

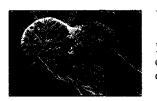
Space Administration Lyndon B. Johnson Space Center

Houston, Texas



Spacecraft carrier

NASA's new Shuttle Carrier Aircraft was delivered on schedule and under budget last week. Story on Page 3.



Venusian pancakes

Magellan's radar has recorded images of circular domes that may be similar to volcanic domes on Earth. Photo on Page 4.

<u>Space News Roundup</u> November 30, 1990 No. 47 Vol. 29

Cohen to receive National Space Trophy Award cites contributions to exploration of solar system

By Kari Fluegel

JSC Director Aaron Cohen will receive the prestigious 1991 National Space Trophy from the Rotary National Award for Space Achievement Foundation.

Cohen will be the fifth person to receive the Rotary award. The trophy, permanently housed in the JSC Visitors Center, is presented annually

to a United States citizen in recog- executive officer of Space Industries nition of his or her preeminent Inc., in 1987; former Congressman contributions for space exploration.

'This is truly a great honor,'' Cohen said. "Past recipients of this award Dr. Lew Allen, director of the Jet have long histories of dedication to Propulsion Laboratory, in 1990. excellence; I am proud to be counted in their company."

Previous recipients include Max-Engineering and currently chief tion of the solar system.

Don Fuqua in 1988; NASĂ Administrator Richard Truly in 1989; and

Cohen, who has served as JSC's director since 1986, is receiving the award for his outstanding contribuime Faget, former JSC Director of tions to the continuation of explora-

The award recognizes his distinguished 28-year career with JSC. His leadership at JSC has helped make America a driving force in space exploration, said Charles Hartman, president of the Rotary National Award for Space Achievement Foundation.

The trophy will be presented at an awards banquet Feb. 28 at the Hyatt Regency Downtown in Houston.



Aaron Cohen

Atlantis lands in Florida

By Kelly Humphries

The Space Shuttle Atlantis already is back in its hangar and being readied for its next flight after the first landing at Kennedy Space Center in five and a half years.

Atlantis completed its STS-38 mission a day late on KSC's Runway 33 at 3:42 p.m. CST Nov. 20 after strong winds forced waveoffs from Edwards Air Force Base in California.

Commander Dick Covey, Pilot Frank Culbertson and Mission Specialists Sam Gemar, Carl Meade and Bob Springer-and their families, who had been in California-returned home to JSC shortly after 10 p.m. that night and were greeted by several hundred co-workers, friends and family.

Atlantis' spectacular launch from Pad 39A at 5:48 p.m. CST Nov. 15 lit the night sky and allowed spectators to see Atlantis' climb for about seven minutes.

The orbiter performed almost flawlessly during the 4 day, 21 hour and 54 minute Department of Defense-dedicated flight. A hydraulic coolant controller malfunctioned

The landing at KSC's Shuttle Landing Facility was the first since



Mission Specialist Carl Meade gets a big welcome home hug from his son, David James, at Ellington Field.

ends of the runway have been charaterization of our handling smoothed for touchdown and shuttle brakes have been beefed up.

William Lenoir, NASA associate during ascent, an electrical problem administrator for space flight, said he stopped use of the vacuum cleaner on orbit and there were several had no qualms about approving the instrumentation glitches, but there landing on KSC's concrete runway and will do so again if the weather is were no serious problems. better at the Cape than at Edwards. Regularly scheduled landings at KSC are probably a year and a half away, STS-51D in April 1985, when Comhe said, and even then the unpredic- secondary landing site for the past mander Karol Bobko set down on table Florida weather will allow only several missions. the same runway. Since that landing, which ended with a blown tire half of the landings to take place there. and extensive brake damage, the "We would like to get a little bit more

qualities," he explained, "we have some tests we would like to do on landing roll out in subsequent missions that are better suited on a lakebed where you have more latitude '

KSC Director Forrest McCartney said the landing posed no especially difficult problems for the preparation teams because KSC has been the

Columbia launch set for Sunday; Astro-1 ready

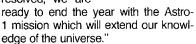
By James Hartsfield

Months of work to locate and repair elusive hydrogen leaks should bear fruit shortly after midnight Sunday when Columbia lifts off on STS-35, its second flight of the year.

Shuttle managers set 12:28 a.m. CST as the opening of the 2-hour, 30-minute launch window following a brief flight readiness review at the Kennedy Space Center on Tuesday.

"The shuttle team has worked very

hard to get Columbia ready to fly, Shuttle Space Director Robert Crippen said after the meeting. "With the hydrogen leak resolved, we are



This will be the fourth launch attempt for Columbia this year, with three previous attempts-on May 29, Sept. 6 and Sept. 18-scrubbed due to hydrogen leaks. However, replacement of the orbiter's 17-inch disconnect during the summer and the work of a special investigation team this fall resulted in a hydrogen tanking test last month that showed no excessive leakage.

Columbia's crew-Commander Vance Brand, Pilot Guy Gardner, Mission Specialists Mike Lounge, Jeff Specialists Ron Parise and Sam Durance-left Houston Thursday evening for KSC. Split into two in-flight teams, from the OMS tanks and routine postthe crew will perform scientific obser-

vations with the Astro ultraviolet and Xray observatory around the clock during the 9-day, 21-hour mission. As planned, the shuttle flight will be the second longest in history. Columbia is currently scheduled to land at Edwards Air Force Base, Calif., at 10:26 p.m. CST Dec. 11.

Columbia's countdown began at midnight Thursday, and early weather forecasts indicated a high likelihood of an on-time launch.

JSC's lead flight director for STS-35

is Gary Coen. Wayne Hale will be in charge of the ascent and entry flight control teams; Coen will be in charge of the Orbit 1 team; Al

Pennington will supervise the Orbit 2 team; and Bob Castle will be the Orbit 3 flight director.

Astro-1

Meanwhile, in the Orbiter Processing Facility's (OPF's) Bay 1 at Kennedy, Discovery's three main engines were installed this week. Also, seals were replaced in the orbiter's freon cooling system, and a newly developed test of the Orbital Maneuvering System fuel tank screens is under way in KSC's Hypergolic Maintenance Facility. Discovery is being readied for STS-39, scheduled for a late February 1991 launch.

Atlantis, fresh from space on STS-38, Hoffman, Bob Parker, and Payload is in the OPF's Bay 2. This week, the pyrotechnic devices on the spacecraft were safed, residual fuel was removed flight inspections were begun.

Elimination of the ferry flight from Please see ATLANTIS, Page 4

Missed opportunities

Hubble Space Telescope manufacturer, NASA share blame for problem

By Kelly Humphries

The manufacturer of the Hubble Space Telescope missed three opportunities to correct the problem in the telescope's less-than-perfect primary mirror, Optical Investigation Board Chairman Lew Allen said Monday, but NASA management must share the blame.

The investigating team concluded that Perkin-Elmer Corp., now Hughes-Danforth Optical Systems, relied on tests with a single instrument when it ground the 94.5 inch-diameter mirror to precisely the wrong shape 10 years ago.

Reliance on the faulty instrument, called a reflective null corrector, resulted in a spherical aberration that has restricted HST's ability to see very faint and very low contrast objects, one of

its primary objectives. A procedural error in how a spacing measurement was made caused the instrument to be about three ten-thousandths of an inch off.

