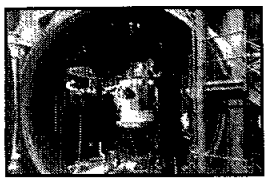
National Aeronautics and Space Administration
Lyndon B. Johnson Space Center
Houston, Texas

Heartfelt thanks

JSC employees are developing a device that may keep heart patients alive and active. Story on Page 3.



SESL reunion

Past and present employees of the Space Environment Simulation Labs to meet on Oct. 15. Story on Page 4.

Space News Roundup

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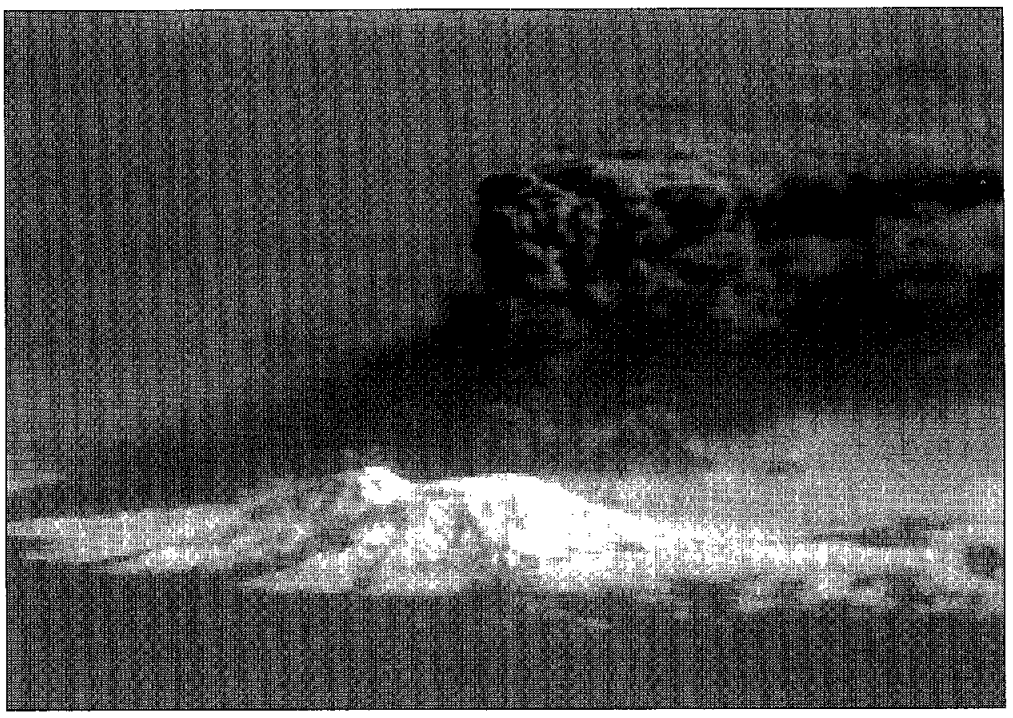


Above: Crew members observed and documented the recent eruption of the Kliuchevskoi volcano, located on the Kamchatka peninsula. The volcano began erupting a couple of weeks ago, but the most recent burst of activity occurred about 8 hours after *Endeavour*'s Friday morning launch.
Left: Mission Specialist Steve Smith holds a canister of gypsy moth eggs. Gypsy moths are among the most destructive pests of hardwood trees in the Eastern United States and researchers are studying how microgravity affects the fertility of the insect.

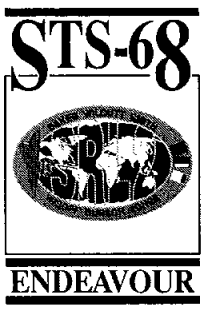
NASA PHOTOS

Endeavour continues Earth observations

By James Hartsfield

With almost a week in orbit under its wings, *Endeavour* continues to perform flawlessly, while Mother Nature provides ample surprises below for observations by the crew and the Space Radar Laboratory-2 instruments on the environmental flight.

Shortly after the launch of STS-68 at 6:16 a.m. central Friday, a volcanic eruption on the Kamchatka Peninsula provided a spectacular, unplanned opportunity for the second mission with the Shuttle Imaging Radar C (SIR-C) and the X-Band Synthetic Aperture Radar (X-SAR). The Kliuchevskoy Volcano in Kamchatka began a major eruption just eight hours after *Endeavour*'s launch, as if on cue to provide supplemental information for he radar lab's geologic studies.



"I don't believe we could have scripted a better scenario for this mission," Space Radar Lab-2 geologist Dr. Jeff Plant told reporters Monday. Data takes were recorded of the erupting volcano with the radar instruments while the crew recorded majestic camcorder video of the eruption and the 10-mile-high plume of smoke it emitted. The crew is working around the clock in two teams—Commander Mike Baker, Pilot Terry Wilcutt and Mission Specialist Jeff Wisoff on the Red and Mission Specialists Steve Smith, Dan Bursch and Tom Jones on the Blue—to perform such visual observations photography to compliment the radar imaging.

Plant said the radar's studies of volcanic activity such as Kliuchevskoy's eruption may add to the understanding needed about such events to better prepare areas with large populations living near active volcanoes.

Endeavour's orbit is right on target for comparisons between the information gathered by the space radar on STS-68 and the observations made in April on STS-59. Trim burns completed by *Endeavour* early in the week put the spacecraft's trajectory within 30 feet of the STS-59 trajectory, providing excellent interferometry observations, where radar observations from each flight—and each season—are combined to note changes.

"Not only will we get amazing data, but our interferometry experiments will be better than we expected," said SRL-2 Project Scientist Diane Evans with the Jet Propulsion Laboratory. "We're seeing dramatic environmental changes between April and October."

Other observations completed by the radar included an attempt to document any flooding or changes in the Japanese coastline following an earthquake and possible tidal wave, or tsunami, on Tuesday.

At KSC, shuttle *Atlantis* rolled over to the Vehicle Assembly Bldg. Tuesday evening. *Atlantis* is being prepared for its 13th journey into space on STS-66, scheduled for launch in early November.

Work to ready *Atlantis* for launch includes replacing the number 8 overhead observation window, which received a small scratch during processing operations. A window was removed from *Columbia*, currently en route to California for a scheduled six-month maintenance period.

Rollout of *Atlantis* to Launch Pad 39B is set for Monday.

Assembly schedule enhances station's capabilities

Assembly sequence refinements that incorporate the latest updates to plans for the International Space Station recently were announced by program officials.

The sequence enhances the space station's science utilization by incorporating early provisions for a centrifuge. It also allows for the construction of Russia's Solar Power Platform earlier and meshes the latest weight estimates for station components with current space shuttle program launch commitments.

"These changes do not affect our major milestones, but do improve upon the previous assembly sequence and hold the line on program costs," said Program Manager Randy Brinkley. "This program is making great progress toward the start of assembly in November 1997."

The Space Station Control Board—which includes representation from NASA, all of the international partners and the Boeing Station team—met this week at JSC, to review adjustments and refinements to the program.

"These meetings are our opportunity to review the progress of the program with our international and contractor partners," said Program Director Wilbur Trafton. "I am pleased with the stability of the program and with the progress we're making."

