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

Screaming computers

A new computer tutoring system for high school students uses some unusual sound effects. Story on Page 3.

Super arrival

JSC's new supercomputer has arrived in Bldg. 46 and is being connected to its networks. Photo on Page 4.

Space News Roundup

Vol. 28 October 13, 1989 No. 41

Next week

CFC kickoff to announce $275,000 goal

JSC will kick off its 19th annual Combined Federal Campaign (CFC) on Monday, working toward a goal of $275,000 in donations.

The CFC is a once-a-year voluntary fund-raising effort that gives JSC employees a chance to contribute to local, national and international health and welfare charities.

The CFC supports two organizations of special interest to JSC employees—the NASA College Scholarship Fund Inc., providing educational assistance to selected NASA dependents, and the Manned Space Flight Education Foundation Inc., chartered to design, build and operate Space Center Houston, JSC's new visitor center.

The total goal for the Houston United Way drive is $56 million, and the CFC hopes to raise at least $1.5 million of that from all Houston federal government employees. This year's drive ends Nov. 14.

Last year, JSC employees contributed $262,535, or 99 percent of the $265,000 goal.

"If each giver would increase their gift by 50 cents per week or if they would give one hour's pay per month, we would exceed our goal," said Teresa Sullivan, CFC coordinator. "We would also like to increase the number of participants from last year's 88 percent."

Sullivan said the CFC allows contributors to make donations over the year in small, convenient installments through payroll deduction.

"I believe that JSC personnel care, and it is my sincere hope that you will contribute as liberally as possible to this deserving combined campaign," said JSC Acting Director P. J. Weitz.

"In making your decision, though, it is good to remember that you will not only be helping your community to help itself; you undoubtedly will be helping a neighbor or loved one when they need it most. With your support and that of your fellow employees, I am confident JSC personnel will be generous with their gifts to this year's CFC."

Each JSC organizational element will have a division or office captain responsible for soliciting donations. They will attempt to contact each JSC employee during the campaign. If you are not contacted and would like to begin participating or change your contribution, contact Sullivan at x38970.

JSC Photo by James Hartsfield

Eric Miller, left, a 13-year veteran of White Sands Test Facility's odor panel, takes a whiff of a sample smell administered by Odor Panel Test Conductor Chris Gillis.

Dedicated sniffers make sure shuttle program doesn't stink

By James Hartsfield

When success smells sweet on board a shuttle, it is in large part due to noses in the New Mexico desert that sniffed it first.

The "odor panel" at the White Sands Test Facility (WSTF) is a group of about 20 volunteers who ensure that America's manned space program doesn't stink. All materials that go into the shuttle's crew compartment must pass these noses before they make it to space.

It's not as strange as it sounds, or maybe it is—but it's an indispensable test. A bad odor permeating an enclosed cabin for several days can become unbearable, and it could be a catalyst for motion sickness. It also could distract crew members from the business at hand, business that is too critical and valuable for such avoidable distractions.

The importance of such testing can be underscored by a Soviet incident in 1976. During the Salyut 5/Soyuz 21 spaceflight, cosmonauts experienced an unbearable acrid odor coming from their environmental control system and were forced to return to Earth before completing their mission.

In a NASA incident, the odor panel prevented a serious odor problem from occurring on Apollo 13. The charts and maps printed for that flight were tested by the sniffers only a short time prior to launch, and a new ink used by the printer on them caused blisters in the noses of all five testers. Even though the maps had been checked for toxicity, "the human nose is so much more sensitive than the analytical equipment we had at the time that the machines couldn't detect it," said Harry Johnson, manager of WSTF's Analytical,

Please see **NOSE**, Page 4

Galileo receives legal OK; launch slips to Tuesday

Just hours after a federal judge announced his decision Tuesday to disallow a court challenge to Thursday's planned launch of *Atlantis* and Galileo, shuttle managers announced their decision to postpone the launch for technical reasons.

The launch was rescheduled for Tuesday, Oct. 17, when the 24-minute window opens at 11:57 a.m. CDT and closes at 12:21 p.m. If *Atlantis* blasts off as the window opens, landing will be at 2:42 p.m. CDT Sunday, Oct. 22.

STS-34
Galileo

The decision to postpone the launch came Tuesday evening when shuttle program managers decided to replace a suspect controller on *Atlantis'* main engine number 2.

The controller, an electronics package that controls all main engine components and operations, weighs about 230 pounds. Workers immediately began preparing to access the aft compartment of the orbiter for the change-out operation.

Earlier Tuesday, U.S. District Judge Oliver Gasch had knocked over the legal hurdle to the launch by refusing to issue a temporary restraining order.

A coalition of three anti-nuclear groups had sought the restraining order on the grounds that NASA had underestimated the chances of a launch accident exposing humans to plutonium from Galileo's radioisotope thermoelectric generators (RTGs).

Gasch ruled that NASA had complied satisfactorily with the National Environmental Protection Act in making its decision to launch.

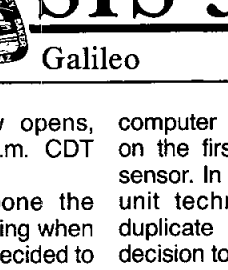
The decision to change out the backup computer on the controller came after the computer displayed erroneous data on the first two of 64 checks of a sensor. In five additional runs on the unit technicians were unable to duplicate the error leading to the decision to change the computer.

As workers completed loading of the power reactant and storage distribution system aboard *Atlantis*, the countdown clock reached a planned built-in hold at the T-19 hours mark. The countdown will remain in that hold until the controller is changed and checked out for flight.

The crew for the STS-34 mission returned to Houston Wednesday morning to practice launch and entry simulations as well as rehearse the deployment of the Galileo Jupiter probe before returning to Kennedy Space Center for the actual launch.

Moorehead becomes deputy for space station program

Veteran JSC manager Robert W. Moorehead has been appointed deputy director for program and operations in the Space Station *Freedom* Program Office by Director Richard H. Kohrs.



Moorehead

Moorehead was special assistant to JSC Director Aaron Cohen, and before that was manager of the NSTS Engineering Integration Office at JSC.

In his new job, Moorehead will direct the space station program office in Reston, Va., which is responsible for the overall technical direction and content of the international space complex, including systems engineering and analysis and configuration management, budgeting and schedules.

James M. Sisson, who has been acting deputy director since June, will assume the position of deputy manager, Space Station *Freedom* Program and Operations.

Moorehead has served in various capacities since joining NASA in 1964, including deputy manager of the Space Transportation System Orbiter and GFE Projects Office and manager of the Avionics Systems Office at JSC.

He has received a number of NASA awards, including the NASA Outstanding Leadership Medal in 1988.

Spacecraft will look back in time

Cosmic Background Explorer to study Big Bang theory

NASA will launch a spacecraft Nov. 9 to study the origin and dynamics of the universe, including the theory that the universe began about 15 billion years ago with a cataclysmic explosion—the Big Bang.

The Cosmic Background Explorer (COBE) spacecraft will be boosted into an Earth polar orbit from Vandenberg Air Force Base, Calif., aboard the final NASA-owned, NASA-launched Delta vehicle.

