, \$900 obo, 474-4742.

'95 SeaRay BR, 18', 135 hp Mercruiser, I/O, galv trailer, skis, vest, low hrs, \$11k obo.

Audiovisual & Computers

Citizen printer "CSX-140" w/GSX color option, \$199. Magdi Yassa, 333-4760 or 486-0788.

Notebook computer by Dell, ex cond, weighs 6 lbs, 386 processor, matte blk case, monochrome screen, new battery, \$500. Box, x32404 or 484-

Hands-free speaker phone w/LED indicator. 13-number memory plus 3 emergency "one-touch" buttons, redial, flash, extras, desk wall mountable, \$40. 332-7427.

Bear Cat 210 scanner, \$50. Liz, 244-1819 or 484-2050.

AIWA #AXR-004 stereo audio/video receiver w/remote, \$120 obo; Pioneer #PD-4550-8FS CD player, single tray, w/remote, \$100 obo. Lisa, x40213 or Steve, 554-4140

Fisher 220W AM/FM stereo receiver & CD

player, \$60/both, x37739.

IBM/SW, Paradox for Windows, \$75; Paradox book w/examples, \$50. 282-3570 or 474-3820. 486 DX2-80, 8MB RAM, 540MB HD, 15" SVGA, 14.4K modem, \$925; 286pc, EGA, 3.5 &

5.25 FD, 40MB HD, \$160. x35549 or 554-7104. Fisher 1-bit 24 CD changer, \$160; audio concepts stereo speakers, \$70; Magnavox 15" floor model TV, needs work, \$70; rack equip, moving box, \$50. Chris, 334-6898.

486 DX computer, non-interlaced Super VGA monitor, 210 MB HD, 4 MB RAM, 5.25 & 3.5 FD, modem, 3 button mouse, 210 watt pwr supply Gameport, modem, software, \$800. Rob, x30395 or 480-8511.

Complete P.A. equipment including mixing board, amps, E.Q, spkrs, & more, \$1.5k. Ernie, x47751 or Barbara, x36575. Pioneer pull-out care stereo, AM/FM/cass, \$85.

x33500 or 480-9329. Mac SE computer, \$395. 488-7771

Sy Quest 44 meg, SCSI drive, \$150. 480-3424.

Musical Instruments

Hondo electric bass guitar w/case, \$200. David, x35928 or 554-4570.

B & W video camera, \$80. 282-3570 or 474-

Household

996-8567.

Loveseat, black/brown/tan, \$100. Liz, 244-1819 or 484-2050

Large dining set, oval table, 6 chairs, lighted china cabinet, all solid wood, 2 table leaves, custom table pad, ex cond, \$1.7k. 244-5907 or 488-

Sofa bed, loveseat, end tables, \$400; GE W/D, \$300; 21cu ft refrigerator w/ice maker, \$300. Kim. x32687 or 332-4375

Simmons crib w/matt & matching chest, natural maple, all in very good cond, \$550; large wood executive desk, 42"x78", medium stain. \$175, 482-4590.

Maytag W/D, large capacity, ex cond. \$670. x32686. Small color TV by Sharp, 9" screen, \$45, 486-

Antique dining table, 45x70, oak/pine inlay, \$550; antique white iron baby bed, \$225. 488 3588. Childcraft Crib-n-Bed converts into toddler

bed/chest of drawers, white w/pastel drawer handles, \$450. 244-7951 or 486-5959. Caloric dishwasher, porcelain lined. Brian,

Sofa w/qn size sleeper, white w/pastel colors.

pink throw pillows, matching pink swivel chair, \$5; burgundy throw, \$10, 882-0405 avail 11/1, \$200. x41036 or 333-4577 Sanyo refrig, 11 cu ft, white, \$100; Whirlpool 3 cycle electric dryer, apart sz, \$75; GE auto washer, almond, apart sz, \$75; all work great, avail

11/1. x41036 or 333-4577. Desk chair, \$25; 2 matching dressers, \$95; 3

lamps, \$50; 2 matching couches, \$60, chair, \$20; coffee table, \$40; 2 end tables, \$50; dining room table, \$100; chairs, \$100; ceiling fan, \$20 obo. 280-3230 or 333-5782.

