



**Glass cockpit**

JSC takes the first steps toward incorporating advanced technology into its T-38 cockpits. Story on Page 3.



**High-altitude award**

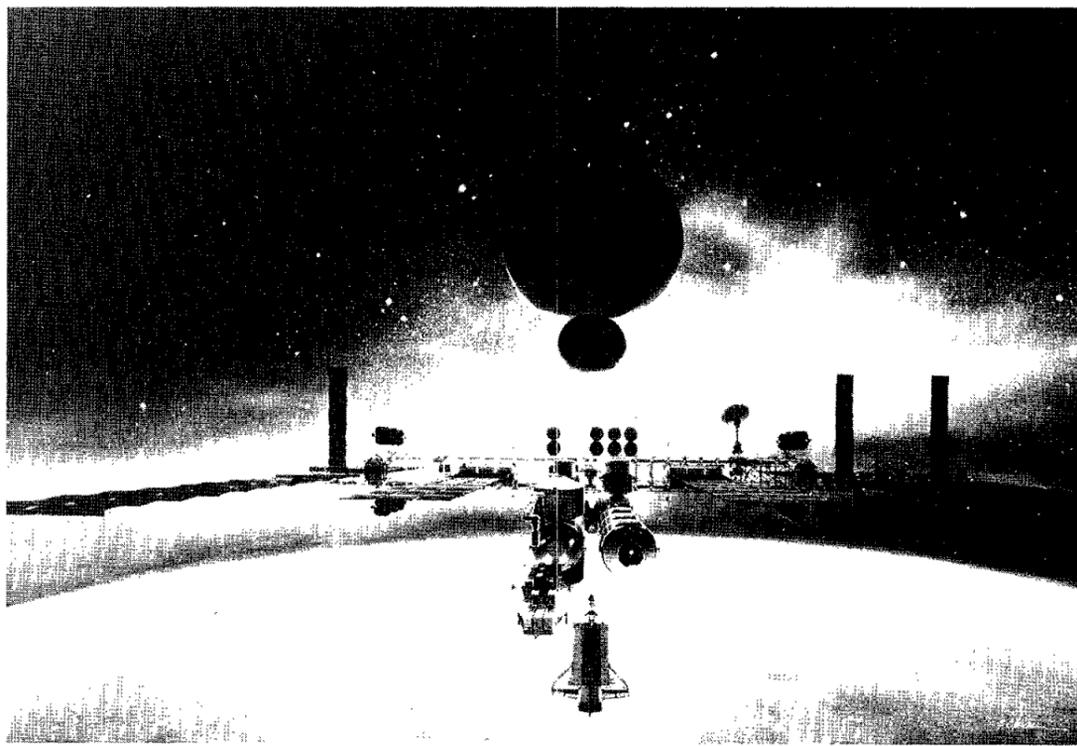
The Federal Aviation Administration thanks JSC for providing specialized high-altitude training. Photos on Page 4.

# Space News Roundup

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No. 40



NASA Illustration by Alan Chinchar

**THE MISSION** — NASA's latest artist's concept of Space Station Freedom, entitled "The Mission," shows the station in its completed permanently manned configuration. With the Earth as a backdrop, the painting by Alan Chinchar also looks toward the Moon and Mars. Following the establishment of Freedom in orbit, the next steps in NASA's Space Exploration Initiative are a permanent lunar base and a human mission to the red planet.

## Aldrich to head Space Systems Development

Arnold Aldrich is the new associate administrator for the recently created Office of Space Systems Development, and Richard Petersen will move to Headquarters to become associate administrator for the Office of Aeronautics and Space Technology.

Aldrich, currently the associate administrator for the Office of Aeronautics, Exploration and Technology, brings a wealth of knowledge in managing the development of large projects. At JSC, he spent many years in various assignments, and was instrumental in providing the program leadership in the safe and successful return to flight of the space shuttle.

Petersen, who has been the director of Langley Research Center since January 1985, will head the new office that is replacing OAET. He also served as deputy Langley director from 1980-85. Petersen has been chief of the Aerodynamics Division at Ames Research Center. He joined the National Advisory Committee for Aeronautics, NASA's predecessor agency, at Ames in 1957.

William B. Lenoir, currently the

associate administrator for the Office of Space Flight, will continue to head that office, with its new focus on space flight operations.

Charles T. Force will remain in his current assignment as the associate administrator for the Office of Space Communications, formerly named the Office of Space Operations.

"NASA is extremely fortunate to have such outstanding senior executives ready to take on these challenging new responsibilities," said Administrator Richard Truly. "With the creation of the Office of Space Systems Development and these key appointments, NASA will be better aligned to execute the development and operation of Space Station Freedom as well as other new capability development projects, and to focus more directly on efficient space operations. These management changes will also ensure a strong future in NASA's aeronautics research and space technology efforts."

NASA field center reporting assignments will remain unchanged, and transition plans will be arranged as soon as possible.

## Processing flow aims for November launch

# Atlantis work back on track

By James Hartsfield

KSC technicians this week are finishing work to replace several small cracked seals along the leading edges of Atlantis' wings, and preparations for STS-44 are back on a normal flow toward a November launch.

A total of eight cracked "Tee-seals," reinforced carbon-carbon expansion joints for the wings' heat-protection panels, were replaced with spare seals following a check of all 42 such seals on Atlantis.

Similarly cracked seals have been found on Columbia and Discovery, and an engineering team from JSC is continuing an analysis of the problem. The analysis so far has shown that the cracks apparently do not occur in flight and are not a safety of flight issue.

The STS-44 crew — Commander Fred Gregory, Pilot Terry Henricks, Mission Specialists Story Musgrave, Mario Runco and Jim Voss, and Payload Specialist Tom Hennen — returned to JSC this week after participating in the routine crew equipment interface test at the launch site. The test was completely successful.

During the 10-day Department of Defense mission, crew members will work with the Defense Support Program and Interim Operational Contamination Monitor payloads. The crew also will participate in continuing Lower Body Negative Pressure research, testing one possible countermeasure for the adverse

effects of zero gravity on the human body.

Other work on Atlantis this week included cleaning of the orbiter's payload bay and closeouts of the engine compartment. Atlantis is to be moved to the Vehicle Assembly Bldg. at the end of next week to be attached to the external tank and solid rockets for STS-44.

