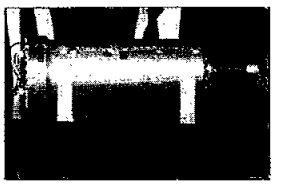
NASA
National Aeronautics and Space Administration
Lyndon B. Johnson Space Center
Houston, Texas

Visual imagery

Evaluation of a new JSC visual imagery concept for training space station crews is underway. Story on Page 3.



CRRES readings

The Combined Release and Radiation Effects Satellite is helping scientists understand the effects of chemical releases in the upper atmosphere. Story on Page 4.

Space News Roundup

Vol. 29 | September 14, 1990 | No. 37

Ulysses crew confident of October launch

By Kelly Humphries

STS-41 crew members said Wednesday they are confident of an early October launch and are comfortable a small Freon loop leak that *Discovery* is expected to fly with is not a safety factor.

"I think we have every reason to expect that we're going to have an October launch," said Commander Dick Richards. "Because of *Discovery*'s prior flight performance and the processing that it's had, I think we've got a reasonable chance of making it."

STS-41
Ulysses

The STS-41 launch window extends from Oct. 5 to Oct. 23 and must be met if the crew is to make a "360-nautical-mile hole-in-one" that will send Ulysses on its five-year journey around Jupiter and out of the solar system's orbital plane for a look at the Sun's poles.

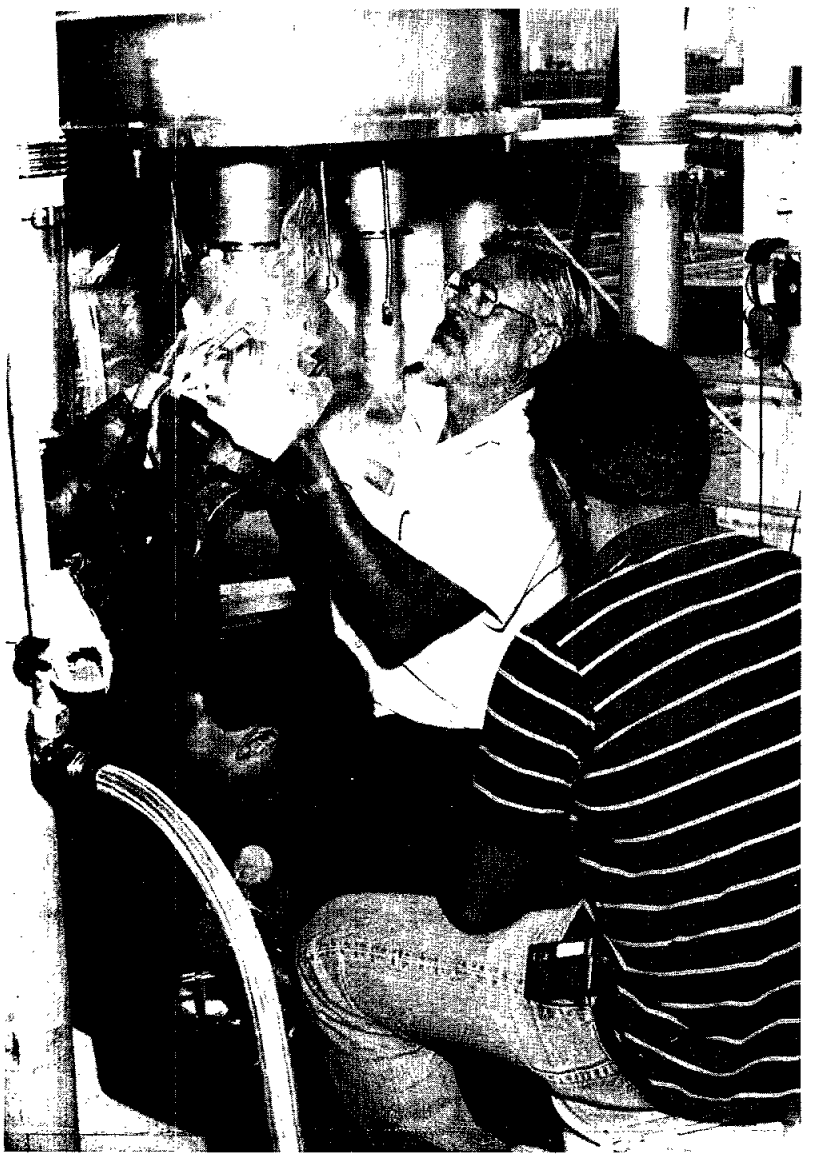
Richards' golf analogy referred to the accuracy of the launch and three booster burns required to put Ulysses on the proper trajectory to complete its mission.

The crew also said it isn't worried about hydrogen leaks that have plagued other space shuttles over the summer or flying with the plutonium that will power the Ulysses solar probe in the radioisotope thermoelectric generators.

As the crew discussed the mission during a Sept. 12 press conference, mission managers, announced that preparations at Kennedy Space Center's Launch Pad 39B are moving toward an Oct. 8 launch or as early in the window as possible.

KSC engineers pronounced *Discovery* safe for flight after Freon coolant loop one was pressurized to almost one-and-a-half times maximum operating pressure and the leak rate did not increase. To pose a problem for *Discovery* during the four-day flight, the leak would have to triple in size. The Freon loop, which has a backup, will be filled as close to launch time as possible as part of the pre-launch preparations.

Please see ***DISCOVERY***, Page 4



JSC Photo by Benny Benavides

Don Buckner, a Lockheed technician, this week installed the suspect liquid hydrogen recirculation pump from OV-102 into JSC's Thermochemical Test Area teststand. Preliminary indications from leak tests at JSC showed minor, acceptable leakage. In addition to Buckner, (left to right) Larry Kilbourn, a Rockwell Service Center technician, and John Dickerson, an EBASCO Services inspector, also monitored the test at JSC.

Damaged seal gets blame for launch scrub

By James Hartsfield

With the discovery and replacement of a badly damaged seal in a main engine valve assembly, Space Shuttle Program officials said *Columbia* appears ready for a Tuesday launch.

Columbia's launch for STS-35 is set for 12:28 a.m. CDT Tuesday.

STS-35
Astro-1

The crew—Commander Vance Brand, Pilot Guy Gardner, Mission Specialists Mike Lounge, Jeff Hoffman and Bob Parker and Payload Specialists Ron Parise and Sam Durrance—was scheduled to leave JSC for Kennedy Space Center this weekend.

After removing the recirculation pump package from *Columbia*'s aft fuselage, KSC technicians performed leak checks of the main engine prevalves located downstream from the pumps. The helium leak checks indicated a problem in the main engine no. 3 prevalve detent cover assembly.

Workers removed the cover Tuesday, discovered a crumpled two-and-a-half-inch diameter seal and replaced it. Officials now believe the crumpled seal was the main culprit behind the leakage that halted *Columbia*'s Sept. 5 launch attempt, and that replacing it may solve the leak problem. The seal apparently was damaged by improper installation during a cleaning of the recirculation plumbing following *Columbia*'s STS-32 flight.

"We were surprised to find a damaged seal there, but now that we have, it appears to explain the data we've seen on the leak all along," said Mike Conley, *Columbia* vehicle manager.

A helium signature test Tuesday, pressurizing the main engine plumbing to twice the normal amount for such a test, showed no prominent leakage from the new seal.

The removed recirculation pump package was flown to JSC and tested for leaks as the new pumps were installed. However, one test run with helium and two runs with liquid hydrogen at JSC's Thermochemical Test Area showed only minor, acceptable leakage, said Propulsion Branch Chief Ralph Taeuber. The failure to find leaks in the recirculation pump package further supports the belief that the damaged seal was the catalyst behind *Columbia*'s scrubbed launch last week.

Veteran astronaut McCandless retires

First person to fly untethered in space leaves NASA, Navy

By Barbara Schwartz

Capt. Bruce McCandless II, a NASA astronaut since April 1966 and mission specialist on two space shuttle flights, has retired from NASA and the Navy.

