



Changing times

The Lower Body Negative Pressure unit has changed a lot since Owen Garriott used this one on Skylab. Story on Page 3.



Center to center

JSC employees are giving aid to Marshall Space Flight Center employees affected by a recent killer tornado. Story on Page 4.

Space News Roundup

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No. 49

Seven receive JSC Aviation Safety Awards

By Jeff Carr

Assuring safe and friendly skies for JSC aviators means more than strict safety policy and regulations. It depends largely on the personal dedication and professionalism of people who care enough to do what it takes to make sure.

The proof is in the scores of NASA astronauts and staff pilots who have been riding the wings of the JSC airplane fleet for more than two decades without serious accident or injury.

"You can't delegate or legislate safety. That's up to the individual," says Donald Puddy, director of Flight Crew Operations.

That special dedication and personal concern were recognized and rewarded this week at the annual JSC Aviation Safety Awards ceremony. Presenting seven awards for special contributions to the safety of NASA pilots and their flying machines was former astronaut and current associate administrator for space flight, Dr. William B. Lenoir.

"NASA is a flying agency, our mission is to fly. Each and every job here really matters and contributes to that mission in a large way," said Lenoir, who, on behalf of NASA Administrator Richard H. Truly and the entire agency, thanked the honorees for their exceptional work.

Marine Col. Bryan D. O'Connor, former chief of NASA's Space Flight Safety Panel, current deputy chief of Flight Crew Operations, and crew commander for STS-40, was honored with the Stephen Thorne "Top Fox" Award for his far-reaching contributions and diligence in the field of aviation safety. The awards committee noted, "his influence has helped foster a rededication to safe operations in all aspects of the space shuttle program".

Pamela A. McCain of the Shuttle Training Aircraft (STA) Simulation Section received the Mark Heath Aircraft Engineering Award in recognition of her support in the management and development of software systems and security.

STA Maintenance Officer Joseph A. Gerky was given the Flight Simulation Engineering Award for his support of astronaut STA training and for his sound judgment in identifying aircraft problems prior to training sorties.

Roger C. Zwieg, recognized for his significant improvements in STA

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JSC Photo by Scott Wickes

SANTA MODULE—Santa Claus and one of his helpers pay a visit to the Space Station Freedom mockup in Bldg. 9B earlier this week. They'll be at the Children's Christmas Party sponsored by the Employee Activities Association from 10 a.m.-noon Saturday at the Gilruth Recreation Center. Santa's visit was arranged by Bendix employee Rich Holtje and his wife, Valerie, a NASA employee.

Two-day delay

Confidence high for pre-Christmas Columbia liftoff

By Kyle Herring

With final pad validation and vehicle close out taking longer than expected, the launch of *Columbia* on mission STS-32 has been delayed to 5:26 p.m. CST Dec. 20.

Kennedy Space Center officials said there were no show-stopping problems, but that it has taken longer than expected to prepare Pad 39A after nearly four years of refurbishment.

"We are pleased at how smoothly the work has been going at KSC to prepare for *Columbia's* launch, and we feel confident about readiness for a pre-Christmas liftoff," said William Lenoir, associate administrator for space flight.

Launch next Wednesday could take place during a 58-minute "window" that closes at 6:24 p.m. The actual liftoff time will determine what day the crew retrieves the Long Duration Exposure Facility (LDEF).

To be ready for a launch date of Dec. 20, the crew would fly to Kennedy in NASA T-38 training aircraft Sunday afternoon. The countdown is now scheduled to begin at 3 p.m. Sunday.

The STS-32 crew is commanded by Dan Brandenstein. Pilot for the mission is Jim Wetherbee. Mission specialists are Bonnie Dunbar, Marsha Ivins and David Low. Wetherbee, Ivins and Low are making their first space flights. Brandenstein previously flew on missions STS-8 and 51-G. Dunbar flew on STS-61A.

At launch complex 39A, final close-out work is scheduled to take place today and Saturday in anticipation of starting the countdown Sunday.

Shuttle managers are now scheduled to meet Monday and Tuesday for the routine Launch-2 and Launch-1 meetings to determine vehicle, crew and flight control team readiness.

Work at the pad this week included hypergolic propellant loading and the "hot fire" test of the solid rocket booster hydraulic power units.

Workers Wednesday began validating systems at Pad 39A that will be used in loading liquid oxygen and liquid hydrogen into the on-board storage tanks. Aft compartment close-out activity is under way. Ordnance installation and checks of firing circuits are planned for Sunday.



NASA offering space tomato seeds to students

NASA is offering 12.5 million tomato seeds to budding student gardeners in the first experiment ever to study the effects of long-term space exposure on living tissue.

It has been more than 5-1/2 years since the space shuttle deployed 12.5 million tomato seeds, housed in the Long Duration Exposure Facility (LDEF), into Earth orbit. During STS-32, NASA plans to retrieve the 11-ton, free-flying satellite. LDEF carries 57 experiments concerned with the exposure of materials to the space environment, one of which is SEEDS.

SEEDS (Space Exposed Experiment Developed for Students) is a cooperative educational partnership among NASA Headquarters Educa-

tion Affairs Division, Langley Research Center and the George W. Park Seed Co., Greenwood, S.C.

The project is designed as a classroom experiment for U.S. students in grades five through university to conduct open-ended research.

NASA Administrator Richard H. Truly said, "Because this is the first opportunity for long-duration space exposure of living tissues, every classroom experiment will be significant. I hope millions of students will experience this hands-on, one-of-a-kind experiment and learn that science is fun."

The SEEDS project has the potential to directly involve 4 million students and 40,000 educators, in 250,000

classrooms.

After LDEF is retrieved, the flight seeds will be returned to Park Seed Co. where an equal number of control seeds from the same lot have been maintained in a ground-based facility.

Following preliminary growth tests conducted by plant scientists, these seeds will be distributed in late February. Each seed kit will contain 50 flight seeds and 50 control seeds, instructional materials and computerized data collection and reporting booklets.

Students will conduct classroom experiments, including experiment design, data gathering, sample comparison and final reporting results. Upper elementary and secondary

levels could compare germination rates and times, seed embryos, phototropic responses and fruit products. Students also could consider the impact of varying environmental factors. Upper secondary and university students could perform chromosome experiments and population genetics studies.

The tomato seed was chosen because students in all geographic areas are familiar with the plant; it is relatively simple to germinate and grow; it is small enough to permit a large number to be flown; and it is proven to be very hardy. The Rutgers tomato seed was selected because has wide adaptation and can be grown in every state.

