

Space News Roundup

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February 7, 1992

No. 6

Columbia passes 32-million-mile checkup

By James Hartsfield

The first space shuttle orbiter, *Columbia*, fresh from a 32-million-mile checkup and upgrade, is scheduled to stop overnight at Ellington Field today, weather permitting.

JSC employees and the public will be allowed in the Ellington gates at NASA Hangar 990 to view the spacecraft from the time it arrives piggyback atop the Shuttle Carrier Aircraft Boeing 747, planned for early afternoon, until 10 p.m.

The chances of favorable weather for takeoff from California dimmed

Thursday when storms began over the Southern California coast, according to JSC weather forecasters. For the latest information on the stopover, call the Employee Information Service at x36765.

Columbia is scheduled to depart Palmdale, Calif., early today to begin its trip back to Florida's Kennedy Space Center where it will be prepared for its 12th space flight, STS-50, scheduled to launch in June. The oldest shuttle has been at Rockwell's Palmdale facilities since August 1991, receiving

an intensive structural inspection and several significant system modifications.

Columbia's airframe received a thorough inspection using visual and X-ray techniques. The inspections revealed no surprises in the way the spacecraft is aging and found no unanticipated damage.

The upgrades to *Columbia* include outfitting the spacecraft to spend up to 16 days in orbit by providing the capability to carry extra hydrogen and oxygen tanks in the cargo bay for use in generating electricity and

water; installing improved equipment for handling waste onboard and for scrubbing the air of exhaled carbon dioxide; and providing extra oxygen and nitrogen for breathing air. *Columbia's* June flight, with the United States Microgravity Lab aboard, is planned to be 13 days long, the longest to date.

Other advancements to *Columbia* include installation of new flight control computers, thermal tile upgrades to reduce preparations required between flights, improvements to the nosewheel steering and brake con-

trols, installation of a drag chute to slow and stabilize the spacecraft on landing, and installation of improved auxiliary power units used to power the hydraulics onboard. More than 50 modifications have been made to update the original orbiter.

Both *Atlantis* and *Discovery* will be taken out of service for several months later this year for similar upgrades and inspections, but *Columbia* is the only shuttle currently planned to receive the capability for longer flights and the only orbiter

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Student experiments leave legacy

By Kelly Humphries

A circle closed last week as 10 years of flying student experiments on the space shuttle ended with the successful reflight of an experiment that had first flown at the beginning of that decade.

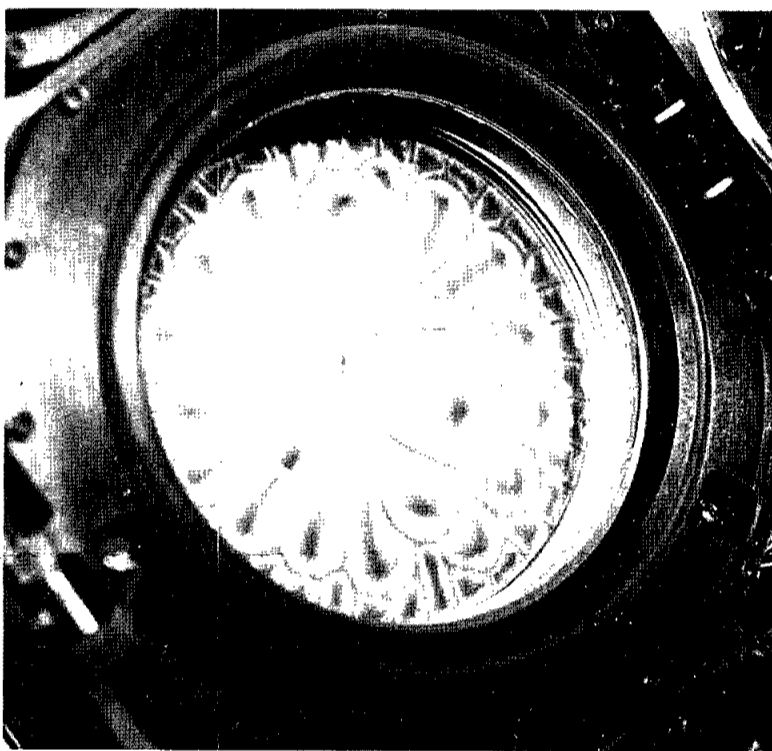
Scott Thomas watched from Mission Control as STS-42 Pilot Steve Oswald activated his Convection in Zero Gravity experiment and the aluminum powder inside six see-through pans began to form a kaleidoscope of radial spoke patterns in heated Krytox oil. The spoke patterns, predicted in advance by Thomas, showed that convection works differently in space, where surface tension is the only force affecting the heat-induced movement.

It was an experiment conceived while Thomas, now a physics doctoral candidate at the University of Texas, was a student at Richland High School in Johnstown, Pa. It had flown once before — on STS-5 in 1982 — but failed to work because of safety shield interference.

"Some of the results looked very exciting," said Thomas, who has not yet seen or analyzed the videotapes of the experiment. "I've learned a lot from the whole experience. Mostly not in scientific terms."

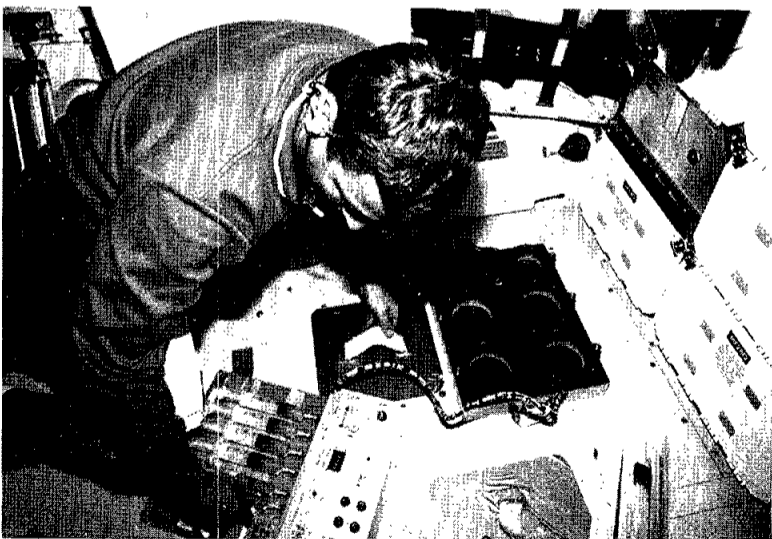
And in spite of some misconceptions about the Space Shuttle Student Involvement Program, those non-scientific benefits are just what it was designed to produce.