The assembly sequence now reflects the Russian Space Agency's plan to construct the solar power platform during the late-1998 to mid-1999 timeframe—about 16 months earlier than previously planned. The change provides the Russian portion of the station with power and eliminates the need to transfer U.S. power to the Russian modules.

The sequence also provides for the early incorporation of a proposed centrifuge module that would augment the station's science capabilities. Though detailed plans regarding the module's feasibility and design are still being worked, Brinkley said program managers decided to include a "placeholder" flight for the module in the assembly sequence.

"As we go through the design process, we will continue to identify areas where our early assessments need adjustment," Brinkley said. "These minor refinements may change the payload manifests of individual flights, but the major milestones will remain steady. That is the nature of an aggressive, dynamic design program."

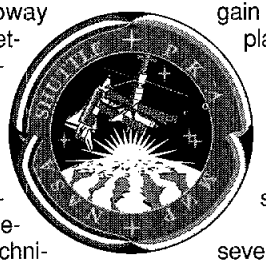
The largest international scientific and technological development ever undertaken, the International Space Station will bring together resources from the United States, Russia, member nations of the European Space Agency, Canada and Japan. Assembly will begin in November 1997, followed by the launch of the U.S. Lab Module in November 1998, the Canadian robot arm in December 1998, the Japanese experiment module in March 2000 and the European experiment module in February 2001. Assembly is scheduled to be complete in June 2002.

Details agreed to for joint missions

Details for joint U.S.-Russian space activities are falling into place, according to JSC officials returning from a week-long visit to Moscow and Star City.

The 24-member delegation, led by Phase One Program Manager Tommy Holloway, recently met with Russian Space Officials to discuss plans for Phase One cooperative missions for the next three years.

"It was a good series of meetings," Holloway said. "We accomplished a lot of things and settled a lot of issues. When you see the atmosphere of cooperation that exists between these two nations now, it's hard to remember that it wasn't too long ago that we were rivals. I am extremely pleased with the trip."



Last year, United States and Russian officials agreed to carryout a series of joint shuttle-Mir missions to develop the experience and technical expertise necessary for the assembly and operation of the International Space Station. The "Phase One" activities are bringing together the United States and Russia in a major cooperative and contractual endeavor that takes advantage of both country's capabilities, Holloway said.

At the meetings in Russia last week, officials from both programs discussed a variety of issues. Among those agreements reached, officials approved a plan to allow the Space Shuttle *Discovery* to fly to within 10 meters (30 feet) of Mir during the proximity operations of STS-63. Previously, the shuttle closest approach to Mir was limited to 30 meters (100 feet).

STS-63, which is currently scheduled for February, is the first time a shuttle will approach the Mir Station. It also will feature the flight of Cosmonaut Vladimir Titov, who has been training in the U.S. for the last year.

"STS-63 is a milestone for these cooperative endeavors," Holloway said. "The experience and knowledge we gain from that flight will be the foundation for the planning for the subsequent docking flights."

The Shuttle *Atlantis* will dock with Mir for the first time in June. During STS-71, the orbiter will remain attached to Mir for five days of joint scientific operations, before returning home with Astronaut Norm Thagard, who will have spent three months at the Russian station.

In total, the Phase One program will consist of seven missions; however, NASA officials are keeping option open to increase the total number of Shuttle-Mir flights to ten. The decision to fly additional missions will be mutually agreed upon no later than 18 months before the proposed launch date, Holloway said.

Also during the exchanges, Russian and NASA officials agreed to a new joint program patch. The design reflects "the dawn of a new era of human spaceflight" and includes representations of Mir; the Shuttle; the Earth, devoid of any political borders; and ribbons of both nation's colors.

Please see **INITIAL**, Page 4

JSC Photo by Robert Markowitz

SHARING KUDOS—STS-61 Flight Director Milt Heflin and members of the Hubble Space Telescope flight team encircle the Collier Award Trophy. The team received the award for their efforts supporting the December 1993 servicing mission. Heflin donated the trophy to JSC to share the congratulations and recognition with all JSC employees.

JSC

Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Store from 10 a.m.-2 p.m. Monday-Thursday and 9 a.m.-3 p.m. Friday. For information, call x35350 or x30990.

Halloween Dinner/Dance: Dinner Dance begins at 8 p.m. Oct. 29. Cost is $17.50 per person. Tickets are on sale at the Bldg. 11 Exchange Store through Oct. 26.

Wurstfest Bus Trip: Nov. 5. Cost is $20 adults, $16 children. Ticket sales begin Oct. 11.

Renaissance Festival Bus Trip: Oct. 15 & Oct. 29. Cost is $17 adult; $5 child (5-12 years). Price includes admission and transportation.

Clear Lake Symphony: Season pass on sale through Oct. 14. Cost is $20 adults; $12 seniors and full-time students.

Ballet Folklorico: Ballet Folklorico performs Oct. 14 at the Opera House in Galveston. Tickets on sale through Oct. 14. Cost is $20.

Bay Area Chorus: Chorus performs "Celebrate the Songs of Nature" at 6:40 p.m. Oct. 23 at Clear Lake Presbyterian Church. Cost is $8 adults, $5 students and seniors.

Renaissance Festival: Festival runs from first weekend in October to second weekend in November. Cost is $10.50 adults; $5.25 child (7-12).

Air Show: Tickets on sale for Oct. 15 & 16 Wings Over Texas Air Show. Cost for 1-day admission is $7.35 adults, $2.10 child.

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

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

Metro tickets: Passes, books and single tickets available.

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

Stamps: Book of 20, $5.80

Upcoming Events: Children's Halloween Party, Oct. 29; Travel Fair, Nov. 1; New Arts Six Concert, Nov. 6, $7; David Parsons Dance Co. & Billy Taylor Trio, Nov. 12, $19; Walt Disney on Ice, Beauty & the Beast, $11.

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

JSC

Gilruth Center News

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

Weight safety: Required course for employees wishing to use the weight room is offered from 8-9:30 p.m. Oct. 19 and Nov. 2. Pre-registration is required. Cost is $5.

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

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

Exercise: Low-impact class meets from 5:15-6:15 p.m. Mondays and Wednesdays.

Aikido: Martial arts class meets from 5-7 p.m. Tuesdays and Wednesdays. Cost is $25 per month. New classes begin the first of each month.

Intercenter run: The month-long competition between NASA centers runs Oct.1-31. Walk or run 2 miles or 10k. For additional information, contact the Gilruth Center at x33345.

Volleyball clinic: Eight-week women's volleyball clinic began Oct. 1. Classes are from 2-4 p.m. Saturdays. Cost is $25. For additional, contact the Gilruth Center at x33345.

Tennis league: A Fall tennis league may be started if there is sufficient interest. Contact the Gilruth Center at x33345.

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

Golf lessons: Lessons for all levels. Cost is $90 for six weeks. For more information, contact x33345.

Sailing club: Intermediate sailing classes will be held Oct. 15. For more information, contact Richard Hoover at x31360, or 996-7716.

Fitness program: Health Related Fitness Program includes a medical examination screening and a 12-week individually prescribed exercise program. For more information, call Larry Wier at x30301.

JSC

Dates & Data

Today

Cafeteria menu — Special: meat sauce and spaghetti. Total Health: spaghetti noodles with turkey meat sauce. Entrees: rainbow trout, liver and onions, beef cannelloni, pork and shrimp egg roll, Reuben sandwich. Soup: seafood gumbo. Vegetables: steamed broccoli, breaded okra, cut corn, black-eyed peas.

