

Lyndon B. Johnson Space Center Houston, Texas



Doubly durable

Engineering's EVA Branch shows the shuttle space suit can handle double the projected use for space station. Story on Page 3.



SOAR '92

JSC hosts the sixth annual Space Operations, Applications and Research Symposium. Story on Page 4.

Space News Roundup

Latest SLS-1 findings show dramatic changes to body

Spacelab Life Sciences-1 investigators are reporting dramatic changes from space travel in some of the body's systems, with a resiliency in others—all of which affect long stays in space and medical research on Earth.

The latest findings from SLS-1 investigations that flew aboard the Space Shuttle Columbia in June 1991 were made public late last

"Taken together, these results show the need for a laboratory in space to complement the traditional laboratory on Earth. This is vital in understanding how the human body works, whether it is in space or on Earth," said Dr. Ronald White, chief scientist of Headquarters' Life Sciences Division.

Four principal investigators from the SLS-1 mission report key findings in the areas of cardiovascular (heart and lungs), musculoskeletal (muscles and bones) and neurovestibular (inner ear/brain) physiology.

Space travel presents a drastic change in working conditions to the heart and lungs, according to Dr. C. Gunnar Blomqvist, a cardiologist from the University of Texas Health

Science Center in Dallas.

Astronauts just returning from space often have difficulty maintaining normal blood pressure and blood flow when standing. One SLS-1 experiment using a catheter inserted preflight into an arm vein of Payload Specialist Drew Gaffney and later moved nearer to the heart shows he experienced a much more rapid fall in central blood pressure than was predicted.

In another area of cardiovascular research, it was found that exposure to space impairs an astronaut's pressure regulating reflexes, called baroreflexes, according to Dr. Dwain in all astronauts studied. The L. Eckberg of the Hunter Holmes McGurie Department of Veterans Affairs Medical Center and the medical College of Virginia.

A close-fitting neck collar that looks like a whip-lash collar was used by SLS-1 crew members to record two blood pressure sensing areas located in the neck. By the eighth flight day, astronauts had significantly faster resting heart rates, less maximum change of heart rate per unit of neck pressure change and a smaller range of heart rate responses. These changes occurred

changes that developed were large and statistically significant.

These results validated findings obtained on Earth. They were based on predictions Eckberg made by studying subjects after prolonged bed rest. This validation could lead to important studies in clinical medicine because studying astronauts before and after flight or studying healthy people before and after bed rest may provide insights into medical problems encountered here on Earth.

Please see SLS-1, Page 4

Freedom wins vote in House

The House of Representatives voted 237-181 Wednesday to continue funding for Space Station Freedom, but provided \$525 million less than President Bush requested.

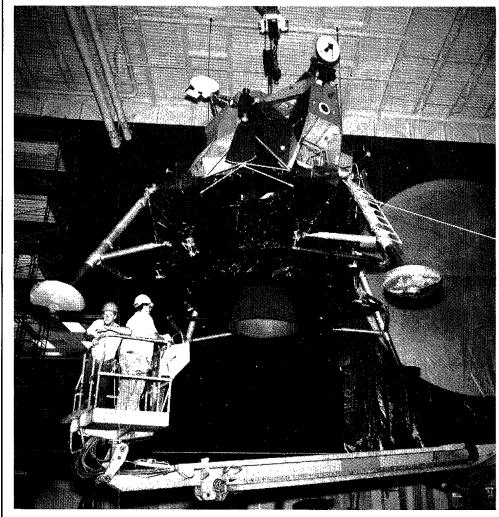
The vote struck down an amendment to an appropriations bill that would have killed the project, providing \$1.73 billion for the orbiting laboratory in fiscal 1993.

"I think this is a victory for America's future," said NASA Administrator Daniel Goldin. "I'm very proud of the Congress of the United States. In difficult economic times, the Congress stood up and did what's right for the future.

Debate centered on the economic issues such as competitiveness, jobs and budget priorities, with many opponents voicing support for the station but saying America couldn't afford it now. Proponents countered that killing the station would set back the entire civil space program for decades and forestall an important investment.

"I'm very excited," said Rep. Mike Andrews, D-Houston. "This is a terrific vote for the space station, for the space program and for the Houston area.

The House finally approved the overall appropriations bill by a vote of 314-92. The Senate, which in the past has been more supportive of Freedom than the House, is expect to take up the topic next week.



PERFECT LANDING—Lunar Module Test Article 8 takes its place in the new Space Center Houston display on the Apollo Moon landings. The LTAs were used to train Apollo crews. LTA-8 is being suspended from the ceiling of the plaza area, poised for landing in front of a large mural of the lunar globe. Construction of the new visitor center is about 85 percent complete, and the grand opening remains on schedule for Oct. 16.

All Atlantis systems go for launch

By James Hartsfield

With a bright forecast. Atlantis is scheduled to launch at 8:56 a.m. CDT today carrying into orbit the European Retrievable Carrier, the Tethered Satellite System and the Evaluation of Oxygen Interaction with Materials

Atlantis' countdown started at 3 p.m. CDT Tuesday and proceeded smoothly except for a double-check of six electrical connections between Atlantis and the

Tethered Satellite pallet on Wednesday. Two last-minute concerns put technicians to work Wednesday and Thursday, but neither was deemed a threat to today's launch.

Prior to closing the cargo bay doors, technicians found dubious reports in paperwork documenting the connections. The cargo bay doors were left open slightly longer than scheduled to allow a check of the connections to verify all was well. The cargo bay doors



were closed late Wednesday after the check verified the connections were good and locking pins were added to them as a safety measure, and the countdown continued without any delays to the planned launch time.

Thursday, a build-up of nitrogen pressure showed up in the catch bottle for auxiliary power unit No. 3. Technicians opened one segment of the aft compartment to vent the pressure, which was believed to have been caused by a nitrogen bubble.

Forecasters called for a 95 percent chance that

Please see ATLANTIS, Page 4

NASA to reform procurement policies

Agency will emphasize cultural diversity through buying

Goldin

NASA will aggressively promote cultural diversity in the work place and in pursuit of contract goals for small and disadvantaged businesses, according to Administrator Daniel Goldin.