On Discovery, located in KSC's new Orbiter Processing Facility 3, workers are continuing a check of all Tee-seals on the spacecraft. As of Wednesday, only one out of 11 seals so far checked was found to have a crack. Also, the STS-48 payload equipment is being removed from Discovery, and a payload bay door functional test was performed.

In OPF Bay 1, Endeavour is continuing preparations for a first launch next year on STS-49, a mission to reboost the stranded Intelsat-VI satellite. Tests of Endeavour's equipment this week included the auxiliary power units and the liquid hydrogen main propulsion system plumbing. Orbital maneuvering system pods also are being installed on the newest space shuttle, as well as wing struts and the mechanical arm.

At Rockwell's Palmdale, Calif., facility, upgrades, modifications and a thorough structural inspection of Columbia are under way. Installation of the equipment necessary to allow Columbia to stay in space for as long as 18 days is under way.



## Network expands with newest TDRS working

NASA's newest Tracking and Data Relay Satellite, TDRS-5, is now operational, expanding the communications capability required by an increasing number of scientific spacecraft.

TDRS-5, launched from the Space Shuttle Atlantis on Aug. 2, was moved from its on-orbit checkout location over the equator at 150 degrees west longitude, to its operational position of 174 degrees west longitude over the Gilbert Islands, south of Hawaii.

"This TDRS launch, deployment and activation, calibration and evaluation has gone more smoothly than any of the previous satellites launched into orbit," said Nicholas G. Chrissotimos, TDRS manager at Goddard Space Flight Center.

There are three other TDRSs in the orbital constellation. TDRS-5 replaced TDRS-3 which is being moved to 62 degrees west longitude, becoming an on-orbit emergency

backup. TDRS-4 and TDRS-1 remain at 41 and 171 degrees west, respectively.

The Tracking and Data Relay Satellite System (TDRSS) is required by Earth-orbiting spacecraft such as the space shuttle, Hubble Space Telescope, Cosmic Background Explorer, the Compton Observatory and the recently launched Upper Atmosphere Research Satellite. TDRS satellites relay command signals and data between the scientific spacecraft and the White Sands Ground Terminal in New Mexico.

The TDRS network has relayed more than two million minutes of data to the ground. Since late 1983, every shuttle mission has required the TDRSS capabilities.

The constellation is currently accomplishing 400 to 500 tracking events per week with better than 99 percent proficiency.

Please see **NEW**, Page 4

## Ozone hole levels lowest ever

Size of Antarctic gap matches previous years

Ozone levels in the Antarctic have reached the lowest values ever observed, according to preliminary data obtained by officials at NASA's Goddard Space Flight Center, Greenbelt, Md.

The preliminary data from the Total Ozone Mapping Spectrometer (TOMS) on NASA's Nimbus-7 satellite indicate that ozone values of less than 120 Dobson units have been measured. Values as low as 110 (plus or minus 6) were observed on Oct. 6, but validation of these numbers is dependent on final calibration.

"The minimum ozone on Oct. 6, 1991, is the lowest we have ever seen with the TOMS instrument in its 13-year record of data," said

Goddard scientist Arlin Krueger. "Although the data are preliminary, we expect that the final results will confirm this conclusion."

This is the fourth severe ozone hole since 1986 and the third consecutive year that severe ozone depletion has developed over the Antarctic. This year's ozone hole occupies an area of about 8 million square miles covering the Antarctic continent. The ozone hole shows no clear sign of expansion compared to previous severe ozone hole years.

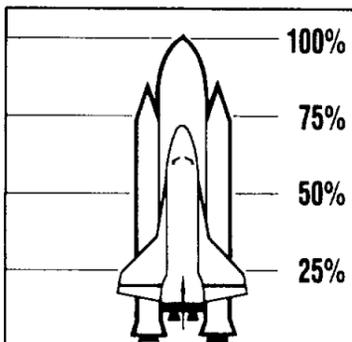
The implications of a single-day minimum are uncertain. The severity of each year's ozone hole also is measured by the persistence of the depletion through the southern spring and its geographical extent

across Antarctica.

Though research has linked man-made chlorine compounds and other chemicals to ozone depletion, the extreme magnitude 1991 minimum cannot necessarily be attributed solely to chemical processes, said Dr. Jack A. Kaye, head of NASA Headquarters' Atmospheric Chemistry Modelling and Analysis Program. Meteorological processes can cause temporary small fluctuations inside a chemically produced ozone hole.

Ozone, a molecule made up of three atoms of oxygen, comprises a thin layer of the upper atmosphere that absorbs harmful ultraviolet radiation from the Sun.

Please see **OZONE**, Page 4



**1991 GOAL: \$385,000**



## Human Resources to offer smoking cessation classes

The Human Resources Development Branch is now collecting names for the next smoking cessation class.

The classes were first offered last year in connection with the implementation of the JSC policy that prohibits smoking in all center buildings.

At the close of last year's classes, 60 percent of the participants reported they had successfully quit smoking.

The eight-week course is open to all JSC and on-site contractor employees. Cost for the classes is covered by the Human Resources Development Branch.

To register, contact Beth Hall at x33078.

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# 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.

General Cinema (valid for one year): \$4.  
 AMC Theater (valid until May 1992): \$3.75.  
 Loews Theater (valid for one year): \$4.  
 Texas Renaissance Festival (9 a.m.-6 p.m. weekends Oct. 5-Nov. 17, Plantersville): child (5-12), \$5.55; adult, \$9.25.  
 Renaissance Festival bus trip (7:30 a.m.-5:30 p.m. Oct. 26 or Nov. 9, includes transportation and admission): child, under 5, \$7; child, 5-12 years, \$10; adult, \$15.  
 NASA Night at Delta Downs (Nov. 16-17). Day trip (3:30 p.m.-2:30 a.m., includes transportation and admission to clubhouse): \$15. Overnight trip (12:30 p.m.-12:30 p.m., includes transportation, reception at Beaumont Hilton, accommodations, admission, brunch): \$50.  
 Halloween Dance (7 p.m. Oct. 26, Gilruth Center, music by 4th Wave Rhythm, costumes encouraged, prizes best costumes): \$15.  
 Entertainment '92 (coupon book): \$26 for FBA members' first book; \$27 for all others.

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# 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.

Defensive driving — Course is offered from 8 a.m.-5 p.m. Dec. 14. Cost is \$15.

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.

Weight safety — Required course for employees wishing to use the Gilruth weight room. The next class will be from 8-9:30 p.m. Oct. 17, Nov. 7 and Nov. 21. Cost is \$5; preregistration required.