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NASA Photos

Above: Radial spokes can be seen clearly in this photograph of Scott Thomas' Convection in Zero Gravity experiment aboard *Discovery*. Below: STS-42 Pilot Steve Oswald activates the student experiment on the shuttle's middeck.



Chances increase for ozone loss over populated areas

Recent observations by NASA's Upper Atmosphere Research Satellite have shown exceptionally high levels of chlorine monoxide at high northern latitudes, raising the possibility of enhanced ozone depletion over populated areas.

Dr. Joe Waters of NASA's Jet Propulsion Laboratory, the principal investigator on UARS' Microwave Limb Sounder, said the instrument detected high levels of chlorine monoxide (ClO) over large, populated areas of Europe and Asia north of about 50 degrees latitude. ClO is a key constituent in the chemical processes that lead to ozone depletion.

On Jan. 11, for example, high ClO levels were observed over Scandinavia and Northern Eurasia, including the cities of London, Moscow and Amsterdam.

These levels, about 1 part per billion by volume, are comparable to levels observed within the Antarctic ozone hole. Stratospheric ClO molecules, which result primarily from industrial chemicals such as chlorofluorocarbons (CFCs) released in the lower atmosphere, are the dominant form of chlorine that destroys ozone in a process that starts when sunlight breaks up the CFCs.

Sustained levels of ClO could lead to significant ozone destruction over the northern hemisphere and perhaps, even lead to an ozone hole over the Arctic, Waters said. Whether an ozone hole actually develops will depend on how long the elevated ClO levels persist.

MLS data also show very low ozone levels in the tropical strato-

sphere over an area roughly coinciding with the Mount Pinatubo volcanic plume. Observation of reduced ozone in the tropics, linked to volcanic plumes, raises the possibility that volcanic eruptions may trigger ozone depletion processes similar to those that occur within the Antarctic ozone hole.

In the tropics, preliminary results show ozone levels at an altitude of 13 miles were about 50 percent less than typical pre-eruption levels observed by other means since UARS was launched Sept. 12, 1991, three months after Mount Pinatubo erupted. MLS total ozone levels in the tropics appear about 10 percent lower than usual. In addition, the MLS observed transient areas of low ozone across the western United States, findings that were verified by independent ground-based measurements in Boulder, Colo.

Computer models have predicted that aerosols from Mount Pinatubo would deplete the ozone layer at a greater rate than previous volcanic eruptions because of the additional chlorine. These models assumed that chemical reactions would occur on the surfaces of the stratospheric sulfur compounds within the volcanic cloud that are similar to reactions on the surfaces of stratospheric ice crystals in Antarctica. The possibility also exists, Waters said, that the low tropical ozone is due to atmospheric dynamics rather than chemistry.

UARS, launched from the Space Shuttle *Discovery* in September, is providing the first opportunity to study these processes from a global perspective.

JSC pumps in \$1.26 billion

Report details center's local economic impact

By Kari Fluegel

JSC pumped \$1.26 billion into the Houston economy during the 1991 fiscal year, averaging a daily contribution to the area of about \$5 million.

The Fiscal '91 Economic Impact Report, released by JSC's Comptroller's Office last week, reveals that though the percentage of NASA's budget given to the center was down slightly to 19.8 percent from 20.7 percent in fiscal '90, the money spent in Houston was up about 7 percent from \$1.182 billion.

About \$1.25 billion of JSC's contribution to the economy in fiscal '91 was directly from contracts, utilities, construction of facilities and other goods and services. About 77 per-

cent of the total is from obligations with prime and support contractors. The remaining \$13 million is from JSC-related sources.

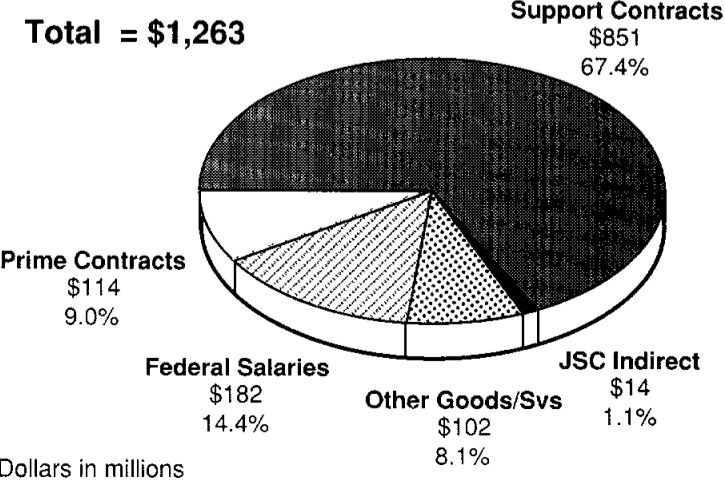
The impact report is produced annually to provide baseline data about the space center's effects on the area's pocketbook. It investigates only the first level of dollar exchange and does not attempt to model secondary impacts, said Bob Beyer of the Comptroller's Office.

During fiscal '91, JSC received \$2.7 billion of NASA's \$13.9 billion budget, about 19.8 percent. Almost \$1.2 billion was shuttle program related; \$853 million, station related; \$307 million, other space related research

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JSC Dollars to Local Economy

FY 1991



New space station facilities dedicated

Two new JSC facilities that will play key roles in the Space Station *Freedom* program will be dedicated next week, and JSC employees are invited to take a tour.

The grand opening ceremony for the Space Station Control Center and Space Station Training Facility will be Thursday morning on the second floor of Bldg. 30 South in the new Space Station Operations Control Room.

Local and national government officials, NASA and contractor management and other dignitaries will be welcomed by JSC Director Aaron Cohen and Mission Operations Director Eugene Kranz. The ceremonies will be broadcast

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JSC

Ticket Window

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

EAA Houston Livestock Show & Rodeo (Feb. 16-March 1, Astrodome): \$9.

EAA Sesame Street Live (11 a.m. Feb. 8, Summit): \$7.50.

EAA Corpus Christi Dog Race Bus Trip, (Feb. 22-23, includes accommodations, breakfast, admission to Texas State Aquarium, Greyhound Track, Aransas Wildlife Refuge and Fulton Mansion): \$70 per person.

