

Consolidated space station and shuttle training teams conduct operations from new facilities. Story on Page 3.



Dick Richards will command the STS-64 mission set for late 1994 on board *Discovery*. Photo on Page 4.

Space News Roundup

Vol. 32

November 22, 1993

No. 46

JPL team develops pollution-detecting glass

Scientists at NASA's Jet Propulsion Laboratory have developed a multifunctional glass that changes color dramatically when it detects pollutants in the air.

NASA contracted for the work seeking a sensor for planetary atmospheres. However, Dr. Albert Stiegman, a JPL chemist who led the effort, said the team discovered the new metal-containing silica gel glass could be equally important in the detection and monitoring of atmospheric pollutants on Earth.

This type of glass is hard and transparent like conventional window glass but, on a microscopic level, is highly porous like a sponge. To make the new pollution sensors, the metal vanadium is placed into the porous channels.

Molecules of gases present in the atmosphere seep into the channels, attach to the metal and change its color. The glass radiates that color. For example, the presence of hydrogen sulfide and nitrous oxide, two important pollu-

tants, turns the glass to a deep amber and a lemon yellow color, respectively. Formic acid turns it dark green. Ammonia turns it pale yellow.

"The most interesting property of this new glass is its ability to function as a chemical sensor," Stiegman said.

Stiegman worked with Drs. Hellmut Eckert of the Department of Chemistry, University of California at Santa Barbara and Gary Plett, Soon Sam Kim, Mark

Anderson and Andre Yavrouian of JPL on the project.

The material also shows a distinct preference for certain gases. It appears to favor the absorption of formaldehyde over that of water, which in turn is clearly favored over ammonia, Stiegman said.

Furthermore, he said, the material is hard, transparent and easily can be fabricated into optical compounds required for a sensing device. Because it is completely inorganic, it can withstand large

temperature extremes and harsh environments without degradation.

"Taken together," he said, "we feel that these properties recommend this material as a new and potentially important type of environmental chemical sensing element."

Stiegman and his associates described the development in a paper, "Vanadia/Silica Xerogels and Nano-Composites," published recently in the journal *Chemistry of Materials*.

Hubble sees Jupiter-bound comet clearly

NASA's Hubble Space Telescope has provided the most detailed look yet at the comet hurtling toward a July 1994 collision with the giant planet Jupiter.

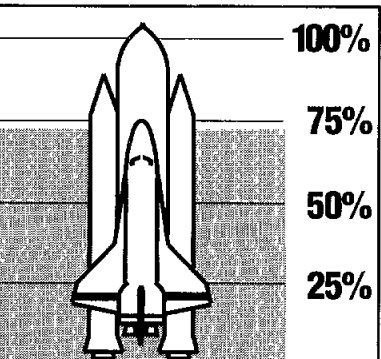
Hubble's high resolution images show that the approximately 20 objects that make up comet P/Shoemaker-Levy 9—giving it the appearance of a string of pearls—are much smaller than originally estimated from observations with ground-based telescopes.

"The Hubble observations show that the cometary nuclei are probably no bigger than 3 miles across, as opposed to earlier estimates of 9 miles," explained Dr. Harold Weaver of the Space Telescope Science Institute, Baltimore.

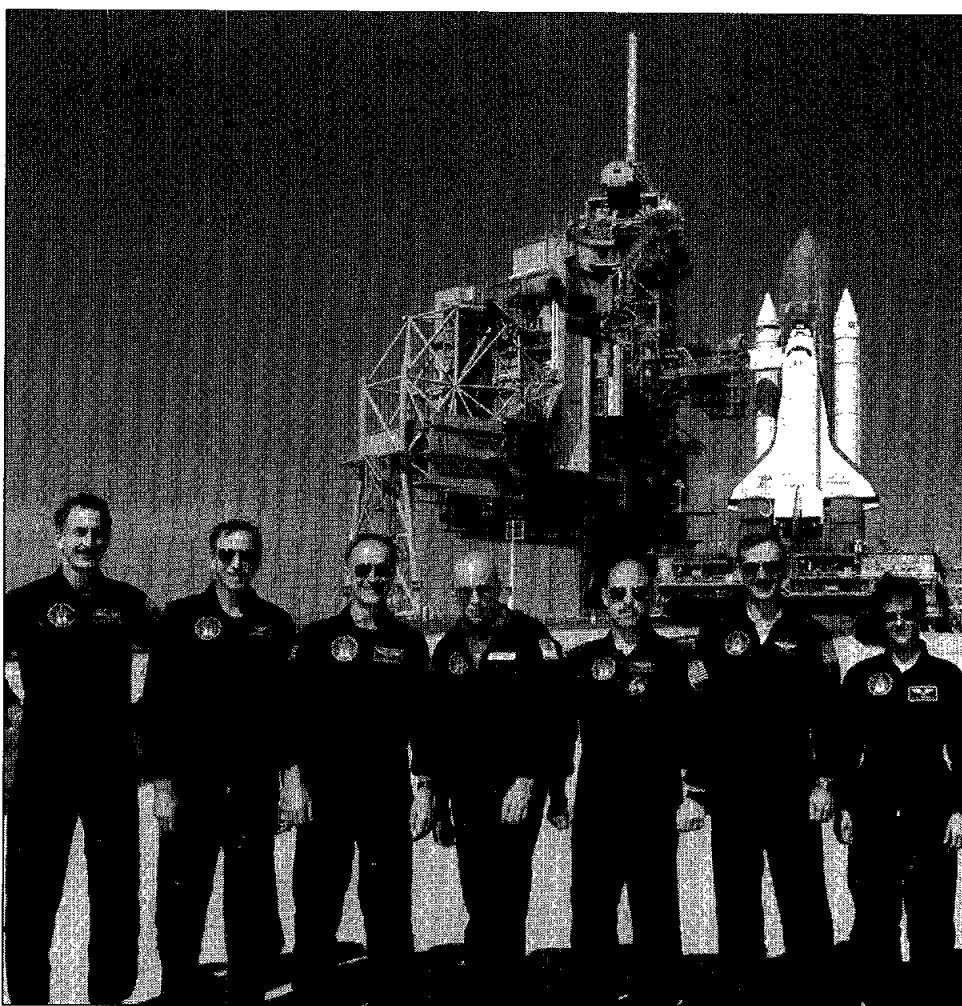
The new Hubble data show that the impacts will unleash only 1/10th to 1/100th as much energy as thought previously. However, even with these new size estimates, the impacts will be comparable in strength to the collision of a large asteroid or comet with Earth 65 million years ago. This cosmic catastrophe is suspected to have caused the extinction of the dinosaurs and hundreds of other species between the Cretaceous and Tertiary periods.