Amateur astronomers' idea makes Top 10

Homemade portable telescope follows movement of stars

By Linda Copley

Three long-time JSC amateur astronomers have built, and currently maintain, this country's largest portable telescope on a clock-driven platform. Their 18-month-long "home-grown hobby" was listed as first on Sky and Telescope Magazine's list of "Top 10 Telescope Ideas of 1989" in the December issue.

The project is a privately financed and built 32-inch f/4 Newtonian reflector telescope, currently residing in its own portable observatory on leased pastureland outside Danciger, Texas.

"As you get older, the price of toys goes up," said Al Kelly, operations resources manager for the Mission Operations Directorate.

Kelly joined with Andy Saulietis,

a subsystem manager in the Avionics Systems Division; Paul Torrance, a pressure systems engineer in the Quality Assurance and Engineering Division; Frank Cooper, science instructor and former director of the Burke Baker Planetarium; and Dennis Zwicky, owner of an optical shop catering to amateur astronomers, to form the Danciger Astronomy Group and build the telescope in June 1987.

Two years, \$12,000 and untold hours of "sweat equity" later, the project culminated with an "unveiling" at the Texas Star Party, an annual May convention put on by the Southwest Chapter of the Astronomical League. The group's ability to transport and exhibit their creation on the remote ranch near Fort Davis, Texas, helped them win the magazine's recognition. Saulietis designed the telescope

and its tracking platform and provided his garage and shop for the project team members to complete the fabrication and construction work. The finished telescope, with a 2-inch-thick primary mirror, is supported on a 4-by-4-foot equatorial tracking platform of plywood and steel.

The platform design, integral to the telescope's portability, allows it to follow its targets at the sidereal (movement of the stars) rate. The unique design is based on a principle that uses sections of a cone whose axis is parallel with the axis of the Earth.

The conical sections were shaped in a metal lathe. The motorized assembly drives the reflecting telescope for 55 minutes before it must be reset, an operation that takes only

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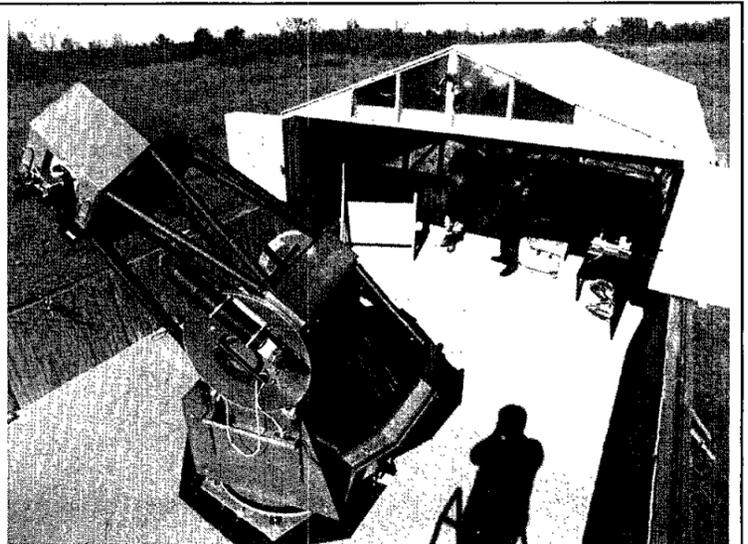


Photo by Andy Saulietis

With the observatory roof retracted, the Danciger Astronomy Group's transportable clock-driven telescope—the largest in the country—awaits a clear night sky for viewing. The 32-inch f/4 Newtonian telescope is able to track its targets as they move across the sky.

JSC

Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Gift Store from 10 a.m. to 2 p.m. weekdays.

General Cinema (valid for one year): \$3.75 each.

AMC Theater (valid until May 1990): \$3 each.

Sea World (San Antonio, year long): adults, \$17.25; children \$14.75. Christmas special: (Dec. 16-Jan. 1, includes snow ski jump and acrobatics and children's snowy play area): \$11.

Children's Christmas Party (Dec. 16, 10 a.m.-noon, Gilruth Rec Center, includes photo with Santa, magician, clown, refreshments): children, \$4; adults, \$1.

Powderhorn Ski Trip (Jan. 23-27): 12 seats still available: \$385 each (four to a condo); \$339 each (six to a condo).

Holiday in the Park (at Astroworld): Pick up a coupon at Bldg. 11 for admission to a winter wonderland: \$5.95 each.

New Year's Eve Dance (Dec. 31, 7 p.m., Gilruth Rec Center): \$12.50 each.

Gold C and Entertainment Coupon Books are now available in the Bldg. 11 Gift Store.

JSC

Gilruth Center News

Sign up policy—All classes and athletic activities are first come, first served. To enroll, you must sign up in person at the Gilruth Recreation Center. Everyone will be required to show a badge or EAA membership card. Payment must be made in full at the time of registration. Classes tend to fill up four weeks in advance. For more information, call x35789 or x30304.

EAA badges—Dependents and spouses may apply for a photo I.D. 6:30-9:30 p.m. Monday-Friday.

Defensive driving—Course is offered from 8 a.m.-5 p.m., Jan. 20 and Feb. 3; cost is \$15.

Ballroom dance—Classes begin at the Gilruth Rec Center on Jan. 4, and meet each Thursday for 8 weeks. Beginning and advanced classes meet from 7-8:15 p.m., intermediate from 8:15-9:30 p.m.; cost is \$60 per couple.

Low-impact aerobics and exercise—Each eight-week session runs twice a week from 5:15-6:15 p.m. Cost is \$24.

Basketball sign-ups—Basketball sign-ups will be Dec. 19-21 at the Gilruth Rec Center. NASA-badged teams will sign up at 7 a.m. Dec. 19-20. Non-badged teams will sign up at 4:30 p.m. Dec. 21.

Volleyball sign-ups—Volleyball sign-ups will be Dec. 18.

Soccer and flag football registration—Sign-ups will be held Jan. 10-11 at the Gilruth Rec Center

Country and Western dance lessons—Dance lessons begin Jan. 22 and are held each Monday night for six weeks. Cost is \$20 per couple.

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. Send ads to Roundup Swap Shop, Code AP3, or deliver them to the deposit box outside Rm. 147 in Bldg. 2.

Property

Sale: Time Share — Harbor Club, Palm Coast, FL, floating week — sleeps 6, close to Atlantic, golf, close to Disneyland and Daytona, new \$8400, now \$5500. 280-1500 x3599.

Sale: 14 x 70 mobile home, 2-2, neat, curtains and miniblinds, \$16K. 534-4770.