Saturday

Astronaut appearance — Astronaut and space artist Alan Bean will autograph copies of his "America's Team...Just the Beginning" artwork print from noon-3 p.m. Oct. 8 at Space Center Houston. For additional information, contact Space Center Houston, 244-2105.

Monday

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

Tuesday

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

Wednesday

PSI meets — The Clear Lake/NASA Area chapter of Professional Secretaries International meets at 5:30 p.m. Oct. 12 at the Holiday Inn on NASA Road 1. PSI Secretary of the Year Dotty Yarbrough will discuss "Is Your Responsibility Motivated?" For additional information, contact Elaine Kemp, x30556.

Toastmasters meet — The Spaceland Toastmasters meets at 7 a.m. Oct. 12 at House of Prayer Lutheran Church on Bay Area Blvd. For additional information, contact Darrell Boyd, x36803.

Astronomy seminar — The JSC Astronomy Seminar will meet at noon Oct. 12 in Bldg. 31, Rm. 129. Walter Kiefer of LPI will discuss the "Evolution of the Tharsis Region of Mars." For more information, call Al Jackson at 333-7679.

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

Thursday

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

Friday

SDD reunion — The second annual reunion of former Spacecraft Design Division workers will be at 4:30 p.m. Oct. 14 at the Gilruth Center south pavilion. Cost is $7. Reservations deadline is Oct. 7; call Sharon at x38960, Lori at x36600, Flo at x33738 or Ann at x36619.

IMAX movie — Space Center Houston will host special showings of "Destiny in Space" at 7, 8 & 9 p.m. Cost is $5 for adults, $4 for children age 3-11 years and adults over 65 years. For more information, contact Space Center Houston, 244-2100.

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

Oct. 15

Star watching — The JSC Astronomical Society and Challenger 7 Memorial Park will host an evening of star watching from dusk to 10 p.m. Oct. 15. Telescopes will be provided. For more information, contact Bill Williams, 339-1367 evenings.

Oct. 18

Blood drive — McDonnell-Douglas will host a blood drive from 8-11 a.m. Oct. 18 at 13100 Space Center Blvd. For additional information, contact Teresa Esquivel, 212-5036.

AIAA meets — The Houston Section of the American Institute of Aeronautics and Astronautics will host its a meeting beginning at 5:30 p.m. Oct. 18 at the Gilruth Center. Astronaut Bonnie Dunbar will present a "Report from Star City." Reservation deadline is noon Oct. 13. For reservations and additional information, contact Fran Jamison, 333-6277; Ardell Broussard, 283-1040; Mary Ann Bivona, 483-1350; or Sarah Leggio, 282-3160.

Oct. 19

Astronomy seminar — The JSC Astronomy Seminar will meet at noon Oct. 19 in Bldg. 31, Rm. 129. An open discussion meeting is planned. For more information, call Al Jackson at 333-7679.

Toastmasters meet — The Spaceland Toastmasters meets at 7 a.m. Oct. 19 at House of Prayer Lutheran Church on Bay Area Blvd. For additional information, contact Darrell Boyd, x36803.

JSC

Swap Shop

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

Property

Rent: LC, Pecan Forest, 3-2-2, FPL, new carpet, no pets. 554-6200.

Rent: Arkansas cottage on Blue Mountain Lake, furnished, wooded, 4 acres, screened porch, $250/wk, $50/day. x33005 or 334-7531.

Sale: Baywind II condo, 1-1, new carpet/paint, W/D, refrig, dishwasher, FPL, near pool, $24k. 486-8047.

Sale: LC, 3-1-1 brick, near Ross Elm, high ceiling, spa/deck, concrete patio, no approval assum/owner finance. x34107 or 534-4190.

Sale: Tiki Island bay house, 3-2-2, $149k w/$1500 floor allowance, nego. x36163 or 409-938-4755.

Lease: Baywind II condo, 2-2-2 parking spaces, FPL, W/D, c'fans, second floor, avail 10-1, $525/mo + dep. x32168 or 474-7982.

Sale/Rent: Baywind I condo, 1-1-1, appliances, c'fans, priv balcony, $390/mo + dep or $23k. Bill, 332-3649.

Sale: Bay Glen 2-story, 3-2.5-2, tile entry and kitchen, deck and cov patio, 5 yrs old. $101.9k. 486-4508.

Sale: Sterling Knoll, 3-2-2, approx 1300 sq ft, swimming pool, FPL, $69.9k. 486-9760.

Lease: University Green town home, 3-2.5-2, ex cond, new carpet/paint, $875/mo. 280-8155.

Sale/Lease: Camino South, 3-2-2, FPL, 1600 sq ft, cul-de-sac, formal DR, $69k or $775/mo + dep. 286-4774.

Sale/Lease: Bay Ridge, 1550 sq ft, inside utility, fenced, $57k or $675/mo + dep. 286-4774.

Sale: Heritage Park, 3-2-2, SW decore, upgrades, very clean, new roof, $75.5k. Carole, 992-5031.

Lease: Clear Lake condo overlooking marina, 2-2.5-2. pool, attached balconies and patio, W/D, refrig, sec gates, $900/mo. 474-4922.

Lease: El Dorado Trace, lg 1 BR condo, cov pkg, W/D, alarm, mini-blinds, icemaker, 2 balconies, $425/mo + dep. Mark, 488-0056.

Sale: Pearland, Green Tee on golf course, 3-3-3, approx 3300 sq ft, FPL, spa. 481-1469.

Sale: Four cemetery lots in beautiful setting w/large trees, Crosby area. 481-1469.

Sale: Santa Fe, Alta Loma, 2.5 acres, unimproved. 337-1311.

Sale/Lease: Univ Trace condo, 2-2, completely redecorated, FPL, W/D, refrig, cov pkg, pool, gym, sauna, $565/mo. 488-5092.

Rent: Galveston condo, furnished, sleeps 6, wknd/wkly/dly rates. Magdi Yassa, 333-4760 or 486-0788.

Rent: LC Countryside, 3-2.5-2, 2-story, 1700 sq ft, new mauve carpet/paint, avail 10-1, $795/mo + dep. x33765 or 326-1390.

Cars & Trucks

'78 Mercury Marquis, 4 dr, auto, good running cond, no rust, $750 nego. John, x38988 or 482-6364.

'92 Ford Taurus GL, loaded, ex cond, low mi, $12.5k. x39357 or 486-5203.

'80 El Camino, $700. 409-948-1361.

'80 Ford, $800. 409-938-4793.

'90 Honda DX, less than 28k mi, 4 dr, A/C, stereo. Roger, 790-2189 or 488-7314.

'86 Chevy Caprice Estate Wagon, all pwr, auto, A/C, recent complete brake and cooling. Roger, 790-2189 or 488-7314.

'91 Honda Accord LX coupe, ex cond, garaged, 5-spd, tint, maroon, 6 yr warr, 38k mi, $12k. Tom, x41076 or 326-3248.

'92 Chevy Silverado PU, white/blk, 5-spd, V6 Sportside, Goodyear Eagle ST tires, 47k mi, ext warr, $15.7k. Kathy, x35807 or 475-0975.