Aikido — Martial arts class meets Tuesdays 6:30-7:30 p.m. and Fridays 5:15-6:15 p.m. Cost is \$35 per month.

Country and western dance — Six-week course meets Mondays 7-10 p.m. beginning Nov. 4. Cost is \$20.

Intercenter run — Runners may turn in two-mile and 10-kilometer run times for competition among NASA centers throughout October. Participants must register at the Gilruth.

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

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# Dates & Data

## Today

**Space Flight Banquet** — The North Galveston County Chamber of Commerce will present its fourth annual Space Flight Banquet at 7:15 p.m. Oct. 11 at the South Shore Harbour Resort and Conference Center in League City. Astronaut Charlie Bolden will be the after-dinner speaker. For more information, call Gwen Neugent, 337-3565.

**Astronomy Seminar** — The JSC Astronomy Society will meet at 7:30 p.m. Oct. 11 at the Lunar and Planetary Institute, 3303 NASA Road 1. Paul Peterson will discuss and demonstrate telescope mirror testing. Weather permitting, there will be an observing session following the meeting. For more information, contact Eleta Malewitz, 489-2197.

**Cafeteria menu** — Special: tuna and noodle casserole. Entrees: broiled codfish, fried shrimp, baked ham. Soup: seafood gumbo. Vegetables: corn, turnip greens, stewed tomatoes.

## Monday

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

## Tuesday

**Free enterprise lecture** — A brown-bag luncheon will discuss "False Economic Ideas and Their Origins" at 11:30 a.m. Oct. 15 in the Lockheed Plaza eighth floor Training Rm. Call Charles Campbell at 333-6107 for more information.

**Cafeteria menu** — Special: fried chicken. Entrees: beef stew, shrimp creole, sweet and sour pork

chop with fried rice. Soup: beef and barley. Vegetables: stewed tomatoes, mixed vegetables, broccoli.

## Wednesday

**NPMA meets** — The JSC National Property Management Association will meet at 5 p.m. Oct. 16 at the Ramada Kings Inn on NASA Road 1. Arlene Rodovich, 1989-90 NPMA national president, will speak. For more information, call Sandra Pierce, 282-4151.

**Cafeteria menu** — Special: Swiss steak. Entrees: fried perch, New England dinner. Soup: seafood gumbo. Vegetables: Italian green beans, cabbage, carrots.

## Thursday

**NACA Reunion** — The NASA Alumni League's JSC chapter will meet October 17-19, for the NACA Reunion in Galveston's San Luis Hotel. For more information contact Guy Thibodaux 333-5340.

**Project Management Series** — Software Cost Engineering models and approaches will be discussed at the Oct. 17 session of the Project Management Series 1991-1993 in the University of Houston-Clear Lake Bayou Bldg. Rm. 2-504. NASA employees should contact Jane Kremer, x32601, to register. Others should call the Software Engineering Professional Education Center, 282-2223.

**Cafeteria menu** — Special: stuffed bell pepper. Entrees: turkey and dressing, enchiladas with chili, wieners and baked beans. Soup: cream of chicken. Vegetables: zucchini squash, English peas, rice.

## Oct. 18

**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.

## Oct. 19

**MOD open house** — The Mission Operations Directorate will host an open house from noon-6 p.m. Oct. 19. Tours of MOD facilities will include the Single Systems Trainer, Mission Control Center, Flight Design Computer Facility, Space Station Mockup Training Facility, Space Station Control Center, Space Station training Facility, Shuttle Mission Simulator, Weightless Environment Training Facility, Manipulator Development Facility, Full-Fuselage trainer, Visual Prototype Laboratory, Mission Operations Support Lab and the Software Production Facility. An art contest for children will be held at the Gilruth Center at 4:30 p.m. For more information, call Steven Gonzalez, x37006.

**Star Party** — A public Star Party sponsored by the JSC Astronomical Society will be Oct. 19 at Challenger 7 Park on FM 528. Observing begins at dusk and continues through 10:30 p.m. For more information, call Bill Williams, 339-1367.

## Oct. 22

**Free enterprise lecture** — A brown-bag luncheon will ask "Are We Falling Behind the Japanese?" at 11:30 a.m. Oct. 22 in the Lockheed Plaza eighth floor Training Rm. Call Charles Campbell at 333-6107 for more information.

# Swap Shop

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

## Property

Sale: Friendswood, 0.9 acre lot, all util, no flooding, \$42K. Ron, x37192 or 996-9724.

Sale: Countryside 4-2-2, good slab, no flooding, hardwood shade trees, lighted parks w/fields, courts, pool nearby, \$72K. Dennis, x39012 or 554-4233.

Sale: LC, Countryside, 3-2-5-2A, 2 story, lg fenced lot, no approval, \$15K down plus \$692/mo. 554-7623.

Lease: LC, 2, FPL, screened deck, fans, new carpet, attached garage, fenced yard, avail now, \$650/mo. Mike, x38682 or 332-7205.

Sale/Rent: CL townhome, 1-1.5-1CP, W/D, FPL, alarm, \$35K or \$495/mo. Debbie, 488-4009.

Rent: Galveston condo, furn, sleeps six, pools, cable TV, wkend/wkly/daily rates. Magdi Yassa, 333-4760 or 486-0788.

Sale: Meadowgreen, 5-2.5-2, 2 story, 2 LR, FPL, cul-de-sac, FHA assum. 488-3191.

Rent: Cancun, beach front five-star condo, sleeps 4, avail February 1 - 29, 1992 on one-wk basis, \$650/wk. Katie, x33185.

Sale: '75' x 250' bayfront on Toddville Rd, \$110K. x38039.

Sale: Galveston, Pirate Beach townhome, 2 plus loft, 1.5, furn. Jeff, 280-3909.

Lease: LC/Newport, 3-2-2, brick, attached garage, lg fenced bkdy, patio, FPL, dishwasher, \$750/mo. 488-6306.

Lease: Camino So, 4-2-2, FPL, fenced bkdy, avail Nov 1, \$750/mo. John, 667-5751.

Sale: LC, Bayridge, 3-2-2, assum, no approval, no flooding, \$58.5K. 992-3876.

Lease: Nassau Bay, 4-2.5-2, fresh lake waterfront, pool, FPL, 3K sq ft, \$2K/mo, avail Oct 1. Phil, x37892 or 333-9518.

