

**Hanging by a tether**

Photos of the STS-47 mission provide crew's eye view of EURECA, TSS and life onboard *Atlantis*. Photos on Page 3.



**Mars Observer**

September launch of satellite will continue tradition of Mariner and Viking by mapping Red Planet. Story on Page 4.

# Space News Roundup

Vol. 31

August 21, 1992

No. 33

## Party comes to JSC

The convention was downtown, but hundreds of Republicans took a break from party politics this week to get a close look at JSC and the American space program.

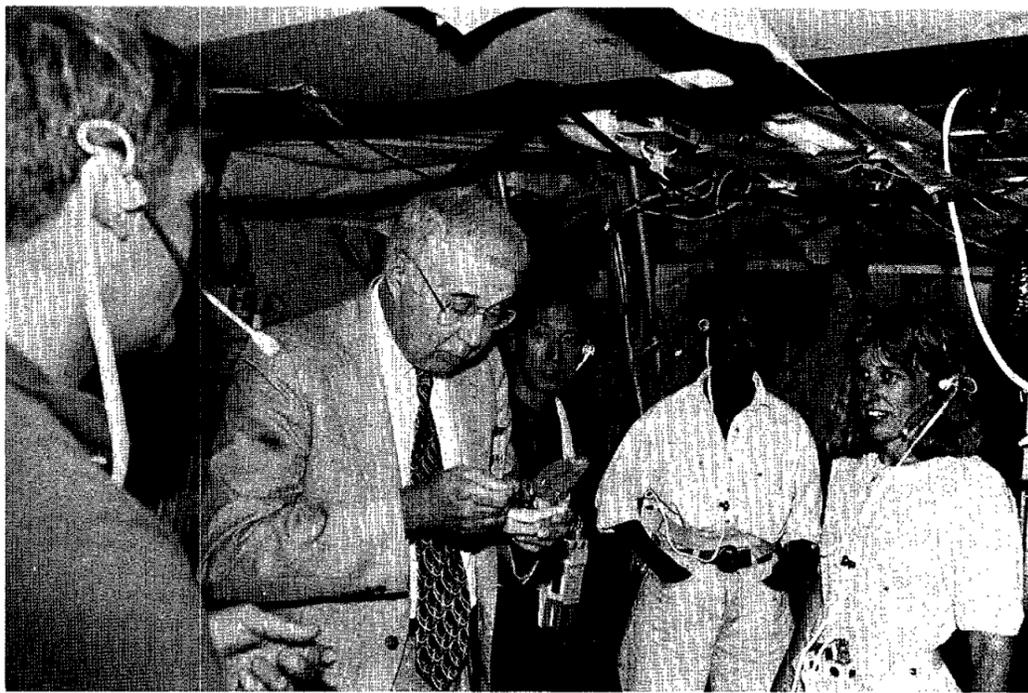
Twenty-seven state delegations, many with more than 100 members, were briefed on JSC activities and facilities. States represented were Maine, Texas, Delaware, Utah, Colorado, Rhode Island, Oregon, Mississippi, California, Vermont, South Dakota, Indiana, Nevada, New Jersey, Oklahoma, Pennsylvania, Wyoming, Minnesota, Ohio, Kansas, Illinois, New York, Wisconsin, Michigan, Virginia, Arizona and Connecticut.

Other dignitaries including senators, representatives and governors from across the country, filled the remaining time available in the Mission Control Center, space shuttle and space station mockups.

Family members also joined the event. Both President George Bush and Vice President Dan Quayle sent relatives to JSC for a visit.

Those who didn't have a chance to travel to JSC could learn more about the space program by visiting the 4,000-square-foot exhibit at the Astroarena.

The exhibit integrated elements from Space and Life Sciences and Engineering, and emphasized the hundreds of medical benefits derived from space research.



The Republican Party got VIP treatment at JSC this week. Above: Rep. Robert Walker of Pennsylvania received a taste of space food from STS-47 crew members, from left to right, Mark Lee, Mamuro Mohri, Mae Jemison and Jan Davis during a crew training exercise. Left: The Utah delegation was one of 27 state groups that visited the space station mockup. Astronaut Michael Clifford briefed the Utah group on station activities.



JSC Photos

## Endeavour gets a lift

By James Hartsfield

Following a few days delay due to a faulty crane, the Space Shuttle *Endeavour* was hoisted vertical to be attached to the fuel tank and solid rockets for STS-47 Wednesday evening.

The delay was caused when one of three cranes experienced erratic movement while stacking the solid rockets for the STS-52 flight in KSC's Vehicle Assembly Bldg. An investigation board eventually cleared the other two cranes to continue flight preparations and the hoisting of the orbiter.

*Endeavour* is scheduled to move to Launch Pad 39B Monday. The STS-47 crew — Commander Robert "Hoot" Gibson, Pilot Curtis Brown, Mission Specialists Mark Lee, Jay Apt, Jan Davis and Mae Jemison and Japanese Payload Specialist Mamoru Mohri — will travel to KSC for a dress rehearsal countdown is planned for Aug. 27. Shuttle managers plan to meet later for a final review of launch preparations and to set a launch date, possibly around Sept. 11.

The 50th flight of the Space Shuttle Program, STS-47 marks the first NASA mission devoted primarily to Japan. The payload complement will carry 43 experiments — 34 provided by Japan, seven from the United States and two joint experiments.

"Astronauts aboard the orbiting laboratory will conduct experiments around the clock. These experiments will add to basic knowledge about the behavior of everything from crystals, fluids and even humans when exposed to the near weightless environment of spaceflight," said Dr. Robert Sokolowski, program scientist.

Elsewhere, *Columbia* continues preparations for STS-52 in the Bay 1 processing hangar. This week, technicians replaced one of the three electricity-generating fuel

Please see **SHUTTLE**, Page 4

## Ocean projects to improve forecasting, measurements

Scientists from the United States and Australia recently completed a project expected to improve the reliability of ocean wave forecasting and to improve measurements from the TOPEX/POSEIDON satellite.

Launched last week, the U.S./French satellite will study ocean topography and circulation, leading to a better understanding of the oceans' role in global climate change.

"What we need to know is how the wind energy is converted into waves and currents under all sorts of conditions, particularly during severe storms," said Dr. Chris

Fandry of the Australia Commonwealth Scientific and Industrial Research Organization's Office of Space Science and Applications.

"Only recently have oceanographers recognized the dominant role of waves in transferring energy from the wind to the current," said Dr. Mike Banner from the University of New South Wales. "Equally important is the strong influence of the waves on the winds. Understanding these processes is a high priority in this experiment."

As part of the Southern Ocean Waves Experiment, scientists observed how ocean winds and

waves affect one another off the coast of Australia. Instrument measurements were conducted from aircraft flying in winds ranging from light and variable to gale force. Data was collected in winds measuring 3.5 mph over calm seas to winds measuring 57.5 mph over seas with 26-foot waves.