King size bed, matt/box springs/frame, \$100. Curt, x41065 or 326-2866.

Queen size waterbed, bookcase headboard, full motion mattress, \$100. Karen, x31385 or 947-Amana refrigerator, 25 cu ft, side-by-side w/

external w/ice/water, almond, \$225, 286-1587. Oak-frame entertainment center, glass doors video cabinets, \$300. x33500 or 480-9329.

Want personnel to join VPSI vanpool departing Meyerland Park & Ride at 7:05 am for JSC. Van pool consist of on-site personnel working 8 am/4:30 pm shift. Don Pipkins, x35346.

Want mature, responsible professional roommate to share house in Kemah, non-smoker, own bedroom/bath, quiet, secluded, garage, \$400/mo 1/2 util. Rick, x38842 or 538-4278.

Want roommate, 4-2.5-2 comtemp house in Seabrook, all amenities, sep phone, sep living areas, \$400/mo, 474-4742.

Want non-smoking roommate to share 4-2. riendswood, cable, W/D, microwave, VCR's FPL, all amenities included, all bills pd, \$250/mo. Michael, x38169 or 482-8496.

Want roommate, non-smoker to share apartment or house in the Clear Lake area. Rob. x32585 or 532-1028. Want empty glass baby food jars, sz #1 & #2

for crafts, need lots, lids not needed. Linda, x40077 Want to buy good reliable car, '89 - '93 year

model, will take over payments, 867-8820. Want low priced pickup, prefer Mazda, Nissan or Toyota, also want school/work car. 271-7011.

Want donations for Son Light Mission on 518 in Friendswood, needed are a washer & electric dryer; electric stove, and other household items. tax deductible donations. Julia, x30294 or 331-

Miscellaneous

Marcy Home gym, 200 lb stack, w/leg curl. lateral bar & bench press, \$145. Stan, x34057 or Weider Flex 2000-Plus home gym/Cross train-

er, ex cond, \$60. x37739. Stair climber, adjustable, sm footprint, \$75. x39357.

Wedding dress, white, sz 5, short sleeves, weil petticoat, \$200; Ig wood glider 2 sep seats, \$250; cement yard statues; sm microwave, works great, \$50; burgundy/green rug, \$35; burgundy pillows,

Dolls from private collection, porcelain & vinvl. ex cond, very reasonable. 488-6521.

Super single waterbed w/mirrored headboard, \$75; 2 antique white wicker chairs, \$10; 40 watt Equalizer, \$15; Chrysler OB starter, 60 hp, \$10; 36" storm door, \$15.332-2453.

Dbl bed/frame, \$150; AM/FM/cass car stereo. \$25; stun gun, \$75; Neiman Marcus rabbit jacket, sz 5, \$100; dinette w/2 chairs, \$100; 3 shelve bookcase, \$25; sofa & loveseat, \$60. 998-7006.

Browning Hi-Power .40 cal "Practical" semiauto hand gun, \$600 firm, Jim, 991-0533. Weatherby Vanguard, 270 cal, Fagen stock,

shells, \$385. Charles, x37678 or 661-4789. 7mm Mag Browning A-Belt w/Leupold 3x9 50mm objective scope, matte finish w/synthic stock, gun case w/sling, \$600 obo. Ken, x40280 or 996-0618.

Brayo 380 auto, \$100; H&R topper 30/30 single shot rifle, \$150; 22 rifle, \$100; Commando Mark 45, 45 cal, \$350. Owen, x30175 or 998-0610.

Dumping style trailer cart for lawn tractor, 10 cu ft steel hopper w/16" pneumatic tires & removable tailgate. \$75. Larry, 39525.

Infant bathtub, \$4; infant carseats, \$7 & \$15; 205 snow skies, \$20. x31883. Sony RMX14 remote commander system for

\$15; queen brass headboard, \$20; coffee grinding machine, \$10. 286-7280. Green house approximately 10'x12', \$150, you dismantel & haul. 286-1934.

car CD changer, \$75; plumed pen w/crystal base.