Sale/Lease: Friendswood, 3-2-3D, formals, lg lot, paneled den w/FPL, cul de sac, fenced yd. 283-5781 or 480-9716.

Lease: Piper's Meadow, 3-2-2, W/D conn, blinds, dishwasher, fans, avail 11/1, \$795/mo. x31826 or 480-9436.

Rent: Arkansas lake cabin, wooded, 4 acres, screened porch, furn, wkly/daily, \$250/\$50. 338-2517.

Lease: El Dorado Place townhome, 2-2.5-2, W/D, FPL, alarms, \$600/plus deposit, no pets. 480-5470.

Rent: Meadowbend, 3-2-2A, patio, LR w/high ceiling, formal DR, new paint, \$750/mo. 333-7321 or 334-3636.

Sale: La Porte, 2 story, 3-2.5-1, lg corner lot, quiet subd, assum \$506/mo note for \$10K equity. 474-2660.

**Cars & Trucks**

'83 Monte Carlo, \$2.5K OBO. 482-6744 after 5.

'74 Volvo 2002, 4 spd, green w/interior, new tires, new \$2K paint job, sun roof, AM/FM/cass, ex cond, \$8K OBO. David, x32791 or 488-9768.

'82 Honda Accord, parts car, runs, needs brakes, \$700 OBO. x37192 or 996-9724.

'83 Honda Accord, blue, 4 dr, A/C, cruise, 5 spd, 138K mi, stereo, \$2.2K. x35121 or 488-7909.

'23' Starcraft travel trlr, 2/30 LP tanks, A/C, shower, gas or electric refrig, 4 burner gas stove/oven, 15' attached roll up awning, \$2.9K. Jo Ann, 943-1694.

'76 GMC PU, 3/4 ton, runs, needs work, \$600; '71 VW bus, doesn't run, \$600. Dennis, x39012 or 554-4233.

'76 Chevy Nova, 4 dr, auto, A/C, \$400 OBO.

Laura, x32666 or 480-2830.

'89 Honda Prelude Si, 5 spd, sky blue, 28K mi, ex cond, alum wheels, alarm, loaded, \$11.5K OBO. 283-4258 or 480-9125.

'72 Buick Skylark, 4 dr, 350 V8, 91K mi, rebuilt trans, ex cond int, \$1150. x38869 or 488-1432.

'91 GEO Storm, 3 dr, 5 mos old, 5.5K mi, 5 spd, air, AM/FM/tape, \$10K. 332-3142.

'82 Toyota Tercel, 4 spd, A/C, radio/cass, blue, 100K mi, new clutch, ex cond, \$1180. Ton, x33242 or 996-5068.

'83 Alfa Romeo GT V6, 2 dr hatchback, 5 spd, A/C, P/W, 58K mi, AM/FM/cass, \$3.9K. Jeff, 333-7062 or 482-8585.

'79 VW Pop Top camper, rebuilt engine and brakes, \$3.5K. David, 929-7120 or 332-9044.

'85 Chevy Cavalier, 2 dr, auto, P/S, P/B, digital inst panel, sun roof, AM/FM/cass, blk/silver, ex cond, \$3.5K OBO. 532-3348 after 5.

'80 Pontiac Phoenix, V6, A/C, 4 dr liftback, auto, stereo AM/FM, lifetime batt, good cond, \$1450. x30092 or 481-3637.

'87 Mazda PU, good cond, 41K mi, air. 532-1513 after 8.

'77 Chevy Malibu, 90K mi, 305 V8, P/S, P/B, A/C, 4 dr, \$750. Cliff, x39529 or 534-2462.

'79 Mercedes 300 SD, sunroof, \$7.5K. 488-4915.

'85 Chevy Cavalier, 4 dr, 4 cyl/2.0L, 70K mi, ex cond, \$2.7K OBO. 488-5522.

'84 Lincoln Cont Mark VII, 84K mi, \$4.5K; '88 Chevy 150K mi, \$3.5K; '74 Alfa GT 2000, 83K mi, \$3.5K; '88 Dodge, 4 wheel drive, 40K mi plus warr, \$6K. 480-7400.

'88 Acura Legend, 36K mi, ex cond, \$16K. 479-7682. Toyota MR2 alloy wheels, fit '85-'89 MR2 and Corolla FX models, \$300. 538-1479.

'89 Nissan 240SX, blk, loaded, headup display, pwr pkg, 23.5K mi, \$13.5K OBO. 488-0929.

'82 Bronco XLT, full sz 4 wheel drive, blue/silver, A/T, P/S, P/B, P/W, 302, cruise, tilt, good cond, \$3950. Tim, x38843 or 332-6153.

'91 Toyota Corolla, 1.9K mi, 2 mos, auto, A/C, AM/FM/cass, P/S, child locks, rear defogger, int/ext protection pkg, pearl red, Krish, 286-9344.

'87 Honda Accord LXI, lt blue, 5 spd, 63K mi, new tires, loaded, ex cond, sunroof, \$8K. Billy, x35365 or 280-8017 after 4:30.

**Cycles**

'85 Yamaha RZ 350, red/wht/blue Kenny Roberts replica, 5K mi, \$1.2K OBO. Jim, 332-6325.

'85 Yamaha RZ 350, Kenny Roberts replica, 5K mi, Jim, 489-9558.

Yamaha RZ 350, Kenny Roberts replica, professional engine porting, Mikuni carburetors, pipes, K&N jet kit, Dunlop radials, bike cover and helmet, \$1795. Hugo, 335-2552 or 286-0432.

'80 Suzuki, 450 GSL, low mi, needs some work, \$350 OBO. Neil, x35582 or 481-3549.

'83 Honda Shadow V70, wineberry red, low mi, rebuilt engine, good cond, \$1.8K. Mace, x30277 or 332-7092.

Mens League Fuji racing bike, 12 spd, ex cond, pump, water bottle, extra tube, owners manual, \$175. Maureen, x38799 or 333-4845.

**Boats & Planes**

'84 Invader, V171, Bolvo AQ 125, ex cond, \$4.8K. Mark, x30160 or 326-3004 after 6.

'Sunflower' sailboat, sail, all access, car rack, \$200. x35121 or 488-7909.

15 ft US-1 sailboat/trlr, easily rigged in minutes, \$600. x37987 or 326-1552.

6hp O/B, old, runs good. 480-3260.

'89 Four Winns 180 Horizon Runabout, 175 l/O, Brougham seating, extras, low hrs, \$13.9K. Terry, x39234 or 338-1443.