Lease: Bal Harbour townhouse, 2 min. from JSC, 3 bdrm., FPL, microwave, atrium, boat slip, pools & tennis courts, dbl. garage, \$1200/mo. 486-8659 or 283-5480.

Lease: 4-2-2, across from Dobie H.S., both formal, FPL, ceiling fans, miniblinds, screened patio, \$615/mo., equal dep., no pets. Chris, 484-1495.

Sale: Ig. lots excl. subdiv. near NASA, mid \$30's, can finance. Don, x38039 or 333-3313.

Sale: Shoreacres, 4-2-2, 1800 sq. ft., new paint and carpet, many replaced items, lg. wooded lot, \$65K. Sally, x37485 or 488-5501.

Sale: Seabrook, 3-2-2, 1800 sq. ft., brick, never flooded, formal, lg. den w/FPL, remod. w/new A/C, heater, roof, int. deck w/spa, \$67.5K. Richard, x30271 or 474-9334.

Lease: Webster/Ellington, nice 2-1 apt. w/ many extras, \$390/mo. Dave, x38156 or Eric, x38420.

Rent/Lease-Purchase/Sale: Hobby Airport/Glenbrook Valley, 2-1.5-2CP, new carpet, FPL, W/D conn., 4 ceil. fans, \$35K or \$450/mo. + dep. x35265 or 641-5279.

Rent: Winter Park, Colorado condo, sleeps 6, wks. avail. during ski season and summer months. 488-4453.

Rent: Fully equip. condo, Heavenly Valley, Lake Tahoe at Stateline, 19-26 March 1990, sleeps 6, \$425. 474-5610.

Sale: Gulf Meadows, brick 3-2-2, den w/FPL, formal, storm windows, dbl-insul. ceiling, 5 ceil. fans, 12' x 26' scr. patio, never flooded, \$59.5K. 282-4085 or 991-1121.

Sale: Heritage Park, 3-2-2, deck w/patio cover, fresh paint, assum. loan, non-qual., near schools. 996-1274.

Trade Houses: Custom canyon view, 4-3, off 360 west of Austin. Prefer 5 yr. old, open plan within 20 min. of JSC. 471-8795 or 333-6083.

Rent-to-own: Baywind II 1-1-1, upstairs, corner unit w/balcony, pool, lighted tennis crts., burg. alarm, W/D, D/W, refrig., \$400/mo., \$150 applies to sale price, 7.875% fixed assum. loan, 480-5504.

Sale: Log home, 3-2-4, Royal Gorge area, all kitchen appl., also sat. dish, on 2 acres, pole barn & corral, FPL, wood paneling, near ski areas, hunting, M. Rutter, 282-3923 or M. Filler, x39421 or (719) 942-4398.

Lease: Heritage Park, 4-2-2, ceil. fans, split bdrm., fenced, \$550/mo. 482-6609.

Sale: 18' x 80' mobile home, on 6 cleared, fenced acres w/many extras, \$40K or will sell mobile home alone, you move, \$20K. 333-3894.

Sale: 5-yr old A-frame house on 3 acres, turn, covered patio, metal bldg., fruit trees, approx. 10 mi. from Crockett, Tx, \$19K. 486-9760.

Sale: Lake Texana area, 966 acres, sell all or part, 4-2.5-3 brick home, 50' x 110' metal shop, 150 pecan trees. (512) 771-3893.

Sale: 1.5 acre lot, Ganado, Tx., 5 min. from Lake Texana, 100 mi. SW of Houston. 335-1250.

Cars & Trucks

'81 Buick Skylark, tan & navy, 70K, runs great, nice int., looks gd., \$1700. 996-9523.

'89 Hyundai Excel GLS, 2-dr hatchb., auto. trans., A/C, 4-yr. warranty has 5K mi., \$9000. 282-5204.

'79 Cutlass Supreme Brougham, very clean, runs great, \$1795. 280-8796.

'68 Camaro, white, 327 w/2-sp. power glide (new trans.), ex. int., body needs minor work, \$4000 cash, OBO. Merrell McDaniel, x37570 or 944-1886.

'85 Toyota MR2, silver, tailfin, fully loaded, 5-sp. ex. cond., 54K mi., \$6500, OBO. Cindy, 779-4515 or Darwin, x32142.

'83 Honda Accord, 4-dr., tan, 5-sp. A/C, P/S, P/B, AM/FM stereo, cass., orig. owner, 105K mi., good cond., \$3900. 482-5917.

'77 Camaro, looks and runs gd., \$1500. 474-2200.

'81 Mazda RX7 GSL, loaded, very clean, new tires, \$3500. John, x38178 or 482-5837.

'83 Mazda 626, low maint., low mpg, \$2500. 488-6526.

'75 T-bird, 460 engine, \$460. 487-4852.

'82 Layton 23' travel trlr., ex. cond., sleeps 4+, new water heater, 3-way ref., full bath, gd. tires, awning, load leveling sys., rear jack. 554-2929.

'84 Jeep Cherokee, white-tan int., 4-sp., cruise, A/C, Alpine stereo, low mi. x32682 or 333-5750.

'87 Chevy Nova, ex. cond., new tires, brakes, 4-cyl., auto., AM/FM, \$5900. 480-3270.

'87 Chevy 150 1/2-ton PU, mags, PW/PL, tinted wind., A/C, \$7500. x35265 or 641-5279.

'85 Ford PU, F-150 Supercab/camper, loaded, 48K mi., \$8500. 473-2505.

'78 GMC PU, new tires, chrome bumpers, being painted, runs gd., rebuilt trans., \$1700. Joyce James, 333-7713 or 337-9909.

'77 Camaro, looks gd., runs gd., \$1500. 474-2200.

'81 Ford Courier PU, runs gd., \$550. Ed, x39847 or 559-1215.

'78 Plymouth Volare, slant 6, auto., 4-dr., runs OK, 4 gd. tires, \$400, OBO. 333-6558 or 339-1337.

'79 Buick SW, 350 auto., new tires, rebuilt eng. (lifters & rods), new batt., alt. wr. pump, great shape, \$850, OBO. 333-6558 or 339-1337.

'75 Ford Granada 302 auto., new tires, new batt., tune up & oil chg. this mo., good shape, \$600, OBO. 333-6558 or 339-1337.

'80 Cutlass Supreme, an American classic, mech. sound, 110K mi., \$1750. 333-7518 or 332-6992.

'86 Celica GT-S, 5-sp., like new, P/S, P/B, A/C, P/W, P/L, powered moon roof, cruise, stereo cass., \$9500. 474-2384.