"Why wasn't it detected prior to launch? The answer to that question is not a particularly happy one," said Allen, director of NASA's Jet Propulsion Laboratory. "There were at least three

cases where there was clear evidence that a problem was developed and it was missed all three times.'

Revealing data from two other instruments-a refractive null corrector and an inverse null corrector-were ignored by mirrorgrinding technicians because the reflective null corrector was the only certified instrument, he said.

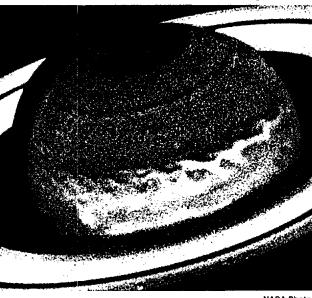
Nevertheless, Allen said blame belonged equally to Perkin-Elmer and to NASA.

Perkin-Elmer management was not made aware of the flaw because its Optical Operations Division did not share its concerns about conflicting test data, Allen said. Also, top management's attention was focused on severe cost and schedule problems instead of fabrication.

NASA's quality assurance representatives

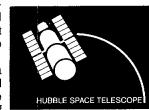
verified the measurement procedure, but were not allowed to personally inspect some measurements because of the danger of mirror contamination, he said. Those representatives were not optics experts and probably wouldn't have caught the problem anyway, he added.

Please see HUBBLE, Page 4



NASA Photo

Even with its spherical aberration, the Hubble Space Telescope continues to return photos better than any made by Earth-bound telescopes. This photo shows the new "Great White Spot" near the equator of Saturn.



JSC **Ficket Window**

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

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

Page 2

JSC

3149

for horses, \$139K. 538-2299.

\$550/mo. x32883.

326-1254 or 333-6150.

ments, \$16K. 480-4088.

488-9020 or 480-6446.

938-3171

or 480-5076

1978.

AMC Theater (valid until May 1991): \$3.50 each.

Dickens on the Strand: (Dec. 1-2, Galveston): child (6-12), \$2; adult, \$4; seniors, \$2

Christmas Dance (7 p.m. Dec. 8, Gilruth Center, music by Kendrix and the Sterling Silver Band): Dec. 8, prime rib, \$15.

FBA Memberships and coupon books are now available-\$1 off civil servant's first book.

Business cards can be ordered by civil servants in Bldg. 11, 250 cards per set. Old logo, \$21; new logo, \$18.

Nutcracker: (8 p.m. Dec. 7-8, 2 p.m. Dec. 8-9, UHCL Bayou Theatre, UHCL Metropolitan Ballet): \$7.

JSC Gilruth Center News

Sign up policy-All classes and athletic activities are first come, first served. Sign up in person at the Gilruth Center and show a badge or EAA membership card. Classes tend to fill up four weeks in advance.

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

Defensive driving-Course is offered from 8 a.m.-5 p.m., Jan. 12 and Jan. 26. Cost is \$15.

Aerobics and exercise—Both classes are on-going.

Property Rent: Heritage Park, room w/phone, fully furn. 3 BR house,

\$200/mo. plus 1/3 util., avail. in Jan. Jay, x35814 or 992-

Sale: Merritt Isl., FL, near KSC, 5-3-2 on 2.5 acres, zoned

Lease: CLC area, condo 2-1, FPL, all appli., miniblinds, W/D conn., storage, swimming pool, \$450/mo. 486-0315. Sale: Lake Travis, 1.5 lots, panoramic hilltop view, \$10K.

Anne, x31138 or 332-4383. Vacation Rental: Lake Livingston, waterfront, 3-2, CA/H, FPL, covered deck, pier, fully furn, wk/wknd. 482-1582.

Sale: 3-2-2 brick, LC-Brittany Bay, FPL, Ig. master bath, \$74,950. David, 554-5514.

Lease: El Lago lakeview, 2-1, util. incl., 5 min. from JSC,

Sale: Orlando, FL retirement home, 2-2, den, Florida rm,

Sale: 2-2-2, guest quarters, 1.5 acres, satellite, near Santa Fe, \$69,900, 282-2667 or [409] 925-8593.

Rent: Baywind I, 1 BR condo, new carpet & paint, ex.

Rent: 3-1.5, 1,500 sq ft, \$550/mo. Steve, x32682 or 922-

Sale: Kerrville, TX, 12'x60' mobile home, furn., good cond., Ig. carport, patio, \$7,500. 333-6150 or 326-1254.

Rent: CLC Carnino South, 3-2-2, FPL, fenced, trees, \$750/ mo. John or Pat, 667-5751.

Sale: 1.52 ac. Alvin Country Club area, some improve-

Lease: Galveston condo, 2-1, FPL, all appliances, 69th

Street, \$550/mo., one year lease. 488-2664. Lease: Pipers Meadow, 3-2-2, FPL, fenced, ceiling fans, year lease, dep. plus \$750/mo., avail. Dec. 1, no pets. Susan,

Rent: Webster/Ellington, 2-1 apt., many extras, \$425/mo. Dave, x38156 or Herb, x38161.

Sale: Bay Glen 2 story, 3-2,5-2, cul-de-sac, shutters, alarm sys., \$122.9K, x39230 or 486-7106. Lease: Egret Bay, 1-1-2, covered parking, FPL, fans, no pets, \$450/mo, plus dep. 333-6729 or 486-9876. Sale: Galveston vacation resort/timeshare, \$12.5K (409) or 21.2 for the story of the stor

Lease: Baywind II condo, 2-2, upstairs, W/D, FPL, updated

carpet, \$475/mo. plus dep. x32168 or 338-2851. Sale: Pipers Meadow, 3-2.5-2, formal LR/DR, FPL, loft, wet bar, fans, new paint, 10% assum, \$92K. Dennis, x34405

Sale: Hot Spring Village, ARK, wooded lot, util., \$13K OBO.

fully furn., \$49,900. 280-2523 or 333-1762.

cond., avail. Dec. 1, \$395/mo. 480-9280.

Country and western-Next dance class begins Jan. 7 for beginners and intermediate. The six-week class meets Mondays, beginner at 7:15 p.m. and intermediate at 8:30 p.m. Cost is \$20 per couple.

Health Related Fitness Program-Includes screening by medical examination and a 12- week education component. For more information call the Physical Fitness Office at x30301

Volleyball sign-ups-registration will be Dec.11. This season will consist of Monday, Tuesday and Friday night games.

- Basketball sign-up-registration will be Dec. 12. This season, there will be Wednesday Mens B, Thursday Mens C and Saturday Mixed leagues.
- Soccer sign-up-Registration will be Dec. 13. This season will consist of Saturday mixed leagues. Non-badged teams may register Dec. 14.

or 474-3384

\$3,400, 485-4932.

x35724 or 482-3134.

or 488-3314.

x38088

480-2570.

488-1320

x30962.

358-9598

Cycles

\$6,300. David, 334-2766.

333-7861 or 538-1621.

mi., \$5,900, x31913 or 486-9488.

\$1.800, OBO. x37467 or 486-4043.

tires/batt., BO. 333-6647 or 286-1032.

4088.

JSC

Software reuse program-JSC's Software Reuse and Reengineering Working Group and the Software Engineering Professional Education Center will present a reuse and design recovery program at 8 a.m. Nov. 30 at the Gilruth Center. Demonstrations begin at 1 p.m. in Bldg. 12 and require registration with Jane Kremer at x32601.