Lido-14 sailboat/trlr, sails, \$995. R. Hoover, x31860 or 996-7716.

'65' tri-fin surfboard w/bag Sebastian Inlet, \$150;

'63' tri-fin, \$140. Dwane, 943-2773.

## Audiovisual & Computers

Apple IIC, mono mon, ext 5.25" dr, mouse, SW, 40 blank disks, \$275; Pioneer turntable, \$40 OBO; Technics turntable, ex cond, \$80. Anne, x34493 or 286-2932.

Math Pac application module for HP-41C series calculators, allows matrix operations, polynomial solutions, numerical integration, diff eq, Fourier Series, complex number operations, hyperbolics, triangle solutions, coordinate transforms, documentation and overlays incl, \$30. x31495 or 326-4991.

Macintosh USA 2/10 upgraded to XL 3.0, IOBM HD, Imagerwriter II printer, SW, complete system, \$750. x35384.

Loran unit, 50 channel, Marine radio, Bimini jeep top, settee, blue. 644-2616.

Atari Mega ST2, 2 MB RAM, mono monitor, 720KB floppy, megaflo 30 HD, \$800; Spectre GCR Macintosh emulation cart w/ROMS, \$250. Jeff, x35534.

Turbo GrafX-16 video system w/4 games, extra controller, ex cond; children's "Video Smarts" learning dr w/3 cass, \$25; RCA 19" color TV, \$200; Code-A-Phone answering machine, \$75. x35896 or 488-7982.

F1 DD for C-64, IBM parallel printer I/F for C-64, 300 baud modem, Ultima-IV, Zork, \$35 OBO. Robert, x35258 or 482-0374.

CompaT 286 computer system, dual floppies, 20MB HD, 2+ M6 RAM, Dos, Word Perfect, color moni, enhanced keybd, \$1.2K OBO. 333-6365 or 286-9572.

Sunpak 522 auto Thyristor handle flash, G/N 240, w/bat pack, filter set, AC adapter, batt charger, PC cord, ex cond, \$75; four industry std Shure SM58 dynamic microphone, with case, ex cond, \$90/ea; two JVC MD-580A dynamic microscopes, good cond, w/case, \$50/ea. Sy, x30504 or 776-9754.

Tandy 1000TL, 80286 based computer, 3.5" and 5.25" DD, 768 KB RAM, 101 kbpd, printer cable, \$300; sound blaster sound and music board w/SW \$50. Gregg Edeen, x38845 or 338-2379.

NEC P5300 printer, wide carriage, 24 pin, 7 built in fonts, takes ADDL font cards, ex cond, \$450. Pat, x35168.

Apple II C, 12" moni, 300/1200 modem, ext drive, mouse and assorted S/W, \$600 OBO. 538-1479.

NEC Powermate PC, 5x20/44 MB HD, VGA moni, 256K VGA card, 386 IBM Clone w/Windows, \$1.6K. x30643 or 488-4373.

TRS80 color computer, dual 5.25" FD, OS9 ROM packs, floppy interface needs work, \$150. Stacey, x32649 or 480-9793.

One pair stereo speakers, homebuilt cabinets w/8" woofer/midrange and horn tweeter, 14" wide x 22" high, \$60. 480-3424.

**Musical Instruments**

Baby Grand piano, \$5K OBO. x38184 or 480-4911.

**Pets & Livestock**

Rabbits, pet and show quality, \$7 and up. Gailo, 554-6200.

Schnauzer, AKC, shot and wormed, ear/cropped, 9 wks old, \$200/ea. Tamela, x36155 after 3:30 or Tannya, 479-0297.

Labrador puppies, AKC, chocolate father, black mother, \$175. Karen, x31385 or 947-2025.

**Household**

Queen sz solid pine waterbed, w/mirrored hdbd and shelves, 6 drwr below, \$250. Bo, 283-9357 or 474-3408.

Queen sz oak waterbed, bookcase hdbd, \$100. 996-8453.

4 drwr wooden dresser, ex cond, \$75 OBO. Mike, x38682 or 332-7205.

DR table w/leaf and hutch, \$300. x39421 or 481-9478.

Leather sided glass top coffee tables, \$50/ea; 15" wire wheel covers, \$25/ea; James, 335-6710 or 482-6744.

Hoover vacuum cleaner, Dial A Matic pwr drive, \$30; GE refrig/freezer, 14 CF, manual defrost, runs but needs service, gold, \$30. 474-2654.

Queen sz bedframe, \$25; microwave, \$45; microwave/TV cart, \$20; coffee maker, \$10; bamboo patio shade, \$15. 480-3017 evenings.

Couch, chair w/tottoman, good cond, \$200. Rob Keiso, x35483 or 480-2997.

Maytag W/D, good cond, \$150. 996-6731.

King sz waterbed w/hdbd and under bed storage, good cond, \$200. Beth, 286-3613.

King sz waterbed, mirrored hdbd, 12 drwr, semi motionless, \$350; formal brass DR table, smoked oval glass top, 4 chairs, \$250, x30636 or 992-2186.

Super single waterbed, \$50; radio/record console, \$50; Roger's silver teaset w/try, \$200. x35896 or 488-7982.

King sz waterbed, oak, htr, \$200. 282-3081 or 332-8247.

Baby crib and mattress, ex cond, \$75; wood high chair, \$35. Hammack, 280-5159.

Maple drop leaf DR table, w/4 chairs. \$85. 480-3424.

Thomasville, 5 pc oak BR set, queen/full hdbd, 2 nightstands, 2 dressers, ex cond, \$750. Pat, x35168.

Whirlpool refrig, ex cond, warr, \$300. 282-3041 or 486-2454.