During his first space flight, STS-41B in February 1984, McCandless made the first untethered, free flight of the manned maneuvering unit he developed with Ed Whitsett of the Automation and Robotics Division.

Paraphrasing Neil Armstrong's historical comment on Apollo 11, McCandless said, "That may have been one small step for Neil, but it's a heck of a big leap for me," just before leaving the orbiter's payload bay for his MMU flight.

His second flight, STS-31 in April 1990, deployed the Hubble Space Telescope.

McCandless was capcom on Apollo 10 and 11 and a member of the astronaut support crew for the Apollo 14 mission. He was backup pilot for the first manned Skylab mission and was co-investigator with Whitsett on the M-509 astronaut maneuvering unit experiment flown in the Skylab Program. He has been responsible for crew inputs to the development of hardware and procedures for the inertial upper stage, Hubble Space Telescope, the Solar Maximum Repair Mission and the Space Station Program.

McCandless remained an active-duty Naval officer throughout his NASA career. He retired Aug. 31 with more than 32 years of Naval service.

He graduated second in a class of 899 at the U.S. Naval Academy in 1958, and became a naval aviator in March 1960. He flew the Skyray and the F4B Phantom II from 1960-64 and saw duty aboard the USS *Forrestal* and the USS *Enterprise*.

McCandless did not announce his plans for the future.

Bruce McCandless

Stop smoking classes begin later this month

If you want to quit smoking but haven't been able to do it on your own, help and group support will be available during duty hours every Tuesday beginning September 25.

The smoking cessation programs will feature Dr. Larry Laufman of the Institute for Preventive Medicine at Methodist Hospital, said Beth Hall, who is coordinating the workshops for JSC's Human Resources Development Branch.

A question and answer session is planned for 3-4 p.m. Tuesday in Bldg. 45, Rm. 304. All interested employees are invited.

Laufman's eight-week program incorporates behavior modification and group support techniques, Hall said. The sessions bring smoker's behavior into line with their want-to-quit attitudes through a gradual weaning process. Counseling on managing stress and coping with withdrawal symptoms and habit triggers also is included.

Methodist Hospital's client list is impressive and the program boasts a high rate of successful completion, Hall said. Laufman is a professor in the Baylor College of Medicine and serves as the Stop Smoking Specialist in the Behavioral Sciences Division at Methodist.

Because JSC is instituting a centerwide policy that prohibits smoking inside JSC buildings beginning Jan. 1, the cost of the

Please see **STOP**, Page 4

Countdown to a Smoke-free Environment

January 1, 1991

Space tomatoes win first prize at Kansas fair

By Kelly Humphries

How are blue-ribbon tomatoes grown in Kansas? Why, by using seeds that have spent almost six years in space, of course.

At least that's how Roger Hoefer started the tomatoes that won first prize in the Kansas State Fair on Sept. 7.

Hoefer, planetarium director for the Kansas Cosmosphere in Hutchinson, Kan., entered a plate of six tomatoes grown from seeds that orbited Earth aboard the Long Duration Exposure Facility. His entry beat out about three dozen others based on conformity, uniformity of shape and ripeness, and freedom from skin blemishes and defects.

"It was almost a lark," Hoefer said of the decision to enter the space tomatoes. "Somebody said, 'Why don't we enter our tomatoes in the state fair?' It's just up the street from us."

Hoefer entered the tomatoes last Friday and they were judged that evening. He didn't have time to check whether they'd won until Monday.

"I couldn't believe it," he said, "they had the blue ribbon on them."

When the news media discovered the story, a tornado of local and international publicity began spinning around Hoefer and the Cosmosphere, which had distributed the seeds to its volunteers to provide experience that will help

Please see **TOMATOES**, Page 4

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.

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

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

Sea World (San Antonio, year long): adults, $17.25, (two-day $21.95); children (age 3-11) $14.75, (two-day $18.95).

Astroworld (valid 1990 season): adult $15.97; children $9.21; season pass, $39.95; Waterworld, $8.15; two-day—AW/WW $18.47.

Lovin' Feeling Concert (7:30 p.m. Sept. 29, Summit): $16.

State Fair of Texas Trip (7 a.m. Sept. 29-6 p.m. Sept. 30, includes transportation, admission, lodging, buffet breakfast): $70.

Astros vs. Braves (7:30 p.m., Sept. 28, Astrodome mezzanine): $5.

Texas Renaissance Festival Bus Trips (Oct. 13 or Nov. 10 - Tickets go on sale Sept. 10): child, $6 (under 5), $9; adult, $12.

Texas Renaissance Festival (Saturdays and Sundays Oct. 6-Nov. 18): adults, $8.95; children, $4.95.

JSC

Gilruth Center News

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

Defensive driving—Course is offered from 8 a.m.-5 p.m., Oct. 13 and Nov. 17; cost is $15.

Weight safety—Required for use of the Gilruth Center weight room. The next classes will be from 8-9:30 p.m. Oct. 10 and 25. Cost is $4.

Aerobics and exercise—Both classes are ongoing.

Ballroom dance—Professional instruction in beginning, intermediate, and advanced ballroom dancing. Classes begin Oct. 4 and meet every Thursday for eight weeks. Beginning and advanced classes meet 7-8:15 p.m. Intermediate class meets 8:15-9:30 p.m. Cost is $60/couple..

Tennis—Beginning tennis lessons are available from 5:15-6:45 p.m. every Monday for six-weeks. Beginning lessons began Sept. 10. Advanced beginner lessons began Wednesday, Sept. 12. Cost is $32.

Soccer—Registration will be Sept. 17. Pick up information at the Gilruth Center.

Flag football—Registration will be by lottery the week of Oct. 1. Come by the Gilruth Center, Rm. 146, for more information.

Softball tournament—Last Men's Open "C" Tournament of the year is Sept. 29-30; Fee is $95. Entry deadline is Sept. 27 at 7:30 p.m.

JSC

Technical Library News

These new publications are available in the JSC Technical Library, Bldg. 45, Rm. 100.

Multiaxial Fatigue: Analysis and Experiments, Society of Automotive Engineers, 1989, TA 460.M85.

Visual Information Processing for Television and Telerobotics, NASA, 1989, TK 5105.2V571.

Electronic Transfer of Information and its Impact on Aerospace and Defense Research and Development, AGARD, 1990, TL 500.N63 A24 No. 466.

Schirra's Space, Schirra, Wally, 1988, TL 789.85.S35 A3.

JSC

Dates & Data

Today

Women's seminar—The Federal Women's Program will have a one-day seminar on "The Competent Business Woman" from 8:30 a.m.-4:30 p.m., Sept. 14 in the Gilruth Center. For more information, call Freda Marks, x30606.

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

Monday

Women's seminar—The Federal Women's Program will have a one-day seminar on "The Competent Business Woman" from 8:30 a.m.-4:30 p.m., Sept. 17 in the Gilruth Center. For more information, call Freda Marks, x30606.

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

Tuesday

AFCEA meets—The next Armed Forces Communications and Electronics Association Houston Space chapter meeting will be held from 11:30 a.m.-1 p.m., Sept. 18 at the Holiday Inn on NASA Road 1. Daniel A. Nebrig will be guest speaker. Tickets cost $12 for members and $14 for non-members and include lunch. For more reservations and information call Veronica Mullins, 283-7342.

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

SAFE kickoff—The Houston Chapter of the SAFE Association's kickoff meeting will be at 11:30 a.m., Sept. 19, in the Gilruth Center Main Pavilion. For more information, call Karin Poehlmann, x33381.

JSC Astronomy Seminar—The JSC Astronomy Seminar will be from noon-1 p.m., Sept. 19, in Bldg. 31, Rm. 129. Dr. Karl Henize will speak on "Early Days of Satellite Tracking." For more information call, Al Jackson, 333-7679.

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

Thursday

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.