Relative to ground-based images, the Hubble image provides improved contrast between the nuclei and their comae, allowing a better estimate of the sizes. However, "even the current Hubble image does not allow a clear separation of nucleus and coma, so its size estimates are still probably only upper limits to the true nuclear sizes," according to Weaver.

Please see **HUBBLE**, Page 4



1993 GOAL: \$440,000



Top: The STS-61 crew, from left Jeff Hoffman, Dick Covey, Claude Nicollier, Story Musgrave, Ken Bowersox, Tom Akers and Kathy Thornton, poses in front of Endeavour. The ten-day mission is set for launch Dec. 1.

Right: Astronomers are getting a close-up look at Comet P/Shoemaker-Levy 9, bound for a July 1994 collision with the planet Jupiter. The HST is providing a detailed look at the 20 objects that make up the comet, giving it the appearance of a string of pearls.

NASA Photos



Dec. 1 date for STS-61 mission

By James Hartsfield

Endeavour was on the move at Kennedy Space Center last week, switching launch pads and taking unwavering aim at a launch in two weeks to service the world's most spectacular telescope.

Following a final review of flight preparations, shuttle managers Wednesday set 3:57 a.m. CST Dec. 1 as the launch time for *Endeavour* on STS-61 to provide the first in-orbit servicing of the Hubble Space Telescope. Monday, *Endeavour* was moved from Launch Pad 39A to neighboring Pad 39B due to sandy grit discovered earlier in the payload changeout room at the former pad.

The grit, a man-made substance used in sandblasting, was found in the clean room following a windstorm Oct. 30. The replacement instruments and equipment for HST were in the room, although in airtight bags.

After the contamination was found, the payloads were moved back to KSC's payload servicing building for cleaning, inspection and rebagging while the Pad 39A room was cleaned and inspected as well. Although the room was cleaned, managers decided to move *Endeavour* to Pad 39B as a precaution.

The pad swap was performed in one day, and the HST payloads, found to be in excellent condition, arrived at Pad 39B a day later to be installed in *Endeavour's* cargo bay, work that was expected to be complete by the end of last week. The crew of STS-61—Commander Dick Covey, Pilot Ken Bowersox and Mission Specialists Kathy Thornton, Claude Nicollier, Jeff Hoffman, Story Musgrave and Tom Akers—will depart for KSC on Saturday to prepare for the launch. The three-day countdown is scheduled to begin Sunday.

Elsewhere, *Discovery* remained on track as preparations for a mid-January 1994 launch of shuttle mission STS-60, a flight that will carry the Wake Shield Facility, continued in the Bay 3 processing hangar. Work this week included installation of the three main engines, servicing of the drinking water system, and installation of the Spacehab module in the payload bay.

Discovery's current schedule calls for the spacecraft to be moved from the hangar to the Vehicle Assembly Bldg. Dec. 15 to be mated with the solid rockets and external fuel tank for STS-60.

In the Bay 2 processing hangar, *Columbia* is undergoing

Please see **Endeavour** Page 4



Section mascot gives station ops team "paws"

By Audrey Schwartz

When it comes to preparing for space station operations, the Maintenance, Mechanical and Logistics Section is "bearing" up quite well, especially now that it has a new mascot.

Last month, the section adopted Oso, a 9-month-old spectacled bear cub born at the Houston Zoo.

Oso, which means "bear" in Spanish, also is the call sign for the section's future Operations Support Officer console position in the space station Control Center Complex. The OSO officer will be responsible for on-orbit mainten-

ance, structures and mechanisms operation of the international space station.

Many of the Mission Operations Directorate sections that are working on space station have picked animals previously for mascots and emblems.

The section chose a bear as its emblem long before Oso became a gleam in its mother's raccoon-like eyes.

"Last year, the 12 people in our section all chipped in and adopted a grizzly bear at the Houston Zoo as our mascot. But when I heard

Please see **OSO**, Page 4



Photo by Houston Zoo

Oso, the mascot for the space station Operations Support Officer, shyly hides behind his mother, Patty, at the Houston Zoo. The spectacled bear, an endangered South American species, is named for its glasses-like markings.

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 more information, call x35350 or x30990.

Christmas tree sale — The annual Christmas tree sale will be held from 9 a.m.-noon Saturday, Dec. 4 at the Gilruth Center. Tickets are on sale until Dec. 2. Price is \$17 for 5-8 foot tree and \$33 for 10-12 foot tree.

Christmas dinner dance — Tickets for the Dec. 10 and Dec. 11 EAA Christmas dinner dances are on sale through Dec. 8. Cost is \$22.50 per person.

Metropolitan Ballet's Nutcracker — Performances will be 8 p.m. Dec. 10 and 12, and 2 p.m. Dec. 11. A limited number of tickets is on sale for \$12.50 per person.

EAA Symphony — The Silver Bells of Christmas concert will be at 2:30 p.m. Sunday, Dec. 5 at Jones Hall. Cost is \$17 per person.

Entertainment '94 Coupon Books — Bay Area/Galveston/Downtown or FM 1960/Downtown: \$30 each, \$1 off first book for civil servants. Gold C Books: \$8

Space Center Houston — Discount tickets: adult, \$7.50; child (3-11), \$4.50; commemorative tickets, \$9.95.

Metro tickets — Passes, books and single tickets available.

Movie discounts — General Cinema, \$4.50; AMC Theater, \$3.75; Loew's Theater, \$4.