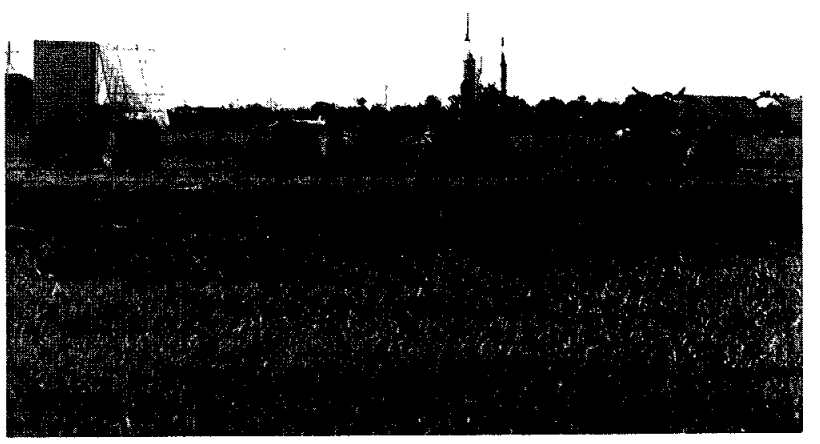
By measuring the diffuse infrared radiation (cosmic background) that bombards Earth from every direction, COBE's instruments will help clarify such matters as the nature of the primeval explosion—which started the expansion of the universe and made it uniform—and the processes leading to the formation of galaxies.

From its orbit 559 miles above Earth, COBE will carry out its cosmic search using three sophisticated instruments: the Differential Microwave Radiometer (DMR), Far Infrared Absolute Spectrophotometer (FIRAS) and Diffuse Infrared Background Experiment (DIRBE)

DRM will determine whether the primeval explosion was equally intense in all directions. Patchy brightness in the cosmic microwave background would unmask the as-yet-unknown "seeds" that led to the formation of such large bodies as galaxies, clusters of galaxies, and clusters of clusters of galaxies. Measurements of equal brightness in all directions would mean the puzzle of how these systems could have condensed since the Big Bang will be even more vexing than it is today.

To distinguish the emissions of our own Milky Way galaxy from the true cosmic background radiation, DMR will measure radiation from space at wavelengths of 3.3, 5.7 and 9.6 millimeters.

Please see **COSMIC**, Page 4



JSC Photo by Benny Benavides

HARVEST SCENE—The space age serves as a backdrop for this rural scene in JSC's "north forty." About 400 acres of JSC grass and weeds were rolled and baled this year to save manpower and equipment wear and tear.

JSC

Ticket Window

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

Astroworld (last month to visit): half price ($9.95) coupons available.

General Cinema (valid for one year): $3.50 each.

AMC Theater (valid until May 1990): $3 each.

Sea World (San Antonio, year long): adults, $17.25; children $14.75.

Texas Renaissance Festival (open weekends Sept. 30-Nov. 12): adults, $8.95; children $4.95.

Texas Renaissance Festival bus trips (Oct. 14 and Nov. 4), departs JSC at 8 a.m. and returns 5:30 p.m.: under age 5, $6; ages 5-11, $9; adults $12.

Halloween Dance (Oct. 28), $11.

20th Anniversary of the First Lunar Landing Speakers Program Videos are available in the Bldg. 11 Exchange Store: "Flying the Apollo Missions"—Recollections by Apollo flight controllers of important aspects of the mission, with Joe Allen, Glynn Lunney, Gene Krantz, Gerald Griffin, and Cliff Charlesworth.

"The Moon As Seen By Apollo Astronauts"—The story of the Apollo missions as told by members of the Apollo crews recalling interesting aspects of their missions. The tape includes Jim McDivitt, Frank Borman, Gene Cernan, Mike Collins, Al Bean, Jim Lovell, Al Shepard, and John Young.

JSC

Gilruth Center News

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

Defensive driving—Course is offered from 8 a.m.-5 p.m., Oct. 16 and Nov. 18; cost is $15.

Taekwondo/Hapkido—Learn the Korean art of self-defense, mental and physical discipline. Tuesday and Wednesday classes began Oct. 3; cost is $40 a month.

Weight safety—Required for use of the Rec Center weight room. Classes will be 8-9:30 p.m. Oct. 25; cost is $4.

Aerobics and exercise—Both classes are ongoing: cost is $24.

Ballroom dance—Professional instruction in beginning, intermediate, and advanced ballroom dancing. Classes are on Thursdays, 7-8:15 p.m. for beginning and advanced and 8:15-9:30 p.m. for intermediate, eight-week course is $60 per couple.

Intercenter run—The 10-kilometer and 2-mile races for the annual Fall Intercenter Run will be held throughout October. Runners may submit their times at the Rec Center.

October softball tournament—A men's open "C" softball tournament will be held at the Rec Center Oct. 28-29. Limited to 12 teams; entry fee is $95. Deadline is 6 p.m. Oct. 26.

Men's and mixed flag football—Sign ups will be held Oct. 12-13.

Country and western dance lessons—Begins Nov.6 and held every Monday for six weeks; cost is $20 per couple.

Beginning tennis lessons—Lessons begin Nov. 6 and are held each Monday for six weeks, 5:15-6:45 p.m.; cost is $32. Sign-ups begin immediately.

JSC

Dates & Data

Today

Sausage burn—The Houston Section of the AIAA Young Member Committee will host a "Sausage Burn" beginning at 5 p.m. Oct. 13 at the Gilruth Recreation Center. All young members and anyone interested in joining AIAA are invited. For more information, call Hiram Thompson, 282-8243.

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

Monday

ACM Lecture—The Clear Lake Chapter of the Association for Computing Machinery (ACM) will feature Robert Savely of the Software Technologies Branch at their monthly seminar on Oct. 16 in the Forest Room of the University of Houston-Clear Lake. Savely will address "Artificial Intelligence Projects at NASA." The social will begin at 5:30 p.m., dinner at 6:00 and the program at 6:45, the cost is $8.50 for members, $9.50 for non-members. Reservations for dinner must be made by Oct. 13 by contacting Susan Porter at 480-4101 or George Widerquist at 480-1994.

Cafeteria menu—Special: meatballs and spaghetti. Entrees: weiners and beans, round steak with hash browns. Soup: chicken noodle. Vegetables: okra and tomatoes, carrots, whipped potatoes.

Tuesday

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

Astronomy seminar—Jim Oberg will discuss "Developments with the Mir Spacecraft" at the JSC Astronomy seminar on Oct. 18, noon to 1 p.m., Bldg. 31 conference room 193. Contact Al Jackson, x33709, for more information.

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

Thursday

NCMA luncheon—The Space City Houston chapter of the National Contract Management Association (NCMA) will meet from 11:30 a.m.-1:30 p.m. Oct. 19 at the Gilruth Recreation Center. Alfred Fernandez, chief executive officer of Etc Technical & Professional Services Inc., will speak on training for transportation and disposal of hazardous or explosive materials. For reservations or more information, call Liz Aldrige, x38518, or Shannon Romine, 282-1770.

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. 20

Galileo overview—The Houston Space Society will sponsor a program entitled, "Galileo: A Closer Look at Jupiter," at 7:30 p.m. Oct. 20 in the Atlantic Room, University Underground, University of Houston. Debbie Jackson, a JSC Flight Activities Officer, will discuss the upcoming mission. For more information, call 520-6924.