According to Dr. Ed Walsh of NASA's Wallops Flight Facility, Wallops Island, Va., this was the first time that wind stress and sea surface topography were measured simultaneously under such a wide range of wind speeds and wave heights. CSIRO instruments studied

wind stress while the Goddard Space Flight Center's Scanning Radar Altimeter observed the sea's topography.

"These data will significantly improve the performance of TOPEX/POSEIDON in the southern ocean and anywhere else there are high winds and waves," Walsh added.

The main instrument on the TOPEX/POSEIDON is a GSFC/WFF-managed radar altimeter developed by the Johns Hopkins Applied Physics Laboratory, Baltimore, Md. The goal of the altimeters on the TOPEX/POSEIDON satellite is to measure mean sea level to an

accuracy of a few centimeters. Walsh said wave depressions reflect an altimeter's radar signals better than the wave crests, causing an error in the measurement.

To measure the magnitude of this bias in the range measurements during SOWEX, an instrument interspersing pulses similar to TOPEX/POSEIDON's was developed by Dr. Bob McIntosh of the University of Massachusetts at Amherst. The data collected during the Australian project will aid scientists in developing models to improve measurements by the TOPEX/POSEIDON altimeters.

## Puddy named as JSC assistant for US/Russian space activities

In preparation of future activities with the Russian space program, JSC Director Aaron Cohen recently selected Donald R. Pudcy to serve as special assistant for Joint U.S./Russian Federation Programs.

"With the relationship between NASA and the Russian space exploration community taking on greater

importance, I believe it is critical that the Center position itself to take full advantage of this unique opportunity," Cohen said.

Puddy will integrate and coordinate all JSC activities that support joint U.S. and Russian Federation programs such as crew exchanges, rendezvous and docking missions between the Space Shuttle and MIR, medical experiments and studies, and feasibility studies on the Soyuz spacecraft as an alternative crew return vehicle for Space Station Freedom, Cohen said.

Puddy's reassignment will be effective September 8. Steven A. Hawley, deputy director of Flight Crew Operations, will serve as acting director until a replacement is named.

Puddy earned a Bachelor of Science in Mechanical Engineering from the University of Oklahoma. He began his career at JSC over

27 years ago following service with the U.S. Air Force. He has held progressively responsible positions including flight director for STS-1; chief, Mission Operations Systems Division; assistant director of systems, Mission Operations Directorate; and director, Flight Crew Operations Directorate.

In addition, Puddy served in a number of other special assignments such as acting deputy director of Ames Research Center, assistant associate administrator for Space Flight at NASA Headquarters, and assistant to the NASA Administrator to prepare the Agency's response to the report of the Advisory Committee on the Future of the U.S. Space Program.

## JSC blood drive initiates bone marrow donor registry

More than just blood will be collected at the next JSC Blood Drive.

For the first time, employees also will have the opportunity to join the National Marrow Donor Program as potential donors.

Each year thousands are stricken with leukemia, aplastic anemia or other fatal blood diseases with the only hope of survival a bone marrow transplant. But nearly 70 percent of those needing help are unable to find suitable donors within their own families and must rely on help from unrelated donors.

Requirements to be a marrow donor are few. Unrelated donors must be between 18 and 55 years old and in good health. A blood test is required to determine the volunteers Human Leukocyte Antigen tis-

sue type. The tissue type is then entered into the NMDP national computer registry.

If properly matched to a recipient and after making a commitment to donate marrow, the volunteer undergoes a relatively simple procedure to remove a quantity of marrow from the pelvis. The donor's marrow completely replaces itself within a few weeks. An overnight hospital stay is normal after marrow collection, and all donor medical expenses are paid by the NMDP.

The Blood Drive and official start of JSC's Marrow Donor Registration Program is from 8 a.m. to 3:30 p.m. Sept. 1 at the Gilruth Center.

For more information, contact Bob Hall at x30613 or Helon Crawford at x34159.



Puddy

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# Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Gift Store from 10 a.m.-2 p.m. weekdays. For more information, call x35350 or x30990.

Metro passes, books, tickets available throughout August.  
Fiesta Texas Park (San Antonio): adult, \$19.50; child 4-11, \$13.55.  
Sea World (San Antonio): adult, \$18.90 (child free with paying adult); child 3-11 \$13.55.

Astroworld, \$16.95 and \$14.95 (child under 54 inches), \$44.95 (season pass) and Waterworld, \$9.50.

Six Flags, \$16.95 (one-day) and \$22.95 (two-day).  
Movie discounts: General Cinema, \$4; AMC Theater, \$3.75; Loews Theater, \$4.  
Stamps, Walt Disney Club memberships also available.

Upcoming events: Lovin' Feelings Concert (7:30 p.m. Sept. 26, Summit): tickets on sale Aug. 31.

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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 badge or EAA membership card. Classes tend to fill up four weeks in advance. For more information, call x30304.

**EAA badges** — Dependents and spouses may apply for photo identification badges from 6:30-9 p.m. Monday through Friday. Dependents must be between 16 and 23 years old.

**Weight Safety** — Required course for employees wishing to use the Gilruth weight room is offered from 8-9:30 p.m. Aug. 27. Preregistration is required; cost is \$5.

**Defensive driving** — Course is offered from 8 a.m.-5 p.m. Aug. 29. Cost is \$19.

**Aerobics** — High/low-impact classes meet 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 beginning Aug. 19. Cost is \$24.

**Aikido** — Martial arts class meets Tuesdays from 6:15-8 p.m. Cost is \$15 per month.

**Country and western dance** — Country and western dance lessons for beginners will be offered from 7-8:30 p.m. Mondays beginning Sept. 14. Advanced classes will be from 8:30-10 p.m. Cost is \$20 per couple; classes run for six weeks.

**Flag football** — Officials are needed to work flag football games during the fall season. For details, call the Gilruth at x30304.

**Fitness program** — Health Related Fitness Program includes medical examination screening, 12-week individually prescribed exercise program. Call Larry Wier, x30301.

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# Swap Shop

Swap Shop ads are accepted from current and retired NASA civil service employees 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

Rent: TLV 1 BR furn efficiency on waterfront, paid util, lease, ref, \$425/mo. x32799 or 532-1725.

Sale: Webster, 3-2-2, D/W, carpet, wet bar, new tiled hall/bath, new kitchen floor, ceiling fans, FPL, \$78.5K. x34771 or 480-9036.

Rent: Pipers Meadow, 4-2-2, \$850/mo w/1st mo and security. John, 409-986-6381.

Sale/Lease: Dickinson, 3-2-2, cathedral ceilings, lrg master BR, fenced, kitchen appl, assumable. 538-1217.