Cafeteria menu-Special: meat sauce and spaghetti. Entrees: baked scrod, liver and onions, fried shrimp. Soup: seafood gumbo. Vegetables: green beans, buttered broccoli, whipped potatoes.

Saturday

SHPE run-The Society of Hispanic Professsional Engineers will host a benefit "S.H.a.P.E.-Up Run" at 8 a.m. Dec. 1 at Nassau Bay City Park. Tshirts will be given to the first 500 entrants in the 5K and first 50 participants in the 1K run; awards will be given to the top finishers. Forms are available at the Gilruth Center. For more information or to volunteer, call Linda Barrows, 333-9422, or Bob Duzan, 487-2383.

Monday

3637

Cafeteria menu-Special: breaded cutlet. Entrees: beef chop suey, Polish sausage with potato salad. Soup: French onion. Vegetables: okra and tomatoes, green peas.

Tuesday

Simulation program—JSC and the Software Engineering Professional Education Center will present a seminar on real-time simulation at 8:30 a.m. Dec. 4 in the University of Houston-Clear Lake's Bayou Bldg. Rm. 1-311. Registration is \$35 per person. For more information, call SEPEC at 282-2223.

Dates & Data

Cafeteria menu-Special: fried chicken. Entrees: Salisbury steak, shrimp Creole. Soup: split pea. Vegetables: mixed vegetables, beets, whipped potatoes.

Wednesday

IEEE video conference—The IEEE Galveston Bay Section will present a fiber optics applications video conference at 10:30 a.m. Dec. 5 in the Gilruth Center. Registration deadline is Nov. 30. For more information, call Andy Lindberg, x31474.

Computer security workshop-ISC and the Software Engineering Professional Education Center are sponsoring a computer security, integrity and assurance workshop at 8:30 a.m. Dec. 5 in UHCL's Bayou Bldg., Rm. 2-504. Cost is \$95 per person. Civil servants should call Human Resources' Jane Kremer at x32601. For more information, call SEPEC at 282-2223.

Cafeteria menu-Special: stuffed bell pepper. Entrees: fried catfish with hush puppies, braised beef rib, barbecue plate, wieners and beans, shrimp salad. Soup: seafood gumbo.

Vegetables: corn O'Brian, rice, Italian green beans.

Thursday

Cafeteria menu-Special: barbecue smoked link. Entrees: beef stroganoff, turkey and dressing. Soup: chicken noodle. Vegetables: Lima beans, buttered squash, Spanish rice.

Dec. 7

Cafeteria menu-Special: meat sauce and spaghetti. Entrees: baked scrod, liver and onions, fried shrimp. Soup: seafood gumbo. Vegetables: green beans, buttered broccoli, whipped potatoes.

Dec. 12

Women's Holiday Party-A JSC Women's Holiday Party will be held at 5 p.m. Dec. 12 in the Gilruth Center. The party will include dinner and entertainment. Deadline for tickets is Dec. 5. For more information contact your directorate secretary.

Dec. 13

AIAA meets—The American Institute of Aeronautics and Astronautics will meet at 5:30 p.m. Dec. 13 at the Gilruth Center. John Young, special assistant to JSC Director Aaron Cohen for engineering, operations and safety, will speak. Tickets are \$9 for members, \$12 for nonmembers and \$8 for students/young members. Reservation deadline is noon Dec. 10. For more information call 333-6064, 283-6000, 283-4214 or 282-3160.

<u>Swap Shop</u>

AST 6-pak loaded mem., clock, ports, Taxan color hi-res monitor, \$1,275 or trade for car or Mac SE. x30092 or 481-

Intel 386 inboard PC, installs in your 8088 IBM, IBM XT, Compaq, or Tandy 1200 HD, \$895; Norton SI 16 plus spd., 2 yr. warr., \$375, x30092 or 481-3637.

IBM computer sys., 512K, 20 MB HD, monochrome monitor, ex. cond. 480-7257. Zenith 150 computer sys., 640K RGB monitor, EGA capable, ex. cond. 480-7257.

TI-994A computer w/assorted SW cart. and access., \$150. Ed, x36969 or 332-0442.

Dram chip (1 MB) 256(R, 70ns, 36 qty., \$100 all; Heathkit, enith H69 computer, \$350. James, 487-3223 or 623-3782. IBM PC, 2 floppy disks, 2 serial, 1 parallel, monochrome screen, dot matrix printer, DOS manual, modern. 957-3549. Free set of Byte computer magazines from June '76 to

'85 Buick Electra Park Ave., auto., 70K mi., ex. cond., Dec. 84. x30707 or 488-1262. '81 Monte Carlo, V8, auto., 78K mi., ex. cond., \$2,800. x39216 or 482-5197. Radio Shack TRS 80 color computer, SW, \$30. x37467

Ur 405-4043. Leading Edge XT compat., 4.77/7.16 MHz, 640K mem., 2 360K floppy drives, WD MFM HD controller, built-in CGA, MS-DOS, GW-Basic, \$250, nego. 480-0735. Commodore 64, disk drive, color monitor, 2 joysticks, \$1K workbird (2000).

worth of SW, ex. cond., \$350, OBO. 480-0735 **Musical Instruments**

Spinet piano, Fruitwood-Estey, bench, \$400. Janice, x33013 or 534-2418. Cornet, good cond., \$80. Terry, 282-6796 or 474-5639.

Yamaha organ, console, 2 kybds, 1 octave pedals, rhythms, percussions, \$450. 480-2444.

Pets & Livestock

'83 Mercury Cougar, 2-dr., loaded, \$4K, OBO. 333-7853 Collie, std. sz., 3 yrs., male, golden sable. Wendell, x36182 466-3203. '86 Ford Aerostar van, V6, fuel ini, w/QD, ex, cond., \$4,800,

Baby cockatiels, handled, Linda, 484-7834.

Free kittens, blk, 484-7583. 3 AKC mini Dachshund males, shots, born, 9-13-90, avail., 11-16-90, \$150. Michael, x34158 or 480-2152.

90 Eagle Talon TSi Turbo, loaded, ex. cond., 8,500 mi., \$13,800, OBO. 282-3242 or 286-3631. Personal '84 Silverado Blazer, auto., 4WD, 6.2 liter diesel, loaded, Will the person who bought the '67 Vette from the Nov : cond., \$3,800. 338-2851. '85 Chevy S-10 Blazer, V6, auto., good tires, clean, 63K 2 Roundup please call me. Tim, x38843 or 332-6153.

Photographic

JC Penney 70-210mm zoom, manual focus, Minolta mount, ex. cond., \$20. Dillman, x31733. '87 Grand Am, auto., 4-dr., low mi., \$5,975. x36252 or 73 GMC Sierra 3/4 ton truck, 454 eng., AC, camper,

Household Off-white sofa, matching ottoman, \$100. Fran, x33573 or 0-9376.

commode, coffee, 2 tier lamp, \$50/ea.; Early Amer. dresser, \$50; antique Victrola cab., \$75; platform rocker, \$15;chair w/ottoman, \$20; pictures, mirrors, books, lamps, antique dishes, etc. McCreary, 488-7636. Sofa, off-white, good cond., \$35. Linda, x32745 or 480-

3187

Wanted

Want roommate to share lg. 2 BR apt. in Webster, avail. Dec. 1, \$272.50/mo. plus 1/2 util. Cindy, x33251 or 486-4579

Want riders for van pool from NW Houston (Little York/ 290 Park-n-Ride) to (610/I10 Park-n-Ride). Wendell, x36182 466-3203. Want '75-'80 Ford Pinto, no pwr., auto., must be towable.