"As administrator of NASA, I have made a personal commitment to increasing cultural diversity in the workplace and to increasing the contracting opportu-

nities for small and disadvantaged contractors," Goldin told the National Contract Management Association in Los Angeles last week.

Goldin announced a series of procurement reforms designed to make NASA a model of excellence for the federal government and to ensure that the public receives the best value for its tax dollars.

Goldin said the agency had implemented a range of initiatives to increase the number of contracts flowing to small and disadvantaged businesses, including:

- Emphasis on SDB considerations in the earliest part of procurement planning, with continuing emphasis in acquisition strategy meetings and other procure-
- Establishment of firm percentages of large prime contracts to be subcontracted to SDBs, with reward of special incentive fees to prime contractors when they exceed the SDB requirement.

"Small and disadvantaged businesses need assistance above and beyond set-asides," he said.

"In the coming months, we will be setting up a new 'minority business resource advisory committee' in NASA to help us bring more SDB contractors into the NASA family," Goldin said.

Discussing the procurement reform effort, Goldin said that NASA must continue to give the American people technical advances and

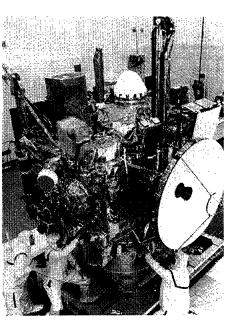
the 'best' value for their tax dollars. "In the future, NASA will not tolerate 300 percent cost overruns, defective spacecraft hardware or the failure to follow work instructions that protect government furnished hardware," Goldin said.

"Nor will we tolerate schedule slippages," he added. "We can't keep letting months turn into years and years into decades.'

The major procurement changes include: · Awarding new contracts to companies that have demonstrated they are accountable by delivering quality systems that meet cost schedules and technical requirements.

· Determining award fees by the end result.

· Giving contractors greater responsibility for success of a program, including opportunity for increased awards if they hold to schedule, keep program cost within estimates and deliver a satisfactory product.



MARS OVSERVER -- GE Astro Space

engineers ready the Mars Observer spacecraft for transfer to Kennedy Space Center's Hazardous Servicing Facility. The satellite, which will orbit the Red Planet and gather data for future human landings, is scheduled for launch Sept. 15 aboard Titan III

New energy policies target after-hours air-conditioning use

Four operational policies have been established to save energy at JSC by minimizing air-conditioning use and giving more authority to energy conservation managers and coordinators, JSC Acting Director Paul J. Weitz announced this week.

The four policies are designed to help JSC meet energy reduction goals mandated by Congress using 1985 as a base year.

"JSC must reduce energy usage by 10 percent by 1995 and by 20 percent before the year 2000,' Weitz said. "It is clearly a significant challenge to all of us at JSC and equates to an air-conditioning reduction of 8 million tons per year."

One of the new policies gives total responsibility and authority" for the energy reduction program to the JSC energy manager, directorate and program-level energy conservation managers and division-level energy conservation coordinators.

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JSC

Ficket 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.

Ringling Bros. Barnum Bailey Circus (11 a.m. Aug. 1, Summit): \$8, limit

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.

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. 11 and 27. Cost is

Defensive driving — Course is offered from 8 a.m.-5 p.m. Aug. 1. 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. Cost is \$24.

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

Scuba - Scuba lessons will be offered at 6:30 p.m. Tuesdays and Thursdays beginning July 30. Cost is \$190 plus \$20 for the open water dive trip. Personal equipment needed runs about \$90.

Dates & Data

Today

Co-op reunion — A reunion honoring the 30th anniversary of the cooperative education program at JSC will be held at 5 p.m. July 31 at the Gilruth Center. All current and former NASA co-ops, their supervisors and friends are invited. Tickets, which may be purchased in Bldg. 11 during lunch hours July 20-24, are \$5. For more information, call x32697.

Cafeteria menu — Special: tuna and salmon croquette. Entrees: pork chop with yam rosette, Creole baked cod. Soup: seafood gumbo. Vegetables: Brussels sprouts, green beans, buttered corn, whipped potatoes.

Monday

Cafeteria menu — Special: Italian cutlet. Entrees: braised beef ribs, chicken a la king, enchiladas with chili. Soup: cream of broccoli. Vegetables: navy beans, Brussels sprouts, whipped potatoes.

Tuesday

SOAR '92 — JSC will host the 1992 Space Operations, Applications and Research Symposium Aug. 4-6 at the Gilruth Center. Cosponsored by JSC and the Air Force Material Command, the symposium will include program overviews, panel session, exhibits and technical papers on robotics and telepresence, automation and intelligent systems, human factors, life support and space maintenance and servicing. For registration information call 282-2223; for exhibits information, call Chris Ortiz, x31904.

Cafeteria menu - Special: stuffed cabbage. Entrees: turkey and dressing, round steak with hash browns. Soup: beef and barley. Vegetables: corn cobbette, okra and tomatoes, French beans.

Wednesday

Toastmasters meet — The Spaceland Toastmasters Club will meet at 7:15 a.m. Aug. 5 in the Bldg. 3 cafeteria. For more information, call Darrell Boyd at x36803.

Astronomy Seminar — The Astronomy Video Tape Series continues during the weekly JSC Astronomy Seminars. "Old Supernova" with Dr. Roger Chevalier will be shown at noon Aug. 5 in Bldg. 31, Room 129. For more information, contact Al Jackson at 333-

Cafeteria menu — Special: pepper steak. Entrees: catfish with hush puppies, roast pork with dressing. Soup: seafood gumbo. Vegetables: broccoli, macaroni and cheese, stewed tomatoes.

Thursday

Cafeteria menu — Special: chicken fried steak. Entrees: beef tacos, barbecue ham steak, Hungarian goulash. Soup: turkey and vegetable. Vegetables: spinach, pinto beans, beets.