Sale: Lake Livingston, 3-2 14 x 80 Lancer MH on wooded lot, all util, oak cabinets, 15 x 20 raised deck, \$119.9K. Michelle, x36792 or 326-3447.

Sale: Clear Lake Shores, 3-2-2, 2 story, contemporary, gameroom, lg gar, trees. 538-1849.

Lease/Sale: Middlebrook, 4-2-2A, new roof, carpet, vinyl, cabinets, formals, den, avail immediately, lease for \$1050/mo. Morshed, 334-3984.

Sale: Lake Livingston, Impala Woods, 30 x 70 lot, util avail, paved roads, \$3K. Teena, x37787 or 422-6369.

Sale: Lake Livingston, Cedar Point, dbl lot w/small cabin, util, \$7.9K. Rich, x36900 or 332-7399.

Lease: Meadowgreen, 4-2.5-2D, 2-story, lg deck, side patio, FPL, master dn, \$1200/mo. 480-9195.

Sale: San Leon, small, newly remodeled frame house, small yard w/optional lots, owner financed, \$32K, \$4K dn. Aubrey, x36580 or 339-1402.

Lease: Pipers Meadow, 2-2-2A, vaulted ceiling, fenced, new paint/carpet, fan, gar dr opener, refrig, \$725 + dep. x31275 or 486-0315.

Lease: Pipers Meadow, 3-2-2, carpets, drapes, FPL, fenced, built-ins. \$825. 538-3352.

Lease: Barringer Way condo, 2-1, W/D conn, stor area, no pets, \$425/mo. 486-2048.

Lease: Univ Trace condo, 1 BR + study, fans, W/D, avail immediately. 488-2946.

Lease/Sale: Nassau Bay TH, 4-2-2, 2000 sq ft, remodeled, master dn, 2-story LR, \$1290/mo, less for 3 yr lease, or \$119.9K. Jerry, x38922 or 488-5307.

Rent: MH, 1-1 furn, plus detached rec bldg, lg yard w/trees, avail 10-1. 326-1159.

## Cars & Trucks

'88 Toyota Camry LE, V4, wht, elec sunroof, 55K mi, one owner, ex cond, \$8950. 481-1683.

'76 E250HD club wagon, mech ex, good cond, \$2K. Tom Rogers, 244-9855 or 996-0574.

'85 Chevy Cavalier station wagon, wht, auto trans, radio, 85K mi, one owner, \$2.9K. 523-1000.

'71 Ford Explorer PU, good tires, needs some work, \$800 OBO. Elaine, x33810 or 334-3398.

'88 Subaru GL, white, auto, A/C, PS, PB, PW, PL, 50K mi, new tires, AM/FM, ex. cond, \$5K. x35843.

'59 Chevy PU, BO; '80 Chevy Van, \$1.5K. 334-2335.

'85 Honda CRX, 5 spd, AC, AM/FM/cass, new tires/brakes, 80K mi, ex cond, \$3.3K. Larry, x33168 or 488-7460.

'91 Camaro R. Sport, wht, auto, cass, \$10K. 487-2383.

'91 Chev Corsica, V6, 24K mi, 4 DR, tilt, cruise, locks, AM/FM/cass, warranty, \$8450 OBO. Ron, x34713 or 333-2273.

'89 Olds Cutlass Sierra, 4 DR, pwr access, alloy wheels, cruise, AM/FM/cass, ext warr, \$5.9K. 497-6401.

'83 BMW 318i, 49K, project car, \$2.5K OBO. Irene, 286-0206.

'88 Toyota Camry DX, 52K mi, 5 spd, alloy wheels, loaded, ex. cond, \$7K. 282-2810 or 554-6138.

'68 Ford Mustang, red all new body, 4 spd, \$5K. 474-4303.

'87 Isuzu PU, long bed w/liner, 5 spd, A/C, 32K mi, \$4K OBO. 283-1010.

'89 Ford T-Bird SC, 5 spd, loaded, cd player, 58K mi, \$11K. 933-7222.

'85 Ford E150 XLT van, dual AC, towing, 4 capt. chairs, 87.5K mi, good cond, \$5.4K. Barbara, 282-2879 or 482-1106.

'75 Chev Camaro, 350 eng, runs good, \$850 OBO. Terry, 282-4777 or 474-5639.

'88 Chevy Cheyenne PU, wht, pinstripping, new tires, AM/FM, AC, 5K mi on new 4.3L V6 eng, \$7850 negotiable. 337-4440.

'76 Plymouth Duster, mech restored, complete maintenance records, some parts w/warr, \$1.5K. x32799 or 532-1725.

'80 Honda Civic, 3 dr, \$215. 280-2192 or 480-6697.

'91 Toyota Previa LE, 15K mi, ex cond, capt chairs, AM/FM/cass, cd w/9 spkrs, consider trade for Camry + cash. Dennis, x39012 or 992-5285.

'90 Eagle Talon Tsi, all wheel drive, turbo, wht, AC, PS, AM/FM/cass, pwr windows/locks, \$12.5K. 532-2059.

## Boats & Planes

17' VIP, 90 HP Chrysler OB, walk-thru, fwd seating, ski equip, jackets, covers, low time, \$3K. x30480 or 992-2891.

'89 Sea Touring Kayak, Chinook expedition w/rudder, 16" long, 24" wide, 49 lbs, ex cond, all equip, \$1K. 538-1985.

Trlr, fits 24' Hurley sailboat and others, \$950 OBO; 42' live-aboard steel hull junk-rigger sailboat, single-hand sailing, \$50K OBO. Doris, x37545 or 333-2373.

Catamaran, G-Cat, 5.0m, galv trlr, blk amadized alum, gray hulls, 7:1 harking blocks, 2 booms, new tires, life jackets, BBQ pit on trlr, first \$1.5K cash. Darrell, 283-1118 or 480-7226.

62" Mike Meyers surfboard, good cond, price negotiable. Sean, 488-4527.

McGregor 25' sailboat, trlr, radios, eng, extras, \$5.5K. 486-6411 or 480-0828.

## Cycles

'85 Kawasaki KDX200, good cond, \$850. Frank, x39924 or 992-3515.

'82 Honda Nighthawk 650, good cond, \$1K. Susan, 286-4624.

Mens Silver Raleigh 10 spd, good cond, \$75. 538-1849.

Raleigh Rapide 10 spd, good cond, \$55 OBO. Doug, 480-9280.

'85 Honda Elite 80cc scooter, 3.2K, ex cond, \$500. x34771 or 480-9036.

'79 Suzuki GS550 motorcycle, runs well, 13K mi, \$450. Mike, x34378 or 486-4983.