Sept. 21

Houston Space Society — The Houston Space Society will present a lecture by Alex Dessler, chairman of Rice University's Department of Space Physics and Astronomy, at 7:30 p.m. Sept. 21 in the Embassy Room, University Center, University of Houston. Dessler's topic is "Will NASA Go Down Like the Hindenburg?" for more information, call 639-4221.

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.

Sept. 25

BAPCO meeting—Bay Area PC Organization (BAPCO) will meet from 7:30 p.m., Sept. 25, at the League City Bank and Trust. For more information contact Earl Rubenstein, x34807, or Tom Kelly, 996-5019.

Sept. 26

JSC Astronomy Seminar—The JSC Astronomy Seminar will be at noon-1 p.m., Sept. 26, in Bldg. 31, Rm. 129. A videotape featuring V. Courtillot - "Internal Cause of the Cretaceous - Teritary Boundary Events" will be shown. For more information, call Al Jackson, 333-7679.

Oct. 5

Technology van—The NASA Technology Transfer van will be at JSC from 9 a.m.-1 p.m. Oct. 5 in the parking lot south of Bldg. 25. The 60-foot van's displays highlight the importance of transferring technology to the private sector.

Oct. 20

Wings Over Houston—The 1990 Wings Over Houston Airshow will be Oct. 20-21 at Ellington Field. The U.S. Marine Corps' vertical take off and landing jet, the Harrier, will participate and the Confederate Air Force will celebrate the 50th Anniversary of the Battle of Britain with its WWII airpower demonstration. Contact Col. Ray Jones, 850-7545, or Lu Lewis, 784-5200, for more information.

October 28

Bicycle ride—The Texas Coastal Century bicycle ride will be held from 8 a.m.-5 p.m. on Oct. 28 at the University of Houston Clear Lake. Proceeds will benefit the Houston Food Bank and University of Houston-Clear Lake recreation and sports. Early registration by Oct. 1 is $10; registration after Oct. 1 is $15. For applications and more information, visit the Gilruth Center. Call Mike Prendergast at 335-2505 for details.

Oct. 30

Space conference—Space Exploration '90, a conference and aerospace industry exposition sponsored by the NASA Alumni League, will be held Oct. 30-Nov. 1 at the South Shore Harbour Resort and Conference Center. Contact Carol Ramey, exposition manager, 800-765-7615, for more information.

Nov. 6

Ada users' symposium—The third annual NASA Ada Users' Symposium will be Nov. 6 and is hosted by JSC and the MITRE Corp. For more information contact John Cobarruvias, x39357, or Sheila, 333-0910.

Nov. 27

National technology conference—Technology 2000, a national technology conference, will convene Nov. 27-28 at the Washington Hilton Hotel. For more information call 212-490-3999.

May 22

Space Development—The National Space Society will host the 10th annual International Space Development Conference May 22-27 at the Hyatt Regency on the Riverwalk in San Antonio. The theme is "Space: A Call for Action." Abstracts, due by Nov. 1, may be sent to Bob Blackledge, 6015 Eagles Nest Ct, Colorado Springs, 80918-1510. For more information, call Carol Redfield at 512-522-3822.

JSC

Swap Shop

Property

Rent: 2-BDR duplex, A/C, new carpet, refrig., range, new paint, avail. 9/1, $325/mo. Cooper, 484-0775.

Sale: 1.14 acre in Splendora, TX, on corner of paved road, wooded on hill, owner fin. 921-7212.

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

Rent: Lake Livingston, waterfront house, 3-2, CA/H, furn., covered decks, pier, new cond., wknd or wk rates. 482-1582.

Lease: Pebblebrook condo, El Lago, 1-1, mirrored walls, miniblinds/verticals, W/D, upstairs unit, 650 sq ft, $335/mo. Lindemann, 488-3300 or 532-2218.

Lease: 3-2-2A in Forest Bend Sub., Friendswood, ceiling fans, screened back porch, CCISD, $615/mo., first/last + $300 dep. 996-9416.

Sale: League City, Meadowbend Sub., 3-2-2, cul-de-sac, FPL, fans, miniblinds, gar. opener, 2811 Woodhall Ct. 480-7100.

Lease/Sale: Baywind II condo., ground floor, 1 BR, W/D connections, FPL, $365. 486-0898.

Sale: Bay Glen, 4-2.5-2, 2090 sq ft, cul-de-sac, 9.5% FHA assum. Melinda, x30257 or 488-7449.

Rent: Lake Travis cabin, private boat dock, CA/H, equipped, accom. 8, wk/day $325/$80. 326-5652.

Sale: Large lot (120' x 162') in Friendswood; near jr. high and elem. in custom home neighborhood, $25k, OBO. Rick, 283-1988 or 996-8961.

Sale: Dickinson, 2716 Frostwood Cr., 4-2-2D brick, 2800 sq ft, open concept, FPL, lg lot, trees. x31466 or 534-3932.

Sale: Dickinson, 2 acres, Humble Camp Rd., improved property, util. avail., trees, 12K/acre. Shelly, 333-7153.

Sale: Texas City, 2-1-1, den, dining & living rms, enclosed back porch, curbs, $32,500 OBO. Shelly 333-7153.

Sale: Corner lot Westwood Shores on Lake Livingston, 60' x 115', near lake, util. avail., $9,500 OBO. x30032 or x31834.

Sale/Lease: Wedgewood Village Friendswood 3-2-2, 1700 sq ft, formal dining room, new paint & carpet, $68,900 or $750/mo. Gretchen, 282-6650 or 482-6744.

Sale: 3-1.5-2 brick, NW Houston (inside Loop 610), on cul-de-sac, approx. 1800 sq ft, C/AH, kitchen appliances, fans, $84K nego. Richard, 868-9426.

Rent: Galveston condo, Seawall & 61st, sleeps 6, furn. day/wk/wknd rates, cable TV. x33479 or 486-0788.

Sale: Shoreacres, contemp., 4000 sq ft, 5-4-study plus mother-in-law suite and workshop, on wooded 1 1/3 acre, $114,900. x38039 or 333-1751.

Sale: Two water view lots near NASA, $38,500 ea. Don, x38039 or 333-1751.

Lease: Middlebrook II 3-2-2, 1940 sq ft, FPL, fence, garage w/door opener, ex. cond., $800/mo. plus dep., no pets. 480-3260.

Rent: Room in lg house, Sageglen, nice, maid, util. pd., $270/mo. Eric, x38420 or 484-9179.

Cars & Trucks

'78 TransVan, V8, sleeps 3, good tires, runs good, needs body work, $1750 OBO. Cooper, 484-0775.

'80 Ford Ltd., 4dr, maroon, maint. rec., AM/FM/tape, good tires/brakes, no rust, $2,200. 554-7083.

'82 Toyota Supra, loaded, 87K mi., new brakes and exhaust, $4,000. 474-4084.

'88 GMC Custom Van, loaded, low mi., ex. cond., $16,500. 333-3700.

'85 Cadillac El Dorado, loaded, new tires, lo mi., ex. cond., $8,250. 333-3700.

'86 Toyota van, 48K mi., auto, dual air, cruise, $7,000. Bill, x34315 or 485-6276.

'80 Pontiac Phoenix, V6, AC, 5-dr liftbk, new auto. transmission w/1 yr warr., new bat., $1,950. x30092 or 481-3637.

'89 Hyundai Excel, auto, grey int., AM/FM/cass., 4-dr, sunroof, 21K mi, dark red, ext. warr., ex. cond., $1,500 and assume note. x35294 or x32161.

'77 Sunbird V6, it runs, BO. x37121.

'82 Z28, auto, T-tops, PS, PB, new A/C and tires, 81K mi, $3,800 OBO. Mike, x39856 or 484-7319.

'83 Mazda RX-7 GSL, ex. cond., 75K mi, sunroof, 60 series tires, new brakes, 5-spd., $4,050. 478-1596 or 486-4508.

'89 Ford Probe LX, red w/gray int., 16.4K mi, sun roof, upgraded stereo, power pak, ex. cond., $10,900. 335-1711.

