



American Heritage Day activities profile contributions of many cultures to American lifestyle. Photos on Page 3.



More than 1,100 people compete in the annual Loral Lunar Rendezvous run. Photo on Page 4.

# Space News Roundup

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No. 29

## International cooperation marks record flight

*Columbia's* seven astronauts returned to Earth on Saturday, and eager scientists immediately began work digesting the data collected during the longest shuttle mission to date.

Commander Bob Cabana, Pilot Jim Halsell, Payload Commander Rick Hieb, Mission Specialist Carl Walz, Leroy Chiao and Don Thomas and Payload Specialist Chiaki Mukai returned to Houston and an Ellington Field homecoming celebration Saturday evening.

The second International Microgravity Laboratory mission was not scheduled to be the longest shuttle flight to date, but when weather conditions at Kennedy Space Center prevented a Friday landing, the stage was set for the record-setting 14 day, 17 hour, 55 minute-flight. The crew traveled some 6 million miles.

"We stayed up there 15 days—a long time to be in space, but not as long as we need to be,"

said Commander Bob Cabana. "To stay up there for a long time and continue to do good science, the International Space Station is the way to go, and I think this flight made a big step toward that. We had 15 different countries involved, six different space agencies, a lot of coordination from remote sites. It was an excellent effort by everybody."

Hieb said the in-flight maintenance repair of the Japanese electrophoresis unit was a perfect example of that cooperation. It involved taking pieces off of Biorack, a European facility, and the space shuttle, and work by American and Japanese crew members in a European Space Agency-built Spacelab.

"No matter what language we speak, no matter what our ethnic background or cultural

background, we get together and talk about space science and we come to agreements," Hieb said.

"We ended up with 100 percent success on our facilities and it was due to the efforts of Rick and our crew getting in there, doing IFMs, being persistent and making the equipment work. We fixed it all and did a lot of good science as a result of it," Cabana added.

Landing went smoothly, and an inertial measurement unit that had exhibited errant readings on the last several days of the flight performed well during entry.

"This was an enormous mission," said Dr. Bob Snyder, IML-2 mission scientist.

The 200 scientists working on the experi-

ments expect "huge results," he said. There will be a quick assessment of the samples immediately, and some investigators will have results soon after that, particularly those working with biological cells that have a short lifetime.

"This mission was such an ambitious mission, but now everything I can do has been completed," Mukai said. "I hope that we brought back a lot of scientific data which will be used for our lives on Earth."

Metallurgical samples and data tapes will take longer to receive and analyze, with preliminary results expected in three months and more detailed findings in a year.

"The microgravity program I feel is now beginning," he said. "Only now are we establishing these laboratories, getting them up and running. We have an enormous way to go to actually operate in this unusual environment."



## JSC helps to protect resources

By Eileen Hawley

Technology developed for the space program now may be used to increase our ability to protect our environment on Earth from pollution.

JSC Director Dr. Carolyn Huntoon signed a landmark agreement July 15 between JSC and the Air Force in which both agreed to share technology that may help prevent or lessen the effects of pollution. The agreement between JSC, the Air Force Center for Environmental Excellence and the Air Force Human Systems Center, creates a cooperative effort which will allow joint development of environmental and health technologies.

"The work we will do to create a pollution-free environment on Earth is similar to what we do for the astronauts on board the shuttle," said Kumar Krishen, JSC's chief technologist. "On board the shuttle, we create a small world for the astronauts, and it has the attendant problems of air and water pollution."

The technologies developed to deal with those problems has applications to reclaiming polluted land, air and water here on Earth, Krishen said.

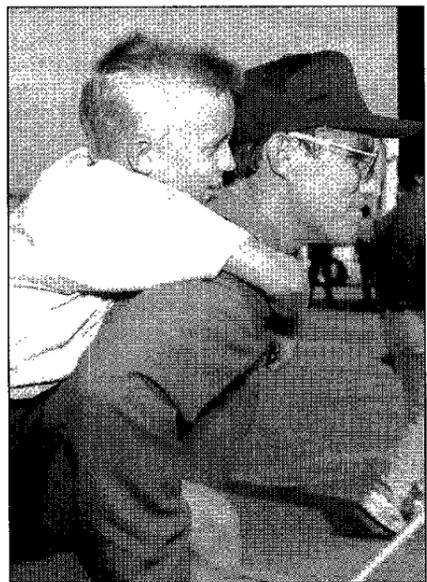
"Ideally, we would live in a world where we do not pollute," Krishen said. "Through these joint efforts, we can try to reverse the process of pollution and reclaim some of our plan-

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Above: STS-65 Payload Specialist Chiaki Mukai is greeted at Ellington Field by Lorna Onizuka on Saturday. Friends, family and fellow employees welcomed home the crew of the International Microgravity Laboratory-2 mission following the record-setting 14 day, 17 hour, 55 minute flight, which ended with a landing at Kennedy Space Center. Left: Mission Specialist Carl Walz gets a welcome home hug from his son, Aaron, who in turn gets a piggy-back ride.

JSC Photos by Benny Benavides



## Endeavour rolls to launch pad as crew gets ready

The six STS-68 astronauts will travel to Florida next week for the final countdown dress rehearsal before the planned Aug. 18 launch of the Space Radar Laboratory-2 mission.

SRL-2 will provide scientists from around the world with a second opportunity to study how the Earth's global environment is changing from a unique vantage point 120 nautical miles above the planet's surface, this time during a different season.

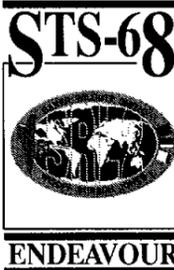
The SRL antenna complement, which first flew during STS-59 in April, will again give scientists highly detailed information that will help them distinguish between human-induced environmental changes and other natural forms of change. NASA will distribute the data to the international scientific community so that this essential research is available worldwide to help people make informed decisions about how best to protect the environment.