Movie discounts: General Cinema, \$4; AMC Theater, \$3.75; Loews Theater, \$4.

Metro bus tickets and passes: 7 percent off.

The following discount tickets will be available soon:

EAA Walt Disney's Ducktales, March 24-29.

EAA JSC Picnic, May 2.

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. For more information, call x30304.

EAA badges — Dependents and spouses may apply for photo identification badges from 6:30-9 p.m. Monday through Friday. Dependents must be between 16 and 23 years old.

Weight Safety — Required course for employees wishing to use the Gilruth weight room. The next class will be from 8-9:30 p.m. Feb. 20.

Defensive driving — Course is offered from 8 a.m.-5 p.m. March 21 and April 10. Cost is \$19.

Aerobic dance — High/low-impact classes meet from 5:15-6:15 p.m. Tuesdays and Thursdays. Cost is \$32.

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

Aikido — Martial arts class meets Tuesdays and Fridays. Cost is \$35 per month.

Fitness program — Health Related Fitness Program includes medical examination screening, 12-week individually prescribed exercise program. Call Larry Wier, x30301.

Golf — The JSC Golf Association is accepting members for the 1992 season. League fee is \$5. Maximum handicap is 36. First tournament is Feb. 22. Call Gary Morgan, x33740.

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Dates & Data

Today

Black history — The 1992 JSC Black History Committee will present "Education 2000" at 11:30 a.m. Feb. 7 in the Gilruth Center. Thomas Foster, director of the Houston Christian Institute, and Thaddeus Lott Sr., principal of Wesley Elementary School, will speak.

Cafeteria menu — Special: Salisbury steak. Entrees: baked scrod, broiled chicken with peach half. Soup: seafood gumbo. Vegetables: cauliflower au gratin, mixed vegetables, buttered cabbage, whipped potatoes.

Monday

ISSA meets — the Texas Gulf Coast Information Systems Security Association will meet at 11:15 a.m. Feb. 10 at the Holiday Inn on NASA Road 1. Terri Craig of Coopers & Lybrand will speak on "Information Security and Quality." Cost is \$10 for members, \$12.50 for guests. For more information, call Emily Lonsford, 333-0922.

Cafeteria menu — Special: beef and macaroni. Entrees: ham steak, Parmesan steak. Soup: chicken and rice. Vegetables: green beans, carrots, au gratin potatoes.

Tuesday

STS-42 briefing — The STS-42 crew will brief employees on their recent mission at 3 p.m. Feb. 11 in Teague Auditorium. All employees are invited to attend as their work loads permit.

Cafeteria menu — Special: Mexican dinner. Entrees: potato baked chicken, barbecue spare ribs. Soup: tomato. Vegetables: squash, ranch beans, Spanish rice, broccoli.

Wednesday

PSI meets — The Clear Lake/NASA Area Chapter of Professional Secretaries International will meet at 5:30 p.m. Feb. 12 at the Holiday Inn on NASA Road 1. STS-44 Commander Fred Gregory, Pilot Tom Henricks, Mission Specialists Story Musgrave, Mario Runco and Jim Voss, and Payload Specialist Tom Hennen will present a PSI banner flown aboard the shuttle. For more information, call Cynthia Thomasen at x30599, or Pat Woolcock at 754-2570.

Cafeteria menu — Special: baked meatloaf with Creole sauce. Entrees: baked scrod, liver and onions, ham steak. Soup: seafood gumbo. Vegetables: beets, Brussels sprouts, green beans, whipped potatoes.

Thursday

SSQ meets — The Society for Software Quality Houston Chapter will meet at 5:30 p.m. Feb. 13 at the Nassau Bay American Host Hotel ballroom. David Card, director of software process and measurement for CSC System Sciences Division, will speak on "The Role of Measurement in Software Engineering." Reservations are due by Feb. 7; call Karl Wiesner, x33807.

Cafeteria menu — Special: smothered steak with dressing. Entrees: chicken and dumplings, corned beef with cabbage. Soup: beef and barley. Vegetables: spinach, cabbage, cauliflower au gratin, parsley potatoes.

Feb. 14

Abstracts due — The University of Houston-Clear Lake, the Institute

of Electrical and Electronics Engineers and the Instrument Society of American are seeking papers for their JAIPCC (Joint Applications in Instrumentation, Process and Computer Control) '92 Symposium. The theme of the March 19 symposium is "Technologies for New Exploration." Abstracts of 250 words or less are due by Feb. 14 to James Villarreal, Software Technology Branch, PT4, Houston. For more information, call James Villarreal, x38076 or Yashvant Jani, 480-8906.

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

Feb. 17

Presidents Day — Most JSC offices will be closed Feb. 17 in observance of the Presidents Day holiday.

Feb. 18

Picnic committee meets — The 1992 JSC Picnic Committee will meet at 4:30 p.m. Feb. 18 at the Gilruth Center. For more information, call Ginger Gibson, x30596.

Feb. 21

HSS meets — The Houston Space Society will meet at 7:30 p.m. Feb. 21 in Rice University's Space Sciences Bldg., Rm. 106. Dr. David Talent, principal scientist for Lockheed Engineering Services, will discuss "Garbage in Orbit." For more information, call Clifford Carley, 923-7221.

Swap Shop

Property

Lease: Tranquility Lake condo, 1 BR, approx 700 sq ft, microwave, W/D, fans, FPL, boat ramp. 332-3798.

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

Rent: CLC townhouse, 2 story, 2-2.5-2, mirrored accents, gray carpet, FPL, patio, \$750/mo. 289-6777.

Lease: Fuqua/1 45, 3-2-2, \$595/mo. Minh, 333-6806 or 484-2456.

Lease: Webster/Ellington condo, 2-1, W/D conn, \$475/mo. Dave, x38156 or Eric, x38420.

Lease: Barringer Way, 2-1, W/D conn, pool, storage area, no pets, \$425/mo. 486-2048.

Sale: Friendswood, 2 lots, 0.95 acre, all util, \$32K/\$39K or \$55K/both. Ron, 996-9724.

Lease: CLC, Meadowgreen, 4-2.5, 2350 sq ft, formals, master BR downstairs, gameroom and 3 BRs upstairs, fans, custom drapes, \$1250/mo plus dep, avail March 1st. Sue, 335-2996 or 486-5621.