'80 Mazda RX-7 LS, blk w/brn leather int, low mi, ex. cond., cass., sunroof. 480-5901.

'73 240Z, white, 4-spd, A/C, $995. Paul, x37806 or 326-2311.

'83 Honda Prelude, 5-spd, sunroof, ex, cond., 83K mi, one owner, $4,500. B. Craig, x32338 or 420-2936.

'88 GMC S15 Jimmy, red, auto, new tires, assume balance, no equity req. 338-0017.

'86 Cadillac Sedan Deville, loaded, 50K mi, $8K. 486-7572.

'85 Pontiac Sunbird, good cond., runs well, 5-spd, good MPG, $2,100. Mike, x34378 or 486-4983.

'84 Mustang L, Hatchbk, A/C, 72K mi, Michelin tires, auto, one owner, $2,875. 482-6291.

Cycles

Montagner Italian racing bike w/dura-ace groupo 57 cm frame, Royal wheels, $850 OBO; Cannondale mountain bike, lifetime gaurantee on frame, $275 OBO, Don, x35560.

'82 Harley Davidson Sportster XLH motorcycle, elec. start, ex. cond., low mi., new batt., $2875. x30092 or 481-3637.

Univega Vivatech 1050 12-spd bicycle w/Shimano components, w/bottle, util. bag, trunk rack. 282-5238 or 486-4534.

'87 Kawasaki KLR-650, multi-purpose, 6K mi, liquid cooled, elec. start, ex. cond., $1,900. Nicolas, 282-3307 or 486-4016.

Men's 10-spd bicycle, 26 in. frame, good cond., $46. 486-6762.

Boats & Planes

12' flat bottom boat, 6HP Merc. outbd trolling motor. 996-9646 or 282-4271.

650SX jet ski, 2 mo. old, like new, $3,600 OBO. 471-3857.

9' Bass Hunter boat, trolling motor, $295. Jim, x36588 or 358-9598.

'73 34' Bristol Classic sloop, 1 owner, NorthEast construction, 28 HP Westerbeke Diesel, fast cruiser, sleeps 7, lg. cockpit, spacious mahogany interior. 474-7225.

10' aluminum flat bottom boat, $100. 538-1922.

Aircraft propeller, Sensenich 74DM6-0-58, overhauled and yellow taged, fits some Beech, Piper PA-18, PA-22, PA-28 series aircraft, $900. 283-5327.

'83 16' Starcraft, V-hull ctr, cons. w/55HP Johnson OB, TNT stnlss prop., rebuilt in '90 w/lg bow & stern casting platforms, trl. mtr., perm. 18-gal. tank, wheel steering, poling platform, fbrgls push pole, galv. trlr, $3,500. 488-7314.

'78 Sea Ray 23' 220 Overniter cuddy cabin, IB/OB OMC 350 w/'85 Calkins tandem axle trlr., surge brakes, ex. cond., $9,850. 332-4807.

16' Renegade ski boat, 140HP Eninrude SST prop, new ign system, carpet, paint, $2,700 OBO. 333-6868 or 486-7846.

Sailing catamaran, 5-meter G cat, including sails & trlr, $750 OBO. 474-4615.

Audiovisual & Computers

Atari 1040 ST, color, StevoTEK glasses, joysticks, desk, chair, SW, CAD3D, C compiler, games, $500 OBO. x38308 or 484-5927.

Apple IIe, 128K, duo-disk, monitor, parallel interface, joystick, manuals, SW, $750 OBO. Roger, 280-0769 or 335-2780.

Sony integrated stereo AV amp TA-AV480 w/ programmable remote, 120 Watts w/15 Watts for surround sound, $275; Sony F-30 8mm Camcorder w/175 W video light, $2700. x33233 or 480-5061.

Macintosh 512K, 2 400K drives, modem, printer, carrying case, keypad, assorted SW, $900. 280-2241 or 480-5862.

Scuba dive computer, U.S. Divers J. M. Cousteau Data Scan III electronic dive computer, built-in electronic dive tables, replaces pressure & depth guage, 1 mo. old, was $648 now $550 OBO. Patrick, x32635 or 488-1079.

Magnavox camcorder, video light, charger/battery, carrying case, access., manual, was $1,400 now $700. 282-5429 or 484-5366.

Hitachi portable video cassette recorder (VHS) w/video camera, 4-hr batt. pack, was $1,380 now $200 OBO. Lonnie, x37876 or 482-0547.

Air Man 750 headset, push-to-talk switch, Nautronic flight computer, Archer & Warrior information manuals, flight training manuals, $100. x30750 or 1-585-8162.

Atari 800 computer w/cassette drive, $100 OBO. Gretchen, 282-6650 or 482-6744.

Technics 110 W/chan. home stereo amp., new, $250 OBO. Tom, 283-4315 or 538-4068.

Cerwin Vega 200W speakers, 15" woofer, (2) 2" drivers. new factory woofers & grilles, $300/pair. Frank, x33573, x39924 or 480-9376.

Tandy 1000 SX 384 exp. to 640, 360K floppy, DOS 3.2, RGB color monitor, Deskmate IBM Write, games, complete documentation, $400 OBO. Rob, 485-7627.

Magnavox Camcorder, $650; PC-XT w/color, 20 meg HD, 640K, $900. James, 554-2929.

IBM compatible laptop, backlit screen, 2 720K 3.5" floppy drives, 1 meg RAM, 8088 processor, 1200 baud modem, case, some SW, $800. Mike, x34378 or 486-4983.

IBM XT computer, Taxan hi res color, 640K, IBM 30 MB disk, AST 6-pack, clock, SW, $1275, x30092 or 481-3637.

Musical Instruments

Six-string Fender Mustang electric guitar, good cond. w/hard case, new strings, tremelo bar, $175 OBO; 12-string Ventura acoustic guitar, good cond. w/cast, pitchpipe, new strings, $150 OBO. 996-9701.

Artley clarinet, ex. cond., $250 OBO. x31593 or 480-6292.

Travis 3/4 classical guitar w/case, $50. 283-5465 or 332-1725.

Baldwqin Fun Machine (organ), ex. cond., $1000. 480-4691.

Gretsch 5-piece drum kit w/cymbals & hi-hat, extra hardware incl., $600. Galen, x38857 or 332-8837.

Reynolds trumpet w/case, approved for school band, $100; Fender Mustang guitar and Peavey Backstage amp, $350. Ross, x38411.

Pets & Livestock

Free 2 yr old female Main Coon cat, fixed, shots. 996-9646 or 282-4271.

Baby cockatiels, hand fed, hand tame, cinnamon, cinnamon pearl, and a gray. Linda, 484-7834.

Rabbits, mini-lops and New Zealands, $10 and up. 554-6200.

Registered cocker spaniel puppies, shots and papers. Frank, 282-3858.

Exotic registered Vietnamese miniature pot-bellied pigs, breeders & pets avail, $500 - $3,500. James, 482-6744.

Exotic Australian shepherd dogs, $250 ea.; finches, ringneck doves, guinea pigs, $5 ea. Jim, 482-6744 or Della, 409-778-6976.

Free dogs, 10 yr old male collie/lab mix; 8 yr old spayed, white, female shepherd; 6 mo old springer spaniel mix, all shots, new Houston licenses. Richard, x30104 or 868-9426.

Household

Bissel power steamer, like new, cleans, rinses and vacuums, includes extra formulas, $145. x33233 or 480-5061.

Sofa/love seat, dk brn, $175; 2 chrome/glass end tables, $30; chrome/glass coffee table, $40; tall sofa table w/o glass, $10; DR table w/4 chairs, $50; gold chair, $15. Kim, x31350 or 484-2777.

French Provincial dresser, $45. 480-3424.

Oriental rug, 6'x9', Ming design, navy/ivory/maroon, $250 OBO. Roger, 335-2780 or 280-0769.

Wood 36'x72' exec. desk, $150; 2 wood drafting tables, $65-$125; girl's single canopy bed w/cover, spread, and pillows to match, $100. x30271 or 480-5727.