'81 VW Rabbit, auto, AM/FM/cass, new tires/exhaust, good cond, $1.3k. 286-6004.

'85 Porsche, 5-spd, sunroof, A/C, AM/FM/cass, ex cond, $5k OBO. x35180 or 326-3706.

'92 Toyota Corolla, FWD, A/C, std trans, pwr steering, AM/FM/cass, 34k mi, $7300. Ray, x38876 or 338-1065.

'83 Pontiac J2000, new clutch/starter/brakes, 7k mi on tires, $750. Nancy, x38275 or 480-4634.

'90 Chevy PU, loaded, side steps, $8k. 337-7546.

'88 Toyota 4Runner, red, 4WD, V6, auto, cruise, cassette, pwr, ex cond, $10.5k. Jeff, x38424 or 992-9571.

'82 Suburban Silverado, 3 seats, runns good, $2795. 488-6917.

'63 Chevrolet Corvair Greenbriar Sports Van, all orig cond, clean. $3500. 488-6917.

Boats & Planes

'90 Stratos 17' bass boat, GT100 Johnson O/B, custom trlr, all accessories, ex cond, $7.5k. 538-4422.

24' pontoon boat, 40hp Johnson elec, depth finder, FM/CB radio, troll motor, convertible top, accessories, 2 batteries. West, x36174.

'94 McClain galvanized trailer for approx 18' boat, $1200 OBO. Bob x44431 or 326-5616.

Audiovisual & Computers

HP Laserjet compatible, 6 PPM, 1.5MB, 31 resident fonts, 4 scalable fonts; Postscript printer, 6 PPM, 3.0MB, 35 resident postscript fonts, parallel, serial and Appletalk interface, $650 for both. Victor or Henry, 488-1264.

Active color notebook, 4MB RAM, 210MB removable HD, 1.44MB FD, PCMC IA type II or III, $1300 OBO; hand scanner, $70; 2400 baud int modem, $20; MS Works, $35; MS DOS 6.21, $40; IBM PS2 mod 25 8086 CPU and monitor, $40. Kelley, x36818.

Cobra LD-200 laser detector, $25; radar detector, $10. x30044.

Audiovox 7 band, in-dash, 40W graphic equalizer/amp, 50-20k Hz response, 5 segment LED, fader control, $45. 271-7011.

Mac II, 170MB HD, 5MB RAM, 5 expansion slots, 13" Apple hi-res RGB monitor, kybd, ImageWriter II printer, 2400 baud modem, S/W, $800 OBO. Jon, x41169 or 996-6062.

Boston Acoustics T-100 loudspeakers, top of the line tower configuration, walnut veneer cabinets, $500/pr. Musgrove, x38356 or 488-3966.

Atari 1040ST computer, internal operating sys w/Windows-like presentation, 3.5" FD, 1MB RAM, SC1224 color & SM124 B/W monotors, Star NX-1000 multi-font printer, S/W, $375. Rex, x48455.

Citizen printer CSX-140 w/GSX color option, slightly used, $350. Magdi Yassa, 333-4760 or 486-0788.

Commodore w/monitor and lots of S/W, $100. 488-6917.

Musical Instruments

Electric piano/organ w/bench and lots of music books, $200. 488-6917.

Boston upright piano, $500. x45035 or 334-4124.

Pets & Livestock

German Shephard, 4 yrs old, needs room to run, beautiful, friendly, protective, dog house, 36' chainlink fence, free. x47009 or 332-6754.

Male shorthair kitten, 15 wks old, white w/blue-gold eyes, gentle, free neutering and vet care for 6 mo, free. x34606 or 554-2487.

Puppies, 2.5 mo old, free. 991-0821.

TB gelding, 17 hands, 9 yrs old, great adult hunter and equitation horse, schooling 3'3"-3'6" easily. Karen, 331-6853.

Mobile dog pen, 10x20x6 w/gate, new chainlink, $295. x30737.

Jenny Lind wooden cradle, mattress and bedding set, ex cond, $40. 488-3314.

Tappen solid state elec range, 1.5 yrs old, ex cond, $250. Jean, x32215 or 922-6674.

Qn sz waterbed w/12 drawers, mirrored headboard, $200; round porcelin sink, off white, like new, $20. 488-6917.

Sears elec dryer, $50; Sears 19.6 cu ft refrigerator/freezer, $100. 996-0981. x30044.

Black TV stand for 35" TV, like new, $120 OBO. 991-0821.

Matching desk, computer table w/riser, printer table, lateral file, $250/all. Kathy, 474-4947.

Antique armoire, beautiful condition, $400. x48781 or 286-3401.

Olive color rocker/recliner, vinyl, good cond, $30. x41096 or 326-5184.

Microwave, ex cond, $75. 286-0022.

Sectional sofa w/2 recliners, 6 pcs, tan, ex cond, $650. Karen, x47931 or 488-0056.

Big Sur qn sz waterbed w/bookshelf hdbd, ex cond, $125; red Power Rangers costume, sz med, $25; ping pong table, $60; Evenflo infant car seat, $20. x45035 or 334-4124.

Bed/couch from Germany, $60; full sz water bed w/heater, $75; black hanging lamp, $20; solid wood frame chair w/orange cushions, $35; all OBO. Liz, x31543.

Baby crib and mattress, $75 OBO. 488-5445.

Wards chest freezer, 28" deep x 56" wide x 34" tall, good working cond, approx 15 yrs old, $50. Mary, x31911 or 532-3309.

Wanted

Want men's used mountain bike, 2 to 5 yrs old, good quality bike at $100 to $200 less than new bike. x32567 or 488-3314.

Want life jackets, nylon water ski type, sm and lg sz, good quality, used, in good cond, low priced. Tami, x49848 or x49830.

Want NASA publication SP-480 *Far Travelers* or any SP. Ron, 333-6952 or 482-1385.

Want roommates, 4-2-2 house, Sagemont, non smokers, S Belt 8 and I45 area, W/D. Minh, x37492 or 484-2456.

Want perspnnel to join VPSI vanpool, West Loop Park & Ride lot at 6:50 am to NASA/contractors. Richard Heetderks, x37557 or Ed Rangel, x36124.

Want investment newsletters *Fidelity Monitor* and/or *Investech Mutual Fund Advisor*, will trade or share cost. 486-9605.

Want low priced school or work truck or car. 271-7011.

Want non-smoking roommate to share 3-2-2 LC house, $250/mo or $300 for private bath + 1/2 util. Rob, x41027 or 538-1449.

Want personnel to join VPSI vanpool departing Meyerland Park & Ride lot at 7:05 am for JSC, on-site personnel working 8 am/4:30 pm shift. Travis Moebes, x45765 or Don Pipkins, x35346.

Want STS-64 payload and experiment cloth patches and/or decals, SAFER, LITE, SPARTAN, ROMPS & SPIFEX, will buy or trade. Andrew, x34312 or 280-0647.

Want US flags and patches flown on STS-41B, STS-61C, STS-27 and STS-47. Rich, 908-922-6000 ext 3290 or 908-531-7852.

Want deer lease, reasonably priced. Tim, x38843 or 409-925-5011.

Want someone to share 4 BR house w/pool near NASA. 286-7227.

Want Wizard of Oz collectibles. x31883.