'85 Cadillac, front-wheel drive, like new, 64K mi., \$9400, OBO. x38298 or 488-4089.

'84 Mitsubishi Cordia, turbo, 5-sp., one owner, 99K mi., all receipts, ex. cond., \$1950. 484-5149.

'82 Plymouth Reliant, P/S, P/B, 4-sp., 2.2L, very clean, \$1200, OBO. Scott, x31695 or 488-0754.

'79 Dodge Omni, 2-dr. hatchb., 5-sp. man., AM/FM cass., looks and runs great, 99.6K mi., \$950. Bob, x39079 or 488-5881.

'78 Olds Delta, 350, A/T, P/S, P/B, cruise, int. wipers, tranny newly rblt., runs great, \$800; 350 GM auto. trans., short shaft, \$50. x33678 or 489-7494.

'81 Datsun 280ZX, turbo, T-tops, 2-tone brn., auto., A/C, AM/FM/cass., sport tires, ex. cond., runs great, \$3600. 283-4171 or 486-8574.

'74 Bethany camper trailer, pop-up sleeps 8, stove, heater, ice box, water tank, sink, converter, good cond., \$2000. x33100 or 337-4803.

Cycles

'83 Honda XL 600R, street legal, runs, \$600. Brad, 485-2101.

PK Ripper BMX frame and fork, never used, \$95 (\$200 new); men's Schwinn Varsity 27" 10-sp., met. gold, \$25. 482-7873.

Want motorcycle needing work. x37664 or 554-2766.

'78 Kawasaki KZ650, w/helmet, ex. cond., needs batt., \$700. Steve, x35806 or 333-4222.

'85 Suzuki touring bike, windscreens, fairs, footrests, backrest, shaft drive, very low mi., ex. cond., \$1300. Patrick, x32635 or 488-1079.

JSC

Dates & Data

Today

The Moon: Gift to Humanity program—Dr. Wendell Mendell, planetary scientist, will speak to the Houston Space Society on using the Moon as a stepping stone for exploration and development of the rest of the Solar System at 7:30 p.m. Dec. 15 in the Caribbean Room at the University of Houston. Call 639-4221 for more details.

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

AFCEA meeting—Major General Richard D. Smith, Commander of the San Antonio Air Logistics Center, Kelly AFB, San Antonio, will be the guest speaker at the monthly Armed Forces Communications and Electronics Association (AFCEA) Houston Space Chapter meeting. The meeting will begin with a social at 11:30 a.m. on Dec. 19 at the South Shore Harbour Hotel. Lunch will follow at noon, and the speaker will begin at 12:30 p.m. Tickets are \$10 for members, \$12 for nonmembers, and reservations must be made by Dec. 18, by contacting Debbie Williams, at 283-6667.

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

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.

Dec. 22

Open Season ends—The final day of the JSC Health Benefit Plan Open Season is Dec. 22. The deadline was extended because delivery of supplemental written materials to the benefits office was delayed. Contact Shirley Whittaker at x32681 for additional information.

Cafeteria menu—Special: tuna and noodle casserole. Entrees: liver and onions, deviled crabs, roast beef with dressing. Soup: seafood gumbo. Vegetables: whipped potatoes, peas, cauliflower.

Dec. 25

Christmas holiday—Most JSC offices will be closed and the center will be closed to visitors in observance of the Christmas holiday. The Space News Roundup will not be published Dec. 29.

Dec. 26

BAPCO meeting—The Bay Area PC Organization will meet at 7:30 p.m. Dec. 26 at the League City Bank and Trust. Contact Earl Rubenstein at x34807 or 326-2354, or Ron Wald-billig at 337-5074 for information.

Dec. 31

New Year's Eve dance—The JSC-EAA New Year's Eve Dance will begin with a social hour at 7 p.m., dinner (cold cuts) at 8, and dancing from 9 until 1 a.m. at the Gilruth Rec Center. Music will be provided by Sterling Silver and 4th Wave Rhythm; cost is \$12.50 per person. Tickets sales end on Dec. 22 at 2 p.m. For information, contact Larry Davis, x38055.

Jan. 1

New Year's Day—Most JSC offices will be closed in observance of the New Year's Day holiday.

Jan. 3

Threshold Group Meeting—A coordinating committee meeting will be held from 4-5 p.m. Jan. 3 in Bldg. 45, Room 128. For information contact James Atrum, x33085.

Jan. 31

Thrift Savings Plan Open Season Ends—Federal employees wishing to join or make changes to their thrift savings plan must do so by Jan. 31. For information, contact the benefits area at x32681.

Swap Shop

Boats & Planes

'84 Carver 26, sleeps 4, loaded w/electronic instr., new bottom, \$27,800, negotiable. 532-2213.

'74 17' boat, tri-hull fiberglass, split windshield, w/74 135hp Chrysler outboard, '76 Shoreline trlr., tilt, wench, buddy bearings, \$2000. x33100 or 337-4803.

Dolphin SR sailboat and trlr., \$500. Bullock, 488-6526.

14' fiberglass V-hull, new seats, top & accy's, 40-HP Evinrude, no trlr., \$450; 15' fiberglass V-hull w/top & accy's. and trlr., 33hp eng., \$550; 18' Hobie Catamaran, comp. w/trlr. and accy's, \$850. 474-5558.

'84 O'Day 222 sailboat, 10hp Honda motor, like new, galv. trlr., \$6500. Sue Ann, x33841 or 280-0313.

Holiday deadlines

Because of the Christmas and New Year's Day holidays, Space News Roundup will not be published Dec. 29. Swap Shop and Dates and Data deadlines will be affected.

The deadline for Swap Shop ads to be published in the Jan. 5 issue will be 5 p.m. Wednesday, Dec. 20. The deadline for receipt of information for the Dates and Data section of that issue will be 5 p.m. Wednesday, Dec. 27.

Audiovisual & Computers

Commodor 64 computer, \$75; Okidata 120 printer, \$150. Joel, 482-8628.

Jasmine 46 mbps HD, new, w/cables, SW and utilities, \$500. Al, x30054.

Want to buy or trade Apple monotone monitor for color monitor for Apple IIE. Tino, x30725. ST 251-140 meg, 28 msec HD for PC's, still in box, \$345. 486-4463.

Samsung amber monitor, never used, \$40. x35753 or 337-2002.

Atari 2600 console, two joysticks, two paddle controllers, AC adapt, 5 games, \$20. 488-2735.

Smith-Corona L-1000 LQ printer, serial and parallel interface, \$240, OBO. Joe, x35259 or 486-5565.