Baby Tenda Table high chair w/adj. seat, bather, bib, swing stand, chalkboard & chair, $250; convertible stroller/carriage, $40; infant car seat/carrier, $20. 482-7643.

Custom made, French style sofa, wing back chairs, drapes & fabric divider, ex. cond, $900. x31636 or 484-5388.

Super single waterbed, good cond., w/frame, pedestal, heater and side bumpers, $45. Terry, x35026 or 554-6549.

Sofa/loveseat, beige, good cond., both $150; glass coffee table, $30; JVC stereo rack, $80; TV stand, $35. Ted, x36894 or 280-9595.

Full sz box spring, mattress, $125. x38896 or 482-9447.

Sofa/loveseat, off-white, beige, some peach w/oak trim, good cond., $150. x38896 or 482-9447.

Solid mahogany hand-carved dining room round table w/two leaves and 8 chairs, unfinished, $875. x33182 or 486-2622.

Tripple dresser, 2 mirrors, headboard, frame w/night stand, all solid oak, $425; mattress & box spring, $100. x33182 or 486-2622.

High quality water filter, $99 OBO. 283-5496 or 332-1614.

Antique solid maple dresser w/beveled mirror, $400 OBO. 283-5496 or 332-1614.

Photographic

Canon Sure Shot camera AF-35mm, $45. 482-7643.

Wanted

Want: Danish bookcase, self standing. Joe, 944-6513 or 333-7357.

Want: Ford Pinto, V6, no air, auto, between '74-'77, body not important, does not need to be running, needs to be towable. Trey, 280-4275 or 484-7834.

Want carpool from Pearland Shadycrest, Parkview or Wood Creek Subdiv. to JSC. Karen, x35517 or 485-3214.

Want running stroller, good cond. x39589 or 486-4508.

Want: Donnay Allwood tennis racket in good cond., Bjorn Borg signature, strings not needed. 333-7206.

Want singer, musicians, photographer, or anyone who provides a wedding service. Patty, 326-1853.

Want trundle bed. 554-6200.

Want grandparents or anyone with extra time to volunteer at the JSC Child Care Center. Work as little or as much as you can — help needed in morning, noon, or afternoon. Georgia Strain, x34734.

Want working refrigerators in good cond. for the JSC Child Care Center. Georgia Strain, x34734.

Want set of junior golf clubs, good cond. Rich, 333-6350 or 481-1486.

Want stable roommate to share LC house in Sageglen, maid, W/D, util. pd, $270/mo. Eric, x38420 or 484-9179.

Miscellaneous

Aquarium, 20 gal. w/pump, $25. 480-3424.

Southbend 9" lathe w/motor on wood cabinet, 3-jaw chuck, extra tooling, good cond., $800; new Craftsman 7" bench grinder w/ guards, light, $125. 921-7212.

Wedding gown, sz. 3, fancy ivory fit, $250; wedding gown, Sz. 8 sm. w/slip, ivory, $125. Kim, x31350 or 484-2777.

Baby crib, ex. cond., $80. 484-5149.

Complete Gaffer & Stattler 2.5 ton central A/C heating system, good working cond., $400 nego. Qvan, x38304.

Jumpking outdoor trampoline, good cond., was $350 now $175. x37953.

Long aquarium, 30 gal., full set-up, $150 OBO; tank, light, pumps, filters, gravel, custom aquarium stand/couch table, nude, $125. Mike G., 480-2067 or 488-5921.

Baby clothes, strollers, car seats, etc. 484-5927.

Jobst extremity pump w/gauntlet, ex. cond., $100. Earl Rubenstein, x34807 or 326-2354.

Fiberglass camper top, fits short bed, $300. 538-1922.

Metal shelves for full sz. service van, both sides, $250 OBO. O. T. Lewis, x35710 or 482-2253.

American Racing Rims (4), blk wire mesh, 5 lug, 14 in., $225. Rick, 283-1988 or 996-8961.

Imperial sewing machine, $25. 339-1337.

Wood, 2x4's, 2x6's, 2x8's, 1x6's, 4x4's, used, 25¢ ea. OBO, approx. 500 pieces. 339-1337.

Heavy duty garden tiller, $50; working lawn mower, $10; platform DB bed, $35. Richard, 538-1854.

Woman's 3/4 length off-white coat, sz 15/16, $85. 482-2587.

Pool table, slate bed, approx. 4' by 8', all accessories, will help move, $500. Tony, x35966.

Chain link dog kennels (2), 4'x4'x12', will deliver, $125. Tim, x35472 or 486-0127.

One way Delta Airlines ticket from Houston Hobby to Washington, D.C. Dulles, leaving 10-16-90 at 9:45 a.m., arrive Dulles 5:20 p.m., $95 OBO. 282-6684.

Chain link dog run, approx. 15'=5'=5', good cond., $60; baby crib, good cond., white, $50; hanging lamp, basket weave cover, $15. 332-9124.

Two-door legal sz file cabinet, ex. cond., was $200 now $100. x30874 or 333-1316.

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

Universal 30 caliber M1 carbine rifle, ex. cond., $135. 282-5570.

Sears Lifestyler cross country skier/rower, ex. cond., $175. Brent, x36456 or 486-0389.

Tailgate for '86 Silverado pickup, dk blue, $100 OBO. 635-5031.

Roper garden tractor, 18HP, 44 in. cutting deck, rear lift, $1,950; blade and dump wagon avail. x34490 or 334-1893.

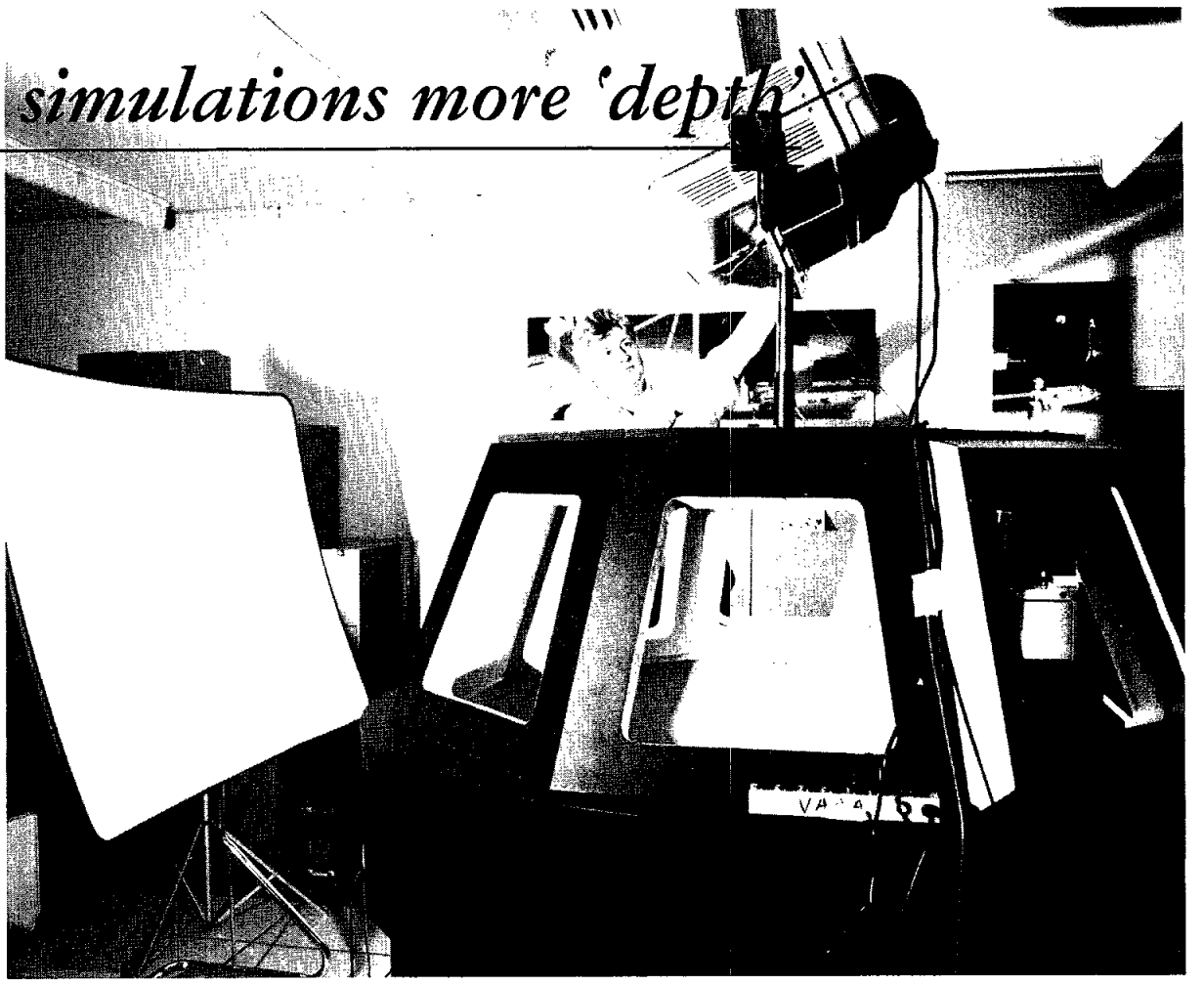
Treadmill, speed, distance, adjustable tension/slope, $100; DP Bodytoner rowing machine, $65. 333-7180 or 333-9581.