Trev. 280-4275 or 484-7834. Want riders for a van pool starting from SW side and

Braeswood-610. Chau, x31451. Want occasional resp. babysitter for 4 1/2 yr. old girl in Webster, ref. 332-0442.

Want carpooters from Aliel/Memorial area. Barry Halpern. 333-9502

Want old garden hose. James, 333-7174.

Want old copy of Halliday & Resnik's Physics, Parts I & II. 480-0443

Want used educational SW, SW for Apple Ite for grades 2 and above, Math, Spelling, Eng., Science, History. 326-2540.

Want scuba gear for man, suit, BC, regulator, etc. 280-8796.

Want old wrist, pocket watches, 480-7338.

Wall of what poker matches too root. Want male non smoking roommate to share 4 BR home, \$275/mo. plus 1/3 util. Dow, 282-3957 or 486-5220. Want a ride from anyone going north to Tulsa or KC area on Fri., Dec. 21, will share gas. Phil, 283-1157 or 286-4522

Want van pool riders from Sugarland. Westwood Mali Fondren, Loop 610 Park-n-Ride to JSC. Alice, x35234. Want toy trains, Starwars toys. Ron, 482-1385.

Want by 1-15-91, lg. 1 or 2 BR townhouse, house, duplex w/yard or patio, perhaps w/future purchase option, pet owner. 480-6539.

Want grandparents, volunteers and substitute teachers, janitorial and groundkeeping companies or individuals interested in working at the JSC Child Care Center. Georgia Strain, x37667.

Miscellaneous

7' flocked artificial Christmas tree, life-like, good cond., you haul, \$30. Dillman, x31733. O'Sullivan computer desk/hutch, lg., like new, model 0782, \$100. x31275.

truck, \$50; Apelco 400 paper graph/chart recorder fish finder, \$100; Craftsman jigsaw/sander, \$40; blue full length formal, \$50; black tea length, \$40. Brad or Julie, 339-1445. Lady's ski boots, sz. 8 1/2, \$75; new Serta sunlamp on 5' stand, \$50, 486-0174. Lady's foxtail jacket, never worn, was \$700, now \$400.

x34046. Metal tool box for reg, truck, \$50; plastic tool box for sm.

486-0174.

Woman's sz. 10 raccoon parka w/hood, \$375; mahogany hink cape, sz. 10, \$375. 333-3885. 100 25¢ postage stamps for \$23.75; 400 25¢ postage

stamps for \$94.50. Jeff, 333-7010 or 482-5393. New aluminum miniblinds, 70W x 53H, 2 sets still in box

w/hardware, \$30 ea; bookshelves, glass front barrister style, \$25 ea. 286-5431. Moving boxes, all sizes, \$1/box. 286-5431.

Two skate boards, Ig. and sm., \$15 ea. Aaron Brown, 944-0493

Over the cab camper, sleeps 5, stove, sink, frig, bath room, shower, A/C, \$300 OBO. x39230 or 486-7106.

Gun rack w/.22 rifle w/scope, 20 guage shotgun, .25 cal leretta, .22 cal revolver, some ammo., all for \$255; two VHS VCR's, \$125 ea. 332-0047.

Sears Lifestyler rower/xc/skier, \$125. (409) 938-3171. Video carncorder batteries for Cannon 8mm, 4 CM1060 NiCd 6V 1000 mAh batteries, were \$75, now \$50 ea; wireless

telephone, 300 ft range, \$30. Patitick, x32635 or 488-1079. Lg. rattan etegere, 4 glass shelves, was \$450, now \$200; rattan sola table, 18" deep, 60"long, 70" high, was \$267, now \$125; antique seed bin, \$50, all in ex. cond. 488-2984.

Fiberglass camper w/carpeted sleeper insert, fits short bed PU, \$275. 332-1885.

110 lb wt set and bench, all \$46, 333-7009 or 486-6762. Antique marble-top washstand, \$300; sm. enal foot bath tub, \$175; wrought iron twin bed frame, \$35. Debbie, 334-1505.

5x8x6 enclosed heavy-duty trir, \$800; Head 198 cm skis, Tyrolea bindings, Nordica bools, \$300; Oxford compact dictionary, \$50; EV midrange and tweeter horns, CTS 15" woofers, \$100; two home speakers, \$100. Phil, 282-3600. Rollaway bed, steel construction, \$50; seldom used

wnmower, doesn't run, \$20, 482-5621. Metal, wood venier TV table w/wheels, \$15: Craftsman tool box, \$10. Kari, x38649.

Playboy magazines, Aug. 1980 to present, will sell as a set, \$150. 482-7627. Moving boxes, all sizes, \$1 ea. or 12 for \$10; oak bentwood

Xerox 3701 copier, needs \$450 repair, \$300 OBO. Don

Rent: Galveston condo, furn., sleeps 6, Sea Wall Blvd. & 61st St, dly/wkiy/wknd rates. Magdi Yassa, x33479 or 486-078

Sale: Univ. Green townhouse, 3-2-2, fans, FPL, whirlpool

tub, loft, alarm sys., \$92K. Dennis, x34405 or 48

Rent: Pagosa Springs, CO, 2-2 house sleeps 8, Jacuzzi, loaded, ski Wolf Creek and Purgatory, 5 Jan-20 Apr 91, 1 wk, \$580. Scott, x34614 or 334-2278.

Sale: Univ. Green, 2-1-2, patio home, fenced, new paint, vaulted ceiling, miniblinds, custom drapes, fans, FPL, deck, \$76K. 480-7338.

Sale: Seabrook townhouse, 3-2.5-2C, 1400 sq ft, fenced patio, \$22K, OBO, 333-7345 or 474-2339.

Sale: 60 acres on Hwy 80, 3 mi from Karnes City, TX, 50 mi. from San Antonio; El Campo, TX, 2-story house on 1.5 lots w/fruit trees. 783-9164.

Rent: 1 BR apt, all util, balcony, alarm, covered parking, \$395/mo. Steve, x36623 or 332-8639.

Sale: Seabrook bayfront lot, \$125K; two water view lots near NASA, \$38.5K/ea. Don, x38039 or 333-1751.

Sale: Oak Brook 4-2.5-2, new carpet, backs up to golf course, \$98K, 480-4502.

Lease: CLC condo, 2-1, FPL, blinds, all appli,, fenced patio, pools, \$450/mo. 486-0315.

Lease: Galveston Bay waterfront, 2-2, block paneling, wood floors, decked, fenced, hot tub, \$1,200/mo. 333-6277 or 339-3562

Sale: Baylor condo, 1 BR, furn., ex. cond., tax deductible, nego, 334-3896.

Lease: LC Countryside, 3-2-2, FPL, fan, fenced, no pets, \$725/mo. plus dep. 486-9811.

Cars & Trucks

57 Pontiac Catalina V8, needs ball joints, \$350. 488-6621.

77 Grand Prix, new trans./tires/radiator, \$1,495, OBO. David, 554-5514 or 282-3827

68 Chevelle, 6-cylinder, 100K mi., runs well, \$1K, OBO. Ed. 283-5716 or 333-1563.

'87 Trans Am, 31K mi., loaded, ex. cond., \$10K. 486-4909.