Aug. 7

Cafeteria menu — Special: tuna and salmon Croquette. Entrees: pork chop with yam rosette, Creole baked cod. Soup: seafood gumbo. Vegetables: Brussels sprouts, green beans, buttered corn, whipped potatoes.

Aug. 12

PSI meets — The Clear Lake/NASA Area Chapter of Professional Secretaries International will meet at 5:30 p.m. Aug. 12 at the Holiday Inn on NASA Road 1. Lisa Giacchino Tolman, an attorney, will discuss the legal effects of not having a will in the state of Texas and financial considerations when preparing a will. Cost is \$10; reservations may be faxed to 676-8676. For more information, call Bonnie House at 676-3764.

Astronomy seminar — JSC Astronomy Seminar will be held from noon to 1 p.m. Aug. 12 in Bldg. 31, Room 129. For more information, contact Al Jackson at 333-7679.

Aug. 17

UNIX meeting — The JSC UNIX Systems Administration Group will meet at 2 p.m. Aug. 17 in Bldg. 12, Rm. 256. Emily Lonsford of MITRE will discuss "ÚNIX Security." For more information, call Mark Hutchison, x31141.

Aug. 18

Expert systems workshop — JSC's Software Technology Branch and IBM Corp. are sponsoring a series of workshops on verification and validation of knowledge-based systems at the Gilruth Center. The next workshops will be from 8 a.m.-4:30 p.m. Aug. 18, 20, 25 and 27. For more information, call Chris Culbert, 283-8080; Bebe Ly, 283-8072; David Hamilton, 282-3857; or Scott French, 282-8346.

JSC

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

Lease: TH, 2-2.5, FPL, W/D, dishwasher, fans. 554-7275

Sale: Lake Livingston, Impala Woods at Onalaska, 30 x 70 lot, camp or build, 1/2 mi. off water, util avail, paved roads, \$3K. Teena, x37787 or 713-422-6369.

Lease: Pipers Meadow, 3-2-2, DR, FPL, gas util, fenced, patio, \$850/mo. 482-6609.

Sale: Lake Livingston, 2 lots, \$5K. James, x36666 or 487-5730. Lease: Lake Travis cabin, private boat dock,

CA/H, fully equipped, accommodates 8, \$425/\$85, 474-4922

Sale: Huntsville, 7.99 acre lot, city util, cleared, trees, fenced. 479-7174.

Sale: El Jardin, 3-1, dbl driveway, private pier/ramp, \$57,700 OBO. 663-6526. Lease: Pipers Meadow, 3-2-2, carpet, drapes,

FPL, fenced, built-ins. 538-3352. Sale: Webster, 3-2-2, new dishwasher, carpet, wallpaper, wet bar, newly tiled hall/BR, new patio cover, fans, FPL, \$79.9K. Nina, x34771 or 480-

Pearland, 3-2-2, new appl, 1700 sq ft, 5 yr old roof and AC, fans, microwave, \$66.5K.

Rent: Galv beach house, D/W, central air. furnished. Ed Shumilak, x37686.

Sale: 71 acre ranch, LaMoca Hwy 83 Webb County, deer blinds, deer feeders, 2 BR house, water well, elec pwr, mineral rights, \$120K. 326-1833

Lease: Seabrook, 3-2-2, low util, fenced, FPOL, W/D conn, \$880/mo. Beth, x30528 or 474-

Sale: El Dorado Trace condo, 1-1.5-1CP, appl, patio, balcony, FPL, fans assummable, low equity. Barbara, 488-3383.

Rent: Galveston condo, furn, sleeps 6, Seawall Balvd & 61st St., pools, weekly/daily. Magdi

Yassa, 333-4760 or 486-0788. Rent: Island Tust, 3 BR, Ig kitchen, oak floors,

decks, trees, \$650/mo. 538-1849. Lease: Kemah/Clear Lake Shores, 4-2-2, new carpet, office, skylight, no pets, 2000 sq ft, blinds, fans, \$700/mo + \$700 dep, avail 8-15. 334-2335.

Cars & Trucks

'85 Mustang Convertible, low mi, clean, reliable, economical, \$5895 or OBO. 332-2229. '80 Buick Riviera, full power, mirrored sunroof, ex cond, \$1.2K. 996-5739.

'88 Toyota Camry DX, 52K mi., 5 spd, alloy

wheels, loaded, gray, ex cond, \$7.2K. 554-6138. '70 VW Bug, \$2K; 77 Chevy Suburbnan, \$2K. Heather, x30582.

'81 Cutlas Supreme, PS/PB, tilt, new headliner, new eng, ex cond, \$2K OBO. 337-5853.

'82 Honda Accord, 3 DR hatchback, need

work, will sell parts or complete for \$550. Tony, 486-5707.

'85 Dodge Daytona Turbo, gold/blk, auto, low mil, 6 spkr stereo, 1 owner, good cond, \$3K make offer. 538-3431.

'91 Chevy Corsica, 4 DR, 24K mi, wht ext, blk int, V6, \$8450. Ron, x34713 or 333-2273.

'85 Toyota MR2, ex cond, custom wheels, car phone, loaded, \$5.2K, 538-1479.

'76 Monte Carlo, V8, auto, PW/PS/PB, AC, cruise, new brakes, \$700 nego. Steve, 282-4456

'84 Nissan Sentra, 4 DR, 5 spd, AC, AM/FM, cass, good cond, \$1.4K. 646-7528 or 486-0966. '84 Olds Cutlas Calais, 4 DR, V6, cruise, tilt,

85K mi, \$2495 OBO. 244-5068 or 333-6243. '90 Nissan 300ZX, 28K mi, ex cond, best offer.

'90 Eagle Talon TSI, all wheel drive turbo, ex cond, wht, AC, PS, AM/FM/cass, pwr windows/locks, \$13.5K, x34379 or 532-2059.

'84 Dodge Ram, 1-2 ton PU, good cond, good tires, \$2.5K. 282-3095.