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# Dates & Data

## Today

**Cafeteria menu** — Special: barbecue link. Entrees: deviled crabs, broiled codfish, liver and onions. Soup: seafood gumbo. Vegetables: buttered corn, green beans, new potatoes.

## Monday

**Metric courses** — The JSC Metrication Committee and the Human Resources Development Branch are sponsoring several courses on using the metric system of measurement and writing with it. A three-day course for engineers, designers and technical/fabrication workers will be offered 8 a.m.-4:30 p.m. Aug. 24-26 at One Harbour Square on FM 2094. For more information, call Glen Van Zandt at x33069.

**Cafeteria menu** — Special: chili and macaroni. Entrees: barbecue sliced beef, parmesan steak, spare rib with kraut. Soup: French onion. Vegetables: ranch beans, English peas, mustard greens.

## Tuesday

**BMC meets** — The Bendix Field Engineering Corp. Management Club will host an open house meeting at 4 p.m. Aug. 25 at the Gilruth Center. For more information, call Jerry Stoner at 282-3862.

**Cafeteria menu** — Special: corned beef hash. Entrees: meatballs and spaghetti, liver and onions, baked ham with sauce. Soup: split pea. Vegetables: buttered cabbage, cream style corn, whipped potatoes.

## Wednesday

**Astronomy seminar** — JSC Astronomy Seminar will be held from noon to 1 p.m. Aug. 26 in Bldg. 31,

Room 129. For more information, contact Al Jackson at 333-7679.

**Cafeteria menu** — Special: barbecue link. Entrees: cheese enchiladas, roast pork and dressing. Soup: seafood gumbo. Vegetables: pinto beans, Spanish rice, turnip greens.

## Thursday

**Metric courses** — The JSC Metrication Committee and the Human Resources Development Branch are sponsoring several courses on using the metric system of measurement and writing with it. Two half-day courses designed for secretaries on rules for writing in metric parlance will be offered from 8:30 a.m.-noon and 1-4:30 p.m. Aug. 27 at One Harbour Square. For more information, call Glen Van Zandt at x33069.

**JSC-ARC meets** — The JSC Amateur Radio Club will meet at noon Aug. 27 in Bldg. 16, Rm. 253. The meeting will feature a program about linking the two-meter repeater with the OSCAR 13 satellite. For more information, call Dale Martin, x37740.

**SCS meets** — The Society for Computer Simulation Bay Area/Houston Chapter will meet at 11:45 a.m. Aug. 27 in the Lockheed Plaza 3 first floor Pic Rm. NASA's Marvin LeBlanc, IBM's Gary Smith and Erik Geisler and Loral's Scott McClanahan will discuss "DEMOS: The Three Dimensional Virtual Environment at JSC."

**Cafeteria menu** — Special: chicken fried steak. Entrees: roast beef with dressing, fried perch, chopped sirloin. Soup: beef and barley. Vegetables: whipped potatoes, peas and carrots, buttered squash.

## Aug. 28

**Cafeteria menu** — Special: fried chicken. Entrees: fried shrimp, baked fish, beef stroganoff. Soup: seafood gumbo. Vegetables: okra and tomatoes, buttered broccoli, carrots in cream sauce.

## Aug. 29

**LLTV reunion** — The Apollo Program Lunar Landing Training Vehicle Project will commemorate its 20-year anniversary with a reunion at 6 p.m. Aug. 29 at the Gilruth Center. All former LLTV team members and their guests are invited. Cost is \$10 per person for food; reservations are required. For more information, call Herb Noakes at x34325, Peggy Zahler at x35511 or Ron Blilie at 244-3917.

## Sept. 10

**AIAA lunch and learn** — The American Institute of Aeronautics and Astronautics Houston Section and its Guidance, Navigation and Flight Control Technical Committee will present a lunch and learn meeting at 11:45 a.m. Sept. 10 in the Bldg. 3 cafeteria. Victor Bond of McDonnell Douglas will discuss a "Double Lunar Swing-By." For more information, call David Clark at 486-6468, or Rob Carmody at 283-4101.

## Sept. 24

**SCS meets** — The Society for Computer Simulation Bay Area/Houston Chapter will meet at 11:45 a.m. Sept. 24 in the Lockheed Plaza 3 first floor Pic Rm. R. Srinivassan of Krug Life Sciences will discuss "Compute Simulation of Physiological Systems in Space Flight Biomedical Research."

Honda FT500 motorcycle eng, needs work, can be used for parts, \$15. Terry, 282-4777 or 474-5639.

## Audiovisual & Computers

Sega Master system video game unit w/2 control pads, lt phaser, 5 game cartridges. Laurie, x35590 or 991-0821.

T1000SE notebook computer, 1 MB RAM, 1.44 MB floppy, MS DOS 3.3, PC KWIK, extra batt, ac adapter, all books, \$500. Andy, x32506 or 337-1797.

Two yr old Tandy 1400-FP laptop, 2 front loading, 3 1/2" drives, int 2400 baud modem, APEX dot matrix printer, assorted SW, \$500. 554-6216.

Commodore 64c, monitor, over 100 games, \$300 OBO. 474-4303.

286 clone, 1 MB RAM, 3.5 & 5.25 FD, 2 ea 20 MB HD, Hercules, graphic w/moni, 1200 baud modem, mouse, SW, \$500. Rich, x36900 or 332-7399.

IBM XT, 640K, mono, modem, 312K FD, \$300. Joel, 894-8021.

Alpine car amps 40W and 18W, 6x9, 4x6 car spkrs, Kenwood AV rec, 135 Wch w/surround, Onkyo/Infinity spkrs, Yamaha EQ, Kenwood CD, BO. Scott, x49854 or 554-6167.

IBM comp computer, Panasonic, 640K RAM, 30 MB HD, mono monitor, DOS, int modem, graphics card, \$650. 488-5564.

Radius accelerator for Macintosh SE, System 7 compatible, \$250. Chuck, 286-5506.

486, 33 MHz, 4 MB RAM, 105 MB HD, SVGA 1 MB card, mouse, Panasync SVGA monitor, Windows 3.0, DOS 5.0, sound card, ex cond, \$1650. 482-5404.

**Photographic**

Underwater bag for 35 mm camera, hvy plastic w/glass ports, \$20. 480-3260.

Bronica ETRS medium format SLR camera, 75mm Bronica Zenzenon lens, prism finder, waist level finder, 220 film back, ex cond, \$1085; Ikelite underwater housing and Canon AE-1 SLR, \$375; Ikelite Substrobe-S w/w slave strobe, \$75. Kevin, 486-6411 or 480-0828.

**Pets & Livestock**

Sheltie puppies, 6 wks old, shots, \$185. 771-1012.

Persian kittens, blk and blue, copper eyes, \$200-250. Kristy, x31468 or 286-0146.