Cafeteria menu—Special: Salisbury steak. Entrees: baked scrod, 1/4 broiled chicken with peach half. Soup: seafood gumbo. Vegetables: cauliflower Au Gratin, mixed vegetables, buttered cabbage, whipped potatoes.

Oct. 22

Public lecture—The second in a series of free public lectures in the Beyond Earth's Boundaries program will be held Sunday, Oct. 22, from 3:30 to 5 p.m. at the University of Houston-Clear Lake auditorium, 2700 Bay Area Boulevard. Dr. David Black, director of the Lunar and Planetary Institute (LPI), and a panel of scientists will discuss the scientific questions to be addressed by the Galileo mission to Jupiter. The series is co-sponsored by the LPI, UH-CL and JSC. The first lecture, held Aug. 22, reviewed the Voyager Neptune encounter. A program in January will discuss manned exploration of the solar system. The fourth and final lecture planned in the series will coincide with the launch of the Hubble Space Telescope and will discuss 21st Century space exploration.

JSC

Swap Shop

Swap Shop ads are accepted from current and retired NASA civil service employees and on-site contractor employees. Each ad must be submitted on a separate full-sized, revised JSC Form 1452. Deadline is 5 p.m. every Friday, two weeks before the desired date of publication. Send ads to Roundup Swap Shop, Code AP3, or deliver them to the deposit box outside Rm. 147 in Bldg. 2.

Property

Rent: League City, 1 BR in 3-2 house, $225 unfurn.-$250 furn., bills split evenly, non-smokers only, sm. pets tolerated. Russ, x35217 or 332-4336.

Sale: New Heritage Park, 3-2-2, very nice, $70,000, OBO. 996-1990.

Sale/Lease: Oakbrook, 3-2-2, $750/mo. plus dep. or $79,000, conv. mort. only. Matt, x34285 or 486-72260.

Sale: Seabrook, 3.29 acres w/sm. 2-1 home, quiet, secl., $95,000. 532-4784.

Sale: Santa Fe, 1 acre, 30 min. from JSC, quiet neighborhood, $6,500. x34964 or (409) 925-4300.

Sale/Lease: 10 acres, 1/2 mile west of Hwy. 146 on FM 517, barn, ponds, util., more. Trey, 280-4381 or 484-7834.

Lease: Comal/New Braunfels, 3 BR riverfront condo, tubing, furn., post-season special rates, wknd./wk., $160/400. George, 333-6811 or 488-4236.

Rent: 7 days, Pagosa Springs, CO., 2 BR house unit, sleeps 8, extras, near Wolf Creek/Purgatory, pick wk., Sat. to Sat., 7 Oct.-23 Dec. 89; $350, 6 Jan.-26 May 90; $550. x34614 or 334-2278.

Sale: Lake Livingston lot, 70' x 140', water, elec., Stephens Hills, midlake, west side, $1,995, OBO. T. Ward, 488-5445.

Sale: Seabrook, 3-2-2, new AC, heater, carpet, roof, ceramic and quarry tile, many upgrades, approx., 1,800 sq. ft., all brick, formals, den w/ FPL, never flooded, redwood deck w/spa, $69,900, assume at 9 7/8%, must qual., $0 down. Richard, x30271 or 474-9334.

Lease: Sycamore Valley/Ellington AFB, 3-2-2, FPL, formal dining, ins. util. room, mini-blinds, fenced, $650/mo. 482-6609.

Lease: Friendswood/Forest Bend, 3-2-2, formal dining, ceiling fan, FPL, fenced, $595/mo. 482-6609.

Lease: Friendswood, 3-2-2, lg. lot, close to schools, $750/mo. 282-5519 or 484-6439.

Sale: League City/Newport, 3-2-2, new neutral tone carpet, no MUD taxes, many extras, $73,500. Donna, x30261 or 332-0289.

Cars & Trucks

'77 Chevy Nova, manual, new batt., good tires, reliable, no AC, 87K mi., $850, OBO. x35096 or 488-2540.

'79 VW Scirocco, 4-spd., 80K mi., one owner, $1,500, mech. great, body good. x37075.

'74 Oldsmobile, 56K, $1,500; '69 Firebird rebuilt eng., $400, new PF. 480-6048.

'81 Nissan, 28ZX, one owner, T-tops, 5-spd., silver, garaged, $3,995. Mike, 333-2335.

'81 Datsun 280ZX, red, T-tops, new tires, rebuilt 5-spd. trans., very clean, ex. mech. cond., $3,850. x35055 or 474-2906.

'82 Citation V-6, auto., AC, PW, AM/FM cass., very clean, maint. sched., $2,000. Bruce, 485-0396.

'78 VW Scirocco, Champagne Ed., ex. cond., one owner, AM/FM, AC, reliable, new tires/batt., extras, $1,900. K.R., x32491.

'83 Ford XLT P/U, AC, AM/FM, auto., cruise, tilt, PS, PB, mags w/new tires, $3,500. Miles, x32540 or 486-8828.

'84 Ford Escort GT, sunroof, cruise, fog lights, stereo/cass., 5-spd., PL, 71K miles, ex. cond., mag. alloys avail., new water pump and timing belt, $3,000. Laurie, x33748 or 338-2368.

'80 Ford Pinto station wagon, 2-dr., runs good, low mi., $1,500. 488-7572 or 280-0571.

'86 Celica GT-S, 5-spd., ex. cond., PS, PB, AC, PW, PL, powered moonroof, cruise, stereo cass., BBP, $10,125. 474-2384.

'69 Chev. Camaro, orig. rebuilt 327/350 turbo trans w/shift, AC, PS, PB, dual exhaust headers, high-perf., refurbished body, alarm w/beeper, $5,500, OBO. Joyce, x37261 or 721-0601.

'71 VW bug, multi-color custom paint, custom mag. wheels, new tires, low mi., rebuilt eng., $1,200. Wyleen, 484-0987.

'72 Buick Electra, V-8, white, AC, PS, PB, PW, cruise, tilt, deluxe uphol., clean, like new, one owner, ex. cond., $2,995. x39109.

'63 Classic Olds Delta 88, V-8, AC, radio, PS, PB, one owner, '63 consumer report top rating, perf. cond., $1,995. Fred, x39109.

'86 VW Jetta GL, 34K, 5-spd., AC, cruise, sunroof, PW, mirrors, door and trunk, custom lighting group, ski carrier, AM/FM tape, alloy mag. wheels, $7,500. 538-3331.

'85 Chev. Nova, 5-spd., blue, AM/FM stereo cass., Michelin radials, ex. cond., 50K, $3,900. x37292 or 480-3729.

'81 Plymouth Horizon, auto., 2.2 L, 4-dr., clean, runs good, stereo, high mil., $685. Jennifer, x37466 or 488-5976.

Boats & Planes

15' mahogany boat, no motor, $100. 282-4519.

17' '74 Steury, tri-hull fiberglass, split windshield w/'74 OB 130hp Chrysler motor and '76 shoreline trlr., tilt, wench, buddy bearings, $2,000. David, x33100 or 337-4803.

15' International 470 sailboat and trlr., $1,300. x37075.

'78 Renken 19' Bowrider, 170hp fresh wtr. cooled Merc. I/O, galv. EZ loader trlr., depth finder, good cond., $4,000, OBO. 532-3515.