Sale/Lease: El Dorado Trace condo, 1-1.5-1CP, appli, patio, balcony, FPL, fans, designer wallpaper/carpet. Jeanne Wright, 991-0237 or 761-3622, pager.

Sale: Baywind II condo, 2-2-2, \$39.5K; Uni-Trace, 1-1-2, fans, appli, W/D, FPL, \$29.5. Gilbert, 333-4306.

Sale: Near LaMarque schools, 3-2-2, C/AH, assum/no equity buy out. x38976 or (409) 938-4365.

Rent: LC, Pecan Forest, 3-2-2, FPL, fenced, no pets, \$795/mo. 554-6200.

Lease: New Heritage Park, 4-2-2, refrig, W/D, FPL, microwave, avail Feb 1st. Gary, 283-3866 or 326-4713.

Rent: Galveston beach house, C/AH, furn, dly/wkly/mo. Ed Shumlak, x37686.

Sale: Seabrook lot, 75' x 250', \$110K. Steve, 282-3097 or 471-2859.

Sale: LC/Kemah lot, near South Shore Harbor, 3.67 acres, unrestricted, trees, pond, \$55K OBO. Dave, 488-3747 or 488-2763.

Sale: House, 3-2-2D plus gameroom, pool, 2K sq ft, A/C, wallpaper, ceramic tile, carpet, new int paint, lg lot, trees, \$105K OBO. 337-2671.

Cars & Trucks

'80 Pontiac, auto, 4 dr liftback, V6, A/C, AM/FM/stereo, good cond, \$1350. 481-3637.

'91 Ford Escort GT, sunroof, A/C, 5 spd, AM/FM/cass, 11K mi, \$10K. Ted, x38719 or 486-1717.

'80 Toyota SR5, eng good cond, body fair, 120K mi, \$1795. Matt, 282-5230.

'86 Buick Park Ave, 4 dr, wht, blue int, ex cond, 83K mi, \$5.5K. 332-4942.

'85 Chevy Cavalier, 4 dr, 4 cyl 2.0L, auto, 75K mi, new tires/brakes, ex cond, \$2.4K. 488-5522.

'90 Toyota Tercel DX, auto, tint windows, 17K mi, ex cond, \$5K. 479-8699.

'91 Honda Civic, 16 valve eng, 2 dr, 5 spd, tint windows, A/C, AM/FM/stereo, 5K mi, \$9850. 333-7867 or 332-9240.

'85 Ford Tempo GLX, A/C, AM/FM/cass, good cond, 65K mi, \$2K. x31543.

'84 Nissan 300 ZX, 2+2, auto, A/C, stereo cass, \$4350. 481-3637.

'53 Chevy PU, \$1.9 OBO. 534-6750.

'84 Porsche 944, auto, leather, 59K mi, ex cond, \$8.5K. 488-5015.

'88 Toyota Celica GT, loaded, ext warr, 60K mi, ex cond, \$7.5K OBO. 282-2743 or 466-1038.

'87 Suzuki Savage 650, new tires/batt, custom painted, \$1.6K OBO. Chris, 337-5338.

'90 Jeep Wrangler Laredo, red w/gray hardtop, 4WD, auto, A/C, loaded, 70K/7 yr warr, 22K mi, \$13K. 333-9078.

'91 Chevy GEO Storm wagon, A/C, AM/FM/cass, \$8.3K OBO. 286-1754.

'87 Honda CRX hatchback, 5 spd, A/C, AM/FM/cass, 37K mi, \$6K, ex cond. 335-8539 or 992-5958.

'85 Nissan 300 ZX, T-tops, 5 spd, AM/FM/cass, cruise, 88K mi, \$5.9K OBO. 280-0410.

'88 Nissan Stanza, auto, 4 dr, light blue, 52K mi, \$5.2K. x32064 or 474-5636.

'90 Ford Probe GL, auto, new tires, A/C, 51K mi, \$9K, ex cond. (409) 267-3750.

'79 VW pop top camper, rebuilt eng/brakes, \$3K. David, 929-7120 or 332-9044.

'78 Toyota Celica coupe, sunroof, new radiator, alternator, gas tank, starter, brakes, carb, exhaust pipe, muffler, 2 liter eng, auto, records, \$975 OBO. Bill, 335-1407.

'78 Buick Riviera, blk/gray, 403 V8, ex cond, \$1695. x35180 or 326-3706.

'75 Mercury Monarch Ghia, 4 dr, 302, int ex cond, \$795. Currie, x38176 or 331-2288.

Boats & Planes

'18' Prindle, double trapeze, new sails, ex cond, \$1.8K; 22' 4" Gulf Coast sailboat, main jib, spinnaker, new uphols, ex cond, \$2.5K. Greg, x32259 or 474-7634.

'86 Bass Buggy pontoon, 20', trlr, 35hp Mercury, less than 70 hrs, elec start, Hummingbird LCR-2000 depth recorder, 2-6 gal tanks, new batt, \$5K OBO. 282-4231 or 992-3351.

'76 Catalina sailboat, 27', 3 sails, I/B diesel, birmini, wheel, updated int, 2 batt, depth/knot meter, \$13.5K OBO. Ken, x30921 or 554-6504.

'77 J-24 racing sailboat, restored, new hardware, rigging, rudder, trlr coated w/zinc and paint, keel faired to min, 4hp Evinrude, \$10,250. David, 929-7120 or 332-9044.

'18' Catamaran w/galv trlr, \$500. Mike, 532-1812.

'16' Prindle Catamaran, life vests, double trapeze, extra equip, trlr has 9" wide beach tires, good cond, \$1K. x30620 or 488-6267.

'195" Century bowrider w/140hp I/O Mercruiser, seats 7, ex cond, \$5.2K OBO. Nancy, x38710.

Cycles

Honda FT500 eng, needs starter and ring gear on flywheel. \$50 OBO. Terry, 282-3883 or 474-5639.

'84 Honda Interceptor 500, ex cond, \$1.6K; '88 Yamaha YZ 125, ex cond, \$1.2K. Andy, 333-6671 or 332-9105.

'78 Honda GS 400A, auto, needs carb work, low mi, \$250 OBO. Tom, 335-1514.

'80 Yamaha 650 special, good cond, \$800 OBO. 538-1574.

Kawasaki EX 500 sport bike, blk/red, lower faring, Nady alarm sys, 3K mi, \$3K, ex cond, x38841 or 326-5446.