AKC Chihuahua puppies, fawn and chocolate, 2 m, 1 f, \$200. 534-3893.

Free to good home, fem tabby and blk kitten, both neutered, shots. 283-5747 or 538-1203.

Baby birds, hand fed cockatiels and parakeets. Linda, 484-7834.

Parakeets, home raised, blue and aquamarine, \$5 ea. x32767 or 532-1725.

Rabbits, mini-lops and fuzzy lops babies, \$15 and up. Gailo, 554-6200.

**Musical Instruments**

King cornet, Conn trombone, \$100 ea; Ludwig drum practice stand. x45383 or 480-3167.

Crate 60W bass amp, \$175; Ultimate piano stand, \$100; saxophone, \$75; albums, songbooks. x31883.

**Household**

Kg sz waterbed, dk oak stain, motionless matt, 6 drwr frame, headboard w/shelves, mirror, \$350. 486-5203.

Contemporary brass and glass dinette w/ beveled glass top, 4 navy blue chairs, \$175; kg sz waterbed, heater and vibrator, \$125. Kristy, x31468 or 286-0146.

5 pc BR furniture, solid wood, custom made, \$2500. 482-2587.

Teak coffee table w/inlaid tile, 24" x 60", good cond, \$100. Fisher VCR, \$150; 13" color TV, \$75. Chuck, 286-5506.

All wood desk and hutch, light stained, ex cond, \$200. 482-5404.

Built-in dishwasher, \$100; white wicker changing table, \$50; Graco stroller, \$50; wind-up swing, \$40; lg oak entertainment center, \$50. Kathy, 282-4229 or 335-0926.

CA kg sz matt w/box springs, ex cond, \$400. x32767 or 532-1725.

Sofa, loveseat and chair set, brn plaid, good cond, \$150. John x34390 or 554-4217.

Matching sofa and chair, lt blue floral pattern, ex cond, \$150. Ignacio, 282-4818 or 486-1078.

25" RCA color TV, floor mod, good cond, was \$600, now \$160. 331-0164.

Contemporary sofa and matching chair, \$125. Terry, 283-6646 or 554-6631.

Glass top ice cream parlor style dinette table w/4 padded cream cloth blk metal chairs, ex cond, 4 place setting blk dishes incl, \$90. Don, x30496.

Kg sz waterbed w/headboard, motionless matt, \$250; sleep sofa, \$50. 283-5759.

Daybed w/trundle, white frame, \$200 OBO. Cathy, x30415.

Whirlpool side-by-side frost free refrigerator, almond, water/ice dispensers, 4 yrs old, was \$1400, now \$800; Kenmore lg capacity gas dryer, 3 yrs old, was \$480, now \$300. Fisher, 996-9415.

Leather sofa and matching loveseat, new, was \$3500, now \$2000; table w/4 chairs, was \$200, now \$150; kg sz waterbed, \$100. Irene, 286-0206.

Dk green sofa, good cond, \$130. Joanne, 283-5683 or 474-3517.

Contemporary sofa, cream, 89", good cond, \$100. 474-4303.

2 Boltflex couches, \$300 ea; 2 coffee tables; desk, \$75; lamps; tools; glass table, \$100. Darrell, 480-7226 or 283-1118.

On sz waterbed w/heater, padded rails, bench, mirror headboard w/shelves, sheets, comforter, \$125; qn sz waterbed w/heater, padded rails, bookcase headboard, \$50. Barbara, 335-2571.

Lg round brass tray on stand, \$100; pair butler end tables, \$100 ea; 7.5' grandfather 8-day clock, Westminster chimes, \$2500; ms drafting table, \$25. 488-5564.

## Wanted

Want repairable A/C units, free pickup. Aubrey, x36580 or 339-1402.

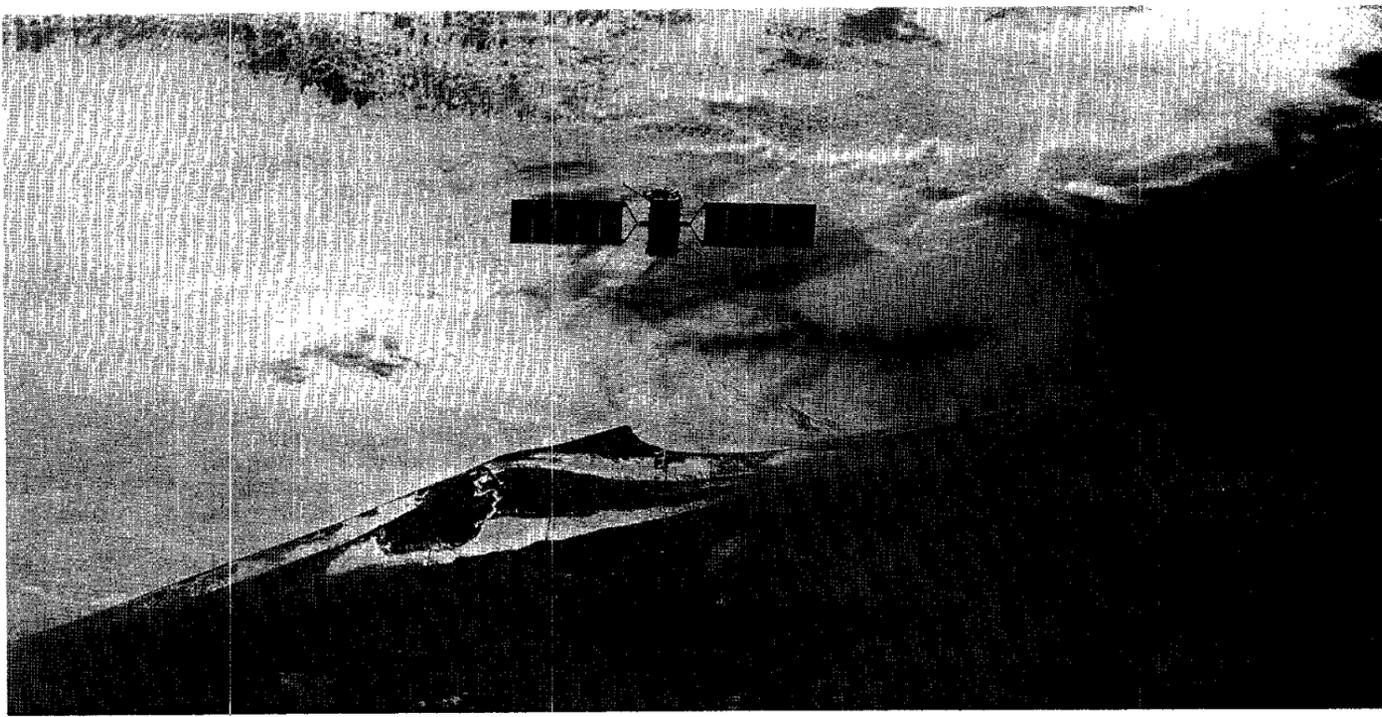
Want patches from NASA and other space related organizations, buy or trade. Andrew, 280-0647.