Upcoming events: Children's Christmas Party, New Year's Eve Dance.

Stamps: Book of 20, \$5.80

JSC

Gilruth Center News

Sign up policy — All classes and athletic activities are scheduled first come, first served. Sign up in person at the Gilruth Center and show a NASA badge or yellow EAA dependent badge. Classes tend to fill up two weeks in advance. Payment must be made in full, in exact change or by check, at the time of registration. No registration will be taken by telephone. For more information, call x30304.

EAA badges — Dependents and spouses may apply for photo identification badges from 6:30-9 p.m. Monday-Friday. 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. Dec. 1. Pre-registration is required. Cost is \$5.

Defensive driving — Course is offered from 8:15 a.m.-3 p.m. Saturday. Next class is Dec. 4. Cost is \$19.

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

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

Aikido — Martial arts class meets from 5-7:30 p.m. Tuesdays and 6:15-8:15 p.m. Wednesdays. Black Belt class from 6-8 p.m. Fridays, requires instructor permission. Cost is \$25 per month.

Western dance — Country and western dance classes begin Jan. 3. Beginner class meets from 7-8:30 p.m. Mondays and advanced class meets from 8:30-10 p.m. Mondays. Cost is \$20 per couple for six weeks.

Line dance — Classes meet from 7-8 p.m. Tuesday nights beginning Jan. 4. Cost is \$10 per person for six weeks.

Fitness program — Health Related Fitness Program includes a medical examination screening and a 12-week individually prescribed exercise program. Contact Larry Weir at x30301.

JSC

Swap Shop

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

Property:

Sale: Middlebrook, 3-2-2, split plan, new furnace/roof, custom windows, lg deck w/cover, storage shed, \$89.5k. 486-0785.

Sale: Sagemont, 3-2-2, both formals, den, FPL, new roof/carpet, trees. Ben, x34339 or 481-1439.

Rent/Sale: Baywind II condo, 1-1, W/D, refrig w/ice maker, dishwasher, FPL, ground floor, \$425/mo, avail immed. Steve, x49625 or 486-8047.

Rent/Sale: 3-1-1, den, gas range, refrig, dishwasher, W/D conn, \$450/mo or \$38k. Bill, x39376 or 332-3649.

Rent: Alameda/Kirkwood area, lg 3-2-2, formals, hi eff AC, gas heat, ex cond, ref required, \$800/mo, dep dependent on children and pets. 996-0033.

Sale: Taylorcrest, 4-3-2.5D, southern colonial, 3200 + sq ft, pool/spa, water view on cul-de-sac, island kitchen, 3 BR suites, balconies, art studio, \$290k, 3% co-op, Richard, x30271 or 326-4963.

Sale: Taylor Lake Village, 4-2.5-2, many upgrades, 2900 sq ft, custom features, \$180k. 474-5609.

Lease: CLC/Oakbrook West, 4-2.5-2D, contemp, lg LR/DR, FPL, sec sys, garage opener, new roof, no pets, \$995/mo. 482-6009.

Lease: Heritage Park, 3-2-2, c'fans, lg yard, fenced, clean, new roof/paint, \$695/mo. 482-6609.

Sale: LC/Bayou Brae, 4-2-2 colonial, new carpet/roof, detached all brick garage, lg lot, covered patio. 332-6325.

Sale: LaPorte/Glen Meadows, 3-2-2, new in '93, \$79.9k. 470-8993.

Sale: Taylorcrest, rustic country home on wooded 3.6 ac, pond, atrium, 3-2-2, separate workshop, solar satellite, never flooded, 2400 sq ft, \$160k. Jim, x39229 or 482-7873.

Sale/Lease: Nassau Bay, recently remodeled, gas, trees, \$114.5k/\$795.

Rent: Breckenridge, CO, ski house, sleeps 12, 1 block from ski shuttle. Larry, 303-482-9124.

Rent: Arkansas cottage overlooking Blue Mountain Lake, furn, wooded, 4 ac, screened porch, antiques, \$250/wk, \$50/day. x33005 or 334-7531.

Rent: Wolf Creek, CO, furn, 2 BR, sleeps 5, no smoking/pets, day/wk/mo or longer. Bob, x30825 or 998-7372.

Rent: Galveston condo, furn, sleeps 6, Seawall Blvd and 61st St, wknd/wkly, dly. Magdi Yassa, 333-4760 or 486-0788.

Lease: Seabrook, 2-2.5 TH, and 1-1.5 TH, W/D conn, front and back doors, patio, outside storage, 2 covered parking spaces, \$585 and \$495. 474-9262.

Sale: San Leon mobile home, 3-2, hardboard exterior, W/D and kitchen appliances, bamboo bar w/4 stools, day bed, sofabed, \$17k OBO. x38138 or 559-1437.

Sale: LC/Meadowbend, 4-2-2, FPL, c'fans, newly landscaped and painted, \$69.9k nego, assum. Peter, 526-1853.

Cars & Trucks

'88 Isuzu Impulse SE, 63.4k mi, 5 spd, alloy wheels, AC, AM/FM Dolby cass, sun roof, ex cond, \$4.7k OBO. 335-5954 or 532-1940.

'90 Acura Legend Sedan LS, auto, sun roof all pwr, AC, blk w/ivory leather, \$16.9k. 212-1473 or 286-5945.

'88 Toyota Camry LE, loaded, low mi, \$8k OBO. G. Jackson, 334-1524.

'81 Corvette, 4 spd, mirror T-tops, custom blue striped paint, 75k mi, \$12k OBO. x33765 or 326-1390.

'92 Eagle Talon, metallic turquoise, 22k mi, bumper to bumper 36k/3yr warr, \$1.5k and take over payments, 32 mo. 333-6610 or 532-3067.

'72 Ford LTD, auto, 400 cid eng, well cared for, runs good, \$550 OBO. 333-6533 or 488-5445.

'87 Tempo, needs work, \$500. 338-1040.

'85 Oldsmobile Delta 88 Royale, 4 dr, 85k mi, \$2k. 436-1027.

