

Space News Roundup

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No. 26

'It's the final stretch'

Countdown test cheers launch team

The STS-26 crew boarded *Discovery* on Launch Pad 39B Thursday morning to go through a final dress rehearsal of the return to flight with Kennedy Space Center's Firing Room team.

The Terminal Countdown Demonstration Test (TCDT), or "dry count," began with a call to stations for the launch team at 5 a.m. CDT Wednesday, and the simulated countdown began at the T-19 hour mark. T-0, the culmination of the test, occurred about 9:30 a.m. Thursday. The crew flew from JSC to Kennedy Tuesday and spent that afternoon practicing approaches and landings on the Kennedy Shuttle runway in the Shuttle Training Aircraft.

The TCDT was the final major test before launch, said Daniel Germany, deputy director of the JSC Orbiter Projects Office. "The last three weeks of this flow are really aimed at launch. There's no real major test left after the TCDT," Germany said. "The next set of activities all dovetail together to lead to the final countdown. It's the final stretch."

A firm launch date for STS-26 is expected to be set following a Flight

Readiness Review scheduled for Tuesday at Kennedy, and, at present, nothing has appeared that would interrupt the flow toward launch, he said. "We're still looking at sometime in the last week of September for launch."

This week, technicians at the pad are performing a borescope inspection of the Orbiter's gaseous oxygen (GOX) system. Three GOX flow control valve parts were removed from *Discovery* last weekend in an effort to determine why two of the valves were sluggish during the Aug. 10 flight readiness firing. Debris was found on the valve poppets removed from the Orbiter, and they are now being studied at Rockwell in Downey, Calif.

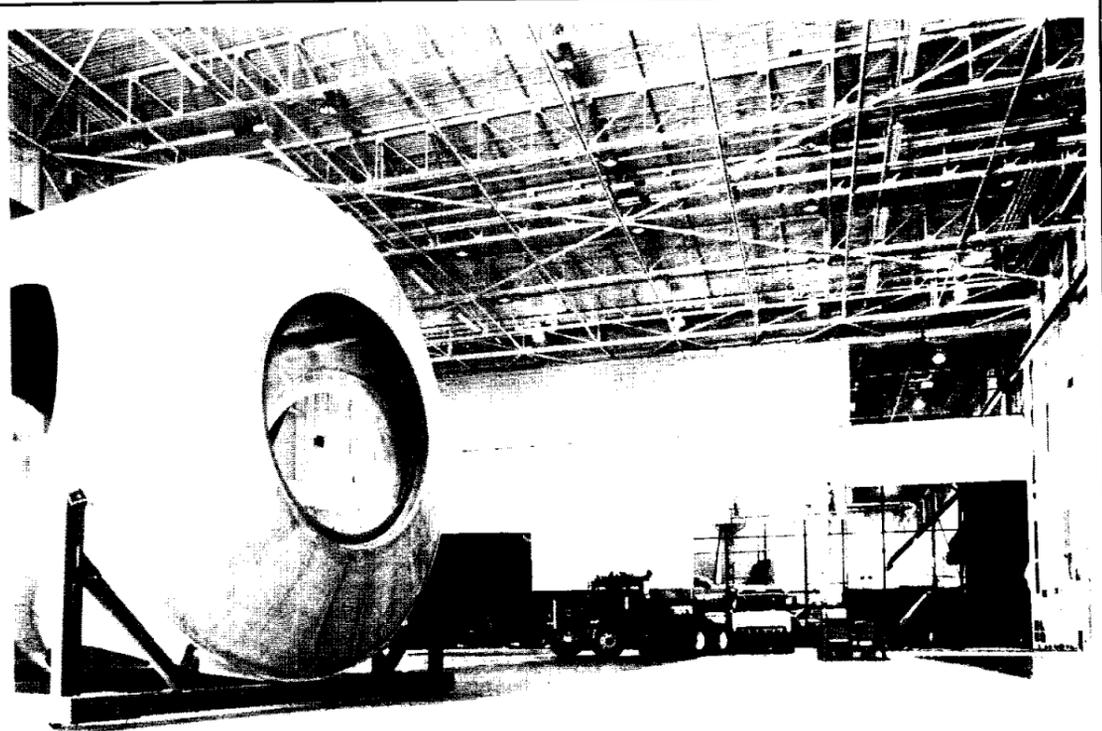
"We're converging on a solution for the problem," Germany said. "At this point, we don't forecast any launch delays due to the solution."