Want female roommate to share CLC house, pref non-smoking \$250/mo plus 1/3 util. Theresa, 333-7772 or 480-6980.

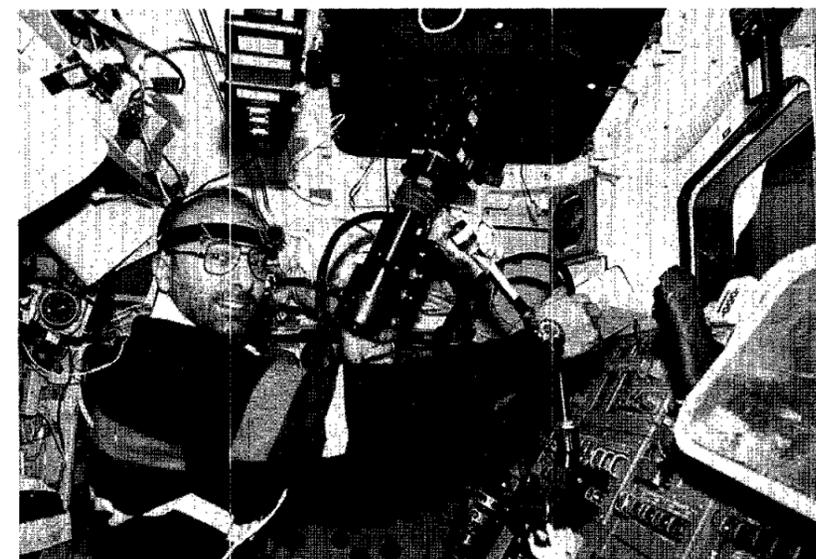
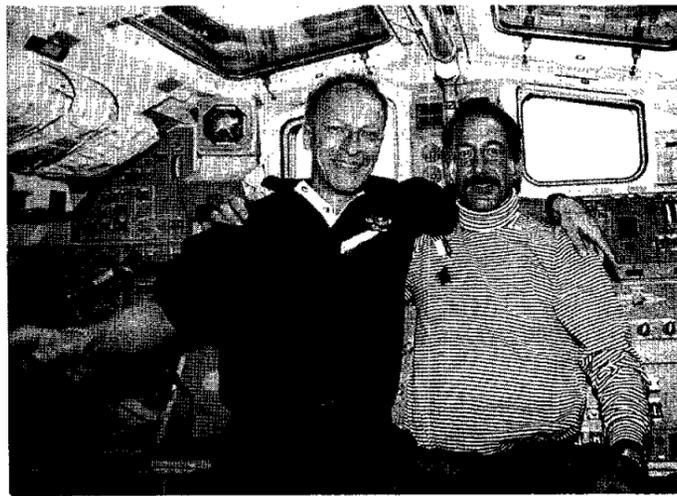
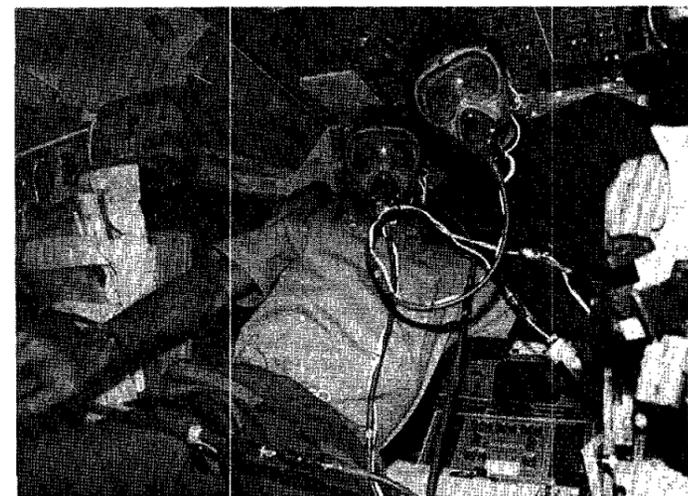
Want Burley or equivalent 2 wheel child carrier. Michele, 482-9576.

Want backpacking equip, good cond, backpack, stove, tent, etc. David, x38990 or 338-2046.

Want good used chainsaw, 16" or 18" cut. Ken, x30921 or 5



# Ties That Bind



**L**ooks can be deceiving, and the STS-46 crew told employees this week that its recent mission to deploy the European Retrievable Carrier and test Tethered Satellite System operations was more successful than it may have appeared to the uninitiated.

EURECA is now in its proper orbit and beginning its check-out phase, and the TSS-1 experiments proved that the satellite can be controlled safely while close to the shuttle. While a jammed reel kept the tether from being played out its full 12.5-mile length, the crew did prove that electricity can be generated by passing a conductive tether through the Earth's magnetic field.

The eight-day mission also was a photographic success, producing several never-before-seen views. Counterclockwise from top:

1) The European Retrievable Carrier passes over Kennedy Space Center and Cape Canaveral after being released from the robot arm by Mission Specialist Claude Nicollier. Less than 24 hours earlier, *Atlantis* had blasted off from the same space port highlighted by sunglint in this photograph.

2) The crew poses for a self-portrait. Back row, from left: Commander Loren Shriver, Pilot Andy Allen and Mission Specialist Franklin Chang-Diaz; front row, from left: Mission Specialists Claude Nicollier, Payload Commander Jeff Hoffman, Mission Specialist Marsha Ivins and Payload Specialist Franco Malerba.

3) With their windows boarded up for intravehicular operations, Nicollier and Shriver pose in front of a tiny Swiss flag and a photograph of the Matterhorn, a popular peak on the Swiss-Italian border. Nicollier, representing the European Space Agency, is a native of Switzerland.

4) When the reel jammed on TSS-1, Hoffman and Chang-Diaz, right, began preparing for a possible space walk by beginning a pre-breath period on *Atlantis'* flight deck. They're breathing pure oxygen through "quick-don" masks that are designed primarily for use in the event that the cabin air becomes contaminated. Pre-breathing through the masks is a relatively convenient way of purging nitrogen traces from the bloodstream, protecting the space walkers from the "bends" when they leave the 10.2 pounds per square inch pressure of the crew cabin for the 4.5 ppsi of their space suits. The pre-breathe exercise turned out to be for naught when the crew was able to free the jammed tether from inside.

5) Malerba, representing the Italian Space Agency, participates in the Tether Optical Phenomena Experiment, which involved photographing the tether using image intensifiers and special filters.

6) Allen prepares for the return home, going through checklists while sitting in his position to the right of the commander on the flight deck.