'91 Honda Accord EX, dk blue 4 dr, maintained per factory schedule, 53k mi, \$13.5k. Wayne, x45709 or 723-8425.

'90 Mazda Miata, red, ex cond, garaged, 44k mi, stereo cass, aluminum alloy wheels, custom car cover, \$10.9k. 280-1747 or 338-2674.

'88 Chevy Caprice Classic Brougham, all pwr, loaded, 51k mi, 305 V8, dk blue, \$7k. Mike, 283-6935 or 996-8132.

'89 Pontiac Lemans, \$3,150. Max, x38563 or 331-7957.x

'80 Fiat convertible, mechanically sound, needs some interior work. Edwin, 282-4091 or 996-1106.

'87 Hyundai Excel, 5 spd, 4 dr, AC, tinted windows, AM/FM/cass, non smoker, garaged, new battery, well maintained, ex cond, 59k mi, \$2.9k. x33662 or 334-6794.

'90 Toyota Celica GT, ex cond, metallic grey, loaded, pwr, AC, 5 spd, CD, alarm, tinted glass, cellular phone. Thibodeau, x38232 or 480-0919.

'86 Audi 5000 CS, loaded, leather int, ex cond, maintenance records, 63k mi, \$8.7k. 485-2987.

'78 Porsche 928, brown w/leather int, auto, ex cond, 75k mi, \$8.5k. Bill, x48889.

'89 Ford Aerostar minivan, Eddie Bauer, all pwr, digital pkg, dual AC, ex cond, \$9,995. 980-7481.

Boats & Planes

'90 Hunter 30' auxiliary sloop, AC, roller furling, full batten main, digital knot/depth/wind, autopilot, bimini, ex cond, \$52.5k. 980-7481.

21' VIP Volante, 260 Mercruiser, Alpha One outdrive needs repair, hull/int clean, open bow, trlr, \$5.5k OBO. Chris, x34561 or 480-3859.

'91 Bayliner 16' V-hull boat, 50hp force motor, Bayliner trlr, removable deck seats, depth finder, trans ext warr, \$4.5k. x38193 or 409-267-3750.

22.5' SeaRay Cuddy Cruiser, ex cond, 228hp Mercruiser I/O, new Alpha One outdrive, 6" color Furuno depthsounder, VHF, \$8.5k. Mark, x38013 or 992-4132.

Cycles

Men's 10 spd Raleigh Rapide bicycle, \$69; women's 12 spd Miyata touring bicycle, \$79. 333-7009 or 486-6762.

JSC

Dates & Data

Today

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

Tuesday

Blood drive — The last on-site JSC blood drive of 1993 will be from 8-11:30 a.m. and 1-3:30 p.m. Nov. 23 at the Gilruth Center. For more information call Dan Mangieri, x33003; Mary O'Rear, x36531; or Susan Anderson, x33082.

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

Wednesday

Freedom Fighters — Space Station Freedom Fighters will meet at noon and 5 p.m. Nov. 24 at the Freeman Memorial Library. For additional information, contact David Cochran, 482-7005 after 5 p.m.

Astronomy seminar — The JSC Astronomy Seminar will meet at noon Nov. 24 in Bldg. 31, Rm. 129. For more information, call Al Jackson, 333-7679.

Russian speakers — Practice your Russian language skills from

11 a.m.-1 p.m. Nov. 24 in the Bldg. 3 cafeteria. For more information, call Jack Bacon, x38725 or Amy Mendez, x38066.

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

Thursday

Thanksgiving Day — Most JSC offices will be closed Nov. 25 in observance of the Thanksgiving Day holiday.

Friday

Cafeteria menu — Special: baked chicken. Total Health: roast beef au jus. Entrees: deviled crab, Creole baked cod, baked chicken, beef cannelloni, Reuben sandwich. Soup: seafood gumbo. Vegetables: seasoned carrots, peas, breaded okra, steamed cauliflower.

Monday

Cafeteria menu — Special: hamburger steak. Total Health: vegetable lasagna. Entrees: beef Burgundy over noodles, fried chicken. Soup: cream of chicken. Vegetables: buttered corn, carrots, green beans.

Nov. 30

Lunch seminar — Larry Wier of the Health Related Fitness Center will discuss pre-ski season exercises to reduce the risk of injury. The

meeting begins at 11 a.m. in the Bldg. 30 auditorium. For more information, call x30301.

Dec. 1

Astronomy seminar — The JSC Astronomy Seminar will meet at noon Dec. 1 in Bldg. 31, Rm. 129. Dr. Gautam Badhwar will discuss a galactic cosmic radiation model and radiation hazard for interplanetary travel. For more information, call Al Jackson, 333-7679.

Dec. 2

IEEE conference — The Institute of Electrical and Electronics Engineers will host a videoconference on "Engineering Applications for Monte Carlo and Other Simulation Analyses" from 10:30 a.m.-2 p.m. Dec. 2 at the Gilruth Center. Reservations deadline is Nov. 26. For additional information, contact Frankie Hap, 333-6064.

Dec. 5

Christmas concert — The Bay Area Chorus will present a "Christmas Collage" at 3 p.m. Dec. 5 in Teague Auditorium. Cost is \$3 for adults and children over 12. For additional information, call 684-6030.

Dec. 6

Engineering applications — The latest developments in mechanical system simulation software will be demonstrated at 9 a.m. in Bldg. 12, Rm. 112. Representatives of MDI Adams will discuss space engineering applications. For additional information, call Ken Tanoury, (214) 789-5353.

Audiovisual & Computers

IBM PC, 640k, two 5.25 FD, 13" color monitor, kb, S/W, no HD, IBM Proprinter, paper, \$250; Okidata dot matrix printer, \$100. Michelle, x31109 or 474-7263.

Portable stereo w/cassette player, \$25 OBO. Trudy, x35106 or 333-6688.

Toshiba 3100SX laptop, 5 MB RAM, 40 MB HD, 1.44 MB FD, math coprocessor, gas plasma VGA, 2400 baud modem, leather case, AC/DC converter, MS DOS 5.0, Windows 3.1, Logitech mouse, \$1k. Trent, x47498.