'83 Olds Delta 88, AC, power, AC, 120K mi, \$1.6K. BK, x31610. '84 Toyota Corolla SR5, 5 spd std, front wheel

drive, 4 cyl, 85K mi, Dolby radio, cass, spkr, AC, tint windows, all maintenance records, avail Aug '92, \$2.8K. Marianne, x33706 or 554-5818. '80 Dodge Omni, good cond, 100K +_ miles,

\$750. Jim Poindexter, x38624 or 475-9671 '91 Toyota Previa LE, wht w/gray int, 14K mi,

loaded., Dennis, x39012 or 992-5285. '77 Grand Prix, new eng. radiator, batt.

ilterantor, starter, 1 vr old trans, \$1K OBO. David, 554-5514 or 244-5739.

'59 Chevy PU, \$950; '80 Chevy van, \$1.5K.

334-2335. '79 Ford Pinto body prts; Trey, 484-7834 or 280-2989

Boats & Planes

17' Coleman polyurethane canoe, \$250. Collins, 283-9323

16' Hobie Cat, '82 Nationals boat, 2 sets of sails w/trlr, ex cond, best offer, Bob, x34468 or 486-7687

16' open bow '83, 120 Merc I/O, ss prop, skis, vests, galv trir, ex cond, \$3,750. 334-4341.

16' Terry bass boat w/65 HP Merc, trolling motor, depthfinder, 2 live wells, galv McLean trir, \$2.2K OBO. 485-8249 or 335-6202.

15' 470 sloop w/2 sets of sails, boat cover, \$700. Kathy, x32021 or 554-4579. 15' boat w/trlr, 55 HP Chrysler O/B. 334-2335.

Cycles

Raleigh Rapide, 10 spd bike, good cond, \$65 OBO. Doug, 480-9280.

Raleigh Olympian, 12 spd racing boke, suntour shifter, leather padded seat, \$125. Chris, x32606 or 333-3839.

Mens Silver Raleight, 10 spd, good cond, \$75.

Audiovisual & Computers

286-16mhz IBM comp PC, 20meg HD, 1 MEG RAM, CGA monitor, 1200 baud modern, printer, mouse, software, desk w/hutch, \$1K. Doug, x33855 or 334-5519.

Macintosh SE, 1 MB, two 800K diskdrives, Apple kybd, ImageWriter II, cables, documents, \$850. x45359 or 326-4679.

Brothers #3400 word processor, 1 yr old, keyboard, monitor, 3.5 disk, spreadsheet capable, \$300 OBO. 996-0377.

Tatung CGA color monitor, ex cond, \$250 OBO; Panasonic 1180 dot matrix printer, ex cond, \$150 OBO. Lisa, 283-7536 or Pat, 474-

IBM compatible XT, 40 MB, math coprocessor. Hercules graphics, 640K, FD, \$400. 334-4894.

Hi-Fi sytem, Scott 25w/ch stereo rec, Norman labs model 8 spkrs, 10" woofer, walnut enclosures, exc cond, \$130. Musgrove, x38356 or 488-3466.

Apple III computer, built in and ext drive, make offer. Doug, 480-9280.

IBM laptop, 640K, 2-3.5 FD, LCD screen with adapter for CRT, detachable, NLQ printer, 2 power supplies, 1 battery B/U, carrying case, \$700, 286-6242, IBM 286, 40MB HD, 1 MB RAM, 5.25 and 3.5 FD, Hercules graphics, \$500. 334-

Tandy 1000, 384K, 2 360K FD, mono monitor, DOS, \$100; Tandy wide carriage daisywheel printer, \$50, both for \$130, 992-5958 or 335-

Pets & Livestock

AKC cocker pups, born 5-10-92, \$130/ea. Tamela, x36155 or 998-8859. Cocker Spaniel, AKC registered puppies, 4

males, 1 female, parti and buff, \$200, ready 7-31. 996-9415. Persian kittens, wht, blk, blue, Himalayas,

assorted colors, \$200-\$500, adult females, \$50-100; stud service avail, fee nego. Kristy, x31468 or 286-0146

Free, 1 vr cocker spaniel, x34280.

Chihuahuas, AKC, 3 male, 1 female, 8 wks old. 534-3893. Free kittens, 4 gray, 1 tan; micromachine toys,

\$25; child life preserver \$5. 488-2283. Free Keeshond, 5 yrs old, shots, housebroken. Kathi x30123 or 480-8674

Free four month old blk/whte collie mix male puppy, Gloria, x31891 or 538-2283. Baby birds, cockatiels, parakeets. Linda, 484-

Musical Intstruments

Stingerland drumset, 6 pc, hi-hat, 1 ride cymbal, 1 crsh, \$850, 538-1479.

Casio keyboard, 100 sounds, 61 full sz keys, 2 built in spkers, stand/AC adapter/sustain pedal, \$150 OBO, Darryle, 282-4283 or 286-9218.

Clarinet, Buffet E-12 master model, one level below prof, \$600 OBO. 996-0377.

Household

Crib w/ matt, ex cond, \$50. Tamela, x36155 or Robert, 472-6323. Queen sz waterbed, 65% motionless matt, It

oak, 6 underdrawers, mirrored HB, heater, pad. sheets, padded rails, \$200. Heather, x30582 Electric dryer, good cond, \$25 OBO. Steve, 474-5226 or 333-7819.

Queen sz sofa/matching love seat, both sofa sleepers, good cond, \$300/set. Garry, x37565 or

331-3017. Solid teak dining table, \$200; solid oak kitchen table with 4 oak chairs, \$150. xd36609 or 554

2532. Black & Decker vacuum cleaner, \$100; twin bed w/frame and headboard, \$70, 554-2532.

4 poster New York style king sz waterbyed, new \$150, best offer;tv/stereo entertainment center, \$45; Pappasan chair w/ottoman, \$50, best offerantique dresser w/marble top, \$500; 901 Bose concerto speakers w/blk pedestool stands, \$1.5K, best offer, x31169.

Litton go anywhere microwave oven, 650w, 0.8 cu ft, \$120. 992-5958 or 335-8539.