AudioSource EQ-1 analyzer/equalizer, 2 ch., 10 bands/ch., \$140, OBO. Joe, x35259 or 486-5565.

Peavey PA system, 400W, 4-ch., 8 input, 2 col., ea. w/4 10" spkrs, \$375; CPB bass pedals, \$150; acoustic lead amp., 400W, 4 12" spkrs., \$225. Steve, x34176 or 486-8424.

Pioneer 100W receiver, \$125; Pioneer cassette deck, \$75; Radio Shack 50W bookshelf spkrs., \$60, or \$225 for all. Frank, x33573 or 480-9376.

Household

Washer, elec. dryer, refrig., \$100 ea. Cindy, 484-6261.

Wicker etagere, wicker stand, wicker chair w/cushion, all for \$75. x34176 or 486-8424.

AM/FM, tape player/recorder, turntable, sep. spkr. enclosure, good cond., \$65, OBO. x37413 or 326-1404.

Stuent desk, formica top, cloth chair w/rollers and tilt, very good cond., \$39, OBO. x37413 or 326-1404.

New upholstered bar stools, 30" high, writing desk, office style end tables and chairs. Tom, x31418 or 863-7561.

Six drwr. dresser, 1 1/2 yrs. old, ex. cond., \$75. Bob, 488-8672.

Couch, \$70; loveseat, \$40, do not match, contemp. style. 996-9191.

Drk. walnut desk w/hutch top and chair, \$200; Mediter. DR set w/lighted hutch w/6 chairs, \$300, OBO. Barbara, 282-2569 or 996-8426.

Queen sz. sleeper sofa, good cond., \$80; chest of drws., \$40; king sz. bed w/matt., hdbd., \$100. 486-4463.

DR table w/extra leaves, 4 chairs, \$150; lg. oil painting, \$30; beaut. antique window bench, \$250; lg. Peruvian fur rug, for wall hanging or floor, \$100; misc. decorator items, mirrors, pictures, glass, some antique; 2 long foldup antique benches, \$100, both good cond. 488-5564.

Antique oak armoire and dresser; armoire has single door w/beveled mirror, \$600/both; antique American pine dbl. bed w/new matt., never used, \$900. 966-1442.

Dk. country oak bdrm. furn., gd. cond., captain's bed, \$50; night stand, \$25; 2 4-drawer chests, \$50 ea.; student desk and chair, \$65; twin hdbd. & rails, \$45; 2 matt. w/1 box spring, \$15 ea. Lonnie, x30694 or 480-2348.

Queen sz. waterbed, hibernation semi-motion matt., 9 mo. old, pine-mirrored hdbd/bkcase, htr., linens, \$325; dinette set, antique white, 4 padded chairs & bench w/table, \$75; twin bed frame & matt., \$30; 10' x 12' used beige carpet, \$25. Steve, x34176 or 486-8424.

Dining table, solid oak, butcher-block style, reclang. 7' x 3' w/6 solid oak cane-bott. chairs, plain style table, very sturdy & strong, \$750, OBO. Patrick, x32635 or 488-1079.

'88 Imperial hvy. duty upright freezer, white, \$600, OBO. 474-2930.

Solid oak bdrm. wall w/chest of drws., ex. cond., \$1300; full-sz. swing set w/slide, good shape, \$40. x30789 or 280-9974.

Couch/matching ottoman, off-white w/subdued accent weave, \$150, OBO. Frank, x33573 or 480-9376.

Lost & Found

6-sp. Raleigh bike missing from MCC. Jon Axford, 483-7671.

Reward: lost white-lace brooch shaped like a flower, sentimental value. Jeanette, x35816 or 488-2509.

LOWER BODY NEGATIVE PRESSURE

Doctor's most anticipated Christmas gift won't be tucked in stocking at home

By Pam Alloway

This Christmas one of Dr. John Charles' most anticipated presents won't be tucked into a stocking at home—it will be aboard Columbia, orbiting the Earth 190 nautical miles high.

Charles, who has a doctorate in cardiovascular physiology, is the principal investigator of the Inflight Lower Body Negative Pressure (LBNP) unit, a Detailed Supplementary Objective on STS-32.

The LBNP, previously used on Skylab missions, allows investigators to assess a person's ability to stand upright after being weightless, known as orthostatic tolerance. Charles and others have spent the past year designing and constructing a collapsible cylinder to fit inside a shuttle mid-deck locker.

Such a device is a substantial change from the Skylab version—a large, metal, noncollapsible container that occupied a notable amount of room.

The collapsible LBNP device itself is accordion-like. When crew members take it out of the locker they will extend tent-like poles that hold the unit in position. Inside the unit is a custom-built seat, similar to a bicycle seat, to suspend the subject and prevent his or her legs from touching the bottom of the "can," as the LBNP affectionately is called by those who work with it.

"Skylab had a 'perfect' unit," Charles said. "We've had to make some compromises to make this unit collapsible. This mission will tell us what work we have yet to do. But this flight is as much a hardware verification test as it is a protocol validation."

STS-32 will be the collapsible version's debut and, with a planned Dec. 18 launch date, Charles may see his inflight LBNP unstowed and in operation on flight day seven—Christmas Eve.

"This will be a nice Christmas present if it comes together and works," Charles said. "We should get downlink (live television transmission) of them unstowing it. So, if it happens on Christmas Eve, it'll certainly be one of the most important Christmas gifts I'll get."

The experiment will evaluate the use of the controlled intake of salt tablets and water, also known as saline solution, in tandem with a force that pulls fluids toward the body's lower portions. Researchers hope these two techniques will prevent astronauts from having difficulty in standing upright once they return to Earth.

Charles believes that drinking a large quantity of saline solution during the LBNP treatment will offset the common fluid loss that occurs when bodily fluids move toward astronaut's heads during

space flight.

STS-32 crew members will repeat the LBNP procedure more times each day than was required of the Skylab astronauts. Maximum pressure in the procedure will be comparable between the two crews. However, shuttle astronauts will be subjected to higher negative pressure levels over longer periods midway through the experiment.

"Physiologically you perturb the system and measure the ... response to stress," Charles said. "That's what the LBNP does. This will give us a picture of how the cardiovascular system adapts in space flight."

Crew members will measure their heart rates, blood pressure, the amount of salt and water they drink, the elapsed time, and take an echocardiogram plus LBNP pressure readings.

Mission Specialists Bonnie Dunbar and David Low have volunteered to be LBNP subjects. Mission Specialist Marsha Ivins will be the prime operator.