Want inespensive refrigerator, 3-wheeled baby stroller. Jeff, x38424 or 992-9571.

Miscellaneous

Reloading press, Herter's model 3, w/dies and deburring tool, $70. 482-2741.

Factory original Mustang parts, '65/'66, V8, C6, fenders and much more, good prices. Ron, 339-3547.

Imported beverage bottles, all types, brown & green, also regular long neck bottles, all cappable, no twist off, $8-$15/case; swing tops, $1 ea. Dan, x36650 or 409-925-1880.

Compact 10 gal 120V elec water heater w/relief valve, ex cond, $75; Sears Craftsman 1.5hp router w/hard case and bits, ex cond, $75. Bob, 335-5934.

O'Brien slalom ski, 70", case, like new, $120. x39814 or 480-7338.

Formal dining table w/leaves and 6 chairs, $1350; lg fruit press, $300; exercise bike w/pedal and row, $50; lg alum extension ladder, $80. 282-3570 or 474-3820.

Fish tank, 55 gal, stand and access, $175; washer/dryer, $65 ea; student desk, $85; microwave and carrousel, $60; easy chairs, $40/$20; color TV, $75; qn headboard, flat, $75; VCR, $50. 282-3570 or 474-3820.

Set of 4 Chevrolet 15 inch spoke, locking hub caps, $100. 484-0981.

Dog loo, extra lg, ex cond, $30. 484-0987.

Car cover for Corvette thru '82, $15; cover for '80 280Z. 554-7391.

Moving boxes, sm thru wardrobe, $.75 thru $2, used once, volume discounts. 486-8991.

Tunturi E702 air exercise bike, spd/heart/time monitor, movable arms, adjustable seat, $225 OBO. x38079.

Gynmastics practice mat, 1 piece, 5'x10'x4", $100; Olivetti electric typewriter, $40. x38171 or 946-4034.

Total eclipse, once in a lifetime tour in Peru, Nov 1-5 w/optional side trip to Machu Pichu, incl round trip air fair, $1700. 480-6262.

Tropical plants, misc types and sizes, $5 and up. Bob, x33149.

Brownie uniforms, short-sleeded blue chambray shirt w/culotte jumper, like new, sz 6 and 7, $24 ea. x48781 or 286-3401.

Genuine brass qn sz bed w/frame, $450; 20" lawn mower, runs good, $45; Weed Eater 5hp rear-tine tiller, used once, $450; DP Air-Gometer dual action exercise bike, $50; 250 sq ft grey marble 12"x12" tiles, all or part, $3/sq ft. *Where There's a Will There's an A* high school video tutorial, $30. x39129 or 997-2280.

Remington Express Magnum 12 gauge shotgun, new, $200; Marlin model 30. 30-30 lever action rifle w/scope, sling, and hard travel case, ex cond, $275. x36656 or 481-5498.

Adult clown costumes, 1 boy and 1 girl, $30 both or sold separately $20 for boy and $15 for girl. 538-2127.

Leer top, fits full sz pickup, '88 GMC/Chevy LWB or later, sliding rear window and boot, $400 OBO. 481-6370.

Fisher Price high chair, $35; Baby Tenda combination high chair/bathing table/desk, $100. Carole, 992-5031.

Diamond wedding set, round shaped 1.19ct diamond, attached band w/diamond chips, appraised $6k, sell $3k. Vicki, x37432.

Morgan storage shed, 7'x11', $700; sliding glass shower/bath doors, $50; wooden dog house, $25; stacked washer/dryer unit, needs major repairs, $100. 668-0068.

Camper top for Chevy S-10 PU, fiberglass, was $600, make offer. x36061 or 992-4617.

Space Shots trading cards, series 1-3, uncut sheets, $10 ea, boxes, sets, more; '69 Man on the Moon unopened box, $500. 997-9979.

Computer desk, solid wood, stained medium brown, 42"w x 28"h x28"d, matching hutch and monitor stand, rollout drawer for kybd, ex cond, $165. Rex, x48455.

Metal detector, needs repair, $50. 488-6917.

Technology with a heart

JSC-designed device can help save lives

By Eileen Hawley & Audrey Schwartz

David Saucier, a JSC engineer, knows what it's like to lay ill in a hospital bed suffering from cardiovascular disease. He also knows what it's like to recover.

Following a severe heart attack and triple bypass surgery in 1983, Saucier joined about 100,000 other Americans in search of a donor heart to save his life. Fortunately for Saucier, a heart was found and in 1984 a team led by renowned heart surgeon Dr. Michael Debakey performed transplant surgery.

Six months later, Saucier was back at JSC with renewed vigor and dedication...and a desire to use space technology to help people with diseased or damaged hearts.

With the help of fellow JSC workers — Greg Aber, Jim Akkerman, Dick Bozeman, Jim Bacak and Paul Svejkovsky; Dr. Debakey, and Baylor College of Medicine specialists Robert Benkowski, George Damm, Dr. Kazumi Mizuguchi, Dr. George Noon and Dr. Yukihiko Nose — Saucier is seeing the idea become reality as the close-knit group works together to develop something called a Left Ventricular Assist Device.

The LVAD is a small—2 inch long, 1/2 inch diameter—turbine pump that helps the heart circulate blood throughout the body and can help keep a patient alive until the diseased heart recovers on its own or is replaced through transplant surgery.

"The versatility of this pump is that it can be used both for temporary or permanent use," Debakey said, "allowing patients who are not transplant candidates or whose hearts may not recover on their own, an opportunity to continue living a normal lifestyle."

The medical community has been working on developing a small implantable ventricular assist device for more than 30 years, Aber said. The JSC-developed device isn't intended to be an artificial heart, but rather a booster pump that works in parallel with the heart to keep an adequate supply of blood circulating through the body.

Researchers hope to develop a device that is fully implantable and which would allow a patient to leave the hospital and lead a relatively normal life.

"You can get an idea of how important this is when we know there are more than 50,000 patients in this country that need this kind of device," Debakey said. Based on his own experience, Debakey believes the number actually is higher—about 150,000 people a year—based in part on the growing number of people aged 65 and over who are not candidates for heart transplant surgery.

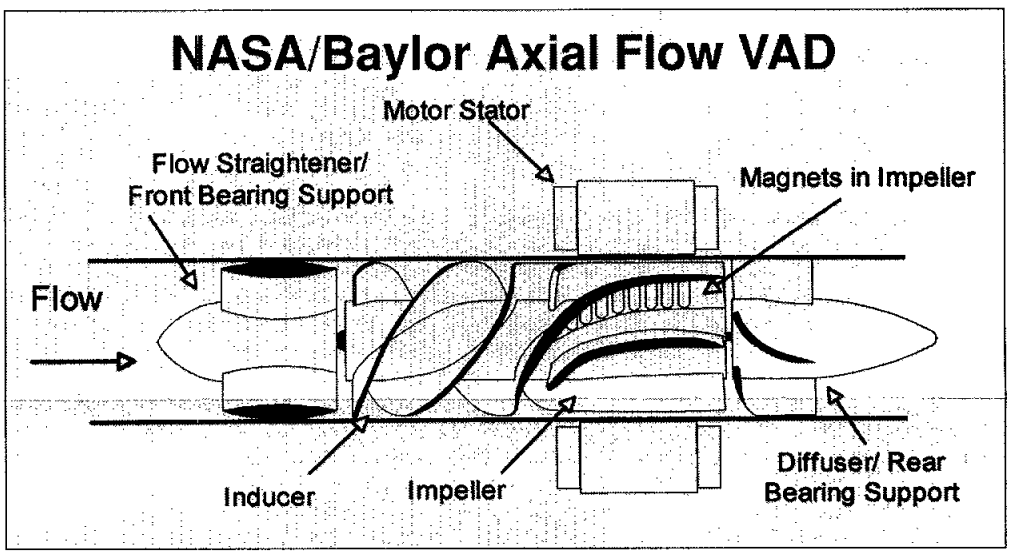
"It's all about quality of life," Aber said. "What kind of quality of life can you provide for these people? Without this kind of pump to help their hearts circulate enough blood through their bodies, some of these people will be bedridden."