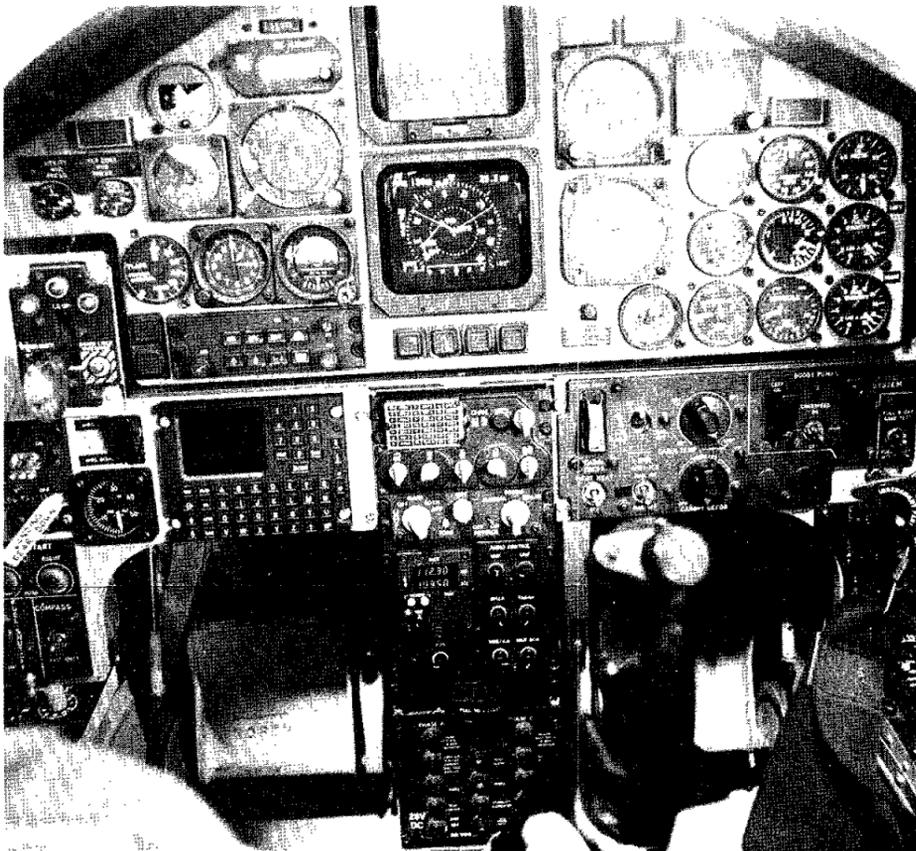
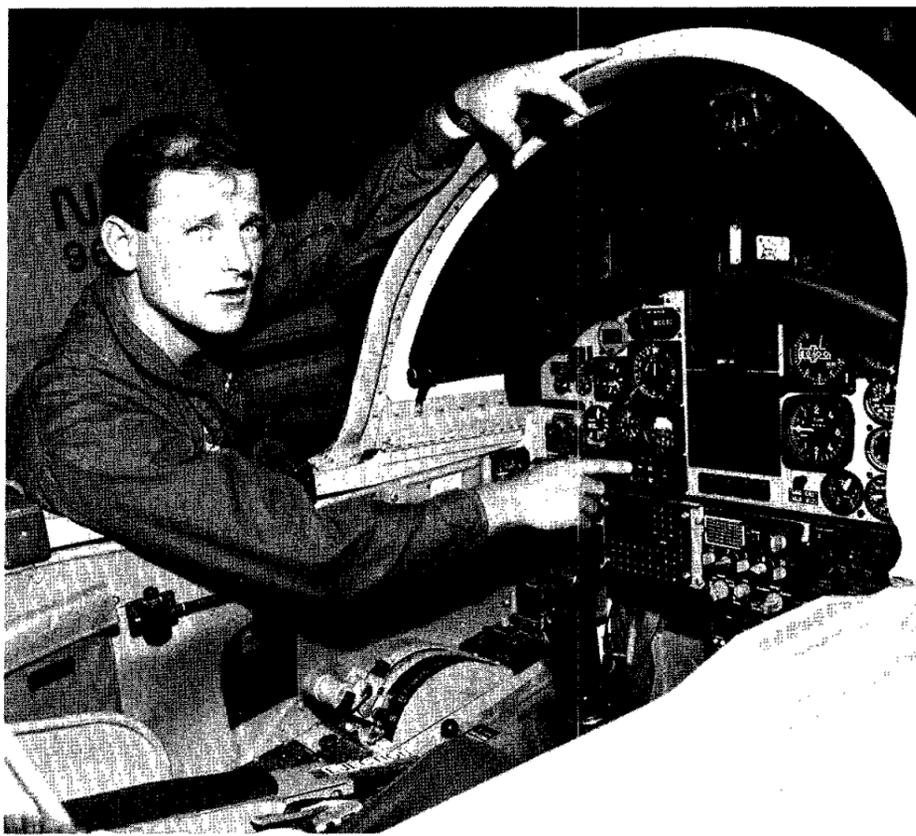
Vinyl wht and blue chairs, good cond, \$20/ea; end table, \$3; bookshelf, \$12; wood twin hdbd and fdbd, \$15; wood twin hdbd, \$10. 339-1337.

## Wanted

Want riding lawnmower, 5hp, in good cond. Magdi Yassa, 333-4760 or 486-0788.

Want riders for vanpool or carpool from SW Alief and Braeswood, 610 locations to CLC/JSC. Satish, 282-4483.

Want firm queen sz mattress. Jannette, x39187.



Top: Project Manager Scott Reagan shows off the advanced cockpit of NASA 912, the first T-38 in JSC's fleet to be upgraded. Next: The new cockpit configuration includes two center-mounted CRTs with multiple display capability. Here, the top CRT is configured to show the aircraft's attitude relative to the horizon, and the bottom shows the new weather radar. Above: Reagan shows the difference between the old and new noses. The old nose, left, includes a Pitot tube that tends to attract lightning. The radome of the new nose includes grounded strips that help dissipate the electricity of any lightning strike. Right: Kevin Kriegel, Reagan and Ace Beall stand in front of NASA 912.



# Advanced Aircraft Avionics

## Astronaut trainers will be significantly safer with cockpit display upgrades

By Barbara Schwartz

NASA's fleet of astronaut training aircraft has taken the first steps toward becoming significantly safer thanks to a new "God's-eye-view" of the weather and other flight information upgrades.

Following a serious lightning strike several years ago, a NASA investigation board recommended that weather radar be added to the T-38 jet trainers. There wasn't enough room in the nose of the T-38 to house the radar, so NASA took advantage of advanced technology and smaller components to improve the plane's avionics and increase the availability and useability of pilot information, said Flight Crew Operations Director Don Puddy.

NASA 912 became the prototype aircraft to incorporate these changes, which eventually should significantly increase the overall safety of the T-38 fleet's operations.

Scott Reagan, project manager and test pilot for the new aircraft, says the prototype has an Electronic Flight Information System, referred to as a glass cockpit because it is essentially made up of two five-inch CRTs that display the flight information and the weather radar data.