'87 Chev. Cavalier, 4-dr., auto., 37K mi., ex. cond., \$4,500, OBO. Dave, x39579 or 482-6187.

67 Dodge Charger 440, new int., reb. eng., good cond., \$3K. 474-7234.

2 childrens Schwinn Varsity 10-spd. bikes, good cond., \$60/ea or \$100/both x38947

'82 GMC Starcraft custom van, loaded, ex. cond., 84K mi, \$6,400. Howard, x31254 or 474-3384.

'84 Cad El Dorado, ex. cond., \$5,900. Howard, x31254

85 Merc-Benz, 300-D turbo, all options, \$15,995. 480-

76 Mercedes 300D, sunroof, all pwr., \$2,850; Big Foot 4WD Chevy truck, \$2K, OBO. Jerry, x39287. '86 Hyundai Excel, 4-dr., hitch, 5-spd., 93K mi., ex. cond.,

'89 Firebird, 13K mi., 12 mo. tuneup warr., \$9,700. Carrie, x38506 or 333-4089.

'87 BMW 325, 2-dr., 5-spd., ex. cond., serv. rec., \$12K.

Phil, x33283 or 353-0108. '90 Jeep Wrangler, WH/BL, man. trans., 4K mi. Julie,

'83 Chevy Malibu Classic, good cond., 101K mi., new

'88 Ford Mustang LX, 2.3L, 5-spd., 27K mi., \$6,500. x32567

'83 Plymouth Turismo, 2-dr. htchbk., ex. cond., 61K mi., -spd, \$2,900, OBO. Dennis, x34405 or 480-5076.

78 Toyota Corolla, needs some work, \$800, OBO. Elien,

'89 Honda CRX Si., 5-spd, sunroof, ex. cond., \$9,300.

77 Dodge Roval Monaco, reliable, serv. rec., \$800, OBO.

85 Chevy S-10 Blazer, 4WD, 125K mi., Tahoe okg., \$4K.

Gene, x38020 or 334-1505. '88 Ford T-Bird TC, std., clean, 27K mi., \$10,300. Rich,

maha 1100 Maxim, 12K mi., new speed rated tires/ batt., \$1,050, OBO. Darrell. 280-7724.

Old 10-spd., well weathered but works, needs new tires. BO. Kari. x38649.

79 Honda XL500, 8K mi., ex. cond., reliable, \$700, OBO. Wally, x36440 or 326-2664

Suzuki GS450 cafe motorcycle w/spare tire, \$500. Jim, 585-0679.

Boats & Planes

Aircraft propeller-Sensenich 74DM6-0-58, fits some Beech, Piper series, \$900, 538-2299. '83 27' Chapparral w/trir., full head/galley, AC, new VHF/ DF/Loran, sleeps 6, \$23K, OBO. x31833 or 534-6073. '86 18' Bayliner Cobra ski boat, 125hp OB, ex. cond., \$5,500. Jay, 280-4275 or 487-7930. V-hull w/trlr., 165hp Merc/covered. 943-3305. 15' Fabuglass Trihuli, walk thru, 65hp Mercury OB,

Sportsman trlr., BO. x31292 or 488-5610.

Audiovisual & Computers

IBM PC-AT 286, 640K RAM mem., 1.2 meg & 1.44 meg floppy, 30 meg HD, EGA color monitor, 287 math co-proc., Panasonic printer, Logitech Mcuse, \$1,700; Apple IIe computer w/monitor, numeric key pad, joy stick, \$190. Jay, x35814 or 992-3149

Cerwin-Vega HED-15 spkrs., \$300/pr.; Phase Linear pwr. amp., \$350. Frank, x33573 or 480-9376.

Zenith AT compat, 286 CPU, 8 MHz, 1 Mb RAM, math coproc., 20 M HD, 2 FD, EGA card, EGA monochrome monitor, \$1K; PC access., Skyscan 4* scanner and OCR, \$90; Epson LQ dot matrix printer, new ribbon, \$250; 1200 aud ext. modern, \$40; IMSL Magician graphics SW, \$30. x37137 or 482-8966.

Commodore 128D w/built in 1571 disk drive. Commodore 1526 printer, Roland DG color monitor, modem, manuals, SW, \$550. John, x38429 or 482-6536.

Apple IIe, 2 drives, Comrex II printer, SW, \$800. x37435

Macintosh 512 Enhanced, 800K drive, \$550, 280-8796, IBM XT computer, 640K mem., 30 MB HD, 2 floppies,

DR table w/3 leaves, 4 chairs, \$350; king sz. wtrbd. w/ mirror hdbd., 6 drwrs. under, semi motion, htr., \$400; LR tables, oak w/glass inlay, 3 end & sofa, all for \$500. 538-1708

Sofa steeper, \$300; DR set, \$200; microwave, \$50; 19" color TV, \$75; coffee table, end table, \$100; lamp, \$30, OBO. x33057 or 538-3431.

King sz full wave wirbd, all access, dk, wood stain wi se hdbd., \$150, OBO. Greg, 929-7348 or 488-20 3 cushion sofa, tan/blue/burg., good cond., \$75, OBO Marianne x33706 or 554-5818

Refrig., med. sz. w/top freezer, left sided hinged door, pink, good cond., \$75. x34557 or 485-1541. Full sz. bed w/matt., frame, It. walnut hdbd., \$100. R.

Franco, 992-2711

Rec. chair, ex. cond., green, \$50. Ed, x36250 or 481-4889

Maytag washer, \$75; Hot Point dryer, \$150, OBO. 333-6193 or 280-0341.

DR set. \$75; 3 arm chairs, \$30/ea;; glass/brass coffee table, end tables, \$75; bar w/4 bar stools, \$50; shelves, \$30.481-2006.

Red velvet chair, green trim, solid, \$75, OBO. Boykin, x37341 or 326-1267

Glass DR table, oak trim, chrome base, 4 chairs, \$100, OBO; oak hdbd, convertible to full or queen sz., matching frame, \$120, OBO. Mike, 997-9247.

G.E. dishwasher w/pot scrubber, built-in, fair cond., needs minor adj., \$80. Magdi, x33479 or 486-0788. Leather sofa w/matching chair, ottoman, \$400, OBO, 480-

Montgomery Ward built in dishwasher, autumn vellow, 10 yrs. old. runs. \$25, OBO, 996-8410.

Boys bunk bed w/ladder, \$100. Ron, x38576 or 470-2130. Montgomery Ward elec. dryer, ext. Ig. cap., \$50, can deliver. Jim Poindexter, x38624 or 475-9671.

Blue Early Amer. sofa, \$50; It. brn. rec. armchair, \$50; lg. br. desk chair w/rollers, rec. & swivels, \$20. x36623 or 332-8639.

King sz. wtrbd. w/bookcase mirr. hdbd., ex. cond., \$300, OBO. Carol, 480-0223 or 334-1376.

Early Amer. table, 6 chairs, \$150; trad, table, 6 padded chairs \$175; smoker/grill, \$110; Mr. Smoker, \$10; LR tables,

Infant car carrier, \$10, 488-6621.

Lg. telescope, 10" f/8 Newtonian, includes eyepieces, 60 mm finder scope, needs mount, \$500 OBO. Ed, 283-5716 or 333-1563.

Newtonian telescope, 10", f/6, 1 25" & 2" focuser. Parks. fiberglass tube, German equatorial mount w/clock drive, 8x50 finder scope, \$750. x31138 or 333-2688.