The motivation to bring the LVAD from concept through development and into production is strong among the JSC and Baylor team members, especially heart recipient Saucier.

"Since my own transplant, I have spent a lot of time visiting people that are waiting for a donor heart," Saucier said. "I feel a real sense of urgency to come up with a practical alternative to transplant surgery."

It was with that sense of urgency and dedication that Saucier and his JSC colleagues began working on the LVAD in 1988, volunteering evenings and weekends to design the pump. In 1992, NASA began funding the project.

"The team was very dedicated," Debakey said "and we made a certain amount of progress considering initially we were working part-time in all of this. I got the impression after our first meeting that we had some really good minds on this problem, and that certainly proved to be the case. Now, we think we have a pump that meets very strict requirements."



Those "strict requirements" include a simple device that pumps at least 5 liters of blood per minute using less than 10 watts of power, is small enough to be implanted without affecting arteries or tissues, and gentle enough not to damage the body's red blood cells.

"A healthy heart normally pumps about 8 liters of blood per minute," Aber said. "But a diseased heart may be pumping only 2 to 4 liters per minute, barely enough to keep a person alive. This pump can provide that extra 4 or 5 liters of pumping capacity to maintain adequate blood flow."

In a diseased heart, muscle movement is reduced creating a reservoir of blood in the heart the LVAD can tap into. The pump works in parallel with the hearts own pumping motion drawing the blood flow from the left ventricle of the heart and increasing the blood output.

The power requirement is designed to allow the use of a relatively small battery pack with a radio coil to power the pump through the patient's skin.

This means a patient is not bedridden, and does not have to rely on a large power console to keep the device operating.

But even more challenging than size or power concerns, was the requirement that the pumping action not destroy the body's red blood cells. These delicate cells carry hemoglobin which could enter the bloodstream if the protective "balloon" of the blood cell was broken. The release of hemoglobin into the bloodstream — called hemolysis — can cause anemia and is potentially toxic.

It was here that space shuttle technology and aeronautical research played a key role.

"We were having problems with blood damage on the initial prototypes," Aber said. "So we teamed up with Ames Research Center to find out why we were wrecking blood cells so heavily."

Computational fluid dynamics analyses of the prototype model conducted at Ames indicated the damage might be occurring at the impeller inlet as blood was being drawn from the heart. The JSC engineers then applied lessons learned from the shuttle's main engine fuel system.

"We know when we pump liquid hydrogen to the main engines on the shuttle too fast, it will begin cavitating, or boiling, at the pump inlet. The pump becomes unprimed and the appropriate amount of fuel won't get to the engines.

"So the way we deal with that is to add an inducer section, which is a section of the pump designed to get the fluid moving gently before it enters the impeller section where the hard pumping takes place," Aber said. "We applied that same principle to this pump and that effectively solved our hemolysis problem."

The LVAD inducer is a series of small "screw-like" blades added to the front of the pump that gently accelerate the flow of blood into the turbine reducing the possibility of damage to vital red blood cells.

With that problem resolved, the team has turned its attention to the issue of rejection of the device by a patient's body.

"Because the LVAD is inert, the only rejection phenomenon we see is blood clotting," Aber said.

"Blood is special and behaves differently from other fluids. When blood comes into contact with any foreign substance, it undergoes changes leading to clot formation," Debakey said. The risk with clot formation is that the clots may break away from the pump surface, resulting in stroke.

A pump that the body won't recognize as a foreign object would be ideal, but that is beyond current technology. Instead, the JSC-Baylor pump gets the blood flow in and out of the pump quickly, and by eliminating areas of stagnation reduces the tendency for clot formation.

The clotting tendency may be further reduced by treating patients with anticoagulation medications. The blood must be thinned enough so it won't clot on the pump, but not so much that the patient runs the risk of bleeding to death from a minor injury.

"There is a fine line between anticoagulant therapy to support the LVAD and maintaining some type of normal life," Aber said. "You can design a pump so that you reach a balance that maintains a safe coagulation capability in the blood stream and yet keeps the blood from coagulating in the pump."

Finding that acceptable balance is a challenge that the team looks forward to solving together.

To understand how the pump will work in the human body, team members are using fluids simulating the properties of blood to gain knowledge of pressure, flow and efficiency. The first clinical use of the device most likely will be short term, during open heart surgery or as a temporary assist to stabilize a patient after surgery.

Some larger ventricular assist devices saw short term use in patients as early as 1966. Many of those devices were large, expensive and extremely complicated. Patients typically were restricted to bed, hooked up to a large external power source.

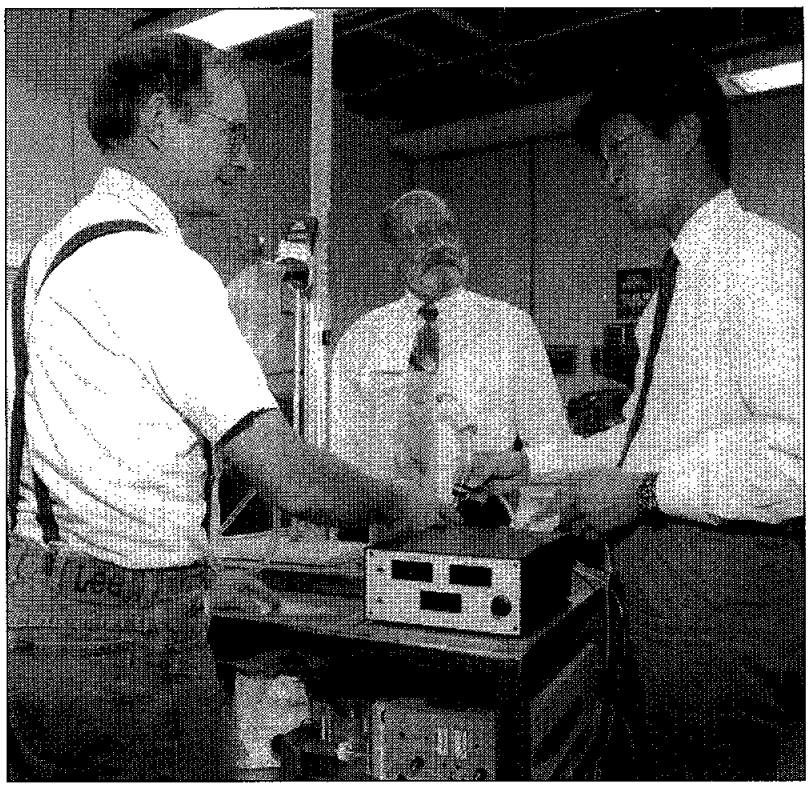
The JSC-Baylor designed LVAD is smaller, more efficient and likely to be less expensive.