Tests are being conducted to determine the source of the debris found on the poppets, and the results of the borescope inspection will be evaluated along with the condition of the valve poppets. The poppets will be cleaned and reassembled by

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STS-26
The Return to Flight



JSC Photo by Kim Murray

Construction workers tear down a temporary wall separating Bldg. 9B from Bldg. 9A Wednesday as the new 26,000-square-foot facility nears completion. 9B will house Space Station training and test equipment, including mockups such as the one at left.

Construction of 9B nearly done

A 27,000 square-foot facility to house Space Station *Freedom* mockups and test bed equipment at JSC is nearing completion, and a grand opening is in planning for next month.

Bldg. 9B, an addition on the west end of Bldg. 9A, is now getting finishing touches from construction workers, and a temporary wall that separated the facility from 9A was torn down this week. 9B, built at a

cost of about \$3 million, is one of the two largest construction projects at the center in recent years, the other being the Central Computing Facility, Bldg. 46, now in the works.

9B features a 21,000 square-foot high-bay area that will house high fidelity mockups of the space station habitation module, resource nodes, a sampling of the truss structure and the station's mobile work station, among other training structures, said

Chris Perner, chief of the Man-Systems Division.

"It will be unique from any other facility," Perner said. "We'll make use of the existing air-bearing floor and Orbiter Remote Manipulator System mockup and be able to practice transferring space station items from the payload bay."

The Space Station mockups now in the high bay of Bldg. 15 will be

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Work forges ahead on rest of Space Shuttle fleet

While the eyes of the nation are focused on STS-26, the first Shuttle flight in more than two and a half years, preparations for the regular return of Americans to space are forging ahead.

The processing and modification of *Atlantis*, slated to fly STS-27, a Department of Defense mission in November, and of *Columbia*, scheduled to fly STS-28 in July 1989, are well under way at Kennedy Space Center.

Both orbital maneuvering system

pods have been installed on *Atlantis*, now in Kennedy's Orbiter Processing Facility (OPF) Bay 2, and the system's connections are being checked out this week. Also, the third and final main engine is now being installed in *Atlantis*.

Stacking of the solid rocket motors (SRMs) for STS-27 is nearing completion in the Vertical Assembly Building. All of the SRM segments have been assembled, and work is now proceeding on the installation of

the nose cones.

Meanwhile, radiators are being installed on *Columbia*, located in OPF Bay 1, and a variety of inspections and modifications of the Orbiter are ongoing.

The payloads for upcoming missions also are progressing in their journeys toward space. TDRS-D, which will become the third Tracking and Data Relay Satellite in space when launched aboard *Discovery* in February 1989, is being checked out at the

TRW plant in Redondo Beach, Calif. Shipment of TDRS-D to Kennedy is on schedule for next month.

And Kennedy is gearing up to accept shipment of *Magellan*, a spacecraft that will eventually travel to Venus. *Magellan* is scheduled to leave Earth aboard *Atlantis* on STS-30 in April 1989, and it will use radar imaging to map 90 percent of the surface of Venus through that planet's thick, encompassing cloud cover.

Magellan is now at the Martin

Marietta factory in Denver, and it began a final major test at the factory this week, the pre-ship acceptance test. Shipment of *Magellan* to Kennedy is scheduled for the first week of October, and teams from the Jet Propulsion Laboratory, Martin Marietta and McDonnell Douglas were scheduled to meet at Kennedy last week to prepare for *Magellan's* arrival. A Ground Operations Review for *Magellan* also was scheduled Sept. 2 at Kennedy.



JSC Photo by Mark Sowa

Kaylene Kindt, left, GPC subsystem manager, and Lynn Lutz, JAEL lab manager, work at the console the lab is using to "burn in" a new ship's set of second-generation flight computers.