Moving boxes, including wardrobe, \$1 ea., 15 for \$10. 538-1642

Antiques and collectibles, clocks, lamps, glassware, furniture, nautical, tools, washstand set and more. 538-2028 or 332-4383

Scientific Atlanta cable converter, all channel remote control of non-remote TV, \$50, 333-3071.

Carpet pad, 5 lb., 5/8 in., 30 sq. yards, ex. cond., \$1/ yard OBO. 486-8266.

Crib w/matt \$60 OBO: numerous baby access clothes and shoes, walker, swing, bath tub etc. 337-3122 Blue polyester sportcoat, sz. 42L, \$20 OBO. Greg, 488-

2082 or 929-7348

14" wirespoke wheel covers for Buick, includes lug nuts, wrench, \$250. Joe, 944-3841.

Educational tapes, "Where There's a Will There's an A," including books, brand new, \$20, x34557 or 485-1541. Craftsman electric stapler w/10K staples, \$15, Craftsman

chain saw w/hard case, \$25, needs parts. Samouce, x35053 or 482-0702

Baby items, twin boys' clothes, car seats, swings, etc. Lisa, 474-7234.

Porcelain dolls, Cinderella, Gibson Girl, Modern Bride, Barbara, 488-6521

Basketball backboard incl. post, free. Kurt, x34459 or 992-5031.

Record-A-Call phone answering machine, remote, full sz. cassettes, w/phone receiver \$60 OBO. Katie, x33185.

Sears side-by-side refrig., \$175 OBO; 7'x7' tent, \$20. Keith, x35191 or 480-8449.

Bedliner for longbed Ford PU, headache rack, both \$150. 486-1757

Hitachi professional drywall screwdriver, rated 4.2A, new, \$50. Howard, x37346.

King sz. waterbed, \$75; truck tool box, \$45. Marcus,

1948 Bowman Stan

Genie garage door controllers, model AT90-1, two avail., \$10 ea. x30852

'75 Honda 550cc, \$450; old 6hp Merc, outboard, SCUBA BC, \$45/\$75; spear air, \$125; spear gun, \$70 and \$110. x30686 or 480-3260.

rocker, \$35. 286-5106.

x38039 or 333-1751.

or 333-1485.

Bassett crib, ex. cond. 480-7257.

Tunturi "200" rowing machine, ex. cond, \$50. Gary, x31361 554-4109.

Estate sale: silver, china, crystal, antiques, paintinos, end tables, silver stor. cab., hand-carved LR chairs, buffet side table, etc. x36358.

Assorted maternity clothes, baby items, baby and infant to sz. 3 girl's clothing. 332-0442. Hide-a-bed, good cond., \$75; Harlequin Rom., \$10/box;

video cass. cab., \$80. Sandi, x33854.

Dodge PU custom camper insert, \$150. McCreary, 488-

One-way airline ticket, Ft. Myers, FL to Houston Intercontinental, Dec 28, 1990, \$90 OBO. Bob, 480-1225 or 474-4747.

3/4 carat diamond ring, wide band, solitaire surrounded by diamonds, x32181 or 280-8774.

Medium sz. dog house, \$20; fiberglass outdoor basketball goal and rim, \$15. Musgrove, x38356 or 488-3966.

Desk 48x18 \$95 Ted x36894 or 280-9595

1/3 ct marquis solitaire, was \$850, now \$450. Karen, x32220.

Medical equip.: Jobst extremity pump, ex. cond., \$100. Earl, x34807 or 532-2242

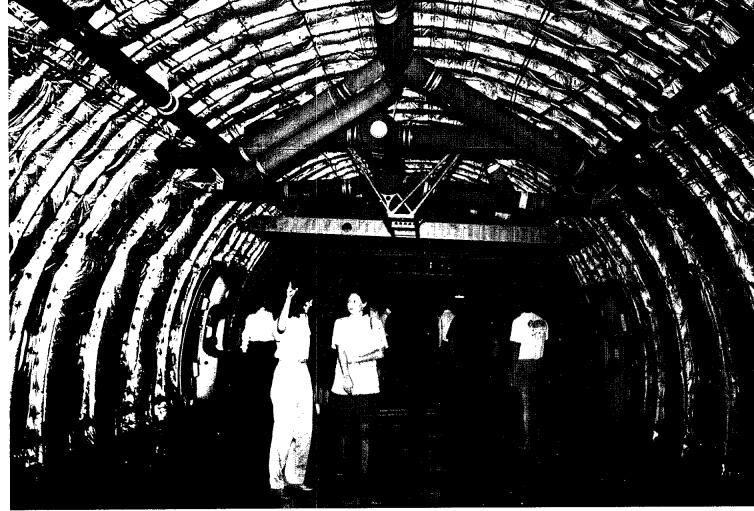
utility/motorcycle trlr, \$175 OBO. Greg, 282-3385 or 286-1309.

1 man's and 1 lady's leather jacket, new; 1 man's Seiko atch, new w/warr. 488-2946

Quality rowing machine, \$75; solid-wood door, no glass \$40; Johnson 6HP outboard, like new, \$395; toilet, \$20, 332-0365

Antique oak sideboard, \$150. Allen, x32937 or 286-8539. Harvest Maid food dehvdrator w/9 shelves, \$50: Smith-Corona manual typewriter, \$25. x30707 or 488-1262. Baby porta-crib, \$35; play pen, \$35; Italian blankets, \$35 ea.; room monitor, \$10, 286-0022 Double baby stroller, \$75. 280-0102.





New SCA lands in NASA fleet

A new Shuttle Carrier Aircraft winged its way into the NASA fleet last week as the modified Boeing 747 flew from Wichita, Kan., to Ellington Field en route to its home in El Paso.

Christened NASA 911, the new SCA was delivered to NASA Nov. 20 at Boeing Military Airplanes facilities in Wichita. It was then transported, via Houston, to El Paso International Airport where it will be permanently based.

During welcoming ceremonies at Ellington, SCA Pilot Joe Algranti presented plaques to previous SCA project managers Dave Finney and Bill Readdy in recognition of their support of the second SCA project. He also presented an Orbiter Ferry Operations group achievement award to L.E. "Skip" Guidry, chief 747 flight engineer.

NASA 911 joins its sister ship, NASA 905 which has ferried all the space shuttle orbiters from California to Florida since the inception of the shuttle program. However, an additional carrier aircraft improves system reliability and eliminates a single point failure from the program, said Don Puddy, director of JSC Flight Crew Operations.

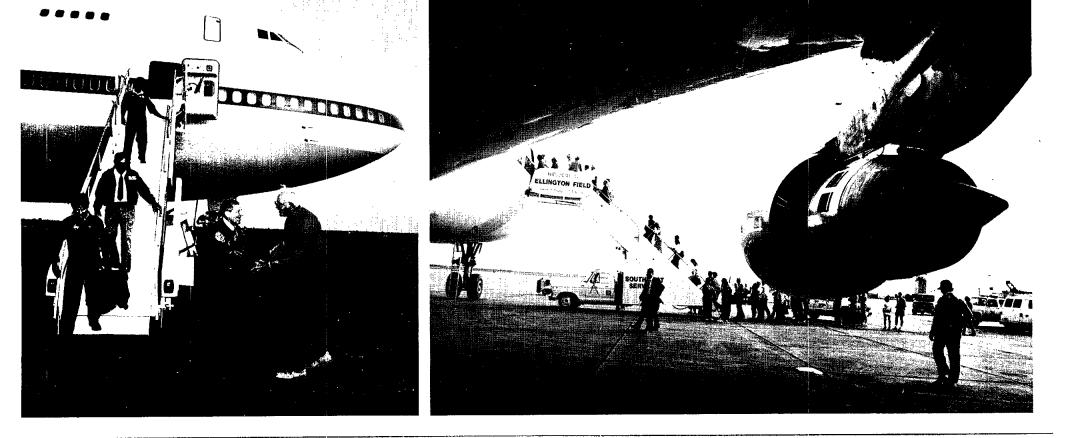
Before joining the NASA fleet, the 747 served as a domestic passenger aircraft for Japan Air Lines. Boeing acquired the aircraft for NASA in 1988, and modifications were begun.