With the LVAD still in the development phase, cost figures are not available but Aber said manufacturing costs for the LVAD should be less than its older, larger counterparts since the simplicity of design minimizes the number of working parts used by the device.

"This is an area where we have existing technology that can directly advance the state of the art in a tangible way," Aber said. "We are a very close-knit group sharing a common motivation to see that technology used to help save lives."

According to Bozeman, work on the LVAD is a "labor of love" inspired by Saucier. For Saucier, the program is an opportunity to take technology and use it in a completely humanitarian effort.

"My goal is to have a permanently installed LVAD pump that can take the place of a heart transplant," Saucier said. "That's my goal. That's when I'll be satisfied." ❑



Clockwise from top left.
The JSC\Baylor College of Medicine team surround their left ventricular assist device, a simulated battery pack and a closed loop water tank. Team members are (from left) Geoge Damm, Baylor; Greg Aber, JSC; Dr. Michael Debakey, Baylor; Dick Bozeman, JSC retired; Dr. Kazumi Mizuguchi, Baylor; Jim Akkerman, JSC; Paul Svejovsky and Jim Bacak, Lockheed Engineering and Sciences Co.; and Robert Benkowski, Baylor. Saucier is not pictured.

Heart recipient David Saucier discusses the LVAD with heart surgeon Dr. Michael Bakey. Saucier holds the pump in his left hand. Debakey performed heart transplant surgery on Saucier in 1984.

JSC team members discuss the results of closed water loop tests on the Left Ventricle Assist Device with Baylor's Dr. Kazumi Mizuguchi.

JSC photos
Dr. Debakey photo courtesy Baylor College of Medicine

'Pirates' reap awards, honors

JSC's Mission Operations "Pirate" team recently received Vice President Al Gore's prestigious "Hammer Award" for its efforts in designing the new mission control center.

The Hammer Award is given by the Vice President to recognize work teams that have made dramatic improvements to how government functions. The Pirates were selected for their innovative approach to developing the new control center resulting in development cost savings of $74 million and recurring cost savings of $22 million per year.

"We call ourselves 'Pirates' to reflect our individual authority and responsibility for our actions," said division chief and head pirate John Muratore. "Our goal was to develop a mission control center that was efficient, flexible and responsive to customer needs."

The pirates succeeded in designing a control center that will be able to support both shuttle and space station operations in the year 2000 for less than the cost to provide shuttle operations alone in 1994.

The Hammer Award is just that. A hammer. But, not an old-fashioned government hammer — this one costs less than $6. When presented to the pirates, the hammer was adorned by a few cents worth of ribbon, a couple dollars work of wood and paint, and a 10 cent card from Vice President Gore. The award is symbolic of the team's efforts to help build a new government that works better and costs less.

The award-winning pirates are: Muratore, Jim Cole, Lydia Morgan, Valerie Sias, Lucy Barnes, Carol Evans, Stan Avent, Steven Gonzalez, Linda Perrine, Charlene Curtis, Janet Lauritsen, Paige Lucas, Theodore Ro, Patrick Duffin, Rhonda Hicks, Kim Anson, Leonard Halley, David Hogg, Marvin LeBlanc, James Brandenburg, Joseph Aquino, Raymond Smith, Lynn Vernon, Brian Anderson, Sharon Moton, Debra Bailey, Bob Brasher, Stanford Hutchison, Dave Miller, Thomas O'Briant, Bill Robinson, Bill Wylie, Linda Uljon, James Allen, Brian Boland, Victor Lucas, and Gary Nealis.

In addition to the pirate team, JSC's Payload Operations Branch also received honorable mention during the award ceremony. That team was recognized for its customer satisfaction level, and its innovative approach to managing activities in support of shuttle flight operations.

JSC Photo by Benny Benavides

PIRATE BOOTY—Mission Operations Division Chief and head "pirate" John Muratore accepts the 1994 "Hammer Award." The "Pirate" team received the award in recognition of its innovative approach to designing and developing the new Mission Control Center.

Depression takes heavy toll on victims

By Audrey Schwartz

Everyone feels tired, "down" and apathetic sometimes. But when these feelings continue for more than a few days, a serious illness called depression may be the cause.

Clinical depression takes an enormous toll on our country. At any one time, about 17.5 million Americans suffer from clinical depression. The illness accounts for more missed days than any other physical disorder, except heart disease and costs the economy about $27 billion a year—more than chronic respiratory illness, diabetes, arthritis or hypertension, according to the National Institute of Mental Health.

Depression is a "whole body" illness, affecting the way a person eats, sleeps, moves and thinks. Without treatment, symptoms can last months or even years. It also can be a fatal illness; about 15 percent of people with untreated depression commit suicide.

Fortunately, with appropriate treatment, such as antidepressant medications and pyschotherapy, 80 percent of depressive patients recover.

Some signals of clinical depression include: feelings of sadness or irritability; loss of interest or pleasure in activities; change in weight or appetite; feeling guilty, hopeless or worthless; fatigue or loss of energy; restlessness or decreased activity; thoughts of death or suicide.

For information, contact the Employee Assistance Program at x36130.

National Aeronautics and Space Administration

Office of the Administrator
Washington, D.C. 20546-0001

September 29, 1994

Dr. Carolyn Huntoon
Director
Lyndon B. Johnson Space Center
National Aeronautics and Space Administration
Houston, TX 77058-3696

Dear Dr. Huntoon:

Please express my appreciation to all the members of your team for the outstanding effort they put forth to make my recent visit a resounding success. It was a wonderful change of pace from Washington, and it gave me the chance to interact with JSC employees in a relaxed, informal setting—something to which I have of late been unaccustomed!

I came away with a renewed sense of awareness and appreciation for the breadth of activity and expertise resident within our ranks at JSC. I found my discussions to be informative and relevant, as well as a catalyst for some honest and insightful dialogue. The exuberance and energy of those with whom I met reaffirmed that NASA's most valuable resource continues to be its people. As I moved from place to place observing the JSC employees, their strong commitment to mission and excellence was clearly evident, and their pride, conviction, and camaraderie were uplifting.

I know that JSC is aggressively stepping up to the reality of a shrinking budget through streamlining, modernization, reorganization, and consolidation. This is a tribute to JSC management at all levels, and testimony that you at JSC are doing your part to posture NASA for the 21st century. We have the tenacity, self-determination, and expertise to take this Agency beyond conventional frontiers. I am convinced that there are no challenges that we cannot overcome. JSC's preeminence in the area of human space flight will significantly contribute to our new direction.

Please extend my thanks to the entire JSC team for a great trip and for their contributions to America's space program.

Sincerely,

Daniel S. Goldin
Administrator

Editor's note: NASA Administrator Daniel Goldin visited JSC on September 12 & 13. During that time, Goldin visited with employees and conducted several meetings both on site and throughout the Houston area. This is the text of a "thank you" letter Goldin sent to Center Director Dr. Carolyn Huntoon.

Beating breast cancer

This year alone more than 46,000 women and men will die of breast cancer in the United States.