7) Nicollier and Hoffman, who trained together at JSC for a dozen years, enjoy their arrival on orbit on the aft flight deck of *Atlantis*. Hoffman became an astronaut candidate in 1978 and Nicollier accompanied a group of trainees that arrive at JSC in 1980.

8) TSS-1's tether snakes away from *Atlantis* as the crew uses thrusters on the shuttle and the satellite to maintain control of the co-orbiting vehicles. STS-46 crew members reported that the maneuvers needed to keep the two vehicles in proper sync worked as predicted, and that control was not difficult even at close distances, which had been the greatest area of concern before the flight. □

## Satellite to travel to Mars

A visitor from the United States will leave for an 11-month journey to Mars next month to continue the investigation of Earth's planetary neighbors.

Mars Observer, the first in a planned series of planetary observer missions, will use a new class of spacecraft derived from Earth-orbiter designs. With its eight scientific instruments the vehicle will study the surface, atmosphere, interior and magnetic field of Mars for 687 days or a full Martian year.

The Mars Observer will begin its 11-month journey from the Kennedy Space Center on board a Titan III rocket between Sept. 16 and Oct. 13.

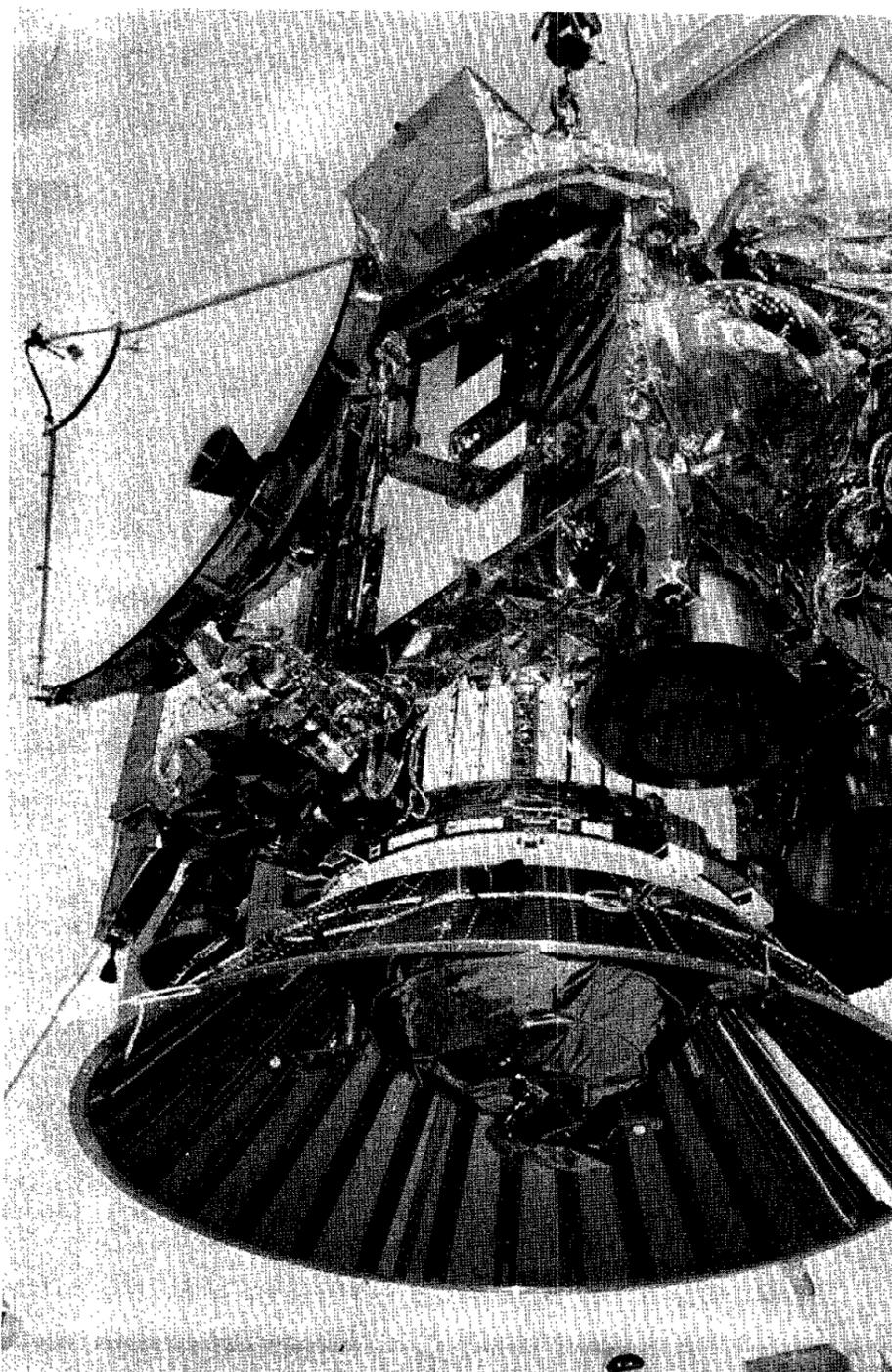
Once it arrives in late-summer 1993, the observer will be inserted into a nearly circular polar orbit to begin mapping the planet and in 26-day cycles.

The global mapping will help scientists understand the geological and climatological history of Mars and the evolution of its interior and surface, and will provide a basis for comparing Mars with Earth and Venus.

In late 1995, near the end of its nominal mission, Mars Observer will begin to serve as a science data relay facility for the landed stations deployed by the Russian "Mars 94" mission.

Mars Observer will continue NASA's exploration of the planet which began with the Mariner 4 in 1964-65. This program reached a peak with the Viking orbiters and landers of 1975-82.

The Mariners and Vikings provided a wealth of data about Mars, but scientists hope new global studies of the planet's geology and atmosphere will give even more information about the planet's evolution.



NASA Photo  
The Mars Observer spacecraft was recently mated to its Transfer Orbit Stage booster at the Kennedy Space Center. The booster will propel the observer on its 11-month journey after being launched on a Titan III rocket next month.

## Trinh to discuss space experiences

STS-50 Payload Specialist Eugene H. Trinh will be the featured speaker at a special forum for the Asian Pacific American Program.

Trinh will present his views on how to enhance professional success and personal achievements. He also will recount his experiences in space during the record setting 13-day mission when he did extensive work with the Drop Physics Module.

The forum, set for 1 p.m. August 27 in the Teague Auditorium, is one activity sponsored by the APAP Council to highlight the achievements of Asian Pacific Americans in the space program. A question and answer session will follow Trinh's presentation. The forum is open to all JSC contractors and employees, and to the public.

For more information, contact Pam Adams, x33761.



Trinh

## State universities join robotics consortium

A robotics consortium of four Texas universities sponsored by JSC recently received a \$500,000 grant from the Texas Advanced Technology Program to study distributed robotics systems integration with fault tolerance.