Bev Doolittle, Woodland Encounter, 724/1500, unframed. 335-8529.

New Prince CTS Graduate tennis racket, grip sz. 4 1/2, $125 OBO. x31593 or 480-6292.

Stereo imaging may give simulations more 'depth'

Three Dimensional Training



By Billie Deason

Just as movie-goers in the 1950s wore special glasses to view early three-dimensional movies, volunteer test subjects recently used specially polarized sunglasses to evaluate one of JSC's latest visual imagery concepts for training space station crews.

Chuck Bailey of the Display, Control and Networks Section and Art Gorski of MITRE demonstrated a new stereoscopic 3-D visual display for employees in mid-July in the Visual Prototyping Laboratory (VPL). Employees were invited to stop by the lab, participate in an evaluation exercise, then score the 3-D effects and overall quality of the visual display.

The VPL, part of the Space Station Ground Systems Division, supports training facility development for Space Station *Freedom* crews. "Better depth perception has been on the wish-list of JSC astronaut crews and trainers for a long time. The out-the-window visual systems used in the Shuttle Mission Simulator at JSC have been largely satisfactory, but there have been some complaints," Bailey said.

Gorski said astronauts experience one shortcoming of the current visual systems when training to use the shuttle's remote manipulator system. "It's difficult to judge the distance between an object of interest and the robot arm, you really can't tell how close you are. So, we think an important application for the stereo display is robotic arm training and robotics training, in general."

Bailey, whose background is in electro-optics, believes robotics training will receive more emphasis in the space station program because of the significant part robots will play in *Freedom*'s exterior maintenance.

Stereopsis, or stereo depth perception, is the most important depth cue the human brain uses. The second most important is the parallax cue, the brain's perception of an observed object being displaced because of a different point of view. "If you move your head side to side, you see how a nearby object outside the window in your field of view moves to a different position relative to the background. Your brain processes that and you know the object is right there," Gorski said.

Other visual cues such as size of objects relative to each other also aid in defining details of what we see. "How tall a person looks in the distance tells you how far away he is," Gorski said.

Closing one eye and not moving the head tends to make images go flat.

"For example, using only one eye to look at an object that's unfamiliar to you, or is obscure—such as some individual part of the space station through a closed circuit television camera—everything all goes together and you can't tell where things are. The stereo effect is definitely an important cue," Gorski said.

The prototype tested in the VPL uses a computer workstation to build the actual scene people see through the cupola mockup window. A 3-D projection system puts the image on the screen. David Phillips, a mechanical engineering co-op student from UT-Austin, designed a unique support stand for the projector. Technical Services Division built the stand.

The visual image includes a left eye image and a right eye image, polarized in opposite directions. With the special polarized sunglasses, the left eye sees only the left eye image and the right eye sees only the right eye image.

"We're really tricking the brain into recognizing the two separate images as one image" Gorski said. The images are actually superimposed. "Without the glasses, you'd see a double image, slightly overlapping."

Once inside the cupola mockup, the evaluator, wearing the glasses, saw the space station truss and portions of modules as they might be viewed from the cupola. Added to the picture was an arbitrary cube, floating in space. The evaluator could move the cube using a hand controller.

"We asked people to judge the cube's size and distance from the cupola window. If you don't know the cube's size, you can't tell if it's 10 miles away or right in front of your face without stereo," said Gorski.

"When we told people the cube was six inches on a side, they could guess quite accurately how far away it was, but they weren't really using the stereo cue in that case," Gorski said. "The only way you can judge those factors is by comparison with the other things you see and by using depth perception.

"What we learned from this demonstration showed that using stereo vision, people could easily judge relative distances between objects, but had a hard time judging absolute distances," Gorski said.

In a dense, complicated scene with numerous objects in view, evaluators could easily judge which objects were closer than others. "When there were things to compare against, they didn't have any problem at all, but with just the cube itself, hanging out there in space with nothing else to refer against, that was a little tougher to judge the absolute distances," Gorski said.

About 10 to 15 percent of the general population cannot see stereo images. "But they're not likely to be astronauts," Gorski said. Although absence of depth perception is considered a visual impairment, it is not a disabling loss. "People who don't have depth perception learn to substitute secondary cues, like the parallax cue. They can function quite well."

Visual systems used for crew training can be broken into three parts. Database modeling—a computer program completed before training begins—creates the objects that make up the scene. Image generation assembles the scene during training from information stored in the database. Finally, image display projects the scene real-time onto a screen or cathode ray tube.

"Image display is the biggest challenge, especially for our application. It's impossible to find anything off-the-shelf that meets all our requirements," Gorski said.

"Our job in the VPL is to study trade-offs in visual technology to get the most bang for our bucks," Bailey said.

"We have to piece together, for budget reasons, off-the-shelf hardware and software and use it for our spacecraft training applications. That's a difficult challenge because commercially available simulators are designed for aircraft training. Aircraft pilots can go out and practice in the real hardware, it's there. If pilot trainers want to see how well the simulator imitates the aircraft, they can go out and look at the airplane. Here, we're building the trainers before we build the space station. Even when station is operational, we'll have to rely on second-hand information about the trainers from people after they've worked aboard Freedom," Gorski said.

Training simulation designers for Space Station *Freedom* are taking a different approach from that of other space programs.

"Most people have wanted a big trainer to be the end-all and do everything. That's the way training has been done up to now. Our recommendation to extensively use part-task trainers for space station crews is a divergence from that tradition," said Bailey.

A part-task trainer can be a low-cost method to concentrate on specialized training, such as using robotics devices.

"The nice thing about part-task trainers is you build a system that meets your major requirements for a specific activity, but doesn't have to do everything," Gorski said.

A part-task trainer could be ideal for robotics training when crew members would be interested in seeing only a small, specific area. A probable training task would require an astronaut to move a remote camera held on a robotic arm into a tight space on *Freedom*'s exterior to view a small light on an orbital replacement unit (ORU) or to remove and and replace ORU's.

"Astronauts want the scene they see out the window to be very sharp, distinct and clear, like it would be in the real world. We can make a television scene very sharp and clear, but it's a very small field of view. For space station cupola training, that same clarity would cost a phenomenal amount of money because we have a very wide field of view, almost 360 degrees. Think about how many television screens that would take... very expensive, and we just can't afford it.

"With a bigger display, such as a large screen or dome with the image projected on it, the image looks fuzzy the more it's spread out. People may not see the details they need to do the work. So, there's a trade-off between field of view and resolution," Gorski said.