New computers 'burning in'

Advanced technology doubles power, halves size

By James Hartsfield

The first complete ship's set of an updated version of the Orbiter's five onboard flight computers, more than twice as powerful but half the size of those now flying, is being tested at JSC and may fly in 1990.

Every flight control function aboard an Orbiter is initiated by or through the five onboard General Purpose Computers (GPCs), including the movement of all aerodynamic surfaces and control of the main engines. "The computers now flying were designed in the 1960s, using 1960s' technology," explained Ned Trahan, chief of the Data Processing Section at JSC. "The new ones have 1980s' technology."

The rapid advance of technology during that period is evident in the appearance of the new GPCs now in the JSC Avionics Engineering Laboratory (JAEL), affectionately called "The Jail" by its residents. The new computers are half the size of the current Orbiter GPCs, made up of a single unit as compared to two units for the current computers.

And the new GPCs operate two to three times as fast;

have about two and a half times the memory capability; and weigh half as much as those now flying, Trahan said. "They also have an Error Correcting Code; you could have a failure in one of the memory chips and the code would automatically correct the data," Trahan said.

It all adds up to what will be a tremendous boost in reliability and performance, plus an open road for innovation. The current GPCs operate at 80 percent of their capability during periods of highest activity. Using the same software, those same periods will push the new GPCs to only 40 percent of their capacity.

"We want to run the old software in the new machines with a minimum of changes. It's proven reliable," Trahan said. "But eventually we'll modify it over a period of time to take advantage of the extended capabilities."

Development of the second-generation GPCs began in 1983, but the race with the rapid evolution of high technology never ends. "You can see that from development to machine takes a long time," Trahan said. And if designers began at square one on development

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JSC Library's Latest

Tech Library has new items

New items now available in the JSC Technical Library in Bldg. 45, open from 8 a.m.-4:30 p.m. Monday through Friday, include:

- *CAD/CAM in Practice: A Manager's Guide to Understanding and Using ...*, by A.J. Medland
- *Comet Halley: Once in a Lifetime*, by M. Littmann
- *Composite Materials: Testing and Design Seventh Conference 1986*, by J.M. Whitney
- *Computer Security Handbook: Strategies and Techniques for Preventing*, by R.T. Moulton
- *CRC Standard Mathematical Tables 1987*, by W. H. Beyer
- *Digital Communications*, by J.G. Proakis
- *Figuring Things Out: A Trainer's Guide to Needs and Task Analysis*, by D. Zemke
- *Handbook of Software Maintenance: A Treasury of Technical and Managerial*, by G. Parikh
- *High Risk Safety Technology*, by A.E. Green
- *Intelligence: The Eye, The Brain, and The Computer*, by M.A. Fischler
- *Managing Technological Innovation*, by D.D. Davis
- *Pascal, An Introduction to the Art and Science of Programming*, by W.J. Savitch
- *Permanent Magnet Design and Application Handbook*, by L.R. Moskowitz
- *Primality and Cryptography*, by E. Kranakis
- *Program Construction and Verification*, by R.C. Backhouse
- *Revising Your Resume: Career Blazers*, by N. Schuman
- *Safety Training Methods*, by J.B. Revelle
- *Space Resources: Breaking the Bonds of Earth*, by J.S. Lewis

JSC

Today

AIAA China trip—A technical delegation from the Houston Section AIAA will depart for a trip to China to visit with the Chinese Society of Astronautics. Participants will meet with technical counterparts in Chinese space facilities at Beijing, Sian and Shanghai, home of Houston's sister section, the Shanghai Astronautical Society. Non-technical activities are planned for spouses. The delegation also will visit scenic and historic sites at Guilin and Hangzhou. For information on applications, call Jim McLane, 488-0312.

Cafeteria menu—Entrees: seafood gumbo; fried shrimp, baked fish, beef stroganoff, fried chicken (special). Vegetables: okra and tomatoes, buttered broccoli, carrots in cream sauce.

Monday

Dance class—Country and western dance classes will begin Sept. 12 and continue for six weeks, meeting from 7-8:30 p.m. each Monday at the Gilruth Recreation Center. Cost is \$20 per couple. Call x30303 for more information.