14' Glassmagic skiboat, 80hp Merc., galv. trlr., skis, fresh water use, ex. cond., 38mph, $1,795. x35180 or 326-3706.

16' Snipe day-sailer and trlr., no sail, fair cond., $250. 333-6594 or 333-3725.

'75 21' Bayliner Volvo 135, I/O, needs work, $27,000, OBO. Eddie or Susan, 534-3649.

'74 Merc. motor and outdrive, 140hp, $1,500. x37402.

Cycles

'82 650 Yamaha, black, good cond., runs well, needs minor work, BO. Jim, x31670.

Girl's 26" Schwinn 3-spd. bicycle, $25. Fred, 488-8111.

'78 Kawasaki, KZ 650, Quicksilver Fairing, other extras, ex. cond., 5,500 mi., $750, OBO. x30577 or 554-2375.

3-motorcycle Sunco trlr., lg. tool box attached, ex. cond., $395. 333-6594 or 333-3725.

'86 Yamaha Maxim, low mi., under warr., 4.5 mos. old, shaft driven, BO. Isaiah, x30108 or 433-7459.

'86 Yamaha FZ-750, red w/white and blue trim, bike lock, 11K mi., $2,250. 332-7912.

Audiovisual & Computers

IBM compatible Tandy 1000, 640K, 16 color CGA, color monitor, 20 MEG HD, two 5 1/4" 360K floppy drives, clock, 1200 baud modem, printer cable, software, $1,000, OBO. Kit, 474-3100.

Commodore 64 computer, disk drive, printer, manuals, complete, $75. Jim, x31670.

Brother HR35 wide carriage, daisy wheel printer w/tractor feed in box, never used, $300. 326-1483.

Apple IIc, full system, no printer, ext. drive, mouse, 12" green monitor, modem, variety software, $850. 538-1479.

Commodore 128 plus 1571 disk drive, ex. cond., dozens of orig. and copied game programs, all books, 4 joysticks, drive cleaner, $600. Burny, x39378.

XT Turbo 640K RAM, 512K ex. memory, VGA color monitor, two HD's, 60 MEG, 2 floppy drives, V20 processor chip, 2 serial ports, 2 parallel ports, 1 game port, 200 watt power supply, batt. backup clock, VGA monitor/board in warr., 1 HD and floppy drive in war., math co-processor avail., $2,100. 482-3002.

Daisy wheel wide carr. printer, C-ITOH, $310; Hayes 1200 baud ext. modem w/manual, $139; 150 watt XT power supply, $39; dual HD card, Everex, $41; full height 360K TEAC floppy drive, $29. 482-3002.

Household

Hanging lamps, $25-$35; student desk, $75; walnut coffee table, $75; couch, contemp./walnut, $175; contemp. chair, $75. x30550 or 486-9604.

Full-size matt./boxsprings/headbd., matching sm. dresser, $125; queen-size sleeper sofa, $175; other misc. items. Nancy, 480-8067 or 283-5745.

3-pc. LR set, good cond., $250; RCA 25" color console TV (not remote), good cond., $225, OBO. Jana, x31653 or 326-4030.

DR table, 1/2"-thick glass top, brass-type base, 6 chairs w/brown uphol. seats, inset cane backs, like new, $300, OBO. Anne, x34493 or 996-1287.

Solid maple bunk beds w/matt. and dresser, $150. Laura, x36665 or 333-9733.

Loveseat, earth tones, $45, OBO; end table, $25; rocker/recliner, $25. 334-3015.

Hotpoint 12 cu. ft. frost free refrig., $200. x34772 or 486-0606.

4-pc. solid oak BR wall unit w/high chest, $1,500; 4 sm. solid wood dinette chairs, $25; 1 lt. brn. chair w/high padded back, $10. x30789 or 280-9974.

Tree Trunk coffee table, $200. 326-2187.

King-size Mediterranean style bed, BO, or trade for sleep sofa. Claire, x34828 or 337-2415.

Sofa, lg. brn., very comfortable, good cond., 8'2" long, $75. 488-6521.

Full-size Bassett bed, $175 w/frame, quilted and plastic matt. covers, extra firm. x38889 or 480-1340.

8-pc. white French Prov. girl's BR, $250; Beautipleat drapery, lt. beige w/hardware and rod, fits 70-7/8x34-5/8", $50. 481-0429.

King-size Springair back supporter Grandeur matt. and box springs, ex. cond., $275. Harris, 488-1048.

Lost & Found

Found Wilson football at Gilruth field. Bob, x30316.

Photographic

New Nishika 3-D camera, uses reg. 35mm film, 3-D pictures, $200, camera only, $400 w/ access. Laurie, x37915 or 326-1930.

AF 28-85 wide angle zoom lens, Sigma 75-300mm telephoto lens, focal DT-50005 zoom flash, Rokunar 55mm mult. image lens 5R, filters, carrying case, used 3 times, was $1,200, now $500. x30180.

Two stroboflash strobes w/var. AC power 50 to 200 watt sec. w/port. stands, $125/ea. Pete, x28572 or 946-6248.

Omega D II 4x5 enlarger w/var. condenser head, 50mm, 90mm, 135mm enlarging lenses and corresponding neg. carriers. x38572 or 946-6248.

Pets & Livestock

Miniature Schnauzer puppies, AKC, no shedding, have shots, $275. Pat, x35011 or 488-3829.

10 yr. old Appaloosa mare, good riding horse; 2.5 quarter horse stud. Kelly, x36168 or 925-1819.

9 wk. male Cocker puppy, buff, housebroken, no papers, wormed, shots, $100. 332-7912.

Wanted

Want to buy home in Bay Forest or Brookwood, pref. sale by owner. 996-1990.

Bay area Aero Club wants to lease a few good, clean airplanes, based at Houston Gulf airport, we pay laibility ins. and tiedown. Pete Frank, 474-2384 or Earle Crum, 326-1953.

Want vertical blinds for 6' patio door, vinyl or cloth, good cond., fair priced. Yolanda, x38938 or 538-3092.

Want roommate for 3 BR house, $250/mo., split bills, Dixie Farm Rd. and Scarsdale off I45. Darren, 333-7593.

Want Volvo 15-in. turbo wheel, 5 spokes, good cond. Vincent, x30874 or 333-1316.

Want to trade my Army green Dodge 4x4 w/ AC, heat, power winch, spotlight, 16-in. tires for PU, auto., Dodge pref. x34819 or 944-9761.

Keyboard synthesist seeking members to form Pop/Rock band. Eddie or Susan, x32858 or 534-3649.

Musical Instruments

1922 Chickering piano, ex. cond., upright, meas. 54" high, BO. 789-7018.

Normandy clarinet, good cond., $100. 944-5904.

Miscellaneous

Peavy stereo chorus amp, 100 watts per channel, $300, OBO. Kit, 474-3100.

Two P175R-13 radial tires, like new, $35. Matt, x34285 or 486-7260.

Backyard light, 754W, $100. x30550 or 486-9604.

Vacation package, 3 day/2 night, Las Vegas Continental Hotel or 5 day/4 night at Orlands/Daytona Beach, BO. David, 282-4519.

Panasonic upright vacuum cleaner w/attach., good cond., $90. x39216 or 482-5197.

Quasar integrated audio system, turn table, 2 tape decks, AM/FM stereo, new cond., '89 model, $150. x39216 or 482-5197.