RCA console color stereo tv, 27" screen, best cash offer over \$400; black velvet/hot pink after 5 dress, sz 5, \$75; pink, floor length after 5 dress, sz 5-7, \$75; Kenmore floor cleaner/polisher,

\$125. Diane, 283-5618. GE elect washer/dryer, \$200 OBO; 10,000

BTU window AC, \$350 OBO. 286-4882. White wicket dresser w/mirror, night stand, bed, box springs, \$150. 996-9690.

Jenn-aire range top w/grill attachment, \$100 OBO, 409-948-8844. Microwave oven, works good, \$40; GE elec lower oven, no controls, 27", \$20. Speier, 282-

Living rm set, sofa, chair, ottoman, coffee table, end table, 2 lamps, brwn w/wood trim, \$250 OBO; dog pen, 6x3x6, \$50. x33814 or 486-9760. Patio furn, stair stepper, clothes, toys, lamps, make offer. 480-0287.

Wanted Want Reebok step & video workout. Gay,

x53092 or 488-2756. Want room and bathroom in apt. or house by 9-6-92. Tom, 333-7820 or 286-5136.

Want Igt weight popup camper, sleeps 6, AC, less than 10 yrs old, good cond. 482-5393 or 333-7010.

Want childrens bicycle seat for 10 spd. Debbie, Want riders to carpool from Humble/Kingwood

area. Latonya Bailey, x39032 or 360-1835. Want female roommate for 3-2.5 house in CLC, must like dogs, \$275 + 1/2 util, nonsmoker.

480-5184. Want female roommate to share 3 BR house in Lakeside, \$370/mo incl. util & dep. Ann, 282-3790.

Want reasonably priced underwater 35mm still camera w/strobe. Charlie, x34754 or 554-7116. Want used Burley 2 wheel child carrier. Michele, 482-9576.

Want small house near NASA, repairs OK, low dn & assum or owner finance, x39120 or 771-0952 Want Nordic track ski exerciser, two wheel

dolly for moving appl. 334-2335. Want riders from Southwest Houston to join

vanpool, Ed, x36124. Want inexpensive desk for college student. Pam. x32946 or 286-7091.

Want nonsmoking housemate, Meadowbend, 3-2-2, \$300/mo, 1/2 util, avail 8-9-92, Frank, x30696 or 538-4003.

Want good used brick, twin size bookcase headboard, 480-3424.

Miscellaneous

Exercise bike, 18 mi, good cond, \$25. 286-9822. Bowling ball, blue hammer, 14 lb, w/Columbia

dbl bag, black, new, both for \$120 OBO. Leonard or Youm, 283-4813 or 922-6484. Unused case of Enfamil w/iron, add water, was \$48, sell \$30, 643-0417.

couch & chair, good cond. \$100: Zenith 25" color t.v. w/stereo & remote, ex cond, \$400; Wards VHS recorder/player w/remote, \$175. Walt,

Grayco Premier baby stroller, ex cond, \$65;

4 Road Hugger bias tires sz H70-15, 5K mi, ex cond, \$15/ea. Romea, x31190 or x31436. Gold recliner, good cond, \$50; 4 drawer legal

sz metal file cabinet, \$35. Tom Rogers, 244-9855 or 996-0574 Golf clubs, MacGregor JNP, two-iron thru pitching wedge, good cond, forged cavity back

design, \$280. Mike, 283-1142 or 486-4975. Spalding metal wood 1,3,5 w/golf bag, was \$125. sell \$80: Ultimax XT driver graphite head & shaft low torque, was \$89, sell \$55. Robert,

Oneway ticket from Houston Hobby to Ontario

California, SW Airline. Leslie, x38791. Folding redwood picnic table/benches, \$35; bumper pool table, \$40; garage door opener, \$30; waterskis, \$20; slalom ski, \$15; P195/75R14 AX Michelin tire, \$5; P205/75R15 Pirelli tire, \$5.

Jim, x34990 or 326-3022. Brittanica Great Works, 54 classics, golf leaf, \$300; Men's 14k gold wedding band, \$40; variety of technical books, best offer; Time Life Library of

Photography, \$75. 282-4878 or 326-1837. 18k yellow gold ladies wedding set, .50 carat Marquis, 1 carat tot wgt, \$1.5K. Linda, 333-4736.

Crib, car seat, potty chair, toddler swing, toys, Nintendo set & games, Michele, 482-9576. Pet door for sliding glass patio door, 1 mo. old, \$75. Karen, x34637 or 559-2858.

Used patio furniture, 5 pcs, \$100; circular concrete stepping stones, 21, \$0.75/ea, or \$100 all; lawnmower, \$60. x36609 or 554-2532. Stainless steel boat grill, attaches almost anywhere, Magma brand, \$35, Kelly, 282-2586.

Moving boxes in good cond, all sizes, \$0.50 ea, you carry away. 283-5740. Lawnmower, 3 HP Briggs & Straton, 20" blade,

\$30 OBO. Steve, 282-4456 or 992-2841. 4 pc luggage set, American Tourister w/keys, \$60; 24" x 80" wood door, unpainted, drilled, assorted sz widow screens, FPL bricks. Cynthia, x32811 or 489-0749.

Mason canning jars, Ball & Kerr, assorted lids & rings, pint jars, other sizes avail; 14" mag wheels, all lug nuts. Jim, x 30145 or 481-3102. .303 Enfield rifle, good cond, \$85; reloading

ress, Lee Pro-100 progressive with .45 claiber carbide dies, ex cond, \$130. John, 332-1570. Escort 2 bands radar detector, power cord, visor mount, 5.25" w x 1/2" h x 4.5" D, \$50.

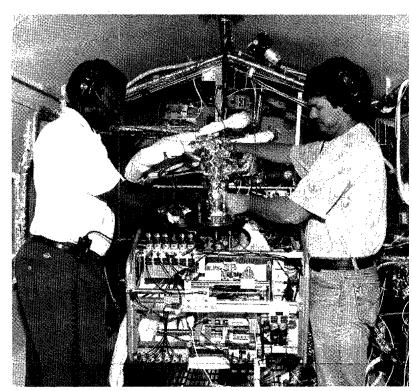
lan, x34853. 21" Toro push lawnmower, good god, \$95. BK, x31610.