NAMU meeting—NASA Area Macintosh Users' next monthly meeting will begin at 7 p.m. Sept. 12 at 600 Gemini (RSOC cafeteria).

JSC Blood Drive—The third JSC Onsite Blood Drive is scheduled for Sept. 12 at the Rec Center from 8 a.m.-noon and 1-4 p.m. For an appointment call Bob Jones, x33004.

Cafeteria menu—Entrees: French onion soup; barbecue sliced beef, parmesan steak, spare ribs with sauerkraut, chili and macaroni (special). Vegetables: ranch beans, English peas, mustard greens.

Tuesday

School Night for Scouting—A special program for boys and their parents to join the Boy Scouts is scheduled at 7 p.m., Sept. 13 at all

elementary schools in Clear Creek, Houston and Pasadena. LaPorte and Deer Park School Districts will hold school night for scouting Sept. 15. Annual registration fee for Cubs or Scouts is \$7 and 85 cents for accident insurance. For more information call Sam Houston Area Council, Boy Scouts of America, 659-8111.

Cafeteria menu—Entrees: beef noodle soup; baked meatloaf, liver and onions, barbecue spare ribs, turkey and dressing (special). Vegetables: Spanish rice, broccoli, buttered squash.

Wednesday

Hypermedia '88 conference—JSC and the University of Houston-Clear Lake will sponsor a two-day conference dealing with software engineering, documentation and education training. For registration and program information, call Glen Van Zandt, x33069.

Secretaries meet—The Clear Lake-NASA Area Chapter of Professional Secretaries International (PSI) will hold its monthly meeting at 7 p.m., Sept. 14. The speaker will be Polly Lewis, an attorney with Greg Jones, Mieszkuc and Pollard. She will be discussing "Women's Issues In Texas Law." A social dinner will begin at 5:30. Cost is \$9. Reservations can be made by calling Mary Todd, 282-3942.

EAP brown bag seminar—A seminar centering on "The Stress of Success for Men and Women: Differences and Commonalities" is scheduled from 11:30 a.m. to 12:30 p.m. in the Bldg. 30 auditorium on Sept. 14 and Sept. 15. Women's perspectives will be discussed Sept. 14 and the Sept. 15 discussion will focus on male perspectives.

Cafeteria menu—Entrees: seafood gumbo; broiled fish, tamales with chili, Spanish macaroni (special).

Vegetables: ranch beans, beets, parsley potatoes.

Thursday

Defense communications—The Armed Forces Communications and Electronics Association (AFCEA) will hold its next meeting at 12:30 p.m. Sept. 15 in the American Host Inn. The keynote speaker will be Lt. Gen. John T. Myers, director of the Defense Communications Agency. The topic will be "The Defense Communications Agency and the Defense Communications System into the 21st Century." A social will begin at 11:30 a.m. and lunch will be served at noon.

Apollo 14 workshop—The Lunar and Planetary Sample Team will sponsor a workshop centering on Apollo 14 samples and the Apollo 14 landing site through Nov. 16 at the Lunar and Planetary Institute. Topics to be discussed include: regional geology of the Apollo 14 landing site; Apollo 14 plutonic rocks; and the relation of Apollo 14 lithologies to the magma ocean hypothesis and other models of early lunar differentiation. Abstracts for contributions are due at the LPI by Sept. 15. For more information, call Jeffrey Taylor, (505) 277-9159, or Paul Warren, (213) 825-2015.

Cafeteria menu—Entrees: navy bean soup; beef pot roast, shrimp chop suey, pork chops, chicken fried steak (special). Vegetables: carrots, cabbage, green beans.

Sept. 17

Deep sea fishing—The JSC-EAA will sponsor a deep-sea fishing trip aboard the New Buccaneer departing Galveston at 7:30 a.m. and returning at 7:30 p.m. Tickets will be on sale through Sept. 16, and are \$40 to fish, \$15 to ride and \$15 for children 12 and under to fish. A limited number are available. For more information, call x35350.