Videos: Trade copies of Night Court, Glow Ladies Wrestling, Friday 13th series, Space 1999, Avengers, UFO, Doctor Who. 480-6048.

Oscilloscope, 20MHZ, dual trace w/test leads, $100. 326-1483.

Camper trlr., '74 Bethany, pop-up, sleeps 8, stove, heater, ice box, water tank, sink, converter, good cond., $2,000. x33100 or 337-4803.

"Meritor" phone system w/5 phones, $500; misc. office furn. 488-0712.

Kirsch dual-track curtain rods w/draw string, various lengths. Bauch, 333-3382.

Tekonsho heavy duty brake control for trlr. tow, $20. Bauch, 333-3382.

Technics spkrs., $50; loveseat, earth tones, $40; coffee table w/glass insets, $30; food proc., $20; milk shake mixer, $5. Kelle, x31951.

Rheem 1.5 ton air cooled condensing unit, used 6 mos., was $800, now $300. 332-4245.

Honda generator, low hrs., well-maint., AC/DC, $175. Bruce, 485-0396.

7' octagonal hot tub cover, almost new, $200; lg. cap. 750 watt microwave, $200; 5-pc. Ward's DR set, $35. Wayne, x32435 or 334-3858.

Go-Cart, Dingo 8hp, good cond., $450, OBO. x30577 or 554-2375.

Sear's FXC 6000 exer. bicycle, like new, $40. x35357 or 333-9197.

Saw/tool grinder, Foley-Belsaw Model 1055, 8 grinding wheels, honning and drill sharpening attach., $500, OBO. Kevin, x36650 or 482-2405.

Chain saw grinder, Foley-Belsaw, elect., rivet spinner, rivet press, bar ail closer, 25' of chain, asstd. link kit, $200. Kevin, x36650 or 482-2405.

2-yr.-old white baby bed, $70; walker, $15; swing, $10; good cond. Don, x39036 or Patti, 482-3820.

Free grass, you roll. 332-0365.

Hotpoint 1.5 cu. ft. microwave oven, $60; treated wood swing set w/deck, $95. David, x36090 or 488-7427.

Marlin 30-30 lever-action rifle w/9x32 scope, shells, $175. Kevin, x33490 or 482-5905.

Micronta Road Patrol XK radar detector, only used twice, visor mount cup, $85, OBO. Greg 480-5132 or 482-7919.

Alum. camper top, fits sm. PU long bed, ex. cond; roll out windows, $75. Lonnie, 282-2731 or 482-0547.

Paperbacks, various topics, good cond. Richard, 488-5969 or 554-7024.

Fine European antiques, armoires, sidebds., draw leaf tables, chairs, curio cabs., washstand, occas. tables. 486-9840 or 955-5669.

4 Toyota Celica GTS rims, '86 model, 5-lug, 5-100s, $250, OBO; 4 alloy blk. mesh Amer. Racing rims, 5-lug, 5-100s, used one mo., $300, OBO. Rich, 280-1500, x3323 or 996-8961.

Radio Shack video special effects switcher, manual and auto., fades, 30 wipe patterns, new, $75. Scott, x38093 or 333-1803.

Corvette silk 15-in. round pillow, $12; solid brass 10-in. windsurfer, $15. Steve, 486-8716.

Eng. ring, 18K yellow gold, round diamond solitaire, .68 carats w/6round diamonds, .18 carats, was $1,500, now $1,200, OBO. x30874 or 333-1316.

2 Wilson Sting tennis racq., good cond., $35/ea., OBO. Vincent, x30874 or 333-1316.

Motorola HT 600 2-way program. radio w/ charger, 2 channel, $175. 486-8276.

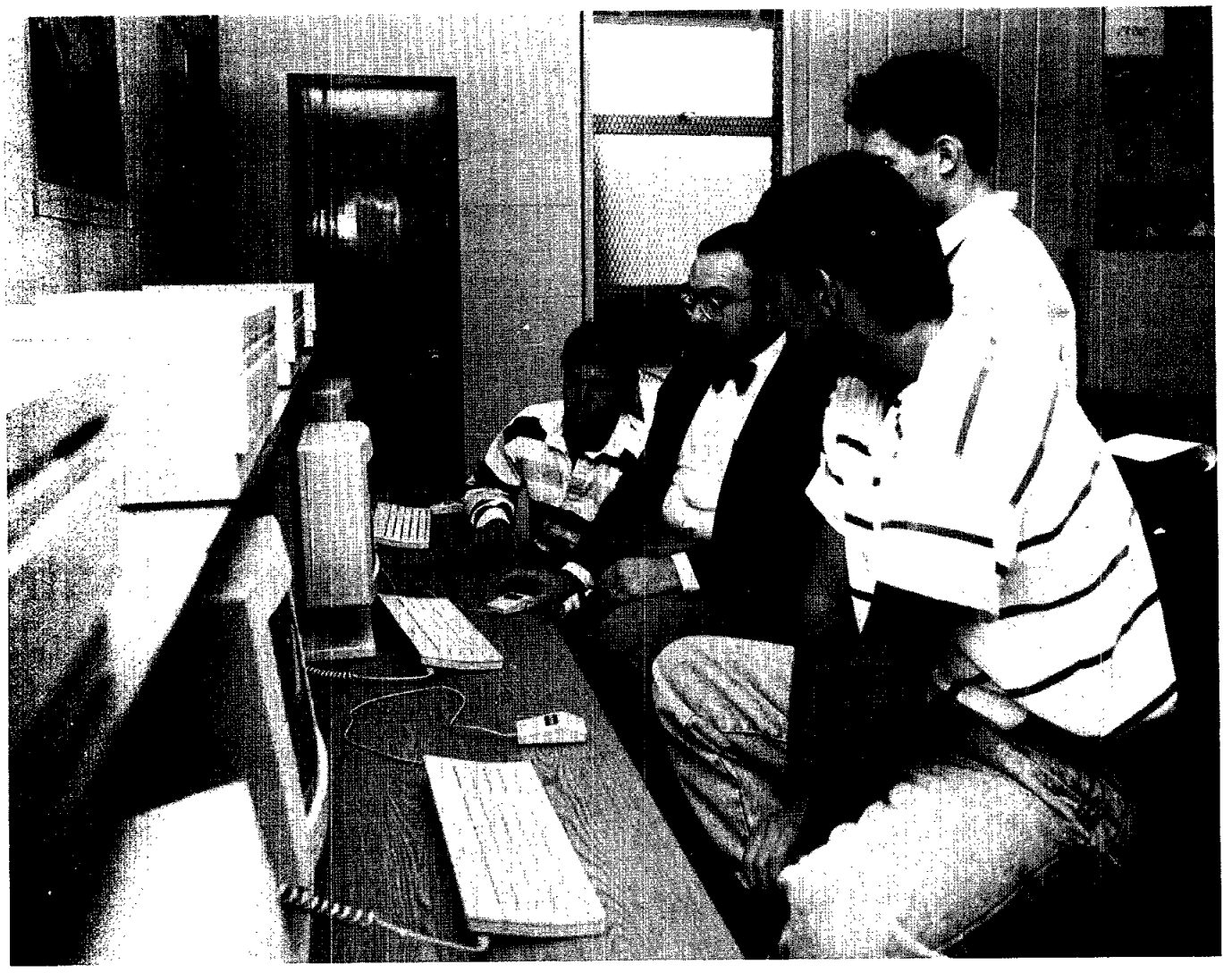
DeSoto couch and chair, $200; exerbike, dual action, $50; student desk, $35; TV stand, $5; ladies Schwinn Caliente 10-spd., $100. 1-538-3331.