The SCA is a heavy, wide-bodied, sweptwing turbo jet powered by four Pratt and Whitney engines. The SCA is distinguished by three struts protruding from the top of the fuselage for mating of the space shuttle orbiters. Structural bulkheads were installed and the fuselage skin reinforced for support of the attachment struts. Two vertical stabilizers also were added to enhance directional stability, and all interior furnishings and equipment aft of the forward doors have been removed.

Wingspan of the aircraft is 195 feet 8 inches, with an overall aircraft length of 231 feet 10 inches. The aircraft has a maximum landing weight of 600,000 pounds and travels at a maximum air speed of 0.6 Mach.

When mated with an orbiter, NASA 911 cruises from 13,000 to 15,000 feet, but can increase its altitude to a cruising level of 24,000 to 26,000 feet when unmated. It has a range of 1,000 nautical miles when mated and 5,500 when not mated.

Above: The newest addition to the NASA aircraft fleet, NASA 911, lands at Ellington Field on its first visit to Houston. Center: Visitors inspect the inner supports added to the fuselage of the Boeing 747 during its conversion to a Shuttle Carrier Aircraft. Lower left: Ben Benham, Southwest Services manager, greets SCA Pilot Joe Algranti and other flight crew members on their arrival to Ellington. Flight crew members are, from bottom to top, Arthur C. "Ace" Beall, L.E. "Skip" Guidry and Larry R. LaRose. Lower right: Visitors enter the aircraft during an open house during the SCA's stop in Houston.



JSC gives 106% to Combined Federal Campaign

employees donated hours' pay per month. \$372,426.24 to this year's Combined Federal Campaign, boosting the grand total to 106 percent of the \$350,000 goal.

All but five organizations gave more than 100 percent of their 1990 goals.

Employees contributed \$57,426 more than they had in 1989, including 396 employees who gave one hour's pay per month and 57 who gave two

Employees earn Space Act Awards

Twenty-three JSC civil servants and contractors recently received Space Act Awards for their patents and inventions.

Space Act Awards are presented periodically to individuals for patents and inventions, Tech Briefs and other scientific and technical contributions.

The most recent awards went to Frederic S. Dawn and Joseph J. Kosmo, "Tapered Tubular Polyester Fabric;" Jimmy D. Bradley, "Power Saw;" Richard L. Sauer, "Biofilm Monitoring Coupon System;" Hatice S. Cullingford, "Method and Apparatus for Bio-Regenerative Life Support System;" William D. Harwell and Mitchell B. Wu, "Magnetic Attachment Mechanism;" Clifford W. Hess and Larry C.H. Li, "Method and Apparatus for Positioning a Robotic End Effector;" Timothy E. Fisher and Richard D. Juday, "Programmable Remapper for Image Processing;" and Michelle A. Rucker and Joel M. Stoltzfus, "High-Pressure Promoted Combustion Chamber."

Recognized for the "Payload Trainer" were Ronald A. Weitenhagen and Neil W. King, of the Training Division; James J. Kirby, Tracy Minish, and Tommy Flanagin, all of Rockwell Space Operations Company; Michael Jones, Toni Grubbs, and Mike Fuller, all of UNYSIS; and Buddy Wood of Mitre Corp.

Also, Gerald R. Taylor was recognized for the patent application of "Portable/Bedside Retinal Digital Image Analysis System.'

Mission Control viewing hours set

The Mission Control Center viewing room will be open to JSC and contractor badged employees and their families during₃STS-35.

Based on a Dec. 2 launch, employees will be allowed to visit the MCC from 11 a.m.-2 p.m. and 5-7 p.m. Dec. 3, 5, 7 and 10. Visits will be allowed from 11 a.m.-2 p.m. Dec. 4 and Dec. 6, and from 1-5 p.m. Dec. 8 and 9.

Employees must wear their badges and escort family members through the regular public entrance on the northeast side of Bldg. 30. Children under the age of 5 will not be permitted.

Special cafeteria hours have been set for the mission as well. The Bldg. 3 cafeteria will be open from 7 a.m.-4:30 p.m. launch day and weekdays, and from 11 a.m.-4:30 p.m. weekends. Bldg. 11 will be open from 6:30-2 p.m. weekdays and 7-10 a.m. weekends

The offices that topped their goals by the most were the Office of the Director, with \$4,271 or 267 percent of its goal; the Space Shuttle Program Office, with \$3,590 or 205 percent of its goal; the Space Station Freedom Program and Operations Office with \$2,205 or 157 percent of its goal; and the Human Resources Office, with \$8,121 or 156 percent of its goal. The Engineering Directorate con-

tributed the largest dollar amount, with \$87,787 or 106.8 percent of its goal. The Mission Operations Directorate gave the next largest amount, \$65,968 or 111.4 percent of its goal.

A total of 2,847 out of 3,584 civil service employees participated. The Office of the Director, Equal Opportunity Programs Office, Legal Office, the Office of the Inspector General and New Initiatives Office all reported 100 percent or more participation.

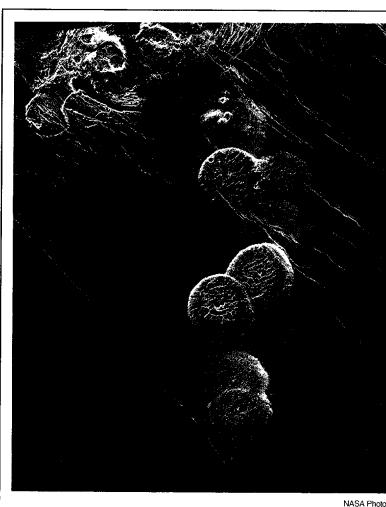
JSC employees at the White Coast Combined Federal Campaign Sands Test Facility contributed \$3,333 to the Sun Country CFC and had 64 percent participation.

Cinda Chullen of Engineering's Management Support Office and John Saiz of the Structures and Mechanics Division won free airline tickets to anywhere in the United States

JSC Deputy Director P.J. Weitz, who served as this year's Texas Gulf

chairman, drew their names from those of 453 eligible contributors who gave one or two hours' pay per month.

Although the CFC officially closed Nov. 13, contributions will continue to be accepted, said CFC Coordinator Teresa Sullivan. Anyone who still wishes to donate should contact the JSC Exchange Operations Office at x39168.



LAVA DOMES-Magellan continues to return spectacular images of Venus' surface. This radar image shows seven pancake-like circular domical hills averaging 15 miles in diameter with maximum heights of 2,475 feet. Scientists believe they are thick eruptions of lava coming from a vent on relatively level ground, and may be analogous to volcanic domes on Earth. So far, 416.2 orbits of radar image data have been received on Earth.