Sept 19

Navy League Council meeting—The United States Navy League (USNL) Council will meet with a cocktail reception at 6:30 p.m. followed by dinner at 7 p.m. at the South Shore Harbour Country Club. Donald E. Smith, vice president and general manager for Bendix Field Engineering Corp., is the new president of the USNL Council and will speak at 7:45 p.m. Tickets are \$15 and reservations must be made by 5 p.m. Sept. 19. For information, call Mary Todd, 282-3900.

Sept. 22

Mixed soccer sign-up—Registration for the Saturday mixed soccer league will be held at 7 a.m. for badged teams and 5:30 p.m. for unbadged teams. League play will begin Oct. 1. For more information, call x30303.

IEEE Education Committee conference—A video conference sponsored by the IEEE Education Committee will focus on "Photonic Switching in Communications and Computing" and is scheduled from 10:30 a.m. to 2 p.m. For more information, call Eddie Robinson, 333-7029.

Sept. 23

Nature symposium and plant sale—Armand Bayou Nature Center will host its fourth annual symposium from 9 a.m.-5 p.m. Sept. 23-25. The event promotes landscaping that maximizes benefits for both homeowners and the community. A plant sale to raise money for the non-profit nature center also will be held.

Sept. 25

Challenger Park fundraiser—A fundraiser to the Challenger 7 Memorial Park will be held Sept. 25, Oct. 2 in case of rain. Events will include a volleyball tournament, a celebrity softball tournament, a chili cook-off and a raffle.

Swap Shop

Property

- Sale: Oakbrook West, 4-2-2, both formals, 2,100 sq. ft., ex. neighborhood, new carpet, \$75,000. John, x36484 or 486-1186.
- Sale: League City, 3-2-2, cul-de-sac, landscaped, low equity, FHA 10% fixed assum. David, x35464.
- Sale: Center, Tx., 420 acres, 300 acres timber, 120 pasture land, 1/2 mineral rights, 482-4365.
- 1981 Moduline mobile home, 2-1, 14x60, A/C, W/D, ex. cond., currently located on storage lot, \$6,500. Troy, x33335.
- Sale: Middlebrook, 3-2-2, study, FPL, wet bar, covered patio, large lot, FHA assum. 10%, \$79,000, 480-9363.
- Sale: Lakehouse, 2 acres, wooded, private lake, 2.5 mi. from Livingston, 3-2, A/C, furnished, \$45,000, 472-3103.
- Sale: 1984 mobile home, 3-2, appl., assume loan, no down payment, 559-2957.
- Lease: 1 BD condo, new carpet, W/D conn., fresh paint, exercise room, sauna, FPL, 333-6216 or 333-6692.
- Rent: Mobile home lot, \$85/mo., \$50 dep. Baker and Kinne, Bacliff, 488-1758.
- Sale: Friendswood repossessed wooded lot, next to creek, \$14,500, 488-3224.
- Sale: Heritage Park, 3-2-2, custom kitchen cabinets, new vanities in baths, mini-blinds, new paint, new tile baths, atrium, fenced and decked yard, many extras. Lori or Tony, x32304 or 482-5139.
- Sale: Friendswood/Sun Meadow Estates, wooded lot in established neighborhood, cul-de-sac, bordered by stream & golf course on 2 sides, approx. 245' deep & up to 86' wide, approx. 1/3 acre, util. on site, \$31,500. Doug, x32860 or 486-7412.
- Sale: Lake Livingston lot, Westwood Shores, fishing, camping, pools, golf, boat storage facility, small down, owner finance or new loan. Joe Reyna, x33729 or 471-5616.
- Sale: Cypress Lake lot, 80' x 140', fish, 4 lakes, pools, camping, one hour from Houston, equity assume note, \$101/mo. Joe Reyna, x33729 or 471-5616.
- Sale: Big Bend area hunting land, 160 acres, \$170 per acre, OBO, 337-4051.
- Rent: Room in tastefully furnished University Place townhome, private bath, immed. avail., quiet and homey, walk to NASA, \$250/mo. plus 1/2 util. Leslie, 280-9544.