Field of view describes how many degrees horizontally and vertically one can see. Resolution is the clarity or focus of the image. Resolution is measured in subtended arc minutes per visible optical line pair. The human eye can resolve objects down to about one arc minute of resolution. In most NASA training visual displays, the smallest resolution is six to nine arc minutes.

"There's a big gap between the best training displays and the capability of the human eye. The only way to do as well as the human eye is to considerably restrict the field of view. Then it's like looking at the world through a cardboard tube," Gorski said.

However, limiting the field of view may fit right in with the concept of part-task trainers.

Another application for the stereo visual display is training with the astronaut positioning system (APS), a foot-restraint work platform fastened to the end of the robot arm. The training scenario includes a role-playing astronaut outside the simulator at an instructor station. That astronaut would play the part of the EVA crewman in the space suit, without having to actually wear an EVA training suit. He would need only the specially polarized sunglasses.

Astronauts inside the simulator would operate the arm and would see a space-suited figure on their visual displays. Using the stereo display, the EVA role-playing astronaut could judge his position in relation to exterior parts of the space station. By intercom, he would give feedback to the trainees, such as, "I need to move six feet to the right and three feet forward to reach the ORU." Without the stereo display for the EVA astronaut, the APS training would be much less effective.

"Using part-task trainers for the more intensive, up close situations allows the big space station trainers to be used for full-mission training. Our training system development contractor, CAE-Link, plans further studies with 3-D stereo visual displays. We will turn over to them our study results and jointly determine if the concept is acceptable for space station training," Bailey said.

Top: Chuck Bailey of the Display, Control and Networks Section, adjusts the stereoscopic projector used to produce 3-D images for space station cupola training. Right: MITRE Corp.'s Art Gorski, who has done much of the work on the 3-D trainer prototype, uses special glasses to see a 3-D image of a space station module and trusswork. The visual image includes a left eye image and a right eye image, polarized in opposite directions. With the special polarized sunglasses, the left eye sees only the left eye image and the right eye sees only the right eye image.

JSC Photos by Kim Murray

Ion cloud observed following CRRES chemical releases

A NASA/U.S. Air Force satellite took its first readings of chemical releases in the upper atmosphere this week, helping scientists understand the processes by which fast-moving neutral gases become ionized.

The two chemical releases, part of the Combined Release and Radiation Effects Satellite (CRRES) project, occurred Monday at dusk local time over the South Pacific and above the atmosphere at altitudes between 300 and 360 miles.

CRRES is a joint NASA/U.S. Air Force mission to study the Earth's ionosphere and magnetosphere and to monitor the effects of the space radiation environment on sophisticated electronics.

The chemical releases were observed by scientists aboard two aircraft, an Air Force KC-135 and a leased Learjet-35. Scientists on American Samoa also observed the releases with low-light video cameras and telescopes. Instruments aboard the satellite also monitored the releases.

A second pair of releases had been scheduled for Wednesday, but were postponed when a camera that was to record the releases from one of the aircraft malfunctioned. The release was being rescheduled for today or this weekend.

"Two releases were seen from both aircraft," said Gene Wescott, a principal investigator for the CRRES project. "The actual releases in darkness were very bright—you could see a spherical shell 10 to 20 seconds after the releases. Barium ions were seen coming up above the terminator. Anyway, it was a success."

In the first release, two canisters were ejected from opposite sides of the CRRES spacecraft. After 25 minutes, when the canisters were about two miles from the satellite, vaporized chemicals were released from each canister to expand. The first pair of canisters released 12 pounds of barium from one canister and 12 pounds of strontium from the other. The second pair is to release 12 pounds of barium and 4 pounds of calcium.

Wescott said barium ions, or electrically charged atoms, were formed by the interaction with the background plasma. No strontium ions were observed, he said.

The observation of such an ion cloud confirmed the critical velocity ionization hypothesis, which states that if the relative velocity of an electrically neutral gas and a magnetized plasma (ionized, or electrically charged, gas) is large enough, the neutral gas will ionize even though less energy is available than is normally required.

CRRES was launched from Cape Canaveral Air Force Station, on July 25 aboard an Atlas-Centaur vehicle. NASA's portion of the mission is managed by Marshall Space Flight Center for the Office of Space Science and Applications.

JSC Shuttle Bus Schedule

Current as of July '90

Taxi Number: 483-4001

Bldg 1	Bldg 16	Bldg 12	Bldg 45	Bldg 44	Bldg 32	Bldg 31/37	Bldg 9	Bldg 8	Bldg 4/5	Bldg *1	Lockheed Plaza IV	Lockheed Plaza II	Lockheed Plaza I	Lockheed Plaza IV
0745	0748	0749	0750	0753	0755	0757	0758	0759	0801	0803	0807	0809	0810	0812
0815	0818	0819	0820	0823	0825	0827	0828	0829	0831	0833	0837	0839	0840	0842
0845	0848	0849	0850	0853	0855	0857	0858	0859	0901	0903	0907	0909	0910	0912
0915	0918	0919	0920	0923	0925	0927	0928	0929	0931	0933	0937	0939	0940	0942
0945	0948	0949	0950	0953	0955	0957	0958	0959	1001	1003	1007	1009	1010	1012
1015	1018	1019	1020	1023	1025	1027	1028	1029	1031	1033	1037	1039	1040	1042
1045	1048	1049	1050	1053	1055	1057	1058	1059	1101	1103	1107	1109	1110	1112
1115	1118	1119	1120	1123	1125	1127	1128	1129	1131	1133	1137	1139	1140	1142
1145	1148	1149	1150	1153	1155	1157	1158	1159	1201	1203	1207	1209	1210	1212
1215	1218	1219	1220	1223	1225	1227	1228	1229	1231	1233	1237	1239	1240	1242
1245	1248	1249	1250	1253	1255	1257	1258	1259	1301	1303	1307	1309	1310	1312
1315	1318	1319	1320	1323	1325	1327	1328	1329	1331	1333	1337	1339	1340	1342
1345	1348	1349	1350	1353	1355	1357	1358	1359	1401	1403	1407	1409	1410	1412
1415	1418	1419	1420	1423	1425	1427	1428	1429	1431	1433	1437	1439	1440	1442
1445	1448	1449	1450	1453	1455	1457	1458	1459	1501	1503	1507	1509	1510	1512
1515	1518	1519	1520	1523	1525	1527	1528	1529	1531	1533	1537	1539	1540	1542
1545	1548	1549	1550	1553	1555	1557	1558	1559	1601	1603	1607	1609	1610	1612
1615	1618	1619	1620	1623	1625	1627	1628	1629	1631	1633	1637	1639	1640	1642
1645	1648	1649	1650	1653										

*Shuttle going off-site

Shuttle buses can get you there

By Pam Alloway

Riding in the center's shuttle buses or taxis is better for the environment, traffic flow and possibly a colleague's nerves.

So JSC officials, in their vigilant battle against the center's persistent parking problems, urge NASA and contract employees to walk, bike, or call for a taxi or shuttle bus rather than driving their own vehicles when moving between buildings in and around the center.

Historically, finding an empty parking spot on-site has presented a challenge to employees and contractors, particularly during times of high tourist traffic such as the summer months and holidays.

One way of easing the parking dilemma is for employees to use the JSC Shuttle Bus or the Space Transportation System Operations Co. (STSOC) Shuttle Bus, when traveling between on-site and off-site buildings, said officials.

The JSC Shuttle Bus makes 18 round trips per day from its first stop at Bldg. 1 at 7:45 a.m. until its last stop at Bldg. 44 at 4:53 p.m. It carries a maximum of 21 passengers.

"Many people come on-site for a number of meetings every week and taking the shuttle bus will alleviate the frustration of trying to find parking," said Ken Gilbreath, director of Center Operations.

The bus, driven by the same people who drive the JSC taxis, stops at 10 on-site buildings that circle the three small lakes in the middle of JSC. That area is known as the center mall area.

Additionally, the JSC Shuttle Bus travels to the three off-site Lockheed Plaza buildings, completing one round trip in about 30 minutes. The Lockheed Plaza buildings are located east of JSC's front gates on NASA Road 1.