Macintosh Plus and ImageWriter, \$450. 326-5150.

PC software, Prodigy, \$10; Solo Flight, \$10; MS DOS 6.0, \$25; Quatro Pro 2.0, \$10; Xtree Pro Gold, \$10. Mark, x30044.

Mitsubishi EGA monitor, broken but fixable, or for parts, \$20 OBO; Zenith 640k computer w/CGA monitor, no HD but has bay avail for one, good cond, \$200 OBO. x34727 or 480-7257.

Macintosh SE computer w/40 MB HD, 2.5 MB RAM, dual FD, std kb and mouse, system S/W, manuals and original pkging, \$600. Kevin, x39461 or 729-2006.

Hewlett-Packard peripheral for HP-41, cassette drive HP82161A and HP-IL module 82160A, ex cond, in orig boxes, BO. Carlos, x38879 or 554-7726.

Radio Shack color computer, Coco disk drive, multipack, X-pad graphics tablet, modem interface, S/W, 2 boxes of related books and magazines, \$125 OBO. x36647 or 666-7440.

Photographic

Nikon FM Chrome body, \$175; Nikkor 50mm f1.4 AI lens, \$150; Nikkor 28mm f2.8 AIS lens, \$250, all in ex cond. x31538 or 480-9356.

Pets & Livestock

Two young cats, 1 male, 1 female, shots, neutered. Jay, x38800 or 333-5869.

Boxer mix puppies, 3 mo, fem, friendly. Laurie, x33590 or 991-0821.

Kittens born 9/19 avail 10/31, 2 litters, tabbys or orange/white, free. Tom or Laura, 946-0681.

Free baby bunnies. Paul, x31883.

Musical Instruments

Yamaha professional upright piano, polished ebony, new \$10k, now \$6k, Friendswood area. 482-5870.

Ibanez RG550 solid body elec guitar and Peavey Classic amp, was \$2.1k, now \$795. 280-9621.

Household

Sleeper sofa, qn sz, blue/gray pattern, earth tones w/wood trim, metal sprung frame, \$170 OBO. 335-5954 or 532-1940.

French Louis XVI dining room set, 6 antique gold leaf chairs w/walnut table, \$2.5k. 333-9530.

Two piece Scandinavian sofa, blue cushions, \$150. 482-5393.

Qn sz semi motionless waterbed, hdbd has 2 lighted cabinets w/etched glass and an etched mirror, 6 drawers underneath, heater and mattress cover incl, \$250 OBO. x38723 or 338-2674.

Refrigerator, dishwasher, washing machine and dryer, BO. x33235.

Wood desk w/lg drawer for drawings, \$95. Jerry, x30951 or 488-5553.

Couch, folds out to qn sz bed, forest green w/brown and lilac floral pattern, rattan bamboo front and arms, you pick up in San Leon, \$50 OBO. Anna, x38138.

Blue sofa, plush, full sz, ex cond, 2 yrs old, Scotchguard, \$275. 486-6794.

Single bed, box spring and mattress, Beautyrest Back Care, \$100. 486-6794.

Matching couch, chair and ottoman, earth tones and wood, good cond, \$300. 487-1119.

Two piece sectional sofa, rust color, \$125; rattan coffee table and end table w/smoked beveled glass tops, \$50 ea.; solid pecan bed room suite, qn sz mattress w/headboard, 2 end tables w/2 drawers, triple dresser w/9 drawers and mirror, \$800. Karen Henry, 282-4141.

Furniture, stereo equipment, camera and darkroom items. Steve, x37152 or 992-7049.

Wanted

Want new members of AIAA National Space Operations and Support TC to replace those outgoing in spring. Jim Stramler, x48531.

Want used mechanical 35mm SLR camera, a working light meter would be nice, but not required. Chuck, x35416.

Want mountain climbing gear, dynamic line and a sit harness. 326-5150.

Want to rent house w/fenced yard, CLC, LC, Dickinson area, from 12-15-93 to 4-15-94. x34354 or 337-1640.

Want person to rent downstairs area of 2 story house, 2 BR, LR, DR, bath, garage, \$400/mo + 1/3 util. Steve, x47928 or 333-4222.

Want aquariums, broken or otherwise. Steve, x47928 or 333-4222.

Want nonsmoking female roommate to share new home in Pearland w/divorcee and 3 children, \$300/mo + util. Tammy, x39449 or 489-3031.

Want responsible, nonsmoking housemate to share 3-2-2 in Bay Glen/CLC, \$300/mo + \$200 dep + 1/2 util. Larry, x33168 or 488-7460.

Want road-worthy trlr to securely transport 17' canoe. Steve, x37152 or 992-7049.

Want booth style DR set, formica top w/bench style seats w/backrests, will pay \$70; want shower stall w/door style closure, will pay \$100. Anna, x38138.

Want female roommate to share nice house, close to I-45, \$250/mo util incl. Theresa, 333-6491 or 480-6980.

Want car pooler from NW/Bear Creek/Katy area to JSC/CL area, hours 7 am to 4 pm. Raquel, x31810.

Want part time kitchen help at Gilruth Center, waitress, dishwasher positions, evening shift 4:00 pm to 9:30 pm. Pat, x30326.

Miscellaneous

Lady's full length winter coat, sz 8, tan, man made cashmere, never worn, \$60. Bob, 482-5984.

19" color TV, remote cntl, \$75; AM/FM/stereo rcvr w/bookshelf spkrs, \$100; men's clothing, slacks and jeans, 33"x 32", shirts, med and lg, jacket and top coat, 38 reg, \$5 to \$50. x36852.

Artificial FPL logs, chest freezer, band saw, grinder, sofa, teal DR table w/leaves and 4 chairs. Tom, x33208 or Maggie, x38217.

Graco Swing-o-Matic swinger, good cond, \$25. 981-1635.

Electric talking battleship game, ex cond, \$25;

remote control toy army tank, works good, \$25. 488-6521.