Cars & Trucks

- '83 Ford F-150 XLT, A/C, AM/FM stereo, P/B, P/S, 302 w/ auto. overdrive, 40K mi., clean, ex. cond., \$5,995, 280-0828.
- '73 VW Super Beetle, new paint, tires, brakes, master cylinder, brake cylinders, muffler, carburetor, fuel pump, some dents, needs upholstery, \$800. Troy, x33335.
- '74 Super Beetle, rebuilt eng., new tires, new battery, new seat covers, ex. cond., \$1,200, x32163 or 635-2502.
- '59 Mercedes Benz 220S, \$3,000. David, x35464.

- '85 Camaro Berlinetta, V-8 w/T tops, 4bbi Quadra-jet, digital, AM/FM, cass., tinted glass, A/C, P/S, P/W, 2 new tires, black w/tan int., low mi., \$9,500, OBO. Leslie, 482-6491.
- '83 Toyota Celica GT, 67K mi., auto. w/ overdrive, A/C, AM/FM stereo, \$4,600, 488-5019.
- '83 Chevy Camaro, P/S, P/B, auto. trans., new tires, 92K mi., \$3,700, OBO. 485-9446.
- '80 Buick Skylark, 4dr sedan, eng. and body in ex. cond., needs trans., BO. Carlos, x30012 or 333-4174.
- '88 Chevy Beretta, auto., A/C, tilt, cruise, extras, 37 mi., \$9,900, OBO. x35245 or 931-1651.
- '84 Corvette, two-tone, auto., Bose stereo, loaded, ex. cond., 59K mi., \$14,000. Marv, 333-7064 or 332-5876.
- '67 Mustang, red, 3 spd., 289 V-8, A/C, good tires, runs good, good cond., \$2,995. Mike, x38169 or 482-8496.
- '87 Dodge Ram Charger, Prospector SE pkg. w/sport wheels, 20K mi., extended warr. avail., \$10,500. Tom, 534-4052.
- '83 Chev Beauville window van, 68K mi., dual air, ex. cond., loaded, \$6,500, 335-1865.
- '84 Pontiac Fiero SE, 65K mi., white w/brown int., A/C, AM/FM cass., NMDH, extras. Rick, x32695 or 559-2735.
- '82 VW Jetta, diesel, 5 spd., A/C, Blaupunkt 3001 radio, 1 owner, \$2,000. Kelly, x34260 or 480-3330.
- '85 Toyota Extra Cab diesel pickup, 63K mi., 34 mpg, ex. cond., \$4,900. John, x39164 or 480-6019.
- '87 Toyota truck, SR5, 4x4, extra cab, \$10,800, OBO, 282-2754.
- '86 GMC Safari van SLE, 2-tone, 38K mi., fully loaded. Bob, 335-6066 or 486-1766.
- '74 Opel Manta 1900 wagon, \$175. Guess, 649-5092.
- '58 Porsche 356A coupe, 1964C engine, \$5,500. David, 554-2992.

Cycles

- Yamaha 80CC Moto Four, ex. cond., \$800, 482-4365.
- '85 KX 125CC Kawasaki bike, never raced, ex. cond., w/helmet & boots, \$650, 326-5843.
- '72 Honda 450CC, needs brakes, clutch and throttle cables, \$225, x34270 or 337-1896.
- '86 BMW K75C, 8,200 mi., black, factory warranty, BMW bags, new tires, \$3,950. John, x36484 or 486-1186.
- '83 Honda 650 Nighthawk, always garaged, 3,600 mi., ex. cond., w/helmet, \$1,300. David, 282-1987 or 480-4692.
- '83 Honda Shadow, tinted windshield, w/helmet & cover, ex. cond., \$1,375, OBO. Moses, x35847 or 437-6727.

Boats & Planes

- Kayak 10' collapsable to 10' x 12', good cond., \$85, x34270 or 337-2682.
- '81 16' Newman Cam II runabout, 100hp outboard w/trailer, ex. cond., \$3,800, OBO, 480-9363.