Audiovisual & Computers

Atari 1040ST, 3.5" FD, color and BW moni, mouse and J/S, SW, BO. Tim, x36324.

A1000 computer w/kybd, ext FD, moni, \$450. Steve, x30631.

Atari computer 800 XL, new, \$50 OBO. 486-8266.

Macintosh SE, 4 MB, two 800K int FD, std kybd, \$800. x36106 or 488-8507.

IBM PC/XT, 640K, 10 MB HD, monochrome display, \$300 OBO. 333-7668 or 488-0345.

IBM XT HD, floppy, Hayes smartmodem, color moni. Epson 80 prtr, \$500 OBO. 286-1051.

Nintendo Gameboy, 8 game cartridges, stereo headphones, ex cond. 286-8822.

Macintosh Plus, ext 20 MG HD, modem, documents, carrying case, SW, \$800. 326-2202.

Microsoft Flight Simulator v1.02, orig prog disk and manual, runs on MacPlus and Mac SE, \$15. 488-5522.

Software Spreadsheet, Quattro-Pro Ver 1, \$30. 474-2654.

Panasonic typewriter/word processor, KX-W1500, 56K DD, tutorial, 3/4 length screen, letter quality, spell check, portable, ex cond, \$450. 286-7133.

Tandy 1000, 384KB, two 360K FD, mono moni, \$175; Tandy DWP220 wide carriage daisy wheel prtr, \$100. 335-8539 or 992-5958.

Mac IIFX, 4/80, Apple 13" high res color moni, ext kybd, \$4.9K; Mac Powerbook 170, 4/40, int fax modem, \$3.3K. 488-5970 ext 122 or 480-7643.

Phonetics, Sensaphone home moni sys, senses pwr failures, high or low temps, BO. 481-6942.

Panasonic bus partner FX600, IBM compat w/moni and ext kybd, runs Lotus, WP programs, new leading edge WP pkg, manuals, DOS and Graphic card installed, 2 FD, 30 MB HD, modem, \$700. 488-5564.

Photographic

Yashica 35mm, compact, auto focus, auto advance/rewind, built-in flash, manual, carrying case, \$75. Robert, x34397.

Musical Instruments

Majestic snare drum w/case and stand, \$95 OBO. 474-2654.

Yamaha DX-11 MIDI kybd and hard case, new, \$500 OBO. 333-7668 or 488-0345.

Yamaha PSR-47 36" kybd, 61 keys and 100 voices, ex cond, \$640 OBO. 480-5469.

Rickenbacker TR7 practice amp, \$60; Boss DS-1 distortion pedal, \$40. 488-3554.

Pets/Livestock

AKC Siberian husky puppies, 3 males, 4 females, blk/wht, 6 wks old, \$200/ea. 991-5280.

English setter or English setter mix. Keith, x36466 or 482-2741.

Purebred weimaraner puppies, 1 male and 1 female, no papers, tails docked, dew claws removed, 6 wks old, \$100/ea. 383-2530.

American fuzzy lops and mini lops rabbits, \$25/up. Gailo, 554-6200.

AKC toy pekingese, blk w/wht markings, male/\$150, female/\$175. x33086 or (409) 925-6632.

Half Doberman/half blk mouth Kerr, trained, 1 yr old. Greg, 335-4398.

Household

Sofa and love seat, light silver/blue velour, good cond, \$100 OBO. Chris Knight, x32304 or 332-5629.

General Electric stove/oven, elec, self-cleaning, yellow, good cond, BO. Sunil, 283-4329 or 480-4270.

Simmons baby crib, matching dresser, ex cond, \$400. 996-6882.

General Electric 23 cu ft refrig, blk front, water outside dr, \$350. 532-2158.

King sz waterbed frame w/whtr, \$30. Rick, x32695.

Queen sz sleeping sofa, orange/brown floral, country style, \$320. 486-5621.

Solid oak trestle table w/4 antique solid oak bentwood chairs, \$350/set or sell separately. 280-8746.

Living rm set, sofa, love seat, chair, earth tones, ex cond, \$200. 335-8539 or 992-5958.

Queen sz matt/box springs, 286-8822.

Round 8-1/2 ft bed w/storage underneath, incl matt, BO. 335-1416.

Matching sofa and chair, light blue floral, ex cond, \$260. Ignacio, 282-4818 or 486-1078.

Two Sealy Posturepedic twin beds w/matching comforter sets, was \$1K, now \$475/all or sell separately. 337-5712.

'89 Sears LX1 series 120 watt stereo, semi-auto turntable, digital tuner, amp, graphic equalizer, CD player, dual cass deck, speakers, ex cond, \$400. Kelli, x38474 or 481-1745.

Wanted

Want female to play on mixed C softball team, exp desired, located in Bldg 1. x32077 or x35180.

Want non-smoking female roommate to share 4-2 house in LC, prefer short term, \$350/mo. x31543.

Want female roommate to share 3 BR house near water in Southshore area, \$300/mo plus 1/2 elec and gas. 538-3320.

Want motorcycle racing leathers, one or two piece, new or used. Jonhe, x30587 or 326-4097.

Want non-smoking roommate to share 4 BR house in CLC, \$250/mo plus 1/3 util. 286-5248.

Want HO train access. Jerry, x39287.

Want fresh local honey; electrolytic capacitors for old AC/DC radios; lap model steel guitar. Jim Bates, x31347 or 944-4687.

Want room and/or roommate, must have view of water and W/D conn, prefer female, April 1st move-in. Virginia, x38373 or 333-9296.

Want apartment sz washer or stackable W/D. 289-6777.

Want members for Bay Area Aero Club, minimum cost flying, FAA certified instructors. Earle, x35408.

Want broken down blatt "Power Wheels" brand elec car w/batt, will pay \$25 to \$50 depending on cond. Phil, 283-5648.

Lost & Found

Lost gold diamond bracelet, reward. x33761.

Miscellaneous

Wall hanging mirror, 24" x 33", \$10, 10' x 12' wall-to-wall carpet, beige, \$50. Ed, x36250.</

Pioneering Space Exploration

Editor's note: This is the final episode of a four-part serialization of the new JSC Strategic plan, "Pioneering Space Exploration: The JSC Strategy." This portion of the plan looks at helping JSC's people reach their potential and implementing the plan.