Bumper filler, 1 pr inner rear, fits '79-'85; Buick Riviera, \$85, 996-5739. Toast Master toaster oven, \$35; 2 Roan Casin tent, \$75; 36" glass shower door, \$10; wall mount bathroom sink, \$10; rear window for Nissan PU

truck, non-sliding, \$10. 334-1119. Mitsubishi DAR35 stereo receiver, 85 watts per channel, needs repair, \$10; Mitsubishi LT20 liner tracking turntable ex cond, \$20; O'Sullivan stereo cabinet, ex cond, \$10; Sanyo electronic coffee maker/grinder, needs repair, \$5; white metal patio chairs w/vinyl straps, 4 for \$10. 486-4369 or

282-8736. Lite oak dresser, \$105; low square coffee tables, \$40 ea; flourscent light fixtures, \$10 ea; metal detector, \$75; 55 gal fish tank/stand, w/large blue discus, \$195; 30 gal tank w/stand. \$100; hutch/dresser med dark oak, \$325; large fruit press, \$250; wood TV trays, \$40; end tables, \$30; stained glass lamps. 282-3570 or 474-3820.

Les Miserables, San Antonio, Nov 23, 2 tickets, center orch, 8 p.m. John, x39357

Swing set, Hedstrom, 5 station, \$100 obo. Andre, x35296 or 992-3004. Eight 1x9-70ns SIMM modules, \$25 ea.

Burley bicycle trailer, 2 child capacity, alloy wheels, \$175. 286-1587. Nissan pickup tailgate, black, \$100; chrome

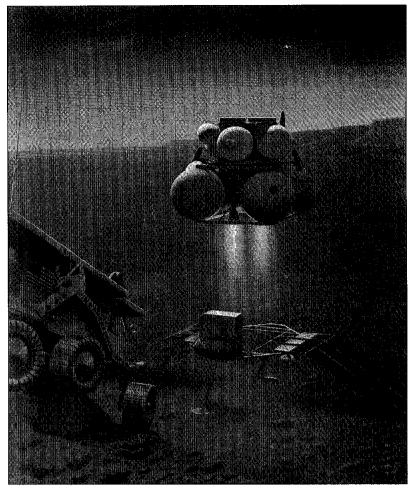
bumper, \$75, 771-0955. Ladies mink/leather trim stroller, size large, \$1k; train table for display, 4x7, \$60; in ground

hot tub spa, seats 6, \$850, 488-3588. Murray 10 spd men's bicycle, \$50; 12-speed Peugeot men's bicycle, PH-10 Carbolite frame, alloy components, ex cond, \$100, 486-8266.

American Tourister luggage/garment hanger on wheels, new \$150 sell \$50, 486-8266.

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 swapouts, 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.

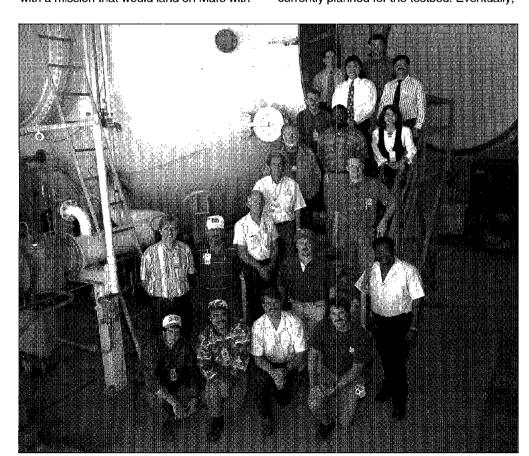
Current plans for the build-up of the MIST system breadboard will allow testing to begin by the end of the year.

"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 onsite 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.

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

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. Lunci

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 trans-

fer 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 Station10:30 - 12 a.m. Enabling Steps to the Future

12:30 - 1:25 p.m. Lund

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. untill 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.

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 Specialists 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 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.

Associate Editor Karen 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.

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.