Kennedy Space Center technicians continue to prepare *Endeavour* for launch. After interface tests in the Vehicle Assembly Bldg., *Endeavour* rolled out to Launch Pad 39A on Wednesday.

Shuttle managers will meet at KSC Thursday for the flight readiness review of all preparations for the seventh flight of *Endeavour* and the 64th flight of the shuttle program.

Leading the STS-68 crew will be Commander Mike Baker, making his third flight. Payload Commander Tom Jones and Mission Specialists

Dan Bursch and Jeff Wisoff will be making their second flights, and Pilot Terry Wilcutt and Mission Specialist Steve Smith will be making their first flights.



The SRL payload is comprised of the Spaceborne Imaging Radar-C/X-Band Synthetic Aperture Radar, and the Measurement of Air Pollution from Satellite. The German Space Agency (DARA) and the Italian Space Agency (ASI) are providing the X-SAR instrument.

The imaging radar of the SIR-C/X-SAR instruments has the ability to make measurements over virtually any region at any time, regardless of weather or sunlight conditions. The radar waves can penetrate clouds, and under certain conditions, also can "see" through vegetation, ice and extremely dry sand. In many

Please see **SPACE**, Page 4

## Satellites help fight Lyme disease

Satellite technology is helping to predict the risk of Lyme disease transmission in high-exposure areas, thanks to the efforts of scientists at NASA's Ames Research Center and the New York Medical College in Valhalla, N.Y.

"We have successfully used satellite imagery to identify specific types of suburban areas in Westchester County, New York, where the risk of exposure to Lyme disease is high," said research scientist Sheri Dister of Johnson Controls World Service Inc.

The NASA team of Dister, Byron Wood and Louisa Beck, working with Durland Fish of NYMC and Westchester County Health Department investigators, combined Landsat imagery and Geographic Information System technology, to identify types and placement of landscape elements associated with Lyme disease risk.

The scientists found that the higher the proportion of vegetated residential area next to woods within a municipality, the higher the transmission risk. About 69 percent of the deer tick bites in Westchester County are acquired by people near their homes.

Lyme disease is transmitted to humans by infected deer ticks and is now the most commonly reported type of disease transmitted by a variety of insects and ticks in the United States. Left untreated, Lyme disease can result in debilitating arthritis, and neurological and cardiac disorders.

"Knowing where the risk of Lyme disease occurs is the first step in prevention — whether behavioral, spraying for ticks, or vaccination," Fish said. "This new method of getting information has given us a complete picture of the high risk areas throughout the county, without sending teams of people into the field."

The preliminary study used rates of Lyme disease antibodies in the blood of domestic dogs as a measure of exposure risk. Dogs exposed to tick bites produce specific antibodies to Lyme disease. The dogs' infection rate can indicate the risk of Lyme disease transmission.

NYMC scientists analyzed the percentage of dogs testing positive in each municipality of Westchester County. Antibody rates increased from south to north as the character of the countryside changed from urban to rural. The Ames scientists used Landsat data to characterize this transition.

Overlaying the canine data onto the landscape map showed a significant correlation between the canine exposure rate and the proportion of vegetated residential areas located next to woods. Residential areas not adjacent to woods did not show this same pattern.



**CRUMBLING MEMORIES** — The Nassau Bay Resort Hotel, a historic fixture in the Clear Lake area, is being torn down after standing empty for several years. The hotel was built in the 1960s and served as a meeting ground for the early space pioneers. Some time in 1995, a Luby's Cafeteria and Hampton Inn Hotel will rise on the former Nassau Bay Resort Hotel grounds.

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## 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, call x35350 or x30990.

**Six Flags:** Tickets available for one-day weekend and weekday admission. Cost is \$20.95 for weekend and \$16.75 for weekday. Two-day admission, either weekend or weekday, is \$27.25. Buy-one-get-one-free coupons on one-day weekday ticket.

**Seaworld of Texas:** Discount tickets: adult \$20.95; child (3-11), \$14.25.

**Fiesta Texas:** Discount tickets: adult \$18.95; child (4-11) and seniors (55+), \$14.25. Special price of \$14.25 for tickets purchased between July 25-30. Tickets good any time this season.

**Splash Town:** Discount tickets, \$11.05.

**Waterworld:** Discount tickets, \$10.50.

**Astroworld:** Discount tickets: adult \$13.75.

**Moody Gardens:** Discount tickets for two of three different attractions: \$9.50

**Space Center Houston:** Discount tickets: adult, \$8.75; child (3-11), \$7.10; commemorative, \$9.55.

**Metro tickets:** Passes, books and single tickets available.

**Movie discounts:** General Cinema, \$4.75; AMC Theater, \$4; Loew's Theater, \$4.50.

**Stamps:** Book of 20, \$5.80

**JSC history:** *Suddenly, Tomorrow Came: A History of the Johnson Space Center*, \$11.

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## Gilruth 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 a.m.-9 p.m. Monday-Friday; and 8 a.m.-4 p.m. Saturdays. Dependents must be between 16 and 23 years old.

**Weight safety:** Required course for employees wishing to use the weight room is offered from 8-9:30 p.m. Aug. 10. Pre-registration is required. Cost is \$5.

**Defensive driving:** Course is offered from 8:15 a.m.-3 p.m. Saturday. Next class is Aug. 6. Cost is \$19.

**Aerobics:** High/low-impact class meets from 5:15-6:15 p.m. Tuesdays and Thursdays. Cost is \$32 for eight weeks.

**Exercise:** Low-impact class meets from 5:15-6:15 p.m. Mondays and Wednesdays. Cost is \$24 for eight weeks.

**Aikido:** Martial arts class meets from 5-7:30 p.m. Tuesdays and 6:15-8:15 p.m. Wednesdays. Black Belt class from 6-8 p.m. Fridays, requires instructor permission. Cost is \$25 per month. New classes begin the first of each month.