Space is a marvelous motivator. Many of us who work at JSC came from faraway cities and states to be a part of the U.S. space program. Many of us have always dreamed of being a part of the space program. We feel proud when we tell people we work for NASA at the Johnson Space Center. We have a profound sense of purpose and community here that in and of itself gives us reason to do our jobs well.

JSC's proven success is directly related to its people and the dedication and pride they feel in their work. Our people are our most valuable resource. We know that our future success is dependent on continuing to provide our people with exciting work, a proper work environment, and the tools that allow them to be productive, innovative, and to reach their full potential.

Build the Talent, Knowledge, and Capability of Our People

Given the challenges of our future, we must put greater emphasis on developing the abilities of all members of the JSC team through job experience and varied training opportunities. To help our people obtain these skills, JSC will:

- Perform selected projects in house to build the expertise required to handle the large-scale exploration projects.
- Develop project management skills by requiring people to take greater responsibility for clear, concise definition of project requirements, followed by management of cost, schedule, and performance to meet those requirements.
- Define job responsibilities and accountability for results to allow decision making at the lowest practical levels.
- Increase opportunities for rotational assignments both within JSC and to Headquarters, other centers and with other partners in space exploration, broadening job knowledge and enhancing understanding of cross-organizational processes.

Enhance the JSC Work Environment

As JSC actively pursues its exploration-focused future, we must ensure that we continue to provide a work environment that allows people to do their jobs the best they can. To accomplish this, JSC will:

- Promote an environment of open communication that recognizes the contributions of all employees and that stimulates the transfer of our hard-learned corporate knowledge to the next generation of pioneers.
- Attract, develop, and retain a high-caliber work force diverse in culture, race, and gender. Use the rewards and recognition systems to acknowledge superior contributions from the JSC team and to encourage continuous performance and quality improvements that support our mission.
- Reward innovators who succeed in making major changes in their work areas, and consider innovation as one of the factors in selecting people for leadership roles.
- Continue to provide opportunities for professional growth through multiple career paths.

Using Our Facilities Effectively

JSC has several unique facilities available for spacecraft and technology development, space life sciences, crew training, and mission operations. As we define and implement new projects and programs in the future, we will require new and upgraded facilities. New

initiatives development organizations will work with the institutional facilities organizations to ensure that requirements for new or upgraded facilities are identified in a timely manner and that the best means of meeting these requirements are evaluated. To ensure that we are using our current and future facility resources most effectively, JSC will:

- Inventory our existing facilities, their capabilities, and their projected use.
- Define and implement a plan for multi-program, cross-organizational use of these facilities wherever possible.
- Make optimal use of our existing facilities by allowing contractors access, to the extent possible, to avoid spending program dollars on creating their own, often duplicate, facilities.

Use White Sands Test Facility as a National Resource

The White Sands Test Facility represents a major asset to JSC engineering, program development, testing, and verification activities. Indeed, with its specialized propulsion, spacecraft systems, components and materials testing environment, it is a unique national asset. To ensure that we are using this resource to its full potential, JSC will:

- Continue to use WSTF to serve a variety of users and be a model for reimbursable work agreements with other federal agencies.
- Have all development organizations annually identify testing and verification procedures that can best be performed at WSTF.

Fostering Educational Outreach and Public Awareness

The public should be able to know not only what NASA is doing, but why we are doing it. JSC shares in the NASA-wide responsibility to ensure that the American public is fully informed about the activities of the nation's space program and its efforts to meet the challenges of space exploration.

JSC must continue to expand its outreach activities both in education and public information to provide increased recognition of the value of the space program as a resource and incentive to return technical excellence to our nation's educational system. JSC's unique facilities, talented work force, and challenging mission enable us to make an important contribution to the development of a talent pool that will enhance U.S. leadership in aeronautics, space science, and technology development. To increase educational outreach, JSC will:

- Assess the current impact of NASA and JSC educational activities and better fulfill unmet needs.
- Expand the creative application of space-related knowledge and techniques to the classroom and campus environments.
- Expand the use of NASA Select Television educational programming, innovative audio-visual products, publications, and syllabus materials.
- Use our emphasis on exploration to inject excitement into educational programs.
- Reach beyond traditional aerospace and

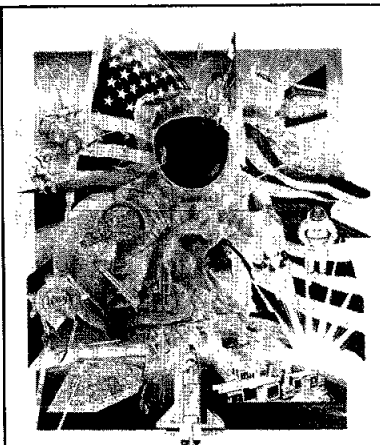


Helping Our People Reach Their Potential

technical fields of study to establish partnerships in support of educational programs.

To foster public awareness of what we're doing and why, JSC will:

- Structure public information programs to inform the public of NASA's emphasis on exploration.
- Make more effective use of NASA Select and other special interest television systems and media resources.
- Increase opportunities to involve the public directly in the adventure and excitement of space exploration through expanded access to the people and events behind our missions and programs.
- Develop in the early stages of program or project definition the supporting rationale to foster public understanding of new exploration activities.
- Incorporate imaging systems in basic vehicle and ground system designs so the public can participate in the exploration of space.
- Continue and expand our efforts to demonstrate the many ways in which the new technologies and scientific requirements of our space program benefit Earth's inhabitants.
- Continue to cooperate with museums and visitor centers, such as Space Center Houston.



1992

*Pioneering Space Exploration
The JSC Strategy*

How This Plan Will Be Implemented

JSC has stepped up to the future. With a new focus on exploration, we will now look at our current activities with a slightly different view: Does our current work relate to our vision? What are the opportunities for use of our shuttle and space station resources to further our exploration goals? How can we do our current jobs better and free resources to take on new work?

Many of the strategies defined in our JSC strategic plan are already being acted on. Many others, however, obviously go beyond our internal JSC organization and will have to be authorized by the appropriate people before we can implement them. We are committed to pursuing these approvals, where needed, to significantly change the way we are currently doing business. We simply have to. Our mission, our future as the lead center for human exploration, depends on it.

A Formal, Ongoing Process

JSC will update our strategic plan annually. During the course of the year, however, several changes are likely to occur that will need timely action. As a result, JSC is establishing a formal strategic planning and action management process to assure that center resources are applied to those activities that best support our mission.