Comic book collection, mostly Marvel, some D.C. and Image, will sell all or part. Kim, x47462 or Jimmy, 409-938-7655.



Training for tomorrow's challenges

Combined space station, shuttle training improves efficiency

By Eileen Hawley

On orbit, astronauts successfully retrieve satellites using the shuttle's remote manipulator arm aided by a ground-developed rendezvous sequence that ends with close-in maneuvering by the commander and pilot.

The success of such exacting operations requires hours of intense training and effort by the shuttle crews, flight controllers, flight directors and payloads officers involved in the mission--efforts that are enhanced by the hours of training activity conducted by the Space Flight Training Division of the Mission Operations Directorate prior to each shuttle mission.

In January, the separate space station and shuttle training programs were consolidated into the Space Flight Training Division and now conduct their joint operations from Bldg. 4 South.

During the past year, the consolidation has brought together training personnel previously located in two off-site locations and is expected to increase the efficiency and expertise base of both organizations according to Ray Dell'Osso Jr., deputy chief of the division.

"We are now able to share systems, and through cross-training, bring the expertise of the shuttle training personnel into the station operations," Dell'Osso says. "There is a lot of experience learned from the shuttle program that can be applied to station. In addition, space station instructors are bringing in ideas that may help improve training in the shuttle program. The exchange of experience and information between programs is working out quite well."

The consolidation also incorporates responsibility for a particular discipline or system for both shuttle and station programs within the same branch. For example, the branch involved with power control systems will develop training requirements for both station and

shuttle training. Avoiding duplication in this way also should result in cost savings to the organization.

The consolidation of the space flight training team and equipment also "enhances our availability to the people we train," says John Pembroke, video producer for the division. Flight crews can utilize three single-systems trainers, the prototype part-task trainer or self-paced payload training computer programs all located in proximity to each other to refine the skills necessary to perform their jobs on orbit.

The flight controllers, directors and payloads officers train on the same equipment as the flight crews to familiarize themselves with shuttle operations and systems.

"Flight controllers, for example, may take the same training courses as the astronauts, but the course is not as specialized and provides more of an overview," says Bill Todd, operations manager for the single systems trainers.

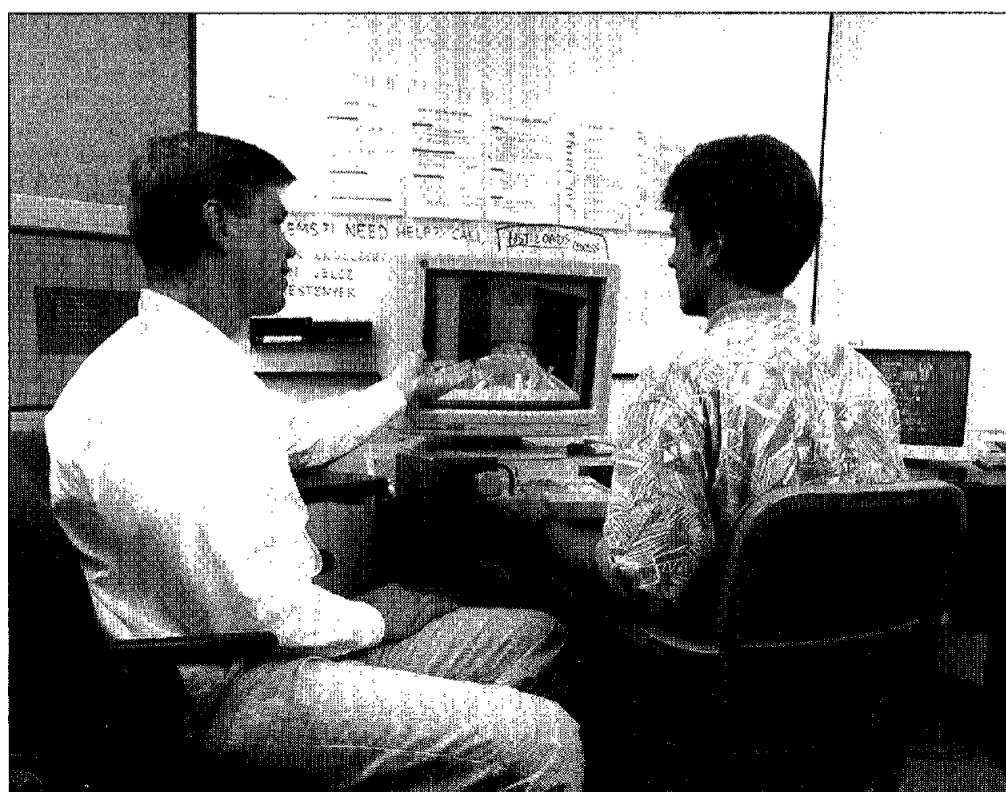
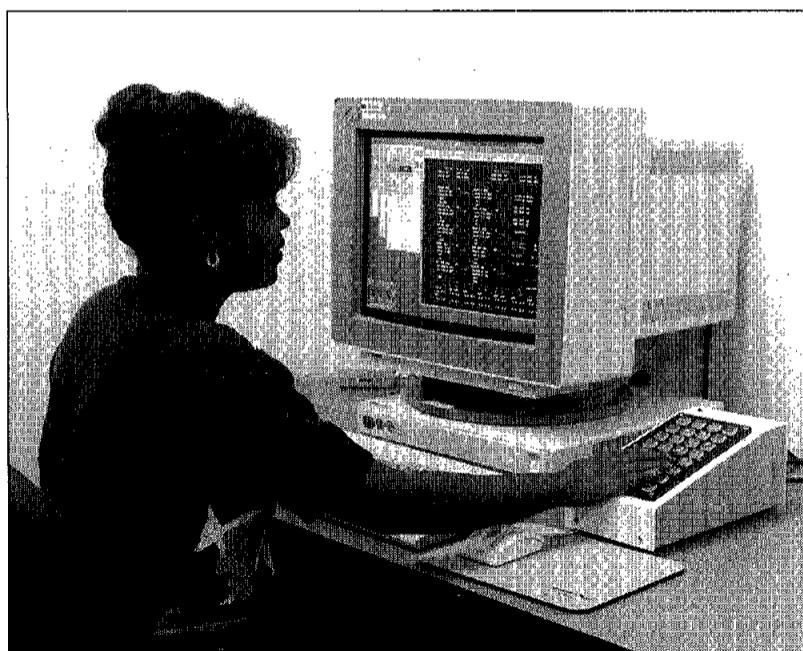
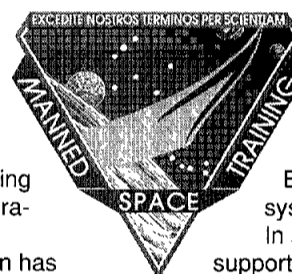
In addition to training flight crews and mission support personnel, the space flight training instructors are developing models for anticipated space station requirements.