"David and Bonnie have been real troopers to do this," Charles said. "They volunteered. This crew is very professional. They've bent over backwards to support us."

Dunbar and Low will alternate sessions in the LBNP, climbing into the unit and sealing it around their waists, similar to crawling inside half of an upright sleeping bag. Once in the

depressurized unit, the subject's veins expand and their blood pools in the lower half of their bodies as if they had stood up, said Charles.

The negative pressure load is increased gradually throughout each session and the subjects eventually drink a large quantity of saline solution.

While in the LBNP, crew members can look out the window, read, or record scenes with cameras. But they're asked not to bend their upper bodies at the waist and break the connecting seal, Charles said. The LBNP is connected to the orbiter's waste collection system by a 20-foot hose giving the unit mobility. The unit also can be strapped to a wall.

A decreased ability to stand upright has been observed in both American and Soviet crew members postflight. Symptoms have ranged from an increased heart rate and decreased blood pressure to fainting. Reversing those effects would be important if an emergency escape from the orbiter were necessary following re-entry into the Earth's atmosphere. It also is important as NASA begins planning for extended duration flights, Charles said.

Several investigators—including Charles—have conducted ground-based tests on the device and spent time inside the collapsible LBNP. That was a tall order for Charles who had to squeeze his 6-foot-7 frame into a

unit built for under six-foot crew members.

"I was very glad to be out of it," he said. "It doesn't fit me very well."

"You can feel pulls against the bicycle seat," Charles said. "But your feet should not touch the bottom of the can. Mine did. You can feel your blood pooling in your legs like you've stood up too long. Depending on your tolerance, you may feel light-headed or nauseated. Your blood pressure also may fall off."

The LBNP test protocol is comprised of a series of "ramps" and "soaks". Ramps refer to the negative pressure loads up to -50 mm. Soaks refer to drinking saline solution during the four hour periods at -30 mm.

Astronauts currently take salt tablets and water before re-entry but researchers believe that treatment will be less effective on longer flights, Charles said.

The LBNP will require about 30 man hours over the final four flight days for the two participants and one operator, said Charles.

Crew members received LBNP training preflight. Additionally, all five astronauts will participate in American Flight Echocardiograph (known as Echo or the AFE, an experiment also manifested on this flight) and stand tests pre- and postflight. AFE testing also will be done inflight in conjunction with the

LBNP testing. The AFE is an off-the-shelf medical ultrasonic imaging system that has been modified for flight. It displays two-dimensional, cross-sectional images of the heart or other soft tissues and displays them on a cathode-ray tube (CRT) at 30 frames per second.

The flight of both the collapsible LBNP and the AFE will convert the mid-deck into a cardiovascular laboratory during the final days of the mission, said Charles.

The inflight LBNP was developed, fabricated and tested at JSC.

The unit's inner bag is constructed of Nomex, a nonflammable fabric that is slightly thicker than cotton. Metal rings were sewn into the bag. The rings fit onto four struts which, when expanded, hold the bag in place. A middle bag is comprised of a neoprene waist seal and a urethane-coated nylon bag which forms the vacuum, or negative pressure, bladder. The outer bag is made of Nomex that provides flammability protection and to which monitoring and control devices are attached.

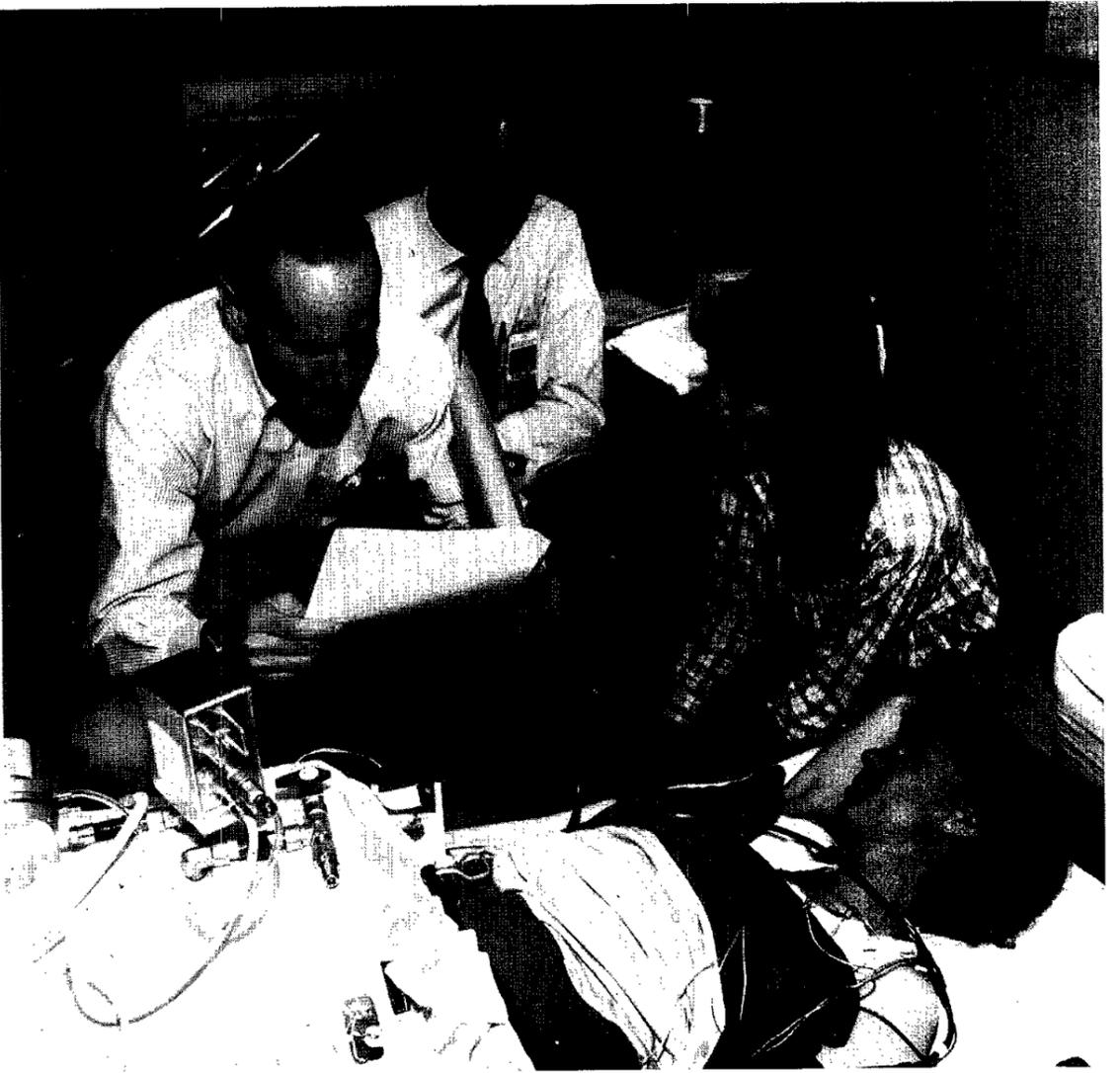
"It's kind of like hanging while you're standing up," said Pat Hite, the GE Government Services engineer who designed the collapsible LBNP.