A new JSC Executive Council will serve as the forum and decision-making body for implementing this planning and action management process. The council will be chaired by the center director; its members will include the JSC senior staff. The council will make resource allocation decisions and resolve any issues that arise as we implement this strategic

plan. Additionally, the council will authorize major changes resulting from continuous improvement in how we do business. Details of the process will be issued at a later date as a JSC Management Directive.

Decide What Activities to Take On

We have defined the vision, mission, and activities we will undertake to get JSC on the road to a vigorous future. Over the next several years, a number of opportunities will be identified and many of the tasks associated with these opportunities will be competing for our valuable resources. When we undertake new assignments, particularly with an emphasis on developing our civil service expertise, we have to look to a structured management process for the center that can evaluate center commitments and the deployment of center resources. We must also evaluate the impact of potential new projects across the center and evaluate the long-term effects of allocation decisions on the balance of JSC's program management, engineering, science, and operations responsibilities. We will have to pass or stop work on those projects and activities that do not fit within the frame of our defined future.

To assure deployment of our strategy at all levels, each JSC organization will develop its own implementation plan. Individual organizations will identify specific objectives, roles and activities, schedules, resource requirements, interfaces, and support needs that are consistent with the JSC plan. Each organization will provide its own characteristic and measurable milestones.

The Executive Council will review all organization plans to ensure that the total of these plans will enable JSC to achieve its goals. While putting their plans into action and measuring progress, individual organizations will also be asked to update their plans at least annually to reflect their progress and to add necessary changes.

Achieving Our Mission

As we implement this plan and new philosophy at JSC, many important changes will be made in the way we do business. To achieve our mission, we must be innovators, seeking new and better ways to manage our limited resources and to do our jobs. JSC welcomes innovation. As we work to make resources available to take on new activities, those of you who have demonstrated leadership in significantly improving the way we do business will be the people we look to lead our future projects. This is, indeed, your plan. Please write down your ideas and send them via your management for review by the Executive Council.

JSC has already made significant progress in the past year. We have agreed on a vision and strategy for the future. We have established specific way points and routes on our road map to the future. We have established a formal centerwide decision-making and analysis process that will enable us to better manage our resources and handle our external environment. By publication of this plan, we bring all JSC employees into the process.

For JSC to vigorously pioneer the future of human space exploration, everyone who works as a member of this center's team must be willing to contribute their ideas, their expertise, and their enthusiasm to making the promise of our exploration-focused future a reality.

Student experiments bring space to grassroots

(Continued from Page 1)

"The important thing to me," said John Jackson of JSC's ManSys-tems Division, who managed the SSIP at JSC from its inception, "is that it gave young people the opportunity to receive national attention for their efforts and encouraged other young people that they can do likewise. It encouraged science and technology education. It gave students an opportunity to rub shoulders with scientists and engineers at NASA. There's no other program in the world like this where they actually participated in the space flight."

Through the years, the student experimenters met presidents, were mentioned in State of the Union messages and earned hometown parades. Seven have become medical doctors and four have Ph.D.s. One works at NASA Headquarters and another is in the Navy and wants to become a payload specialist.

"It brought space to grassroots

America," said Johnson Engineering's Neil Christie, project engineer for the SSIP since it began. "It brought space into thousands of classrooms. It brought space into areas of the country that had no connection with space at all — Nenah, Wis., Rose Creek, Minn., places like that — it also brought in corporations that would otherwise have no interest, but this gave them a door into zero-g research — Kentucky Fried Chicken, World Book Encyclopedia."

Thomas' experiment was one of two SSIP experiments to fly on STS-42. The other, which tested Zero-G Capillary Rise of Liquid Through Granular Media, was conceived by Constantine Costes, now a mathematics doctoral candidate at Harvard University.

The two experiments were the last of 22 to fly aboard the shuttle in the joint NASA/National Science Teachers Association program. The time required for students to commit

to the experiment, the money needed sponsor for development of flight hardware and the lack of flight-ready hardware contributed to the decision not to fly the remaining experiments. But thousands of students submitted proposals, and 21 experiments flew on 15 flights (one student flew two and one experiment flew twice). More than a million students continue to use the materials from the program in their classrooms. And although a new, broader program — the Space Science Student Involvement Program — will take its place, the benefits of the original SSIP will continue to manifest themselves in the years to come.

"I think if you talk to any of the students who flew experiments, they got a lot out of it, even the students who didn't get to fly," Thomas said. "Just writing up the proposal was a very positive experience."

Thomas and Constantine both praised the support and help they received from their corporate spon-

sors and advisers — Dr. Lee Davis of Thiokol Corp., Wasatch, Utah, and Jeff Fisher of USBI Inc., Huntsville, Ala., respectively.

"Jeff Fisher was invaluable," Costes said. "I'm sure (my experiment) would still be on the shelf today if it weren't for his persistence."

The program racked up some impressive firsts, and many lines of research tracked by the students have been continued on subsequent missions or will be continued on future missions by more experienced researchers, Christie added.

On STS-3, the first experiment, Todd Nelson's "Insects in Flight Motion Study," was the first successful study of insects — bees and gypsy moths — in microgravity. Daniel Weber of New York studied the "Effects of Weightlessness on Arthritis" and was the first to fly animals in the Animal Enclosure Module, a cage specially designed for his STS-8 experiment but that

continues to fly aboard the shuttle. Michelle Issel of Wallingford, Conn., studied the formation of crystals in weightlessness. Dan Hebert of Nenah, Wis., looked at how paper forms differently in orbit on STS-61C. Aaron Gillette of Winter Haven, Fla., devised a unique triple-bag packaging system to send sponge specimens into orbit and examine healing processes. Amy Kusske of Long Beach, Calif., looked at how microgravity affect the levels of lipoproteins, which can be used to predict the likelihood of artery disease, in the body on STS-4. Sean Amberg of Seward, Neb., tested the effects of zero-gravity on the growth of plant roots on STS-51D. And John Vellinger of Lafayette, Ind., studied the development of chicken embryos in orbit.

"The reason was to excite young people into science and engineering," Christie said. "It did that and more."

Space station avionics changes organization

The Avionics Office of the Space Station Projects Office is reorganizing to focus on the *Freedom* avionics architecture requirements and design.

The restructuring of the office managed by Edward J. Kenyon will support the critical design reviews that will start later this year, said John Aaron, manager of the Space Station Projects Office.