**Country Dancing:** Classes meet Mondays. Beginners class meets from 7-9 p.m.; advanced class meets from 8:30-10 p.m. Partners are required. For additional information, contact the Gilruth Center at x33345.

**Golf Lessons:** Lessons for all levels. Cost is \$90 for six weeks. For additional information, contact x33345.

**Volleyball registration:** Registration for Mixed "C" volleyball is Aug. 16. Registration for mixed "B" women's and men volleyball is Aug. 17. For information, call x33345.

**Basketball registration:** Registration for men's basketball is Aug. 18. For additional information, call x33345.

**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.

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## Dates & Data

### Today

**Cafeteria menu** — Special: fried chicken. Total Health: vegetable lasagna. Entrees: broiled cod fish, beef stroganoff, vegetable lasagna. Vegetables: steamed broccoli, carrots vichy, Italian zucchini, breaded okra.

### Monday

**Cafeteria menu** — Special: meat sauce and spaghetti. Total Health: potato baked chicken breast. Entrees: wieners and sauerkraut, sweet and sour pork chop, potato baked chicken, steamed fish, French dip sandwich. Soup: cream of asparagus. Vegetables: French cut green beans, seasoned rice, California vegetables, buttered beans.

### Tuesday

**Cafeteria menu** — Special: smothered steak with dressing. Total Health: shrimp creole over rice. Entrees: beef stew, liver and onions, shrimp Creole, baked chicken, French dip sandwich. Soup: navy bean. Vegetables: steamed rice, seasoned cabbage, corn O'Brien, peas, potatoes au gratin.

### Wednesday

**Cafeteria menu** — Special: salmon croquette. Total Health: vegetable plate. Entrees: roast pork, baked perch, steamed fish, vegetable lasagna, Reuben sandwich. Soup: seafood gumbo. Vegetables: mustard greens, okra and tomatoes, vegetable sticks, lima beans.

### Thursday

**Cafeteria menu** — Special: stuffed cabbage rolls. Total Health: oven crisp cod. Entrees: beef tacos, ham and lima beans, pork and beef egg rolls, steamed fish, French dip sandwich. Soup: beef and barley. Vegetables: Brussels sprouts, green beans, buttered squash, pinto beans.

### Friday

**Cafeteria menu** — Special: baked chicken. Total Health: roast beef au

jus. Entrees: deviled crab, Creole baked cod, baked chicken, beef cannelloni, Reuben sandwich. Soup: seafood gumbo. Vegetables: seasoned carrots, peas, breaded okra, steamed cauliflower.

### Aug. 4

**Blood drive** — Martin Marietta will host a blood drive from 8-11 a.m. in the parking lot at 555 Forge River Drive. For additional information, contact Eddie Rangel, 280-2582.

### Aug. 8

**NMA Class** — The Texas Gulf Coast Council of the National Management Association will host a 10-hour "Successful Money Management Seminar" from 6-9 p.m. Aug. 8, 15 and 22. Cost to attend is \$50 per couple for members, \$75 for non-members. For additional information, contact Richard Hergert, 280-0444.

### Aug. 10

**PSI meets** — The Clear Lake/NASA Area chapter of Professional Secretaries International meets at 5:30 p.m. Aug. 10 at the Holiday Inn on NASA Road 1. For additional information, contact Elaine Kemp, x30556 or Diana Peterson, x33077.

**Blood drive** — McDonnell-Douglas will host a blood drive from 8:30-11:30 a.m. and from 1-3:30 p.m. in the rear parking lot at 13100 Space Center Blvd. For information, contact Teresa Esquivel, 212-5036.

### Aug. 11

**Blood drive** — Loral will host a blood drive from 7-11:30 a.m. at Loral Bldg. 1, 1322 Space Park Drive and from 1:30-4:30 p.m. at Loral Bldg. 11, 1816 Space Park Drive. For an appointment, call 335-5030.

### Aug. 16

**Blood drive** — Loral will host a blood drive from 8-11 a.m. at Loral Bldg. 3, 3700 Bay Area Blvd., and from 1:30-3:30 p.m. at Marina Plaza,

South Shore Harbour. For an appointment, call 335-5030.

### Aug. 21

**Chorus auditions** — The Bay Area Chorus will hold auditions for the Fall 1994 season from 3-5 p.m. Aug. 21 at Clear Lake Presbyterian Church, 1511 El Dorado Blvd. For an appointment, call 684-6030.

### Aug. 25

**Blood drive** — Krug Life Sciences will host a blood drive from 8:30-11:30 a.m. in the parking lot at 1290 Hercules. For additional information, contact Beth Brumley, 212-1204.

**Blood drive** — Barrios Technology will host a blood drive from 12:30-3:30 p.m. at 1331 Gemini. For information, contact Tom Hanson, 244-7473.

### Sept. 5

**Labor Day** — Most JSC offices will be closed in observance of the Labor Day Holiday.

### Sept. 14

**PSI meets** — The Clear Lake/NASA Area chapter of Professional Secretaries International meets at 5:30 p.m. Sept. 14 at the Holiday Inn on NASA Road 1. For additional information, contact Elaine Kemp, x30556 or Diana Peterson, x33077.

### Oct. 10

**Columbus Day** — Most JSC offices will be closed in observance of the Columbus Day Holiday.

### Oct. 12

**PSI meets** — The Clear Lake/NASA Area chapter of Professional Secretaries International meets at 5:30 p.m. Oct. 12 at the Holiday Inn on NASA Road 1. For additional information, contact Elaine Kemp, x30556 or Diana Peterson, x33077.