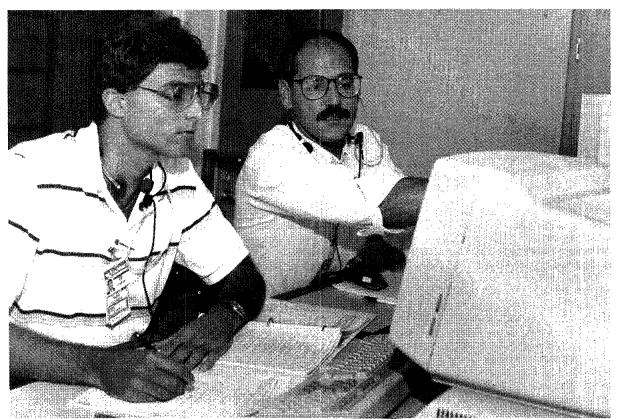
32" wide ste storm door, \$50, brass FPL screen, \$20. 480-3424.

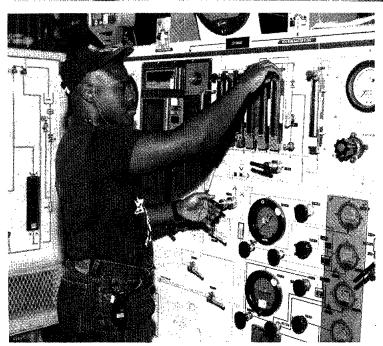
8 FOOT CHAMBER

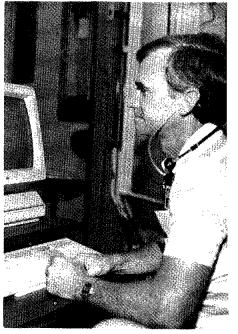
Top: The team that put the space shuttle space suit through its paces during two years of testing that totaled some 400 hours poses outside the Bldg. 7 eight-foot pressure chamber. Right: John Sanders and Ron Dickey prepare PLSS 4 to go to altitude in the chamber. Below: Ed Mohr, left, and Ken Bond, one of several Lockheed test directors who participated in the project. monitor data. Bottom left: Reggie Gay monitors the liquid cooling garment console in Bldg. 7. **Bottom right: Lockheed's Carl** Siggins monitors test data.

> JSC Photos by Bill Blunck and Bob Walck









Doubly Durable

Marathon testing program shows shuttle space suit can do the job outside Space Station *Freedom*

By Kelly Humphries

When the folks in the EVA
Branch of Engineering's Crew and
Thermal Systems Division were
given the job of qualifying the
shuttle space suit for duty on — or,
rather, outside — Space Station
Freedom they took the best
estimates and doubled them.

Glenn Lutz, subsystem manager for the extravehicular mobility unit, said current plans call for about 12 space walks to maintain Freedom before they are to be returned to Earth for servicing. If, for some reason, a cycle were missed the number could reach 25 over a 180-day period.

"We went off and said we need to go prove to ourselves we can do twice that," Lutz said.

This summer, after 50 runs in JSC's eight-foot pressure chamber, the space shuttle extravehicular mobility unit is well on its way to qualifying.

"It passed like a champ," said Lutz, who explained that when the EMU was first certified for flight it was tested for its ability to perform just three space walks before needing a complete checkout. "It was much more capable than we ever gave it credit for."

Lutz worked with a team of engineers, technicians, test directors and console operators from Hamilton Standard and Lockheed in Bldg. 7 to test the space suit's primary life support system. It took 25 people to manage the tests, which at 8 hours a session built up an impressive record of 400 hours of vacuum operation on one unit, PLSS 4. Sandwiched in between the chamber tests were two sets of laboratory tests that simulated everything but the vacuum produced in the chamber. When the second set of laboratory tests ends today, PLSS 4 will have accumulated a total of 100 test runs or 800 hours of work without an overhaul.

"I'd climb in it right now and go EVA," said Gerald Pollock, the Hamilton Standard engineer who monitored the majority of the 400 hours of the chamber tests.

Before each test series began, the PLSS (pronounced "pliss") was prepared just as it would be for flight, including all of the paperwork checks and quality inspections, said Mike Wilson, who manages Hamilton Standard's work on the subsystem. Then it was moved to the chamber, where it was attached to equipment that simulated the metabolic processes of a working human being and then some. It was taken to vacuum in two steps, then held there for 8 hours. Including the pre- and posttest work, each test day lasted about 12 hours.

Pollock's job was to monitor the EMU system and facility parameters, and defend the EMU when any problem turned up. Since the EMU was being tested, the first assumption was always that the fault was in the test article.

"We had problems along the way," Pollock said, "but in most cases it wasn't the PLSS's fault."

The key to PLSS 4's success was a change in the material that is used for the bladders in the water tank structure, Wilson said. The elastic bladder is part of the system that keeps the feed water pressurized. Recent materials developments have led to a change from neoprene to Fluorel, which leaches far fewer contaminants into the water and thus causes far fewer filter clogs and sublimator failures. The sublimator is a plate that works as a heat sink, taking the heat from the space suit and transferring it to water that condenses on the plate as ice and drifts away into space.

As the tests wound on, fewer and fewer problems occurred, Pollock said.

"After a while, it became extremely boring because nothing happened," he said. "We had no problems with the PLSS and very few problems with the facility."

John Sanders was Hamilton Standard's primary life support technician for the tests. He and his fellow technicians prepared the unit and performed all of the preand post-test work.

"We're really proud of the PLSS," Sanders said. "Working in this program, we all realize that we're dealing with a man's life and there's no room for error. We have to be perfect."

The tests have provided valuable engineering data on the long-term performance of the shuttle space suit PLSS, especially components that are considered consumable, such as water filters sublimator plates.