Thrift Savings Plan allows fund juggling

season during which JSC civil servants have the opportunity to join, terminate or change the amount of their contributions to the Thrift Savings Plan.

The TSP 1990-91 Winter Open Season extends through Jan. 31, 1991.

TSP is a defined contribution retirement savings and investment plan for federal employees. The plan consists of three investment options: the G fund, short-term non-marketable U.S. Treasury securities; the C fund, common stock investments; and the F fund, high quality fixed-income securities.

A major change this year allows Federal Employees' Retirement System members to allocate any portion of future contributions to any of the three TSP investment funds-agency or personal contributions.

Each FERS employee must submit a new TSP-1 election during this open by the date the form is received.

November marks the opening of the season to have future agency and personal contributions invested in the common stock index or the fixed income funds. Previous elections of fund distributions will cancel and all future contributions will go to the G fund.

Also, Civil Service Retirement System employees now may allocate any portion of their future contributions to any of the three TSP investment funds.

Another change allows all TSP participants to transfer money that is already in their account from fund to fund up to four times in any calendar year. All TSP participants will receive information on Interfund Transfers with their copy of the November 1990 participant statements.

TSP election forms are available through the Employee Services Section, Code AH76, Bldg. 45, Room 140. The effective date will be determined

Heart walk named for former employee

The American Heart Association is sponsoring a 10-kilometer walk named for a former JSC employee next month.

The AI Jowid Memorial HeartWalk is scheduled to begin at 8:30 a.m. Dec. 8 at the University of Houston-Clear Lake's Developmental Arts Bldg. Organizers hope to raise \$20,000 through sponsorships.

Jowid, who was to have been the local Heart Association president for 1990-91, died recently. He joined NASA in 1964 at Kennedy Space

Center. In 1965, he became spacecraft manager for the Apollo 11 and 14 lunar modules in Bethpage, N.Y. He joined JSC in 1972 and became the project engineer for the space shuttle 1-G trainer, and project manager for Challenger.

His daughter, Christine Jowid, works in the Gilruth Center recreation office and is NASA coordinator for the walk. Anyone who would like to participate is invited to visit the Gilruth Center for sign-up forms or call her at x30304.

Atlantis crew extends thanks families, co-workers

(Continued from Page 1) from California will save six to eight days in Atlantis' processing flow.

"Everybody that's watched this flight from the media side probably thinks the flight began and ended in Florida," Covey said at the Ellington Field welcome home ceremony. "But we all know on the crew that this flight really began and ended here in Houston with our friends and families and co-

have been so important in making this all happen for us.'

Because the flight was classified, the crew gave no details of its mission but Covey expressed hope for the future. He and other crew members said putting together the NASA and national defense aspects of their careers was especially gratifying.

"One of these days maybe we'll be able to tell you about Dick and Frank workers that have supported us and and Carl and Bob and Sam's excellent

adventure," he said.

'Spaceflight is very complex and very difficult," said Culbertson, who had just made his first space flight. "The people who spend a lot of time in each of their areas of expertise to prepare us made us better at it and gave us the confidence to get our job done."

"I'm grateful to the technicians, engineers and scientists in the agency that have allowed me to come home safely after an incredible journey to difference in all of this," Springer said.

share a new lifetime together with a newborn son," said Gemar, whose wife, Char, gave birth to a baby boy, Grant, this week.

Meade offered "special thanks to our world's greatest training crew, I know what a hard job you guys had," and Springer extended those feelings to everyone who worked on the mission.

"It's the people of this program who really make it work and who make the

Hubble's trouble not fixed because of poor communication

(Continued from Page 1)

allowed a situation that inhibited done. NASA should have been aware communications to exist," Allen said. of what was happening at Perkin-'NASA had every right to expect that

fundamentally NASA's responsibility "Perkin-Elmer should not have as a government agency to get this Elmer.

not now exist in the Advanced X-Ray Astronomical Facility, which also will use precision mirrors. He found that NASA communication improvements instituted since the Challenger

repairs will be about \$50 million, he estimated. Fisk said he is certain Hubble's

aberration in 1993. The cost of

atter launch day.

Address correction

An article in the Oct. 26 Space News Roundup listed an incorrect mailing address for the National Advisory Committee for Aeronautics reunion committee. NACA alumni were encouraged to send their current mailing addresses to that post office box. The correct address is Guy Thibodeau, P.O. Box 580629, Houston, TX, 77258.

Sometimes it's OK to act like Scrooge

Scrooge has a bad reputation, but there are times during the holidays when anxiety, depression or stress are appropriate, according to the Employee Assistance Program.

Dr. Gerald Busch will talk about ways to handle the emotional side of the holidays in a brown-bag luncheon at 11:30 a.m. Thursday in the Bldg. 30 Auditorium.

The "Feeling Like a Scrooge" program also will review the distinction between appropriate emotional experiences and more serious conditions.

Perkin-Elmer would have done a better job with this. They had competency and experience in optics and NASA should have expected more professional performance than they actually got.'

Allen said NASA and Perkin-Elmer review boards did not penetrate deeply enough into the fabrication process. Allen said Lennard Fisk, NASA associate administrator for space science and applications, had asked On the other hand, he said, "It is him to make sure similar problems do

dent investigation have mitigated the problems in the AXAF program.

NASA plans to send shuttle astronauts to replace the Wide Field/ Planetary Camera with a second generation camera that will correct for the effects of the spherical

Expo will showcase hypermedia

Hypermedia Expo '90 will showcase the talents and contributions of the field's leaders, and its application to aerospace, science and technology Dec. 3-5.

The expo, from 8 a.m.-5 p.m. each day at the South Shore Harbour Resort and Conference Center, is sponsored by JSC, the University of Houston-Clear Lake and the Hypermedia Working Group.

Hypermedia combines information from different sources into one source: the computer. The idea is to increase the availability of audio and visual information via a friendly, speedy user interface and a wide range of tools, including interactive video and voice recognition.

Among the JSC groups investigating the application of hypermedia to space flight is the Life Sciences Project Division. The division's Hypermedia Development Lab is working on an on-line help system called Life Sciences Interactive Information Recall.

On Space Station Freedom, the information might be packed into a portable computer that could be velcroed to any surface. The LSIIR system also could help office and support personnel in the LSPD during mission integration testing and day-to-day work

Conference cost ranges from \$60 for students to \$175 for industry. Call 282-2223 for more information.



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EditorKelly Humphries Associate Editors Pam Alloway Kari Fluegel

ich also include sola panels that shake the telescope whenever it passes between sunlight and darkness, can be fixed by visiting astronauts.

"Even with this spherical aberration, Hubble is unsurpassed in its capability as an optical telescope," Fisk said.

Classes offered at JSC

JSC is working with the University of Houston and Rice University to bring graduate engineering classes on site.

In January, JSC and Rice will inauqurate a new joint venture that makes classes available to employees via on-site television. Offered through the Rice institute for Continuing Education in Engineering program, the classes will be broadcast from a campus television studio to a designated conference room at JSC. Deadline for registration is Dec. 7.

UH is offering graduate courses at the Clear Lake campus and interactive television classes on site this spring. Registration will be Wednesday in the Bldg. 45 lobby.

Applications are in Bldg. 45, Rm. 146, or Contact Beth Hall at x33078.