Kenyon will continue to manage the restructured office. One new branch will be established by incor-

porating the duties and responsibilities of the existing two branches, the Avionics Requirements and Analysis Office and the Avionics Verification and Integration Office, and spreading them among three branches.

The Avionics Software Office (KG211) will be managed by Emily R. Strickler. The Avionics Hardware Office (KG311) will be managed by Walter S. Marker. Walter S. Ankey will be acting manager of the Support Systems Office (KG411).

Fitness program boasts big contingent in marathon

Eleven of the JSC employees running in the annual Houston-Tenneco Marathon partly owe their physical readiness to the NASA/JSC Health Related Fitness Program.

Richard Jackson, Gloria Arraiza, John Hoover, Joe Gamble, Joe Ruiz, Frank Dacus, Mary Wylie, Don Allison, Bob Doremus, Ed McKenney and James Gardner, who are all members of the fitness program, ran the 26-mile race through Downtown Houston in January.

JSC's fitness program began in October 1989 to promote healthy lifestyles among NASA employees through education, evaluation and exercise in a structured environment.

All participants are required to attend a 12-week course to achieve an understanding of the

role of exercise in health and fitness, develop the skills required to exercise safely and effectively, and acquire increases in fitness through an individually prescribed exercise program.

Graduates of the course are encouraged to return every three months for fitness reassessments.

Prior to enrollment, all applicants must undergo a medical examination including a maximal treadmill stress test for individuals over 35. The results are used in preparation of a computer-assisted fitness assessment and exercise prescription.

Research on the effectiveness of the program shows that those adhering to the protocols lose fat, decrease levels of LDL-cholesterol and triglycerides and increase HDL-cholesterol, muscle strength and flexibility.

Strategic plan available on computer

The 1992 JSC strategic plan, "Pioneering Space Exploration: The JSC Strategy," is now available through several NASA electronic bulletin boards.

In an effort to provide the widest possible distribution to the JSC, NASA and contractor community

while holding down costs, the text of the plan has been placed on the NASAMAIL, TMIS, PROFS and ALL-IN-ONE bulletin boards. Figures, diagrams and pictures are not included.

To access the full text of the plan, read the bulletin board notices entitled JSC Strategic Plan.

Atlantis nearly ready to roll over

(Continued from Page 1)

planned to undergo the inspections and modifications in California.

Discovery, ready for its ferry flight back to KSC after landing from STS-42 at Edwards Air Force Base, will remain in California an extra week while *Columbia's* ferry operations are completed. *Discovery's* two-day flight is set to begin Tuesday. Several refueling stops are scheduled during the flight due to the weight of the International Microgravity Lab-1, still in *Discovery's* cargo bay.

Meanwhile, at KSC, preparations of *Atlantis* for a late March launch on STS-45 with the Atmospheric Lab-

oratory for Applications and Science-1 enter the home stretch next week when the spacecraft is moved to the Vehicle Assembly Bldg. to be mated with the solid rockets and fuel tank. Currently in Bay 2 of KSC's processing hangar, work on *Atlantis* this week included close-outs of the engine compartment, a test of the rudder, elevons and ailerons and checks of the landing gear.

Endeavour, being prepared for a May launch on STS-49, is undergoing leak checks of the life support systems this week. Also, the aft flight deck was fitted with equipment for the mission and the text and graphics system was installed.



JSC Photo by Kim Murray

LUNAR LINGO—Scientists gather at the Lunar and Planetary Institute to discuss experiments and instruments for the first robotic Space Exploration Initiative missions back to the Moon. More than 60 concepts were presented by 25 panelists during the three-day conference that ended Thursday. Lunar and Mars Exploration Program Scientist Mike Duke said panelists looked at a range of instruments that could bring a good return from both orbiters and landers. Examples of technology that would support low-cost orbiters back to the Moon within three years were a highlight of the conference.

Space station open house is Thursday

(Continued from page 1)

live on the JSC Television Distribution System from 10 to 10:30 a.m.

Then, from 1 to 4 p.m. both buildings will be opened to all badged employees for an open house. Escorts will guide visitors to the areas of the buildings that are open for tours, and briefers will explain the facilities, their layouts and equipment, and their purpose in Space Station *Freedom* operations. Employees should enter both buildings through their south entrances.

The SSCC will be the focal point for the coordination of operations

aboard *Freedom* and among control centers around the world. The 102,000-square-foot facility will house mission controllers and ground support personnel providing 24-hour support for the orbiting station. The Mission Control Center next door will continue to direct shuttle operations during space station assembly and utilization.

Construction of the five-story SSCC began in June 1990 and was completed in December 1991. The first mainframe computer will be delivered in September.

The Space Station Training Facility will provide for training of flight crew and ground support per-

sonnel in single system, stand alone and fully integrated modes.

Construction of the addition to Bldg. 5, which also houses the Shuttle Mission Simulation and Training Facility, began in November 1990 and was completed in July 1991. With 15,000 additional square feet, the former Skylab training facility will provide a total of 30,000 square feet of space station training floor space.

The first part-task trainer was delivered in November, and the first flight crew station will be installed in early 1994. The facility is expected to be ready to support training simulations in March 1995.

Economic impact

(Continued from Page 1)

and development; and \$392 million, institutional.

Fiscal '91 brings JSC's funding total since its inception in 1962 to \$44.75 billion in real-year dollars. In that same time period, JSC has paid an estimated \$3 billion to its employees.

Texas remains third behind California and Florida in the rankings of states receiving NASA funds and second in behind California among states receiving JSC funds. Behind Houston, Dallas falls in second place among Texas communities receiving JSC dollars. San Antonio ranks third.

In the manpower column, the fiscal '91 impact statement reports that JSC had about 3,800 civil servants making an average salary of \$48,212 per year. JSC civil servant salaries for fiscal '91 totaled \$182 million.

Local contractors employed 12,876 individuals during the last fiscal year, resulting in more than \$965 million in salaries.

Both the civil servant and contractor work force totals showed only small gains from fiscal 90 — 49 civil servants and 208 contractors — but continues the trend of steadily increasing numbers for the past 10 years.

Also according to the report, JSC entertained 754,000 visitors in 1991, down from 848,000 in 1990 and the projected 840,000 this year. The decrease is attributed to the three-month restricted access to some facilities during Desert Storm. In 1993, that number is expected to skyrocket with the opening of Space Center Houston this fall. The impact report, however, does not attempt to calculate the impact from tourism.

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