"NASA 912 has several significant safety improvements. We added an altitude alert system, a total air temperature probe, and the voice-activated intercom system. To make room for the new equipment, we moved systems around within the aircraft, combined several systems into one-unit packages, and redesigned the cockpit. Part of the challenge of the redesign was to find room in the nose of the T-38 for the new weather radar system.

"We took the landing light, which is, currently on our airplanes underneath the nose, moved it aft to the fuselage area, and now we have two lights just forward of the intakes. We also moved the barber shop Pitot boom off the nose of the T-38 and put on two side-mounted Pitot probes just forward of the cockpit area.

"One of the major safety enhancements was to improve the ergonomics of the cockpit. This is a fancy way of saying we improved the manageability of the cockpit for the pilot," Reagan said.

Cockpit instrumentation was realigned so a pilot can operate all the equipment with his left hand while flying with the right. "When you're strapped into a parachute and into the airplane, it is hard to get your elbow back," Reagan said, referring to the reason for redesigning the map cases and moving them forward to give pilots easier access to flight charts.

"Also, the arrangement of the instruments is improved so that scans are better optimized. For example, the landing and take-off checklists include looking at several different items in the current airplane. The hydraulic gauges are over on the right side, landing gear handles are on the upper left, the flap gauges on the lower left. They are now in one location in the upper left so that at one glance the pilot can check his landing situation or his take-off situation," Reagan said.

The command display unit provides much more information than was previously available. "There can be an overload factor there, but the nice thing about that is you can de-clutter all that information. You don't have to look at everything that is available," Reagan said.

The weather radar helps pilots avoid flying into thunderstorm areas, but lightning cannot

always be avoided. "The Pitot boom on the current airplane sticks out on the front and acts like a magnet for lightning. Now that the boom has been removed, we added some metal strips to the new radome," Reagan said. The strips are grounded, and if lightning strikes, the electrical energy can be dissipated and absorbed throughout the airplane.

A new collision warning system will be added in October for evaluation. The current T-38s have an Identification Friend or Foe transponder, a "squawk box" used by ground controllers to identify various pairs of blips on their radar screens. A code is used to identify each aircraft, its altitude and airspeed. This information is available to anyone able to receive it. A receiver will be added so this information can be displayed on the EFIS horizontal situation indicator in the cockpit.

Reagan is quick to recognize other pilots in the Aircraft Operations Division who have played key roles in the development of this project. Kevin Kriegel put together and ran the test program. Jill Brigham is a project engineer who organized the flight readiness review and is currently keeping a list of suggested changes to 912 for incorporation into the remainder of the fleet. Greg Johnson, a test pilot for the project, developed the ground training program.

"Ace" Beall was the first pilot to go through the familiarization training procedures developed for the new aircraft operations. Reagan said Beall's expertise was helpful in evaluating the effectiveness of the procedures. Beall is currently helping train the astronauts.

The modification program began in Oct. 1988 with the the initial design studies, and in September 1989 LTV Sierra of Buffalo, N.Y., was awarded the contract for the engineering design and cockpit mockup. In February 1990, NASA authorized LTV Sierra to make the modifications, and NASA 912 was delivered to the plant in Buffalo in September 1990 for conversion.

The official rollout ceremony for the modified aircraft was held at Ellington on July 16. Puddy and Chief of Aircraft Operations Robert J. Naughton presented plaques and photographs to key individuals who worked on this project.

John Buck, president of LTV Sierra, was on hand to receive recognition for the personal attention he gave to the modification work. Naughton recognized and thanked his employees and representatives of Northrop Worldwide Aircraft Services Inc., Loral Space Information Systems and Allied Signal, who were instrumental in the development process.

Presentations and tours of the upgraded NASA 912 have been given to many official visitors to JSC since July, including William Lenoir and Robert Crippen.

For the next few months, Reagan, Kriegel, Beall, Johnson, and Brigham, plus 11 pilot astronauts will be flying NASA 912 and evaluating its enhancements. In about six months, the evaluators' comments will be incorporated into a statement of work and request for bid proposals for a contract to upgrade the rest of the T-38 fleet.

"I'm looking forward to completing the evaluation of this particular prototype and moving into fleet enhancement. Although we have some experience in operating aircraft that are one-of-a-kind, the extensive operations in association with the T-38 project are certainly going to offer new challenges," Puddy said.

## Trio earns honors for computer work

Three JSC employees have been singled out for recognition by Government Computer News, one of the principal weekly trade papers in the information resources management business.

The trio — Don Simanton, Debra Johnson and John Symes — received GCN certificates and were guests at a recent luncheon honoring them.

Simanton, assistant director for IRM in the Information Systems Directorate, was recognized for pioneering the use of the Trail Boss program within NASA and for outstanding leadership as the Trail Boss of JSC's Operational Automated Data Processing and Institutional Automated Data Processing initiatives.

Johnson, chief of Administration's

Data Systems and Aircraft Operations Procurement Branch, was cited for leadership and technical support of JSC's OADP and IADP procurements. The purchases will provide all of the computer mainframes for the Office of Space Flight JSC

## People

well into the 1990s and set standards for partnerships between procurement and IRM organizations.

Symes, project manager for the NASA Personnel and Payroll System in ISD, earned accolades for NASA-wide leadership in the design, development and implementation of NPPS as an integral component of a

family of automated administrative systems.

### Beall new Aviation Safety Office chief

Arthur "Ace" Beall became the chief of JSC's Aviation Safety Office at Ellington Field on Sunday.

Beall, who replaced David Mumme, acts as the focal point on all aviation and ground safety matters, working with Flight Crew Operations Director Don Puddy, the Astronaut Office, Aircraft Operations Division, NASA Headquarters and other centers, the Federal Aviation Administration and the Air Force and Navy.

Jack A. Nickel has been named Aviation Safety Officer, replacing Beall and becoming his principal assistant. As part of his duties, Nickel



Simanton



Symes



Beall



Shock

will perform mishap investigations, review aircraft configuration changes and chair various safety meetings.

### Shock top secretary

Barbara G. Shock, secretary to the chief of Engineering's Flight Data Systems Division, recently received the Marilyn J. Bocking Award for Secretarial Excellence.

Shock, who was secretary to the Systems Development and Simulation Division before the 1990 direc-

torate reorganization, oversees and coordinates the correspondence of six branch and staff offices.

She was cited for her work to maintain the continuity of division operations during the transition in the face of massive employee relocations.