### Nov. 11

**Veterans Day** — Most JSC offices will be closed in observance of the Veterans Day Holiday.

## Swap Shop

Swap Shop ads are accepted from current and retired NASA civil service and on-site contractor employees. Each ad must be submitted on a separate full-sized, revised JSC Form 1452. Deadline is 5 p.m. every Friday, two weeks before the desired date of publication. Ads may be run only once. Send ads to Roundup Swap Shop, Code AP3, or deliver them to the deposit box outside Rm. 147 in Bldg. 2. No phone or fax ads accepted.

### Property

Sale: Friendswood, 4-2-2, .5 acre, landscaped yard, 25 trees, new roof, carpet, vinyl, paint, wallpaper, tile, assume 7% fixed, \$37k equity, \$125k. Mark, x38013 or 992-4132.

Sale: Forest Park East, Friendship Section, six cemetery spaces, near chapel, all privileges, \$5.9k. 488-7852.

Sale: Oakbrook West, 4-2-2, completely updated, nice trees, reduced to \$94.5k. Denise, 486-5146.

Rent: Heritage Park, 3-2-2, 1700 sq ft, new floor/carpet & A/C, new paint & roof, \$800/mo + dep. Sonny, x38533 or 474-4198.

Rent: Galveston beach house, central air, furnished, sleeps 6, daily/weekly rates. Ed Shumilak, x37686 or 326-4795.

Sale: Bacliff, 900 sq ft. home on 8' piers, currently leased, all appliances, close to Bay, \$29.5k. 333-1156.

Sale/Lease: Friendswood, Heritage Park, 4-2-2, 1950 sq ft, large covered deck, new tile floor, new ext paint, large living room, dining room, new ceiling fans, \$81.9k or \$900/mo. x33748 or 996-1408.

Sale: Baywind I, 2-1.5, 2 spaces, condo, excellent condition, immediate occupancy, ground floor, W/D, new dishwasher, \$35k, financing available. Tom, 333-3992.

Lease: Barringerway condo, 2-1, W/D hookup, pool, storage area, ex cond, new carpeting, no pets, \$495/mo. 486-2048.

Rent: Galveston condo, furnished, sleeps 6, Seawall Blvd & 61st, swimming pools, cable TV, wknd/wkly/dly rates. Magdi Yassa, 333-4760 or 486-0788.

Sale: Heritage Park, 3-2-2, cul-de-sac, wood floor, windows, updated kitchen & bath, was \$69k now \$65k. Marjorie, 333-1500.

Lease: Townhouse near Putt-Putt, 2-

2.5-1, garage opener, FPL, master BR is 23' long, direct entry from garage, near pool, over 1500 sq ft. 452-3361.

### Cars & Trucks

'90 Ford F350 dually supercab, 7.3 liter diesel, 58k mi, new paint, \$13.5k. Daisy, 409-925-2944.

'83 Thunderbird, V6, Heritage, A/C, power, automatic, cruise, excellent interior, Michelin tires, \$2,750. x35376 or 943-3842.

'79 Ford Club Van, automatic, power steering, power brakes, AM/FM/cass, runs good, \$1.2k OBO. x36461 or 534-4667.

'77 Datsun Pickup, automatic, A/C, AM/FM/cass, needs brake job, \$1.2k OBO. x36461 or 534-4667.

'91 Daytona, sporty, red, non-smoker, 30K mi, auto, A/C, \$7k. 412-4924.

'87 Alfa Romeo Spider Veloce, 36.5k mi, cream ext, leather, pwr, garaged, A/C, \$8.3k OBO. Tim, x32519.

### Boats & Planes

'82 24' Sovereign, 3/sails, 9.9 hp Johnson O/B, sleeps 4, galley, head, excellent condition, \$9.2k. 532-1240.

Michigan Propeller, 13 1/4 x 17 aluminum prop, brand new, \$75 OBO. Rusty, x35589 or 474-9140.

### Cycles

'84 Kawasaki GPz550, super clean, new tires, rebuilt carbs, \$1.6k. x41062 or 480-3195.

### Audiovisual & Computers

IBM Selectric typewriter w/7 typing elements & Panasonic computer printer, KX-P1091i, \$75 ea; computer emulation of Macintosh for AMIGA (Amx 2.5) w/external cartridge & 2 Mac ROM chips & Apple 800k FD, \$200. Dan, 488-5417.

386 DX 25 MHz computer, 4MB RAM, 90MB HD, SVGA monitor & card, 1.44 MB 3.5" & 1.2MB 5 1/4" FDs, MS-DOS 6.0 included, \$600. Chad, x35786 or 482-9263.

Speakers, Pioneer, CS-88, \$50/pair; Garrard Synchro-Lab 55B turntable, \$25. x36813.

486-33 DX VESA, 4MB, 150MB FD, 3.5 floppy, 28 VGA, mini tower, kybd, printer, \$800. 894-8380.

Macintosh Plus, 2.5MB RAM, 20MB HD, kybd, trackball, ext FD, software,

\$300 OBO. 474-3553.

286 PC, monitor, kybd, modem, \$75; computer table, \$20. 480-0903.

### Household

Couch & loveseat, both with dual recliners, \$300. Dan, 488-5471.

Microwave, \$70; coffee table, cherry-wood, heavy glass inset, ex cond, \$360. x39268.

Muave sleeper sofa & love seat, ex cond, \$400; black lacquer air bed, frame and headboard, ex cond, \$150. Joe Carr, x32464 or 486-4026.

Black stand for 35" TV, glass doors, like new, \$120 OBO. Laurie, x35590 or 991-0821.

Solid wood bedroom set, good condition, twin bed w/headboard & mattress, \$100; 2-drawer nightstand, \$25; large dresser w/mirror, \$75; entire set \$150. Karina, x32565.

Washer & dryer, ex cond, just serviced; 6-drawer dresser; 2-twin bed frames; 2-rabbit hutches. 331-2289.