Space station training models are in an early development stage according to Jim Dewberry, project manager for the part task trainer.

"We are working from very preliminary Russian-Alpha requirements attempting to build models for training," Dewberry says. "We will attempt to build a software model for each of the distributed systems of the space station. For example, to train guidance navigation control officers, we will develop a model of a guidance navigation control system which would provide the same inputs as the actual space station systems."

In addition to the crew training facilities, the building also contains the Mission Operations training resource center, training materials library, a video viewing room, and a computer-based training room.

To arrange a tour of the Space Flight Training Division facility, contact Bill Todd, x47311. □



Left to right, top to bottom:
 1) Jim Ruskowski, playback trainer operations manager, points out telemetry on flight controller displays to fellow instructor Romaine Lucero.
 2) In the aft station of the new single-systems trainer in Bldg. 4 South, instructors Karen Pickering and James Bonner review procedures.
 3) On the flight deck, Operations Manager Bill Todd discusses the capabilities of the SST with Acting Center Director Paul Weitz.
 4) Instructor Jackie Prewitt demonstrates a self-paced computer training session in the payload trainer.
 5) Dennis Englebert and Kurt Restemyer demonstrate the capabilities of the prototype part-task trainer which simulates the shuttle's robot arm.
 6) John Pembroke views a training video.

Richards to command STS-64 atmospheric research mission

By Kyle Herring

Navy Capt. Richard "Dick" Richards will command the STS-64 mission targeted for launch in late 1994.

Joining Richards will be Air Force Col. L. Blaine Hammond Jr. as pilot.

Mission specialists named to the flight are Air Force Col. Carl Meade, Air Force Lt. Col. Mark Lee and Air Force Maj. Susan Helms.

The STS-64 mission will carry the LIDAR In-Space Technology Experiment, a project that measures atmospheric parameters from a space platform utilizing laser sensors.

The mission also will carry the Robot Operated Materials Processing System to investigate robot handling of thin film samples, and the Shuttle Pointed Autonomous Research Tool for Astronomy, a free-flying retrievable X-ray astronomy platform.

Discovery's crew members are all space flight veterans. This will be Richards' fourth shuttle mission. The 47-year-old previously commanded STS-41 in October 1990 and STS-50 in June 1992 and was pilot on STS-28 in August 1989.



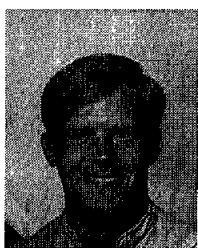
Richards



Hammond



Meade



Lee



Helms

Hammond, 41, was pilot on STS-39, the first unclassified Department of Defense mission in April 1991.

Meade, 43, previously flew as a mission specialist on STS-38, a Department of Defense mission in November 1990 and STS-50 in June 1992.

Lee, 41, was a mission specialist on STS-

30 in May 1989 and payload commander on STS-47 Spacelab-J, a cooperative science mission with the Japanese in September 1992.

Helms, 35, is making her second space flight as a mission specialist and previously flew as a crew member on STS-54 earlier this year.

Cafeteria service reduced Friday

With so many employees still full from Thanksgiving dinner or brown bagging with turkey leftovers, JSC cafeteria service will be reduced this Friday.

Breakfast will not be served that day. Lunch, to be served from 11 a.m. to 2 p.m., will include soups, salads and hot and cold sandwiches.

Regular cafeteria service will resume on Nov. 29.

Hubble studies comet's course

(Continued from Page 1)

During the upcoming HST servicing mission, a new camera called Wide Field and Planetary Camera 2, with corrective optics to compensate for aberration in Hubble's primary mirror, will be installed on the telescope. "The Hubble repair should provide images with much better contrast than the current images, and if the nuclei are close to the sizes we now think they are, then they should really pop out in the new Hubble images," Weaver said.

Hubble's sharp resolution shows that one bright knot in the comet stream is really four fragments close together.

Two of the pieces have an apparent separation of only 700 miles. The Hubble image also shows that most of the visible nuclei have comparable sizes.

"Jupiter's gravity might have disassembled the comet back into the primordial objects, called planetesimals, that were present when our sun formed 4.5 billion years ago," Weaver said. "Once Hubble's optics are fixed, we should get a better handle on the range of sizes within the planetesimal population."

The Jupiter collision is expected to occur over a 6-day period around July 21, 1994.

The effect of the impact will depend not only on the size and velocity of the cometary nuclei, but also their composition and structure.

The Jupiter impacts potentially could produce spectacular phenomena in the giant planet's multicolor cloud tops. The plummeting comet nuclei would turn into gigantic versions of meteors or "shooting stars." Each fireball would blow a hole in Jupiter's atmosphere the size of Texas.

HST is expected to be a key player during next year's encounter, although there are no definite observing plans yet. Due to its low-level of scattered light and high angular resolution, the Hubble should be able to observe the comet even when the glare of Jupiter prevents further ground-based observations.

Endeavour set for STS-61 launch

(Continued from Page 1)

preparations for an early March 1994 launch on shuttle mission STS-62 to carry the United States Microgravity Payload-2 aloft. Work this week included checks of the orbiter power systems, leak tests of the main engine plumbing, tests of the payload bay doors, and preparations for removing the Spacelab Life Sciences-2 module from the cargo bay.