The research group — the Universities' Space Automation and Robotics Consortium — includes researchers at Rice, Texas A&M, the University of Texas—Austin and the University of Texas—Arlington.

JSC's sponsorship helped begin the research consortium in 1989 to bring together research efforts in robotics at the four institutions and direct them toward real NASA problems in robotics and automation.

Work with the group and JSC's Automation and Robotics Technology Division has already demonstrated the capability to control robots in remote labs at Rice, UT—Austin and Texas A&M from multiple control sites, including the Space Systems Automation Integration and Assembly Facility at JSC.

These remote control techniques for robots at distant sites simulate conditions that would exist in ground control of robots in space, with variable time delays in the sending and execution of commands. Specifically, the work will directly support the development of ground-controlled robots on the shuttle or Space Station *Freedom*.

The Texas Advanced Technology Program grant will support a project that will provide base technology to enhance such simulations among the consortium and JSC and the eventual development of robots for Earth-bound or space applications.

## NASA investigates use of radar for search operations

NASA experts are investigating the use of a new radar system in their search and rescue program, an improvement that would allow searchers to "see" plane wreckage hidden by trees or blotted out by clouds.

Currently, search and rescue forces rely on signals from emergency transmitters being sent to orbiting satellites and then relayed to rescue centers on Earth. While that system has been quite successful, the experts believe the use of radar would result in even more lives being saved.

"With our current system," explained Ronald Wallace, NASA's System Manager for Search and Rescue at Goddard Space Flight Center, Greenbelt, Md., "we rely pri-

marily on the satellite system to identify the location of the distress signal. When there is no operating radio beacon, however, we depend on the rescue forces being able to locate the wreckage visually.

"If it is hidden by underbrush, the tree canopy or covered by fresh snow, we face problems finding the crash. And if there's bad weather, we can't see through the clouds."

With the radar, however, he explained, searchers will be able to obtain radar reflections from the ground even if the objects are covered by trees and probably by fresh snow. The radar can penetrate clouds, also.

The radar system would be complementary to the satellite system, Wallace explained. On many of the

searches, he explained, the emergency transmitter — because it is damaged in the crash, has run out of battery power or has been improperly maintained — does not work. As a result, he continued, most rescues are carried out by visual search. That is why the radar is so important, he explained.

NASA has the responsibility for developing technology applicable to search and rescue. Under that authority, it developed an international program known as COSPAS-SARSAT.

Under that program, airplanes or ships in an emergency can send a distress signal that will be picked up by a satellite and relayed to the ground to alert rescue forces. Currently, three Russian and three

U.S. satellites equipped with search and rescue technology are in orbit. Four of these are fully operational.

Since the program started in September 1982, more than 2,300 lives have been saved as a result of the program. The National Oceanic and Atmospheric Administration, the U.S. Air Force, and the U.S. Coast Guard are responsible for program implementation.

Experts at the Goddard Space Flight Center, working with officials from two other NASA centers — the Jet Propulsion Laboratory and the Ames Research Center — have been looking into the use of the radar since 1985, according to Wallace.

The radar, known as Synthetic Aperture Radar, is flown on an air-

plane. It is a side-looking radar that sends signals from the plane and picks up reflections from the ground. The reflections produce images which are processed by computer to improve the resolution.

"The tests have shown that the radar works," Wallace emphasized. "In remote areas, we consistently have been able to pick out the targets we put there, even when they are visually obscured by trees."

The system would be most valuable in these remote areas, he explained. In such areas, searchers are exposed to considerable danger themselves because there is nothing out there but wilderness. The radar system would reduce search time, cutting down on search danger and search costs, Wallace said.

## Shuttle activities continue

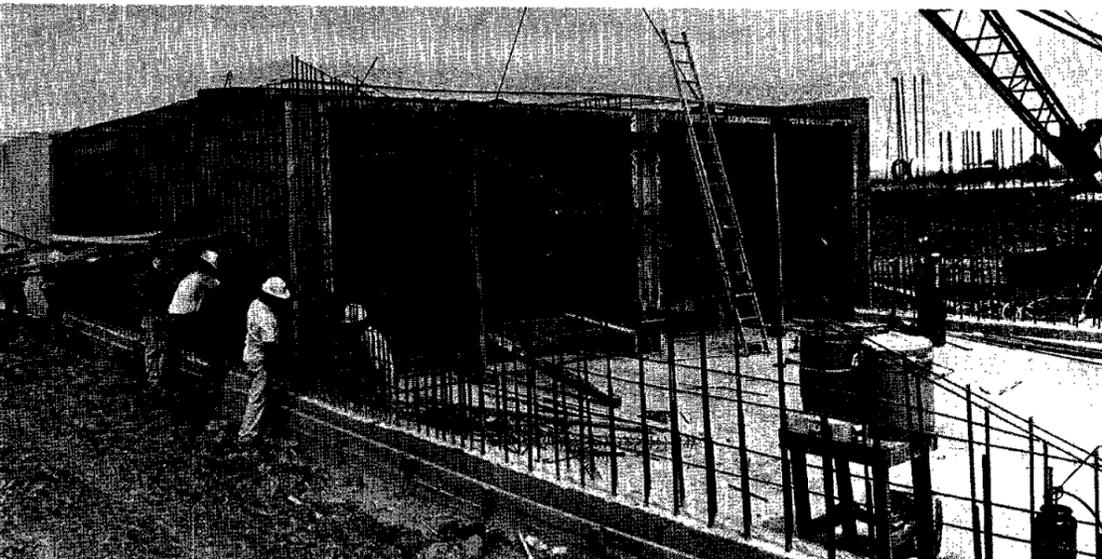
(Continued from Page 1)

cells, installed the drag chute and tested the water spray boilers. The shuttle's three main engines will be installed beginning Thursday.

On *Discovery*, in the Bay 3 hangar, preparations are under way for a Department of Defense mission in mid-October. Workers turned the spacecraft's electricity on this week, opened the cargo bay doors and will install the left orbital maneuvering system pod this weekend.

*Atlantis*, in the Bay 2 hangar, is being readied for a trip to Rockwell's Palmdale, Calif., plant where it will undergo upgrades, inspections and modifications for a year. The forward steering jets were removed this week, the main engines inspected and the hydraulic system checked.

In the VAB, the right solid rocket for STS-52 is complete. Work on the left booster is on hold while an investigation of the crane problem continues.



JSC Photo  
TRAM TUNNELS—Preparations for the October opening of Space Center Houston continues with road work on the tram tunnel. After the new center opens, a total of eight trams will carry visitors to various JSC locations. Trams will begin running on site next week for training of operators and tour personnel.

NASA-JSC

## 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.

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