Set of 15" Enkei alloy wheels for FWD cars and MR2, ex. cond., $250. 480-3270.

'89 5hp Ariens rear-drive mower, var.-spd., side or rear discharge, bag incl., was $600, now $295. Jerry, x38922.

Three sails to fit 26' Hunter sailboat, like new. Marilyn, x33439 or 488-0140.

Hide-a-bed sofa, ex. cond., gold, $75; Moog Satellite synthesizer, multi-voices, plugs into amp or stereo, $35. 480-2082.



JSC Photos by Sheri Dunnette

Bowen Loftin demonstrates the new, improved Intelligent Tutoring System to the Beverly Lee's Physics I Honors class at Clear Creek High School. The interactive system helps students overcome the anxiety of learning what many consider a difficult subject.

Can a computer's frustrated scream help teach?

JSC-developed Intelligent Tutoring System may change a difficult subject

By Kari Fluegel

In the midst of a busy classroom, a physics student watches his computer flash to life.

"A roller coaster moves along a horizontal surface and is observed to slow from 20 m/s to a stop in a distance of 50.0m. What acceleration did the roller coaster experience?"

The student slides the computer's mouse across his desk, selecting formulas and inserting values, when a beep sounds and the moustached face of one of the system's designers appears on the screen to coach him through a rough spot.

The student then continues with his calculations, solves the problem and moves on to the next.

NASA technology is at work once again, this time in the classroom.

The Intelligent Tutoring System helping the student through the roller coaster problem is one of eight technology spinoffs under development through JSC's Technology Utilization Office. The system adapts artificial intelligence technology used to train flight controllers to high school physics.

In the past, classroom computers have been used primarily for drill and practice.

"Like a teacher's helper holding up flash cards," said Bowen Loftin, a University of Houston physics professor working on the system in JSC's Software Technology Branch.

The physics tutor focuses on developing students' problem solving skills rather than doing the work for them. It gives guidance, not answers.

After a student accesses the program, thus creating a progress record that the teacher can review later, he or she is presented with a physics problem and an illustration to help in visualizing the problem. The student then must identify the type of problem, choose the correct formula and insert the correct values for the variables.

If the student makes a mistake, Loftin's face appears to remind him of the proper problem-solving methods or procedures. If the student needs help, he or she punches a key and may be greeted by a frustrated scream from the computer as the help menu materializes on the screen.

"When students have problems in physics classes, the breakdown often does not occur in the delivery of concepts but in the problem solving arena where frustration levels are immense," Loftin said.

Beginning students need more coaching to get through the problem solving but in classes of 20 or more students, a teacher does not have enough time to give each student adequate guidance and attention, he said.

It is at that point the tutoring system enters. The system monitors the student and intrudes when appropriate.

The system does not teach concepts and is not designed to take the place of the teacher or the textbook, said Beverly Lee, the Clear Creek High School physics teacher who is assisting in system's creation.

"It's the next step of technology in the classroom," Lee said.

The project, which is about one year along in a three-year development process, is supported by the Software Technology Branch, the Office of Technology Utilization, the University of Houston, Apple Computer's Classroom of Tomorrow, Pennzoil Products Co. and the Clear Creek Independent School District.

"I see it as a three-way partnership," Lee said. "It's government, education and industry coming together."

"We have tried to clone ourselves and our philosophy," Loftin said. "It behaves like we (Loftin and Lee) would behave.... We (system creators) are taking good people and multiplying and magnifying their expertise."

The system was introduced in Lee's classroom briefly at the end of the 1988-89 year. A small group of students provided input for further development during the summer, and the revised edition has been auditioned in front of Lee's Physics I Honors class already this year.

Designers hope the Intelligent Tutoring System will begin to stem the ever-increasing flow of both physics students and teachers from the country's educational system.

During the 1987-88 school year—the most current data—Texas employed only 45 teachers certified to teach high school physics in 1,071 school districts across the state, said Clyde Howie, systems analyst in the Texas Education Agency's division of teacher certification. That number was down from 67 in 1985-86 and from 56 in 1986-87, he said.

"And we don't believe that trend will turn upward," Howie said.

The tutoring system can help educators who are not trained as physics teachers, but who are teaching physics, meet the needs of their students.

"This could be a valuable asset for teachers who know the rudiments of physics, but don't know where to go from there," Lee said.

The system also can address the decreasing numbers of students entering careers in the sciences, math and engineering. Loftin said he looses about 50 percent of his college students in the first semester of his physics course.

"This is my little attempt to reverse that trend," Loftin said.

Lee also expects the system to have a positive impact.

"It enhances understanding and decreases anxiety," she said, "and by enhancing understanding and decreasing anxiety a career in that area doesn't seem so unattainable."

The system will bring intelligent training systems full circle. The first applications of the technology were in the academic circle but were not completely successful, Loftin said. NASA took that technology, improved it and implemented a training system for flight controllers. Now it's returning to academia, and so far is receiving high grades.

"It teaches you a lot," said Vanessa Plumecocq, a senior. "You can have help, if you need it."

The tutoring system builds a model of each student, adapting to the individual's abilities, behavior and progress. Students are then able to work at their own pace.

"You don't feel stupid," said Anh-Thu Pham, a junior. "You can ask it questions and you don't feel uncomfortable."

The personal prompting is important to students because when a student makes a mistake, it is not done in front of a peer, Lee said.

"It takes some of the dread and fear away from physics," she said.

The system, however, is not directed only at students who regularly make mistakes.

Chris Bauch, a junior who helped refine the system over the summer, said the individual approach allows well-prepared students to progress rapidly and slower students to work at their own pace without holding others back.

"It'll be very useful as soon as they have them in every class in the future," he said.

Artificial intelligence is the emulation of human capability through computer software and hardware made possible by the recent advances and evolution of microprocessors.

"It is exciting to be a part of a spinoff such as this that has the potential to revolutionize education and training," said Bob Savely, the Software Technology Branch manager of this activity.