"In my eyes, it says that the EMU is much more capable than we ever thought it was," Lutz said. "We can stand up with confidence and say, hey the EMU can do the job for station."

Although the tests of the life support system were an important milestone in the work to qualify the shuttle suit for Freedom duty, more work remains. The next step is to perform similar tests on the space suit itself. Lutz said his group will take all of the suit components to ILC Inc.'s Dover, Del., assembly plant and put 25 "EVAs' worth" of bending and cycles on a suit to show that it, too, can perform with same amount of margins.

Then, in 1993, 25 manned simulated space station runs will be performed — about one EVA a week for 180 days in the 11-foot chamber of Bldg. 7 — using a different PLSS. The test subjects will do all of the cleaning, maintenance and repairs required on the suits. Three of the runs will be performed in the Bldg. 32's Space Environment Simulation Laboratory Chamber B under conditions that also simulate the extreme temperatures of space one at the beginning, one after 90 days and one after 180 days.

Students learn by working side-by-side with JSC scientists, engineers

Fifteen students from nine area high schools have taken residence at JSC for eight weeks this summer to participate in an intensive science and engineering program, giving first-hand experience and insight into NASA careers.

The Summer High School Apprenticeship and Research Program was created in 1980 to give students with demonstrated aptitude for and interest in science and engineering a chance to work on a variety of technical and science projects.

During the program, students

work closely with specially assigned mentors and complete research papers on their work. They also make oral presentations to the SHARP group and their mentors at the completion of the eight-weeks.

Students and their mentors include Carmen Allen of LaMarque High School, working with Chris Culbert of the Software Technology Branch; and Yetunde Adigun of Clear Creek High School working with Dan Barta; Tarryl Churchwell of Bellaire High School working with Terry Tri; and AiQin Huang of Washington High School for Engineering Professionals working with Don Henniger, all of the Life Support Systems Branch.

Five other Washington HSEP students are SHARP participants. The students and their mentors are Karma Lowe working with Ray Lachney of the Space Station Systems Division; Reginal Steward working with Michael Jones of the Flight Software Reconfiguration Office; Carlton Jones working with Laurie Webster of the Intelligent Systems Branch; Kane Ali working with Jim Lamoreaux of the Tracking Techniques Branch; and Tamara Adams working with Steve Siconolfi of the Space Biomedical

Research Institute.

Additional SHARP students are Omah Williams of Mount Carmel High School teamed with David Hogg, Control Center Systems Integration Section; Curtis Moshay of Jones Vanguard High School teamed with Dick Bozeman, Thermochemical Test Branch; Twana Lee of Clear Lake High School teamed with Dave Dittmar, Quality Technology Branch; Octavious Chacon of Milby High School teamed with Craig Dinsmore, Test Operations and Institutional Safety Branch; Veronica Estrada of Austin High

School teamed with Tony Smith, Space Biomedical Research Institute; and Rebecca Williams of Jones Vanguard teamed with Vicki Kloeris, Systems Development Section.

SHARP was designed as a feeder program to build a resource pool of potential applicants for future NASA employment in science and engineering. It also was created to attract and train minorities and women who are underrepresented in the NASA scientific and engineering work force.

Eighteen former SHARP students are summer interns at JSC.

Mission Control viewing room, cafeteria hours

The Mission Control Center viewing room will be open to JSC and contractor badged employees and their families during portions of the seven-day STS-46 mission.

Based on a Friday launch, employees will be allowed to visit the MCC Saturday and Sunday, from 1-4 p.m.; Wednesday, from 11:30 a.m.-2:30 p.m. and 5-7 p.m.; and Thursday, from 11:30 a.m.-

Employees must wear their badges and escort family members through the regular public entrance on the northeast side of Bldg. 30. Children under 5 will not be permitted. No flash photography or loud talking will be permitted.

Because of the dynamic nature of shuttle missions, viewing hours may be changed or canceled without notice. For the latest schedule information, call the Employee Information Service at x36765.

Special cafeteria hours also will be in effect during the mission.

The Bldg. 3 cafeteria will be open from 7 a.m.-4:30 p.m. weekdays, except launch day, and from 11 a.m.-4:30 p.m. weekends. The Bldg. 11 cafeteria will be open from 6:30 a.m.-2 p.m. weekdays, except launch day, and 7-10 a.m. weekends and holidays.

Safety Learning Center offers August classes

JSC's test Operations and Institutional Safety Branch is offering another set of safety classes in August for civil servants and con-

Instructors will teach the classes in the JSC Learning Center, Bldg. 226N. Civil service tuition is paid for by the Human resources Office. To register, fill out a registration form available by calling the learning center at x36369.

The classes include:

Asbestos Level I training, 9-11 a.m. Aug. 6.

Confined Space Entry, 8:30-11 a.m. Aug. 7. Hazard Communication, 1:30-

3:30 p.m. Aug. 6.

Protect Your Back, 8 a.m.-noon,

Payload Safety, 8 a.m.-4:30 p.m., Aug. 17.

Apollo astronaut Bean exhibits paintings

The Houston Museum of National Science will host an exhibit of more than 20 paintings by Apollo 12 and Skylab 2 astronaut Alan Bean through Jan. 31, 1993.

"Continue the Dream: The Art of Alan Bean" is a collection of artistic interpretations of human beings from the planet Earth at work in a strange new world. It is on display in the Welch Hall of the museum's lower level. The museum is open Monday through Saturday from 9 a.m.-6 p.m., and Sundays from noon-6 p.m. Admission is free to members; \$2.50 for non-member adults, and \$2 for non-member children under 12.

Bean was a NASA astronaut from 1963-1981. He piloted the lunar module Intrepid on Apollo 12, served as commander of Skylab 2. Be began pursuing his career in art in 1981.



HAPPY BIRTHDAY LANGLEY—NASA employees form a giant '75' to celebrate the 75th anniversry of Langley Research Center in Hampton, Va. Langley, the birthplace of NASA and its precursor, the National Advisory Committee on Aeronautics, began operations July 17, 1917. Langley employees are celebrating the center's significant contributions to aerospace history-from the earliest aircraft to the latest space vehicle concepts-this month.