"It's going to be a neat thing to see it in operation in flight," Hite said. "I've only been around here a couple of years and I think it's really going to be something to have worked on something from the beginning and see it fly."

Other equipment used in conjunction with the 54-pound LBNP will be an echocardiograph, an operational bioinstrumentation system (OBS), and an automatic blood pressure system. Six spot electrodes will be placed on each crew member participating in the experiment and their readings will be recorded on on-board magnetic tape.

Michele Jones, a KRUG International biomedical engineer, is among those who have assisted in preparing this experiment for flight. Jones has spent the past three months working on the support equipment, developing test procedures for the unit and assisting in crew training. During the latter part of the mission when the LBNP is scheduled for crew use, Jones and others will assist in collecting the data and preparing it for researchers' analyses as flight surgeons monitor the experiment real time.

The inflight LBNP is manifested only on STS-32, but it is destined to make a repeat performance on future flights. Charles said he needs between six and 12 subjects to validate the technique.



JSC Photos by Jack Jacob

Top: STS-32 Mission Specialists David Low and Dr. Bonnie Dunbar (lying down) prepare for testing in the Inflight Lower Body Negative Pressure (LBNP) unit. Principal investigator Dr. John Charles, a cardiovascular scientist in JSC's Space Biomedical Research Institute, and Michele Jones, a KRUG International biomedical engineer, review procedures with the two astronauts. Above: Mission Specialist Marsha Ivins, who will be the experiment's prime operator, practices procedures with subjects Low and Dunbar.

Center to center

JSC employees sending help to Marshall tornado victims

Marshall Space Flight Center employees who were affected by a recent killer tornado received some help from their JSC co-workers this week.

JSC Director Aaron Cohen presented a check for \$1,650 to Marshall Space Flight Center Director Jack Lee on Monday, while Lee was here for a NASA Management Council meeting.

The money was raised through JSC's Employee Activities Associ-

ation (EAA), which will continue to accept donations on behalf of Marshall tornado victims.

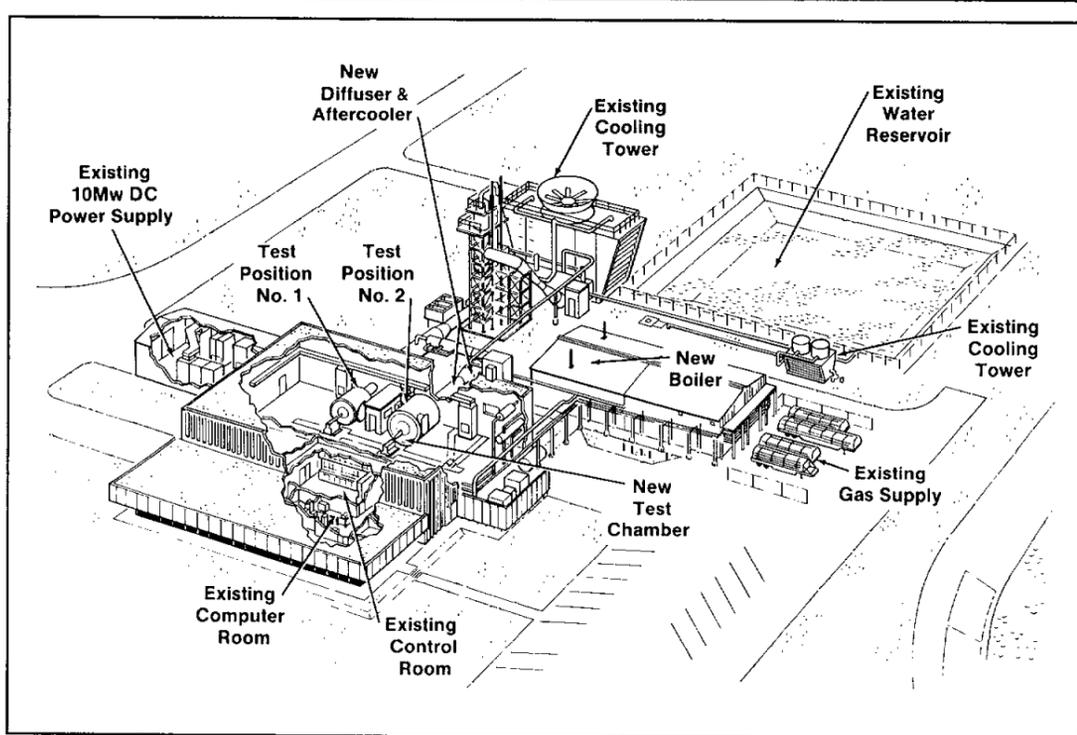
The tornado, which hit Huntsville, Ala., on Nov. 15, killed three Marshall workers, injured many more and caused extensive property damage in the area. Marshall set up a process that specifies that their employees, including on-site contractor personnel, will be eligible for the emergency funds. Requests for emergency aid will be reviewed by

a special employee committee set up by the Marshall EAA. Any excess contributions will be donated to Huntsville-area relief organizations.

Anyone who still wishes to contribute should send donations to the NASA Exchange-JSC Business Office, mail code AW, in Bldg. 11, Rm. 127B. For more information, call Glenda Lancon, x30282; Heidi Glaisyer, x30452; or Teresa Sullivan, x38970.



JSC Photo by Mark Sowa
JSC Director Aaron Cohen presents a tornado relief check to Marshall Space Flight Center Director Jack Lee.



JSC Illustration

This map of the Bldg. 222 testing area shows where modifications are being made to prepare for the testing demands of the next century.

Building readied for new test demands

By Linda Copley

Engineering and Center Operations workers are combining their talents to prepare Bldg. 222 for the testing demands of the 21st century.

Refurbishment of the Atmospheric Reentry Materials and Structures Evaluation Facility, a 1989 Construction of Facilities project, began earlier this year at an estimated cost of \$4.9 million. Working together on the project are the Structures and Mechanics Division and the Facility Development Division.