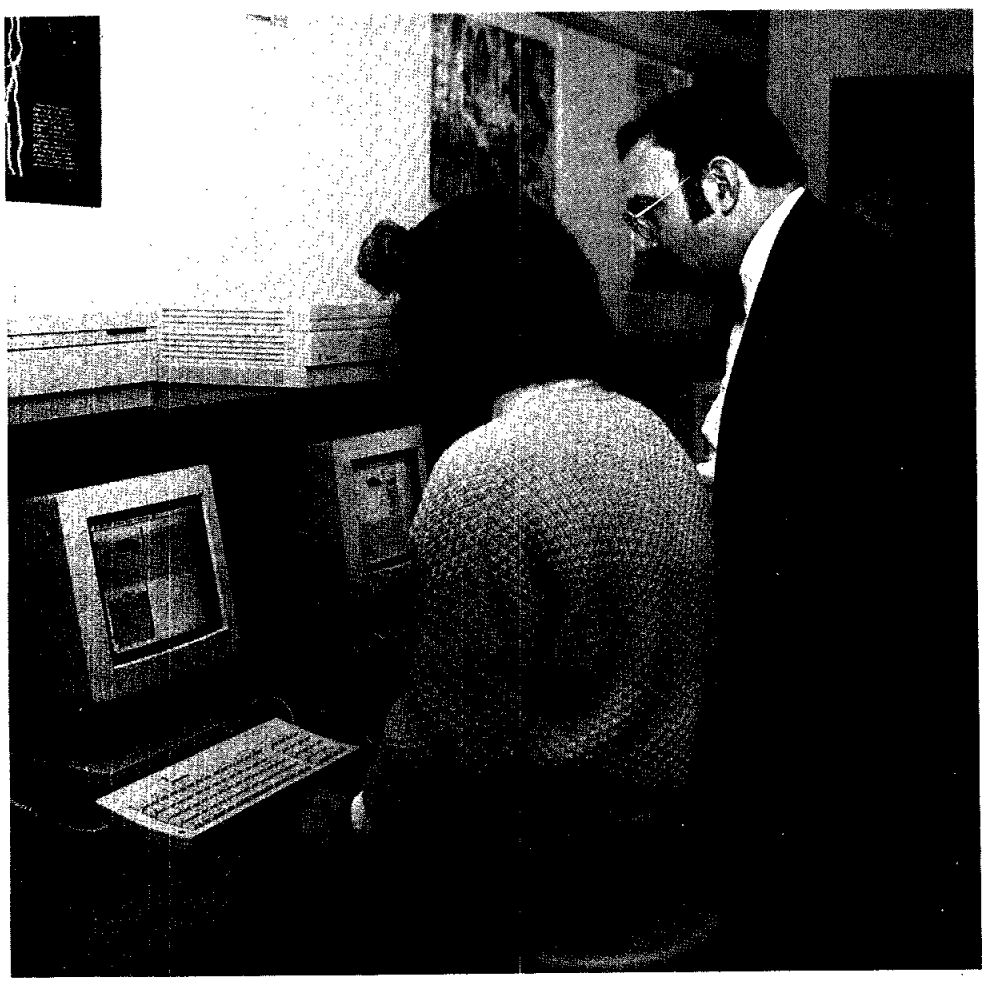
The basic knowledge for artificial intelligence has been around since the mid 1950s, but the complexity of the programs prohibited its use outside the realm of research, Savely said.

The potential for expansion of the Intelligent Tutoring System is broadening. Future versions might include video action to provide students with moving examples rather than static pictures and provide students with tools to make measurements, turning the computer into a true laboratory experience.

Already, at least one spinoff of the spinoff is anticipated.

Loftin said an algebra program had to be built as part of the physics tutor. That part of the program easily could be produced independently.

"We could have a whole spectrum of products," Loftin said, "then you have the real ability to affect education. I can't think of a better use of NASA technology."



A computer screen displays the subject matter for one of the Intelligent Tutoring System's lessons as Loftin and a student observe.

New division chiefs appointed

M. Conley Perry has been appointed chief of the Quality Assurance and Engineering Division, replacing retiring Chief T.J. Adams. Perry has been deputy chief since 1987.

Perry will direct the activities of employees in the Flight Systems Quality Engineering, Institutional Quality Engineering, and Quality Assurance Branches.

Perry joined JSC in 1967 in the Engineering Directorate, and has since served in the Flight Crew Operations and Mission Operations Directorates.

Whittle new safety chief

David W. Whittle, former chief of the Communications and Data Systems Branch, has been appointed chief of the Safety Division. Whittle replaces Jay Greene, who has been appointed deputy manager of the NSTS Program Office.

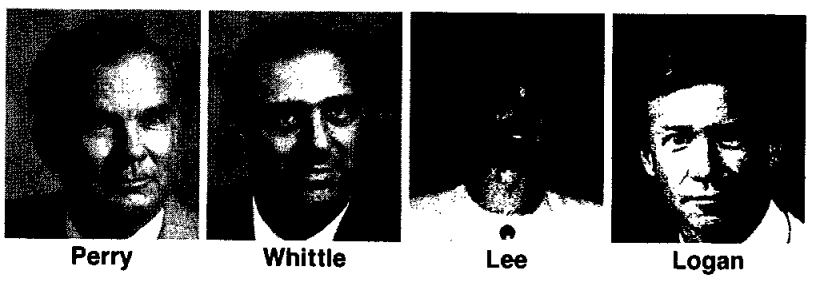
Whittle, together with the division's 58 civil servants, will be responsible for all institutional safety, payload safety, and National Space Transportation System safety.

Whittle joined JSC in 1967, and worked in the Flight Operations and Mission Operations Directorates before joining the Safety, Reliability, and Quality Assurance Directorate.

Lee to shuttle procurement

Deidre Lee, former chief of the Orbiter and STS Integration Procurement Branch, has been named chief of the Space Shuttle Procurement Division. Lee replaces Gene Easley, who was appointed procurement director.

Lee joined JSC in 1984 in the Administration Directorate, after having previously served with the Department of Defense and the Air Force.



Perry Whittle Lee Logan

Logan to program control

Thomas Logan has been appointed deputy chief of the National Space Transportation System (NSTS) Program Control Office. He replaces Howard Renfro, who has been appointed chief of the office.

Logan joined JSC's Administration Directorate in 1980 in the NSTS Program Control/Program Assessment Office. He had previously served with the General Accounting Office.

As deputy chief, Logan is responsible for the management of the NSTS Integration and Operations and Engineering Integration Budget Offices. He will manage cost, schedule, and technical trade-off analyses in support of NSTS programmatic requirements.

Voyager finale

Geyser-like plume seen on Triton

A 5-mile-tall, geyser-like plume of dark material has been discovered erupting from the surface of Neptune's moon Triton in images returned last month to NASA's Jet Propulsion Laboratory, by Voyager 2.

The discovery came just as the Neptune encounter—Voyager 2's fourth and final planetary flyby in 12 years—officially ended Oct. 2.

This is the first time geyser-like phenomena have been seen on any solar system object, other than Earth, since Voyager discovered eight active geysers shooting sulfur above the surface of Jupiter's moon, Io. The new finding—Voyager's last hurrah in its journey past the planets—augments Triton's emerging reputation as the most perplexing of all the dozens of moons Voyagers 1 and 2 explored.

Voyager 2's camera captured the eruption shooting dark particles high into Triton's thin atmosphere. Resembling a smokestack, the narrow stem of the dark plume, measured using stereo images, rises vertically nearly five miles and forms a cloud that drifts 90 miles westward in Triton's winds.

While Voyager scientists are trying to determine the mechanism responsible for the eruption, one possibility being considered is that pressurized gas, probably nitrogen, rises from beneath the surface and carries aloft dark particles and possibly ice crystals.

Whatever the cause, the plume takes the particles to an altitude where they are left suspended to form a cloud that drifts westward.

Voyager 2's working life among the planets may be at an end, but the spacecraft and its twin, Voyager 1, are expected to continue returning information about the various fields and particles they encounter while approaching and eventually crossing the boundary of our solar system. The plutonium-based generators that provide electricity to the spacecraft are expected to keep alive the computers, science instruments and radio transmitter for up to 25 or 30 more years.