Bedsprings, like new, excellent quality, full/\$35; queen/\$45. Mark, x38013 or 992-4132.

Inlaid oak parquet pattern coffee table, \$100. Eric, x31917.

2-wood & white finished bar stools, ex condi, \$50. Bill, x47159.

### Wanted

Want NASA publication SP4215 *Where No Man Has gone Before* or any "SP" pubs; Star Wars toys and figures. Ron, 333-6952 or 482-1385.

Want personnel to join VPSI vanpool from Meyerland Park and Ride lot at 7:05 a.m. to JSC, on-site personnel working 8 a.m./4:30 p.m. shift, currently have 16 members, and looking for 1 to 2 more. Travis Moebes, x45765, or Don Pipkins, x35346.

Want personnel to join VPSI vanpool, West Loop park & ride lot at 6:35 a.m. to NASA/contractors. Richard Heetderks, x37557 or Ed Rangel, x36124.

Want male, non-smoking roommate to share CLC 3-2-2, \$425/mo, all bills paid including cable, excluding long distance, ideal for students or recent grads. Jim, 486-2463.

Want to lease condo in Clear Lake on Bay Area Blvd near NASA, 2 BR, W/D connection, no pets, \$450 - \$485/mo, low deposit. Laura, x32172.

Want non-smoking roommate to live in my home, Friendswood, 4-2, cable, W/D, microwave, VCR, gas grill & all household privileges included, 20 minutes to NASA, \$250/mo, all bills paid. Michael, x38169 or 482-8496.

Want hunting lease, preferably near Sonora or comparable, yearly, or by the day. Nelda, 333-7686 or 332-5641.

Want to rent a Mantis garden tiller. 337-5392.

Want educational toys, 1st year elementary teacher needs books, equipment for classroom, e.g. blocks, legos, shelves, hot plate, anything that can be used in a classroom for teaching 1st graders, donations only please. Michele, 992-4146.

Want housemates, M/F to share 4 BR house with pool, Camino South. Bryan or Amy, 286-7227.

Want small trailer for 12' boat. Chuck, x48274 or 480-4859.

Want non-smoking roommate to share 3-2-2, LC house, \$250 or \$350 for private bath, +1/3 utilities. Rob, x41027 or 538-1449.

### Miscellaneous

Sparkling water carbonation machine, \$50 OBO; six 1909-1911 Tobacco baseball cards, \$100 OBO; unopened baseball card sets, \$30 OBO. Tony, x47401 or 482-4156.

Kenmore commercial upright freezer, \$700 OBO; Wagner power roller, \$25; Unisonic answering machine, \$20. Kelly, 996-8410.

Nostalgia & collectibles, original piano sheet music of early '40's LP records; original Broadway cast shows, \$1/ea. Earl Rubenstein, 480-1998.

Herb plants, container grown and fresh cut, lg selection; Hartco wood parquet floor tile, 3 boxes, color bran, 25 sq ft per box, \$55 per box. 333-6277 or 339-3562.

Gold rope chain, 14k, 20" long, 2.5 mm wide, \$160. Eric, x31917.

Diamond engagement ring, beautiful pear shape .5 carat t.w., near white color, gold band, \$1k; Bahama trip, take a cruise ship from Florida to the Bahamas, stay 3 days, 4 nights, \$175. Jenny, x30392.

Bicycle rack-mounted child seat, "Rhode Gear" seat comes on & off bike rack in seconds, all safety straps &

instructions, \$50. 286-5431.

Dacor wrist depth gauge & weight belt; Star Trek commemorative plates, posters, etc. OBO. Ron, x30887.

President and First Lady Charter Gold membership, \$450; Medela breast pump, electric/battery operated with manual conversion, \$60. Denise, 30455 or 474-2223.

Body Tech Stairclimber, electronic monitoring display, \$75; Krenelin, white size 6, \$20; Casio electronic keyboard, \$40. Su, x45722.

'94 Sportsman 23' travel trailer, loaded, \$11.9k OBO. x36609 or 554-2532.

Flex Force Workout System, Solo Flex design with butterfly, bench press, also stepper, 34 exercises illustrated, excellent condition, \$250. 944-3380.

Water lilies, tropicals, & hardies, assorted bog plants, \$1 - \$25. 337-5392.

Collector selling parts of collection, sports cards, magazines, comics, space related *Life* magazines, *Omni* magazines. Duane, x36145 or 428-7419.

Little Tikes full kitchen set w/attachments, \$125; Little Tikes beauty parlor, \$75; Barbie battery car, \$50; Corvette battery car, \$40; assorted toys. 480-0903.

22" Murray lawn mower, \$30; '93 Saturn bra, \$50; 286 DTK computer w/math co-processor, software, keyboard, needs controller, \$20; 2-sets bookshelves, \$10/each. Linda, x30069 or 286-5937.

Igloo style dog house for medium size dog, complete w/pad, \$50. Joe Carr, x32464 or 486-4026.