Shock, a certified professional secretary, also was recognized for her work with the Summer Aid and Office Education Student programs, and she was selected as the 1990 Office Education Supervisor of the Year.

## Short course shares process control secrets

JSC employees will have to opportunity to look at how information about processes can be used to construct histograms, distribution curves and variable control charts during a Statistical Process Control short course Oct. 23-24.

The introductory level course will be offered from 8 a.m. to noon each day and will consist of lectures and exercises.

Statistical signals will be studied and participants will how to identify an "out-of-control" process. Attribute control charts will be developed for "go-no-go" situations and the results analyzed for out-of-control patterns.

Bill Witherspoon, the course leader, developed the seminar and has presented it several times to Safety, Reliability and Quality Assurance personnel.

The session is open to all civil servants, but space is limited. Openings will be filled on a first-come, first-served basis.

For more information or to register, contact the Human Resources Development Branch at x35266 by Oct. 18.

## Center Operations plans chili cook-off

The Center Operations Directorate is preparing for its third annual chili cook-off at 4 p.m. Oct. 25 at the Gilruth Center.

Fourteen teams have entered this year's cook-off. Judges will be JSC Assistant Director Dan Nebrig, Human Resources Director Harvey Hartman, Astronaut Jim Buchli, Houston Police Chief Elizabeth Watson, Harris County Sheriff Johnny Klevenhagen, Justice of the Peace Steve Phelps and Gene Ross. Showmanship judges are Astronaut Sam Gemar, SR&QA Director Charles Harlan and Lorna Onizuka.

All employees are invited, and public tasting will begin at 7 p.m.

Tickets, which may be purchased from COD employees for \$3 through Oct. 21 and for \$5 thereafter.

Proceeds from the People's Choice—Worst Chili voting will be donated to Crimestoppers Clear Lake, a non-profit organization. For more information, call chairman Ginger Gibson, x30596, or Grace Ferris, x34026.

## Ozone hole deepest so far

(Continued from Page 1)

The ozone hole is a large area of intense ozone depletion over the Antarctic continent that occurs typically during late-August through early-October and breaks up in mid-November.

This is the 13th year that the ozone hole has been monitored using the TOMS on the Nimbus-7 spacecraft. Both are managed by Goddard Space Flight Center. On Aug. 15, a refurbished engineering model of TOMS was launched aboard a Soviet Meteor-3 spacecraft. This new instrument began gathering data soon after launch and also has observed this year's ozone hole.

NASA's commitment to environ-

mental research continues with the Upper Atmosphere Research Satellite, launched Sept. 12, by the crew of *Discovery*. UARS will focus on the chemical, dynamic and energy processes that lead to ozone depletion, complementing and amplifying the measurements of total ozone made by the TOMS instruments.

Beginning this month, NASA scientists will take part in the second Arctic Airborne Stratospheric Expedition. This program, sponsored by NASA, the National Oceanic and Atmospheric Administration, the National Science Foundation and the chemical industry, will use high-altitude aircraft to study ozone depletion in the Arctic.

**GOOD ALTITUDE** — Herb Foss accepts a certificate of recognition from the Federal Aviation Administration's Ronald McGarry at a recent ceremony in Bldg. 41. JSC's Manned Test Support Section received a "Flight Safety Award" for providing physiological training and altitude chamber training flights for Houston-area aircraft crews and ground controllers. Right: Honorees included, from left, Kelsey-Seybold employees Marvin Griffiths, Chuck Shannon, Larry Busch, Mike Fox, Chuck Meckman, Gordon Baty and Foss.



## Can computers simulate human intelligence?

Can computers be designed to simulate human intelligence? Unique work now under way in the new Biocomputation Center at NASA's Ames Research Center may one day provide the answer to the question.

The new center is directed by Dr. Muriel Ross of Ames' Life Science Division. Her team of physicists, neurophysiologists and mathematicians is studying the three-dimensional makeup of a biological neural network, a series of connections between nerves. The team hopes to uncover the basic principles of how nerves are organized and function.

"Understanding even the simplest neural system requires painstaking

analysis of the architecture and physiology of its parts," Ross said.

The Ames scientists have used high-performance computers and graphics workstations to produce the first reconstructions of a neural network based on a living system. Information from the study of biological systems may advance the development of computer computer technology, Ross said.

By using computers to construct 3-D models of biological neural networks, then reducing these detailed models to a mathematical level, it may be possible to design and build electronic circuits to mimic the biological circuits. Such circuits then could

interact with artificial visual input and control the output for guidance systems in mobile robots, Ross said.

Biocomputation Center scientists are developing two image processing systems. The first reconstructs parts of the neural network by capturing, enhancing and digitizing electron microscope images. It then stores them on an optical disk. The second system produces mathematical models that mimic the functions of neural networks by assembling the digitized images as montages. From these, a computer generates 3-D models.

The research may lead to better countermeasures for space adaptation syndrome, which affects more than

half of all astronauts during the first two to four days in space, Ross said.

Ross said the research capability provided by the advanced computers "has changed our whole idea of how parts of the vestibular system are organized." The vestibular system is located in the inner ear and plays an important role in maintaining balance. Using the analytical tools provided by the Biocomputation Center, it is now possible to determine structural and functional changes in this system resulting from different gravity levels.

It will be possible for scientists to compare the responses of bones, muscles, hormones and other systems to various gravity levels.

## New TDRS expands network

(Continued from Page 1)

The 2-1/2 ton satellites have seven antennas and two solar arrays each — that from tip-to-tip are taller than a five-story building. A single satellite can handle more than 300 million bits of information per second per channel—the equivalent of all the data in a 24-volume encyclopedia—in less than 6 seconds.

Studies in the 1970s showed that a system of telecommunication satellites, whose signals were relayed to a single ground station, could better meet the requirements of the Space Shuttle and Earth orbiting satellites than a worldwide network of more than 20 ground sta-

tions. With the TDRSS, controllers can communicate with satellites during 85 to 100 percent of an orbit, depending on the user satellite's orbital attitude. Prior to the TDRSS, communications with the shuttle and other scientific spacecraft were limited to 15 percent of each orbit.

NASA's Office of Space Communications, Washington, D.C., is responsible for overall program management of the TDRSS. NASA's Goddard Space Flight Center manages the operation of the TDRSS through GTE, White Sands, N.M. TRW Space and Technology Group, Redondo Beach, Calif., is the prime spacecraft contractor.

## Space News Roundup

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