The JSC Clinic is joining the American Cancer Society in its efforts to reduce that number by educating people the disease during October's National Breast Cancer Awareness Month campaign.

"Early detection can save the lives of more than 15,000 women this year," said Sharon Briceno at the clinic. "Our goal is to make sure both men and women understand the warning signs of breast cancer and what they can do to protect themselves."

To achieve that goal, the clinic will teach proper breast self examination techniques. Information, including videotapes for viewing at the clinic, is available. The clinic also will provide information on reduced fee mammograms for employees needing them.

The American Cancer Society recommends all women have a baseline mammogram performed by age 40 and then every 1 to 2 years after that. In addition, women should have a breast exam performed by a physician every three years between the ages of 20 to 40, and conduct routine breast self-examination every month.

"The key to success is early detection," Briceno said. "With early diagnosis and treatment, breast cancer is survivable." And that is good news in the fight against breast cancer. The 5-year survival rate for patients with a localized breast cancer has risen from 78 percent in the 1940s to 93 percent today.

Some risk factors, including heredity, can be minimized using simple techniques including maintaining a proper body weight and eating a well-balanced, low fat diet. For information, contact the clinic at x34411.

Safety classes begin Thursday

A series of safety training courses designed to help all JSC employees maintain a safe workplace is set to begin Thursday.

The courses focus on "front line" response levels to potential chemical hazard releases on site and at Ellington Field. Training is mandatory for all civil service and on-site contractor employees.

Courses will be offered in the Bldg. 2 auditorium and are limited to the first 800 attendees. Classes will be held from 8:30-9:30 a.m.; 10:30-11:30 a.m.; 1-2 p.m. and 3-4 p.m. on Oct. 17, 19 and 21. On Oct. 18 and 20, an additional session will be held from 5-6 p.m.

Classes will be offered from 9-10 a.m.; 10:30-11:30 a.m.; 1-2 p.m. and 2:30-3:30 p.m. on Oct. 13 and 14 at Ellington Field. To register for these classes, call x37512.

A Spanish language class will be held from 1:30-2:30 p.m. Oct. 26 in the Bldg. 226N Safety Learning Center.

For information, contact Karen Bleam at x36475.

Initial Phase One agreements set

(Continued from Page 1)

NASA officials also agreed to deliver to Mir an estimated 3.5 metric tons of dry cargo and approximately 3.6 tons of water over the seven to ten shuttle flights.

NASA officials proposed that the water be generated by the fuel cells on the shuttle, but Russian officials are studying the development of a water treatment system to process shuttle fuel cell water to prepare it for long-term storage on the Mir station.

Russian officials also informed the NASA team that they will not need *Atlantis* to carry a replacement gyrodyne to Mir on STS-71. Originally, the mission plan called for the shuttle to transport the attitude control and stabilization unit to Mir to replace a similar piece of hardware on the Russian station.

Plans for joint spacewalks also were agreed upon. The first joint extravehicular activity will occur on STS-80, currently set for July 1996, with second EVA set for STS-82, December 1996. A third spacewalk will be scheduled for a later mission.

"We are about to embark upon an exciting period for both space programs," Holloway said. "The international space community is making history by working together, and to see the pieces falling into place is very rewarding."

Reunion honors unique work

By James Hartsfield

Creating space on Earth through the years has been a task almost as difficult and just as rewarding as actually sending humans to space, and the immense scale required to do the job is evident in JSC's Space Environment Simulation Laboratory.

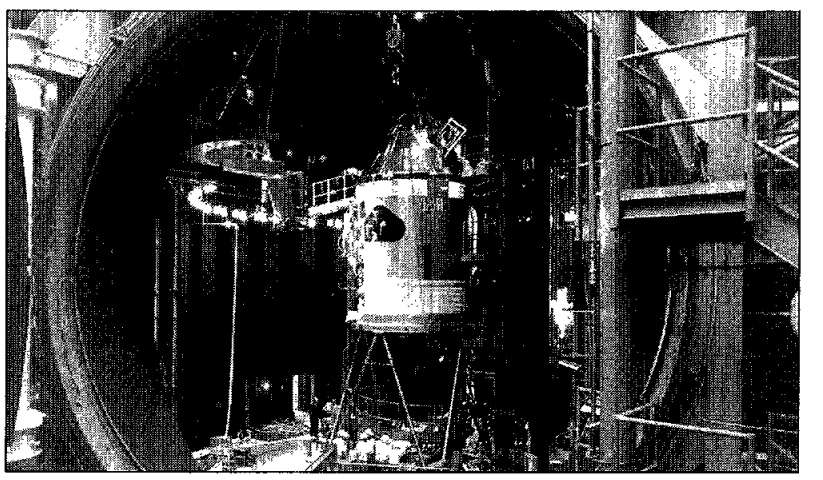
On Oct. 15, past and present SESL staff will celebrate 30 years of operation, said Richard Hermling, who worked in the lab during the 1960s and 70s. In its first years, the lab's huge vacuum chambers were used for tests that imitated the real missions that followed — using an entire spacecraft and crew.

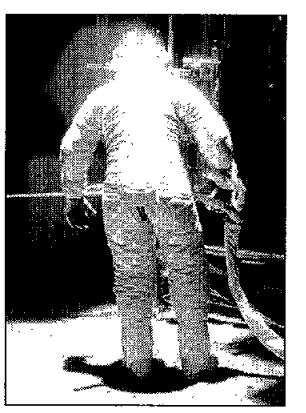
"There was a lot of feeling of triumph at the end of a test just like at the end of a mission," Hermling, now an aerospace engineer manager in the Flight Crew Equipment office, explained. "We did it first — before the flight— and it was risky, even though we were all on the ground. We flew the thermal mission profile, with test subjects first and then with the actual crew."

The SESL includes Vacuum Chamber A, among the largest thermal vacuum chambers in the world with outside dimensions of 65 feet in diameter and 120 feet in height, with a 40-foot wide door. Inside, the chamber is 55 feet in diameter and 90 feet high, and takes seven hours to pump down to its ultimate vacuum pressure. The chamber simulates not only the vacuum of space but also the extremes of heat and cold experienced by spacecraft.

Smaller but no less vital in its service is Chamber B, measuring 35 feet in diameter and 43 feet in height on the exterior with interior dimensions of 25 feet by 26 feet. The two chambers share several systems, however Chamber B can reach its ultimate pressure in five hours.

The reunion runs from 12 noon to 7 p.m. Tickets for the reunion may be purchased at the Bldg. 11 cafeteria for $10. Tickets also may be ordered by mail. Make checks payable to "SESL Reunion" and mail to: Southwest Seminars (SESL Reunion), P.O. Box 890228, Houston TX 77289-0228.





Above: Inside Chamber A the Apollo 2TV-1 vehicle is readied for thermal-vacuum testing. The spacecraft is dwarfed by the 90 foot high, 55 foot wide testing chamber. The photograph was taken in 1968.
Left: In this 1965 photograph, test subject Robert Piljay stands under the direct solar radiation rays in Chamber B in the SESL. Piljay was the first test subject to enter Chamber B under high vacuum and thermal conditions.
The workers who supported these and other Apollo, Skylab and shuttle tests in both Chambers A & B will meet for a reunion Oct. 15 at the Gilruth Center.