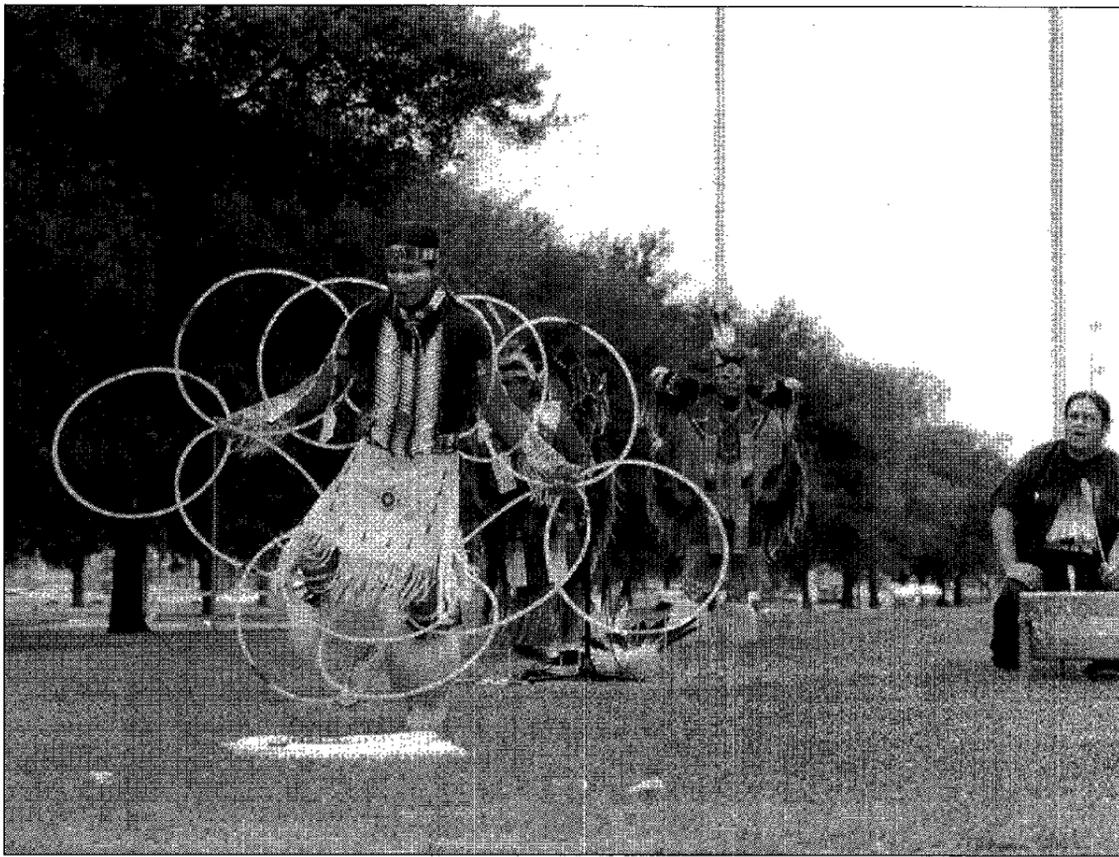
Custom Work benches Inc, medium duty, \$90; heavy duty, \$95; extra heavy, \$105; price includes labor & delivery, have display for showing. Rick, x32464 or 337-7306.

Bassinets, \$50; infant car seat/carrier, \$30; bouncy chair, \$15. Stacey, x32649 or 338-4983.

Sterling silver space coins, Yemen 2 Riyals '69, LEM on Moon, Apollo on Pad, \$40/ea; Guinea 250 Francs '70, Apollo 11, 13, Soyuz, \$20/ea; Eyewitness SS medals, Apollo 17, Skylab, \$20/ea; Apollo Soyuz SS medal w/U.S. & USSR stamps, \$25. John, x30519 or 488-4353.

Little Tykes three piece kitchen set, refrigerator, stove and sink, \$40. Rusty, x35589 or 474-9140.

Rain soft water softner, 3 years old, new \$3.4k, sell \$1.3k. 286-3168.



# Celebrating with pride

## Focus is on unity



**H**undreds of JSC employees and families celebrated unity and diversity during the first American Heritage Day observation July 15.

Entertainers reflecting the cultures of India, America, Vietnam and Mexico delighted onlookers with their performances. Crowds remained through the evening to enjoy the food, fun, and exhibits provided by JSC employees and local businesses. Guests heard performances by rhythm & blues bands, mariachis and gospel singers. In addition to the festivities, employees heard about the civil rights struggle that engaged

the nation in the 1960s and learned the importance of teamwork and cooperation in personal success.

Clockwise from top left

Members of the Alabama Coushatta Nation begin JSC's American Heritage Day observations by performing a Native American dance. The dancers then led attendees to Teague Auditorium for presentations and speeches.

The Mariachi Continental troupe serenades JSC employees. The band wandered through the mall area of the campus encouraging employees to join in the American

Heritage Day festivities.

Silpa Kosuri of the Archana Dance Academy shows the elegance of Indian dance as she performs in front of Bldg. 1.

Dr. John Q. Taylor King, chancellor and president-emeritus of Huston-Tillotson College reflected on the struggle for civil rights in America during the 1960s.

Children and teachers from JSC's Child Care Center are joined by employees as they watch the festivities beginning American Heritage Day. The children later led the audience in Teague Auditorium in the Pledge of Allegiance. □



JSC Photos by Scott Wickes

# Laser reflectors present changing lunar image

A quarter of a century ago, Apollo 11 astronauts Neil Armstrong and Buzz Aldrin deployed a variety of scientific experiments in the fine powder of the Sea of Tranquility.

Among those devices was a laser ranging retroreflector, which, a generation later, is still yielding fundamental scientific data. Scientists analyzing data from the Lunar Laser Ranging Experiment have reported some watershed results from these long-term experiments, said team investigator Jean Dickey of NASA's Jet Propulsion Laboratory.

Laser ranging has made possible a wealth of new information about the dynamics and structure of the Moon. Among many new observations, scientists now believe that the Moon may harbor a liquid core. The

theory has been proposed from data on the Moon's rate of rotation and very slight bobbing motions caused by gravitational forces from the Sun and Earth.

Other recent findings from the laser ranging experiments include: verification of Einstein's theory of relativity, which states that all bodies fall with the same acceleration regardless of their mass; that the length of an Earth day has distinct small-scale variations caused by the atmosphere, tides and the Earth's core; precise positions of the laser ranging observatories on Earth are slowly drifting as the crustal plates on Earth drift; ocean tides on Earth have a direct influence on the Moon's orbit and measurements show that the Moon is receding from

Earth at a rate of about 1.5 inches per year.