JSC Photo by Jack Jacob

SUPER SYSTEM—Carl Martin, computer engineer in the Simulation Systems Branch, welcomes the Cray X-MP EA/464 Supercomputer to Bldg. 46. The computer, which has four processors and contains 64 million words of memory, is up and running now serving a limited number of users on a test basis. Network connections are under way and complete operations are expected to begin in mid-November.

Cosmic launch nearing

(Continued from Page 1)

FIRAS, covering wavelengths from 0.1 to 10 millimeters, will survey the sky twice during the year-long mission to determine the spectrum (brightness versus wavelength) of the cosmic background radiation from the Big Bang.

The spectrum that would result from a simple Big Bang can be calculated with great accuracy. Such a spectrum would be smooth and uniform and have no significant releases of energy between the time of the Big Bang and the formation of galaxies. If FIRAS' measurements depart from the predicted spectrum, scientists will know that powerful energy sources existed in the early universe between these times.

These sources may include annihilation of antimatter, matter falling into "black holes," decay of new kinds of elementary particles, explosion of supermassive objects and the turbulent motions that may have caused the formation of galaxies.

FIRAS' sensitivity will be 100 times greater than that achieved so far by equivalent ground-based and balloon-borne instruments. Producing a spectrum for each of 1,000 parts of the sky, the FIRAS data will allow scientists to measure how much light was radiated by the Big Bang.

DIRBE will search for the diffuse glow of the universe beyond our galaxy in the wavelength range from 1 to 300 micrometers. In the final analysis, any uniform infrared radiation that remains will be very rich in information about the early universe. One possible source would be light from primordial galaxies shifted into the far infrared by the expansion of the universe.

Mission Control Center viewing room to be open

The Mission Control Center viewing room will be open to JSC and contractor badged employees and their families at designated times during STS-34.

The viewing room will be open on flight days 2, 3 and 4 from 4-9 p.m.

Due to the many variables involved in mission operations, viewing times may change. Updates will be reported on the recorded telephone Employee News Service, x36765.

Employees must wear their badges and escort family members. Entrance to the viewing room will be through the visitor area on the northeast side of Bldg. 30.

Visitors should limit their stays during busy periods to afford the opportunity of viewing mission activities to as many employees as possible.

Employees also are invited to a welcome home ceremony for the crew and families of STS-34 at Ellington Field.

The ceremony will begin about seven hours after landing at Edwards Air Force Base. If launch occurs as scheduled at 11:57 a.m. CDT Oct. 17, landing would be at 2:42 p.m. CDT Oct. 22 and the ceremony would begin about 9:42 p.m. CDT.

The ceremony will take place east of Hangar 990. Parking will be available on the west side of the hangar and gates will open one hour before crew arrival.

Updates on landing and return-to-Houston information will be available on the Employee Information Service, x36765.

JSC nominee top minority contractor

JSC's nominee for NASA Minority Contractor of the Year, Dual and Associates of Arlington, Va., has been selected as a co-winner for the award.

Dual shares the honors with Analytical Services and Materials Inc. of Hampton, Va., a Langley Research Center nominee.

The companies were selected from a group a prominent minority businesses that have made outstanding contributions to NASA. President Fred Dual of Dual and Associates accepted the award from NASA Administrator Richard Truly in ceremonies at NASA Headquarters. The presentations were made during the nationwide observance of Minority Enterprise Development Week.

Space News Roundup

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

Editor .....Kelly Humphries

Associate Editor .....Linda Copley

Cook-off sold out

Tickets for the Center Operations Chili Cook-off, scheduled for Oct. 13, are sold out. No tickets will be available at the gate.

Correction

The Apollo astronauts collected a total of 54 core samples from the Moon which included 34 drive tube core segments from 20 locations and 22 drill core segments from three locations.

An article in the Oct. 6 Roundup stated an incorrect number of core samples.

Clarification

The caption for a photograph of the Shuttle Crew Return Alternative Module (SCRAM) in the Oct. 6, 1989, Space News Roundup erroneously listed George Zupp as SCRAM's designer.

While Zupp was lead engineer on the design effort, Wayne Peterson was the principle designer. He was assisted by Chris Cerimele.

Nose talents at White Sands keep shuttle odor-free

(Continued from Page 1)

Chemical and Environmental Lab.

Materials that will go into the shuttle's crew compartment first are checked thoroughly for toxicity and various other properties before they go under the volunteer noses. The more refined analytical equipment of today has virtually eliminated instances akin to Apollo 13, but the odor panel, whose insignia is a large-nosed skunk, can eliminate items if they find them objectionable. The job is serious, and those who conduct it and participate in it are proud of their work.

"Even though it is a volunteer project, I enjoy doing it," said Bobby Gomez, an odor panel veteran of the past 18 years. "It goes for a good cause, so that the astronauts can feel comfortable that someone's tested it all. I wouldn't want them to go through a problem."

It also is now a tradition—the odor panel has been in existence since 1967. Literally every item that has flown in the crew cabins of NASA spacecraft since that time has passed the nosy examination.

All told, the odor panel may have smelled as many as 6,000 materials in its 22-year history, Johnson said. "The testing is set up for the safety of the human volunteers," he explained. "The human nose is very sensitive to some compounds and very insensitive to others. There's no substitute for its observations."

Currently, an average of nine materials is tested each week at WSTF, three in each of three sessions. A typical assortment may include adhesives, fabrics, potting compounds, plastics, paint, inks, shaving lotion or deodorant, Johnson said.

"Most of the time it is a material that we test, something that will be used as a component of something else," added Betty Hoffman, odor panel test conductor. "But every once in a while you get a glove, a razor, something recognizable."

The odor panel volunteers are all WSTF workers with less unusual forms of every day work. "I think it's a break from the routine for them," Hoffman said. "It's something worthwhile. It's a direct contribution to the shuttle program, something you can do personally."

Noses are given extra care on the day a test will be conducted: volunteers don't smoke that day, don't chew gum and don't wear heavy perfume or cologne. They don't eat anything for a half-hour prior to the test. The tests are conducted early in the day, so noses will be fresh from a good night's sleep.

Just to get to that point, to be selected for the odor panel, isn't easy. You have to be a bit gifted in the olfactory department. Members must go through a nose calibration every four months, sniffing a set of 10 odor samples: seven standard odors and three of only water. Members must be able to isolate the odorless water samples.

"Some people just can't pass that test, something is lacking in their sense of smell," Johnson said. "It's really not something you can train, you either have it or you don't."

The day of a test, noses are again calibrated on three samples: two with standard, distinct odors and one of water.

The tests are conducted in a special room protected from pervasive outside smells, and five sniffers grade each sample independently. The samples are subjected to the same heat and humidity they will experience aboard the shuttle and sealed in a glass jar, from which a sample sniff is drawn for each member. The grading scale includes "not detectable," "barely detectable," "easily detectable," "objectionable" and "irritating." A sample will fail the test if the average of all five sniffers falls halfway or more between an "easily detectable" and an "objectionable" rating, Johnson said.

"Normally, the ratings given by the individual odor panel members are very close, although they often differ slightly. That's why we do five people and take an average," he added. "People are very subjective on what smells objectionable, some are more acute than others. And the odor panel attempts to match the variety of sensitivities you would find among astronauts and everyone else."

NASA-JSC