"The purpose of the JSC Shuttle Bus is to provide transportation between Lockheed and the center," said Pedro "Pete" Vasquez, a JSC vehicle management specialist. "It helps to eliminate parking problems. Parking is at a premium, especially since there's construction on-site."

There are 8,960 parking spaces at JSC with 7,290 of those in the center mall area, said Dick Thompson, Facility Planning Office manager.

Many Lockheed employees use the JSC Shuttle Bus, said bus managers, but there's plenty of room for JSC employees. They suggest taking the taxi to buildings on the outskirts of the center and using the shuttle bus to move among buildings within the middle of JSC. If the need existed, they would recommend the addition of a second shuttle bus devoted to the route, said John Chesler, head of the Logistic Division's Center Transportation Section. JSC has four shuttle buses. One bus travels the employee route and the other three are used for tour groups.

If the bus were full every trip it would move about 400 people a day, said Vasquez. About half that amount currently use the bus.

Another shuttle bus prowls JSC streets—the STSOC Shuttle Bus. Its riders primarily are Rockwell employees but it also carries NASA employees to meetings at off-site Rockwell buildings. Jim Holloway, STSOC contract transportation supervisor, said about 280 people ride STSOC's three buses every day. The STSOC bus goes to seven buildings on-site: 1, 4, 5, 7, 12, 16, 30, 32, and 45. It also goes to Rockwell buildings located at 555 Gemini, 600 Gemini, the Eagle Bldg. on El Camino, and the Parsec 1 Bldg. on Hercules. It runs from 7:25 a.m.-5:28 p.m. For more information on the STSOC bus route call Holloway at 282-6916.

Those needing a ride around the center also can call the taxi at 483-4001, but managers recommend that riders traveling between any of the mall buildings or between the mall and Lockheed take the JSC Shuttle Bus rather than a taxi.

JSC to celebrate Hispanic heritage

JSC will recognize almost 500 years of Hispanic achievements at this year's Hispanic Heritage Celebration.

The JSC Hispanic Advisory Committee and the Houston/Galveston Hispanic Employment Program Managers Council are co-sponsors of the event, which begins at 9 a.m. Sept. 26 in the Gilruth Center.

Dr. Alicia Cuaron, a multicultural trainer from Denver, will be keynote speaker at 10 a.m.

A luncheon featuring Larry P. Morata, McDonnell Douglas Space Systems vice president and 1990 Hispanic engineer of the year, begins at 11:30 a.m. Tickets are $7 and may be purchased from any committee members.

A 1:30 p.m. panel discussion on "Recognizing Hispanic Potential in the Workplace" will include: JSC Deputy Director Paul J. Weitz; Ron Parra, Immigration and Naturalization Service; James Piatt, U.S. Customs; and Harriett Elrich, Equal Employment Opportunity Commission.

This year's committee, led by Lupita Armendariz, includes Michael Ruiz, Denise Navarro, Maria Montemayor, Dalia Riojas, Mary Flores, Aide Benavidez, Petra Padron, Raul Mejia, Rosie Hernandez, Steven Gonzalez, Gracie Ferris and Frank Moreno.

Mission Control, cafeteria hours set

Mission Control's viewing room will be open to JSC and contractor badged employees and their families during portions of the STS-35 mission.

The viewing room will be open to visitors for about seven days during the 10-day mission, from 2-4 p.m. weekdays and 2-5 p.m. on weekends. Call the Employee Information Service at x36765 for the specific dates and times. Viewing times and dates may change with little notice.

Employees must wear their badges and escort family members through the regular public entrance on the northeast side of Bldg. 30. Visitors should limit their stays during busy periods. Starting this mission, the guidelines have been changed and children under the age of 5 will not be permitted in the viewing area.

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

Tomatos get national attention

(Continued from Page 1)

them as they give lessons to teachers about the space program.

Hoefer's tomato plants grew in a local flower shop's greenhouse. Two of the plants had abnormalities. One produced both normal blossoms and Siamese-twin blossoms that didn't bear fruit. Another had distorted leaves and produced smaller, oddly shaped, bland-tasting fruit.

LDEF carried 12.5 million tomato seeds as part of the Space Exposed Experiment Developed for Students (SEEDS). About 4 million seed kits, including space-exposed seeds and control group seeds, have been distributed to classrooms across the country.

Several normal tomatoes have been harvested from the patch grown outside JSC's Visitor Center, said JSC Education Specialist Jim Poindexter. The seeds from those tomatoes will be replanted to test whether later generations will exhibit mutations caused by their space exposure.

Stop smoking, help on the way

(Continued from Page 1)

program will be paid by JSC with the exception of a $50 registration fee, fully refunded upon satisfactory completion of the program. Additional free monthly follow-up sessions will be offered to participants for as long as necessary.

Classes will be held from 3:30-4:30 p.m. each Tuesday from Sept. 25-Nov. 13. JSC civil servants may register at the question and answer session or by contacting Hall at x33078. Contractors will be allowed to participate when space is available in the classroom.

Discovery heads toward October launch, Ulysses deploy

(Continued from Page 1)

"It seems to be up and running pretty hard, and we expect it to stay that way," added Mission Specialist Tom Akers. "We're pretty happy that as far as that problem is concerned that's behind us."

Richards said that during *Discovery*'s last flight, STS-31, the orbiter was "very tight, especially in the aft compartment," so he doesn't anticipate any hydrogen leak problems such as those that have affected *Columbia* and *Atlantis* this summer.

All of the crew members said they are confident the RTGs are safe to fly with and indicated their families would be at KSC for the launch.

"Quite frankly, I haven't spent too much time worrying about the RTG situation," Richards said. "My family is going to be down there in Florida, standing underneath *Discovery*, waving goodbye as we go off the launch pad. So, I don't have any problems with the RTG and am confident that the system doesn't provide any hazard to anyone on the ground."

Akers has prime responsibility for deploying Ulysses, but said other crew members also play vital roles.

"Every one of us has a job to do to get Ulysses deployed successfully," he said.

After launch, Akers will check the orbiter interface with the payload and the three-stage booster system. Astronaut Bob Cabana will maneuver to the attitude to align the payload with pinpoint accuracy. Five hours into the flight, Akers will raise the payload 60 degrees and release Ulysses, which will be pushed out of the payload bay by springs at about 5 to 6 inches per second. Richards then will back *Discovery* away and an hour later, the first inertial upper stage burn will take place.

Akers also will work with the solid surface combustion experiment, in which a small filament of paper burn in an enclosure. Motion picture cameras will record the fire watching the flame pattern and heat intensity. The experiment is designed to investigate how fuels burn in microgravity to improve fire safety on the shuttles.

In addition to his piloting duties, Cabana said he will use the heads-up display normally used on landing to test whether it can be used to sight stars and calibrate the shuttle's inertial measurement units. If successful, the method could serve as a backup to the crews optical alignment sight.

Cabana said he'll also test *Discovery*'s ability to maneuver at a high pitch rate as part of a Starlab tracking experiment.

Mission Specialist Bruce Melnick, the first U.S. Coast Guard astronaut to fly, said he will assist Akers in deploying Ulysses and working with the Shuttle Solar Backscatter Ultraviolet Experiment to better understand Earth's ozone layer. Melnick also will work with the physiological systems experiment, which will monitor ionizing radiation effects on the crew.

Mission Specialist Bill Shepherd will operate the remote manipulator system for a test of the materials used in the stranded Intelsat's solar arrays. Intelsat was launched into a low, useless orbit and plans for a future shuttle mission to boost it to geosynchronous orbit are underway. A "test coupon" of solar array material will fly on the arm for a day to glean information on whether atomic oxygen present in low-Earth orbit is degrading Intelsat's solar arrays. The data will help determine how long Intelsat can remain in its present orbit and still be reboosted for a useful life in high orbit.

Shepherd also is responsible for testing the voice command system that will use the human voice to direct cameras inside the crew compartment.

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