Astronaut Jerry Ross pins a Silver Snoopy award on his wife, Karen, during a recent award ceremony at Boeing Aerospace Operations. Ross was one of four employees who received the prestigious award, but the only one whose spouse made the presentation.

Astronaut gets chance to put on dog for wife

Of the four employees receiving the prestigious Silver Snoopy awards recently in a surprise ceremony at Boeing Aerospace Operations, none was more surprised than Karen Ross. Ross received her award from her husband, shuttle astronaut Jerry Ross.

Ross was asked to present the award to his wife personally when he arrived at the surprise ceremony along with family and

friends. "I have hoped that you would be selected for this award for a long time because I know how hard you work to support the space program," Ross said as he presented the award.

The other three awards were presented by astronaut Rich Clifford. The Silver Snoopy award is presented by astronauts to individuals to recognize outstanding effort in supporting the manned space flight program.

Change in badging policy implemented by Gilruth Center

All NASA contractor employees and their dependents will need to purchase annual identification badges to use Gilruth Recreation Center facilities effective Jan. 1.

The Gilruth identification badges can be purchased for \$5 and will be valid for one year from the individual's birthday. In addition, identification badges will be issued annually for spouses and dependents (ages 16-22) for \$5 per person. NASA dependents also must purchase the annual Gilruth badges, although previously issued badges will remain valid until the expiration date.

No identification badges are needed for JSC employees, who must show their NASA badges when registering for activities or using facilities at the Gilruth Center.

Beginning Dec. 6, the Gilruth Center will have special hours for badge applications: Mondays, Tuesdays, Thursdays and Fridays from 5:30-9:30 p.m., Wednesdays from 7:30 a.m.-9:30 p.m., and Saturdays 8 a.m.-4 p.m. Beginning Dec. 20, badges will be issued from 6:30-9 p.m. Monday-Friday and from 8 a.m.-4 p.m. Saturday.

Contractors must show proof of employment when purchasing the identification badges—either their contractor badge, a NASA-issued badge or a signed letter from the company. Spouses and dependents must show a photo identification, such as a driver's license.

For additional information about the new Gilruth Center badge policy, contact Christine Jowid at x35789 or Teresa Sullivan at x38970.

Martin Marietta to host technology day at Gilruth

JSC managers and engineers will have an opportunity to review Martin Marietta's technology activities and independent research and development programs at a special Technology Day.

Martin Marietta will host the program from 9 a.m.-4 p.m. Nov. 30 at the Gilruth Center.

Topics to be discussed will include aluminum-lithium alloy development; composites; hybrid propulsion; and environmentally compliant manufacturing.

Technology day attendees also will be able to obtain information on space communications, data stor-

age and video technology; and integrated fault tolerant avionics.

Engineers will also be presenting information and discussing the current state of advanced satellite ground systems as well as automated flight software code generation and launch operations simulation.

The technology day is being hosted by Martin Marietta's Manned Systems Division.

Martin engineers will be available throughout the day, including the lunch hour, to answer questions about the exhibits or to discuss other areas of technical interest.

Professional development nominations being accepted

Nominations are being accepted for NASA's Professional Development Program which offers selected employees developmental work assignments outside of JSC.

Through the program, an employee is assigned for 12 months at another NASA site, usually Headquarters. "The employee gets an opportunity to find out how other organizations operate," says Karen Batte of the Human Resources Development Branch. "Ideally employees will bring that new perspective with them when returning to JSC."

The development branch annually solicits nominations from JSC directorates for the program. Batte encourages managers to discuss a development assignment with employees they consider good candidates for the program. Employees interested in the program, which runs from August 1994 through July 1995, should advise their managers.

"This is an opportunity for both personal and professional development for selected employees, and the center stands to benefit from their growth," Batte said. Nominations are

due to Human Resources no later than Dec. 15.

The program is open to employees at the GS-13 level and above. Ideal nominees should have 5-10 years professional experience with NASA, and at least five years of managerial experience. Final candidate selection will be based on the needs of the center, the candidate's demonstrated potential and a match of the employee's needs with the program objectives.

JSC nominations are reviewed by the center director and forwarded to

Headquarters where final selections are made. The rating criteria used includes the employee's education record, development record, significant recognition and accomplishments, demonstrated potential, supervisory and managerial endorsements and the employee's purpose for participating in the program.

Final selections at the Headquarters level are expected in late Spring. For additional information, contact Karen Batte in the Human Resources Development Branch at x32604.

Oso helps operation support officers "bear up"

(Continued from Page 1)

on the news about Oso's birth, I jumped right in because he was the perfect mascot bear for the OSO team," said Ken Zingrebe, a Barrios group lead.

Zingrebe explained that the cost of adopting an animal at the Houston Zoo varies according to the species, and sponsors receive a certificate and picture of their furry (or feathered or scaly) founding.

Bear in mind, the money goes to defray the cost of keeping and breeding the animals, some of which, like Oso, are endangered.

The spectacled bear, so named for glasses-like markings around the eyes, is the only bear species native to South America, according to John Gilbert of the Houston Zoo. The bears live in the rain forests and are mainly vegetarians.

Only about 200 spectacled bears currently exist in the United States. The existence of the spectacled bear in the rain forests is threatened by the encroachment of humans, Gilbert said.

The spectacled bear is part of the Species Survival Program. The program promotes cooperative breeding of at-risk animals among

U.S. zoos. Oso's papa bear Willy is from the National Zoo in Washington, D.C., and momma bear Patty comes from the Cleveland Metro Zoo.

Zingrebe said that his coworkers plan to sponsor Oso during its expected 2-year stay in Houston.

The team anticipates adopting another bear at the Houston Zoo after Oso is reassigned for breeding purposes.

"By adopting animals through the Houston Zoo, we can promote our team spirit and help to make our Earth a better place for all living things," he said.

Space News Roundup

The Roundup is an official publication of the National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Texas, and is published every Monday by the Public Affairs Office for all space center employees.

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

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