The facility, originally constructed in 1966 for Apollo reentry environment testing, was last upgraded in 1972 to support shuttle thermal protection system testing. The planned moderniza-

tions include refurbishing the arched wind tunnel reentry environment test facility by constructing a new 12-foot-diameter reentry environment vacuum test chamber diffuser and aftercooler. The new chamber will replace an existing 8-foot chamber.

According to Gene Hajdik, project engineer in the Facility Development Division, installation of the larger test chamber and associated equipment will incorporate state-of-the-art technology into the testing process.

"In 1966, electro-mechanical systems were used to control operations in the facility," Hajdik explains. The planned modifications call for a new system of computerized equipment to replace the 23-year-old system.

A laser diagnostic system currently under development at JSC will be

installed next to the new test chamber. Walter Lueke, project engineer, says the new laser system will provide detailed information to support the development of thermal protection systems on manned spacecraft, says Walter Lueke of the Structures and Mechanics Division.

Refurbishment plans provide for a new 80,000-pounds-per-hour saturated steam boiler to replace the two existing boilers. The new boiler will lead to a more economical operation of the facility's steam ejector system, which creates the vacuum in the test chambers.

The project also includes the construction of new boiler and shop buildings, and is scheduled to be completed by the summer of 1991.

Awards honor aviation safety

(Continued from Page 1)

training and operations and for his outstanding airmanship as an instructor pilot, was awarded the Stuart M. Present Flight Achievement Award. The committee recognized his contribution to the safe resumption of STS operations and to the safety and success of all JSC flight operations.

Arthur C. "Ace" Beall was honored for his efforts to establish a greater local awareness of low-altitude high-speed jet traffic operations at Ellington Field, and for his support of Shuttle Carrier Aircraft ferry operations. Beall received the James A. Korkowski Excellence in Achievement Award.

Quality Assurance Specialist John C. Lamb, recognized for his unique role in restoring the operational integrity of the WB57F high-altitude aircraft, received the John T. Bascham Quality Assurance Award. Stuart J. Williams was honored



JSC Photo by Sheri Dunnette

Winners of the JSC Aviation Safety Awards are, from left: Bryan O'Connor, Joseph Gerky, Ace Beall, Roger Szieg, Pam McCain, John Lamb and Stuart Williams.

with the Aircraft Maintenance Award for his vital part in the determination, analysis, and correction of a KC-135

structural problem, and for his contributions to restoring the WB57F to flight.

Employees, families may make STS-32 Mission Control visits

The Mission Control Center Viewing Room will be open to JSC and contractor badged employees and their families at designated times during STS-32.

Based on a Dec. 20 launch, the Viewing Room will be open work days between 11 a.m. and 2 p.m. beginning Dec. 22 and ending the day before landing.

Since there are many variables involved in mission operations, the viewing times may change. Viewing will not be permitted during peak

activity times such as SYNCOM deploy and rendezvous and grapple with the Long Duration Exposure Facility (LDEF). Updates will be available on the recorded Employee Information Service, x36765.

Employees must wear their badges and escort family members. Entrance to the Viewing Room will be through the visitors area on the northeast side of Bldg. 30. Visitors should limit their stay during busy periods to afford the opportunity to as many employees as possible.

Cafeterias closed Christmas

The JSC cafeterias will have extended hours during STS-32, but will be closed Christmas Day.

Beginning the day of launch, Bldg. 3 will be open from 7 a.m.-4:30 p.m. weekdays and weekends. Bldg. 3 will

be closed Christmas.

Bldg. 11 will be open from 7 a.m.-2 p.m. on launch day, and from 6:30 a.m.-2 p.m. on weekdays during the mission. Bldg. 11 will be closed on weekends and Christmas.

Amateur astronomers win

(Continued from Page 1)

30 seconds.

Another key feature to the transportability of the telescope, according to Kelly, is the ease with which it can be taken down and reassembled. "Everything fits into a standard-sized van," Kelly said. "When we drove out to the Star Party in west Texas, it only took three or four people an hour and a half to reassemble it."

When not on the road making "appearances," the telescope resides in a 16-by-24-foot wood "observatory" with a retractable roof. "We've thermally controlled the building with fans," Kelly explained, "but it is not air-conditioned or heated because it's better for viewing if the telescope optics are kept close to the actual temperature on the outside."

Although built for the private use of the five project members, visitors

are occasionally invited out to its cow pasture location, some 70 miles south-southwest of the city lights of downtown Houston. "We've held frequent 'star parties' for the JSC Astronomical Society and the Brazosport Astronomical Society," said Kelly. "And we've taken some of the JSC co-ops out there, at their request, for an evening of viewing. We're willing to consider other group requests, by appointment, as our schedule permits."

Kelly, who has been a member of the JSC Astronomical Society since 1973, and Saulietis have both been amateur astronomers "since grade school." They both have built large telescopes before, although not of the magnitude of their latest project. "We just couldn't see any reason why we couldn't do it—so we did it," Kelly said.

LDEF should be visible over Houston on clear evenings

Evening sighting opportunities to view the Long Duration Exposure Facility (LDEF) satellite before its retrieval by the STS-32 crew are listed below.

Sighting times are based on information on a tracking vector from the U.S. Space Command for the Houston metropolitan area, and should be accurate to plus or minus a minute.

Beginning at 5:57 p.m. Dec. 19, LDEF should be visible for two minutes at a maximum elevation of 34 degrees, appearing 34 degrees above the south-southeast horizon, moving to 15 degrees above east-southeast.

On Dec. 20, STS-32's scheduled launch day, LDEF may be seen for two minutes beginning at 6:21 p.m. at a maximum elevation of 56 degrees, appearing 56 degrees above the south moving to 20 degrees above the east. On Dec. 23, LDEF should be

visible for two minutes beginning at 5:57 p.m. at a maximum elevation of 66 degrees, appearing at 63 degrees above the south-southeast moving to 15 degrees above the east.

And on Christmas Eve, LDEF may be seen dodging Santa for two minutes starting at 6:21 p.m. at a maximum elevation of 49 degrees, appearing at 47 degrees above south-southeast, moving to 15 degrees above east-southeast.

As a guide to sighting locations, an elevation angle of 0 degrees corresponds to the horizon, while an elevation angle of 90 degrees is directly overhead. A clear, cloudless night, preferably away from city lights, is a must for viewing.

LDEF sighting data will continue to be provided until the satellite is retrieved. Contact Steve Stich or Dan Adamo at x38038 with additional questions regarding sighting opportunities.