Continued improvements in range determinations and the need for monitoring the details of the Earth's rotation will keep the lunar reflector experiments in service for years to come, Dickey said.

The first laser ranging retroreflector was positioned on the Moon in 1969 by the Apollo 11 astronauts so that it would point toward Earth and be able to reflect pulses of laser light fired from the ground.

By beaming laser pulses at the reflector, scientists have been able to determine the round-trip travel time of a laser pulse and provide the distance between these two bodies at any given time down to an accuracy of about 1 inch. Once the laser

ranging experiments began to yield valuable results, more reflectors were left on the Moon. The laser reflector consists of 100 fused silica half-cubes, called corner cubes, mounted in an 18-inch-square aluminum panel. Each corner cube is 1.5 inches in diameter.

A reflector identical to the Apollo 11 mission reflector was left by the Apollo 14 crew, and a larger reflector using 300 corner cubes was placed on the Moon by the Apollo 15 astronauts. French-built reflectors also were left on the Moon by the unmanned Russian Lunakhod 2 mission.

Observatories in Texas and Hawaii have ranged the moon several times using these reflectors. Lick Observatory in California also

has been used in the past for the lunar laser ranging experiments, and ranging programs have been carried out in Australia, Russia and Germany.

The reflectors are too small to be seen from Earth, so even when a laser beam is precisely aligned in the telescope, actually hitting a lunar retroreflector array is technically challenging. Once the laser beam hits a reflector, scientists at the ranging observatories use extremely sensitive filtering and amplification equipment to detect the return signal, which is far too weak to be seen with the human eye. Even under good atmospheric viewing conditions, only one photon — the fundamental particle of light — will be received every few seconds.

## IMAX film premieres Saturday

JSC employees and their families will have an opportunity to relive the excitement of spaceflight as Space Center Houston premieres the newest IMAX movie, "Destiny in Space."

The film, chronicling the events of nine shuttle flights, begins its Houston run July 30 in the visitor center's Space Center Theater. "Destiny in Space" features exterior shots of the shuttle in flight around the Earth, the spacewalks to service the Hubble Space Telescope and the departure

of the Galileo probe on its journey toward Jupiter. The 40-minute film will run exclusively at Space Center Houston through January 31, 1995.

More than 43 astronauts participated in the filming of "Destiny in Space," the third IMAX film focusing on the space program. Footage was shot on a number of shuttle flights.

"Destiny in Space" is presented by the Smithsonian Institution's National Air & Space Museum and Lockheed Corp. in cooperation with NASA.

For additional information and show times, contact Space Center Houston, 244-2100.

## Go native at EAA luau

Employees can enjoy a brief vacation in the tropics during the Employee Activities Association's luau dinner and dance Aug. 27 at the Gilruth Center.

The festivities begin with a social hour at 7:30 p.m. followed by a luau banquet consisting of ham, salad, and cheesecake starting at 8 p.m. Guests may dance to the music of "Toonz" in the ballroom and enjoy hula dancing performed by the Makana Aloha Dancers.

Dress for the event is "island casual." Tickets for the luau dinner and dance are on sale at the Bldg. 11 Exchange Store through 2 p.m. Aug. 24.

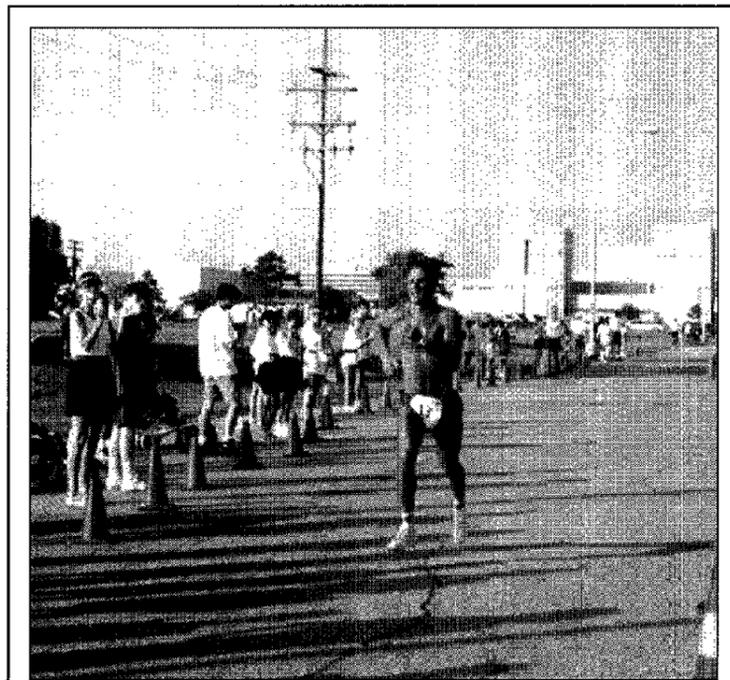
Cost to attend is \$17.50 per person. Tickets are non-refundable. JSC civil service employees, retirees, and NASA-badged contractors may purchase a table of 6, 8 or 12 seats.

For additional information, contact Mavis Ilkenhans, x49644.

## Space News Roundup

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**ASTRONOMICAL FEAT**—Shuttle astronaut Bill Gregory approaches the finish line of the Loral Lunar Rendezvous 5K run held July 16 at JSC. Gregory won the event with a time of 15:58, leading a field of more than 1,100 runners for the annual race commemorating the Apollo 11 lunar landing. Other top winners included Connie Hand, Mark Hunter, Becie Duer and Carl White.

## NASA news travels information highway

Distribution of news releases and other informational materials from NASA Headquarters is taking a giant leap into the Information Age.

NASA Headquarters will no longer distribute news releases, contract announcements or notes-to-editors by mail. On July 25, electronic distribution services such as the Internet and CompuServe became the primary means of informing the news media and the public about NASA activities and programs. Text-only versions of mission press kits also are available via on-line services.