SOAR '92 next week at Gilruth

JSC will host the sixth annual Space Operations, Applications and Research Symposium next week as participants from around the country gather to share results of research that will support space operations of

The Space Technology Interdependency Group's SOAR '92, co-sponsored by JSC and the Air Force Materiel Command, will convene at 8:30 a.m. Tuesday and continue through noon Thursday.

The keynote dinner session at 7 p.m. Wednesday will feature a welcome from Geoff Griffin, deputy director of operations thrust for NASA's Office of Applications and Space Technology. Dr. Billy Welch, director of Armstrong Laboratory, and Dr. Robert Norwood, deputy director for Space Technology for NASA/OAST, will give the opening address at 8:30 a.m.

The keynote speaker will be Dr. Allan Schell, principal assistant for science and technology in the Air Force Materiel Command.

Throughout the conference, panel discussions and exhibits will look at robotics and telepresence, automation and intelligent systems, human factors, life support and space maintenance and servicing.

For more information about the conference, call Chris

Energy conservation starts with air conditioning

(Continued from Page 1)

"If we can really maximize our efforts at shutting off equipment and turning off air conditioning and lights after hours, we can get to the 100 percent goal without any large expenditures," JSC Energy Manager Dennis Klekar said.

The night load reduction policy

sets normal workday operation hours for air conditioning from 6 a.m. to 6 p.m. Monday through Friday. Only direct flight-supportessential equipment and systems will be operated beyond normal day shift hours. Energy conservation managers will identify such equipment and justify its operation to the

JSC energy conservation manager.

The after-hours air conditioning policy establishes that no comfort air conditioning will be provided beyond normal workday hours or on weekends except in support of flightessential activities, emergency situations or special protocol events and designates energy conservation managers as the only ones who may authorize exceptions.

The holiday operations policy orders that no air conditioning for personnel comfort will be provided during federal holidays, and requires contractors to work at other locations if their holidays do not coincide with the government's.

Alaskan experiment could save lives, time and money

NASA is helping a group of dedicated Alaskans begin a three-year experiment that ultimately could result in saving the lives of thousands of campers, hunters and boaters.

The Alaskans will test the use of a small emergency radio transmitter, known as a Personal Locator Beacon or PLB, to communicate with a 10-year-old search and rescue satellite system that up to now has been used primarily for aircraft and ship emergencies.

"We are confident the experiment will prove the value of these emergency devices," explained Wayne Hembree, NASA's Search and Rescue Mission manager at Goddard Space Flight Center.

remote areas undoubtedly will save lives." he continued. "Their use also will lower search times and costs and reduce the dangers to personnel conducting the rescue missions."

The experiment is being carried out with the cooperation of NASA, the National Oceanic and Atmospheric Administration, the U.S. Air Force and the U.S. Coast Guard.

The satellite system, an international program known as COSPAS-SARSAT, has been responsible for saving more than 2,300 lives since it was started in 1982. Principal partnersare Canada, France, Russia and the United States.

That PLB program piggy-backs on four low-Earth-orbiting satellites "Use of the beacons by people in used primarily for U.S. meteorology and Russia's merchant marine ships - to receive emergency signals and relay the information to ground stations around the world.

The PLB experiment is designed to prove the need for a lightweight beacon that can be carried and used in an emergency by individuals. Twenty beacons, which cost between \$1,200 and \$1,700, will be loaned to qualified applicants, transmitting any emergency signal and allowing search parties to "home-in" on the location.

The test is being funded by the North Slope Borough Search and Rescue Department, according to Charles Caldwell, the project coordinator for the borough. NSBSAR provides year-round assistance to overdue hunters, boaters, whaling crews and aircraft.

The North Slope Borough is one of the most remote areas of Alaska. It covers 92,000 square miles (an area about the size of Utah). There are no roads to speak of, and travel is accomplished by amphibious vehicle in the summer and by snowmobile in the winter, Caldwell explained.

With a PLB, he said, the emergency signal would be picked up by a satellite within 55 minutes, the information sent to a rescue coordination center, and the rescue party could be at the scene shortly thereafter. In pre-experiment trials, Caldwell said, the PLB has brought searchers to within six-tenths of a mile and never more than 1.3 miles.

SLS-1 shows big changes

(Continued from Page 1)

In another SLS-1 experiment, there is clear evidence that the number of synapses, the structures used to communicate between the cells of the inner ear's gravity detecting organ and the central nervous system, increases greatly during space flight. However, size remains the same. Therefore, these systems should be able to adapt to the differing gravitational environments of space, the Moon and Mars, according to Dr. Muriel D. Ross, a neuroanatomist at Ames Research Center.

Further research in this area should shed light on the broader topics of memory and learning in

neural tissue and on clinical inner ear diseases.

Following space flight, there is a significant and dramatic reduction in the size of all muscles needed for standing and moving, according to Dr. Kenneth M. Baldwin, an exercise and muscle physiologist from the College of Medicine at the University of California, Irvine.

"Also, there is a reduced capacity of muscles to burn fat for energy production," Baldwin said. "In addition, this experiment has verified that muscles that support the body when we walk around on Earth change their nature in space because they are not needed.'

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.

Dates and Data submissions are due Wednesdays, eight working days before the desired date of publication.

.....Kelly Humphries Associate EditorKari Fluegel

Atlantis on track

(Continued from Page 1)

Atlantis would have acceptable weather for this morning's liftoff.

The STS-46 crew—Commander Loren Shriver, Pilot Andy Allen, Mission Specialists Claude Nicollier, Marsha Ivins, Jeff Hoffman and Franklin Chang-Diaz, and Payload Specialist Franco Malerba arrived at KSC shortly after 8 p.m. CDT Tuesday.

Work continues to prepare Endeavour for its second space flight, STS-47 carrying the Japanese Spacelab, set for mid-September. Three main engines have been installed on Endeavour and the connections were doublechecked this week.