"We are excited by the possibilities inherent in this new way of doing business," said Geoffrey H. Vincent, deputy associate administrator for Public Affairs and head of the agency's public affairs Internet steering group. "Over time, this change will save the taxpayers hundreds of thousands of dollars and allow us to meet

our customers' needs in a much more effective and efficient manner."

The changeover has been planned for almost a year, Vincent noted. "The Internet is quickly evolving, and we hope to evolve with it," he said. "In the years ahead, vast amounts of information on space exploration, from news releases to historical documents and photographs—eventually even video—will be available not just to reporters, but to teachers, students and anyone else who wishes to access it."

Information also will be available from a data repository called anonymous FTP (File Transfer Protocol) at ftp.pao.hq.nasa.gov under the directory /pub/pao. Users should log on as "anonymous" (no quotes), then enter their E-mail address as the password. Users with CompuServe accounts can access NASA press releases by typing GO NASA.

## Employees honored at MFA reception

More than 20 JSC civil service and contractor employees watched the July 8 launch of STS-65 at Kennedy Space Center as recipients of the Manned Flight Awareness award.

The honorees also received a VIP tour of KSC and a reception. Astronaut Winston Scott presented all the honorees with framed certificates and pins.

Civil service honorees were: Richard Armstrong and Bill Spenny, Engineering; Yolando Bejarano, Space Shuttle Program; Linda Billica, Flight Crew Operations; Mike DeMasie and Doug Rask, Mission Operations; Stan Donahoe, Orbiter and GFE Projects; Dan Goulden, Office of the Comptroller; Ralph Grau, Safety, Reliability and Quality Assurance; Margaret Guerra, Space

& Life Sciences; Renee Julian, Space Station Program; Valerie Marburger, Business Management; Betty McNeely, Office of the Director; Scott Morris, Information Systems Directorate; Pete Vasquez, Center Operations; and John Villegas, White Sands Test Facility.

Contractor honorees were: Neil Adams, Gilbane Building; Bill Drummond, Johnson Engineering; Celia Elkins, Northrop Grumman; Larry Guderian, McDonnell Douglas; Bobbie Jessie, GHG Corp.; Brenda Lajara, Omega World Travel; Alfie McAllister, Spar Aerospace; Paul Meier, Loral; Sandy Meyer, Allied Signal; Bob Mullen, Dyncorp; Mike Sanni, Martin Marietta; Bob Sauls, Frassanito & Associates; and Rob Sturtevant, CAE-Link.

## Space Radar Lab-2 follows track of first

(Continued from Page 4)

cases, radar is the only way scientists can explore inaccessible regions of the Earth's surface.

The SIR-C/X-SAR radar data provide information about how many of Earth's complex systems (those processes that control the movement of land, water, air and life) work together to make this a livable planet. The science team particularly wants to study the amount of vegetation coverage, the extent of snow packs, wetlands areas, geologic features such as rock types and their distribution, volcanic activity, ocean wave heights and wind speed. STS-68 will fly over the same sites observed during the STS-59 mission allowing scientists to study seasonal changes that may have occurred in those areas between missions.

An international team of 49 science investigators and three associates will conduct the SIR-C/X-SAR experiments. Thirteen nations are represented: Australia, Austria, Brazil, Canada, China, the United Kingdom, France, Germany, Italy, Japan, Mexico, Saudi Arabia and the United States.

The MAPS experiment will measure the global distribution of carbon monoxide in the troposphere, or lower atmosphere. Measurements

of carbon monoxide, an important element in several chemical cycles, provide scientists with indications of how well the atmosphere can cleanse itself of "greenhouse gases," chemicals that can increase the atmosphere's temperature.

STS-68 will see the continuation of NASA's Get Away Special experiments program. Two universities, North Carolina A&T State University and University of Alabama in Huntsville, and the Swedish Space Corp., Soana, Sweden, will have small self-contained payloads flying during the STS-68 mission. Other GAS hardware in *Endeavour's* payload bay will carry 500,000 commemorative stamps for the U.S. Postal Service in recognition of the 25th anniversary of the Apollo 11 Moon landing.

The Biological Research in Canister payload will fly for the first time, and the Military Applications of Ship Tracks will make its second flight. The Commercial Protein Crystal Growth experiment, the Chromosome and Plant Cell Division in Space Experiment and the Cosmic Radiation Effects and Activation Monitor experiment also will be carried aboard *Endeavour*.

Launch currently is set for 5:54 a.m. CDT Aug. 18. The mission is scheduled to last 10 days, 4 hours, 40 minutes.

## JSC, Air Force sign agreement to help preserve environment

(Continued from Page 4)

et's resources."

According to the terms of the agreement, the Air Force and JSC will develop joint pollution control and remediation or reclamation technologies. The Air Force and JSC will share expertise, and in some instances facilities, as they create beneficial environmental and occupational health technologies. Work at JSC will be coordinated through the Technology Transfer and Commercialization Office.

"We have been working on these cooperative efforts for some time," Krishen said. Krishen will lead

JSC's efforts, assisted by Jerry Elliott who also will act as liaison between JSC and the Air Force.

The agreement grew out of JSC's participation in the joint federal Space Technology Interdependency Group, an inter-agency organization created in 1982 to encourage joint activities between government agencies, share resources, and reduce redundancy.

"Not only does this agreement fully support NASA's commitment to STIG," Krishen said, "it also enhances our Mission-to-Planet-Earth activities by finding ways to protect and reclaim our planet."



**REWARDING EXPERIENCE** — The recipients of the Manned Flight Awareness award gather for a group photo during a VIP reception in Florida. The group of 29 honorees were treated to a tour of Kennedy Space Center and watched the launch of STS-65 on its record-breaking mission. The next Manned Flight Awareness event is set for September.