- '85 Mistral Malibu windsurfer, \$650. Bullock, 488-6526.
- Curtis Hawk windsurfer board, great for beginners, good cond., \$300, OBO. Mike, 333-6246 or 474-7217.
- 20' center console boat w/115hp Johnson outboard eng., new decking, all access. Jon, x31709 or 480-8710.
- '85 20' Rinker deckboat, 305 V-8 SSP, w/ trailer & cover, \$7,950. Bob, 335-6066 or 486-1766.
- 15' center console w/25hp Evinrude, galv. trailer, trolling motor, assorted access., less than 100 hrs. on new motor, good cond., \$1,800. Donald Thompson, x39475 or 644-5044.

Audiovisual & Computer

- Whip 1200 facsimile w/modem, ex. cond., \$175, x32163 or 635-2502.
- Commodore software, Easy Script (word processor), the Manager (data base), Super Expander (cartridge programming aid), Music Composer (cartridge composing aid), \$5 ea. Samouce, x35094 or 482-0702.
- Macintosh software, filemaker plus, version 2.1, \$50, 681-4126.
- Commodore 64 computer & peripherals. Will Seay, 488-4878 or 282-2808.
- Grumman AA-1B, 1973, 150hp Lycoming, Sensenich prop, strobes, chrome disc, aux fuel, dual nav comms w/glide slope, AT50 transponder, intercom, egt, 2860 TTAf, 1339 TTE, all AD's current, \$12,000. Bernie, x32515 or 486-4722.
- TRS 80 Model I computer, 48K RAM, 2 floppy drives, printer, software and documentation, \$100, 333-6575 or 488-8080.

Household

- Microwave oven w/temp. probe, 20 auto recipe modes, 1.5 cu. ft., 650 watts, \$250. Bob, 280-1500, x3066 or 482-9168.
- Antiques, primitive pie safe, \$200; grain bin, \$150; small pine bookcase, \$75; maple doll cradle, \$25; oak sewing rocker, \$150; decorative curtain rod, darkwood w/matching wood rings & brackets, \$25, 532-4766.
- Couch, loveseat & 3 glass top tables, ex. cond., \$60 ea. Mike, 282-4180 or 996-9440.
- New carpet from two rooms, beige 10' x 13' & 14' x 10', \$200, OBO, 438-0201.
- Queen size sleeper sofa, \$100; 19' color T.V., \$100; Goldstar microwave oven, \$40; kitchen table and 4 chairs, \$25, 332-3228.
- Wards continuous cleaner elect. ignition stove, 1 yr. old, used 6 mos., was \$600, now \$250, still under warranty. Becky, x36530 or Cindy, 944-4882.
- White vinyl upholstered rocker, \$25; 2 metal chandeliers, \$70 and \$40; 4 poster white wood double bed, \$50; white wicker hanging chair, \$45, 326-3370.
- Maytag washer, heavy duty, 2 spd. large capacity; Maytag dryer, heavy duty, auto. dry control, 1 yr. old, ex. cond.; \$500. David, x37983 or 583-1645.
- Sofa, wheat w/multi-colored floral stripes,

- 84" wide, \$100, 326-1775.
- Triple dresser w/mirror, chest of drawers and matching night stand, ex. cond., \$275; 4' x 5' oil painting, \$35, 474-3181.
- Solid mahogany dining room table w/3 leaves, 8 chairs, buffet, wood desk, \$800, OBO, x33077 or 474-3122.
- Sofa, \$50; chair, \$25, both in good cond.; sewing machine w/cabinet, \$40. Linda, x32745 or 480-3187.
- Love seat, \$90; 2 high-back wicker chairs w/table, \$40; metal rim chair w/footstool, \$15; set of ovenproof dishes, \$20; telephone stand, \$15. Ray, x38030 or 532-1045.

Wanted

- Want to buy electric trains. Don, x37832 or 996-1425.
- Need ride from La Porte to JSC, Mon. - Fri., hours 8 a.m. to 4:30 p.m., Bldg. 16, will share gas expense. Bennie, x39137 or 471-2258.
- Want to start flying R.C. airplanes, looking for beginners equip., radio, airplane, motor. Jeff, 326-1758.
- Want to trade one yr. old Sears microwave oven, deluxe model with probe, new 22" lawnmower w/grass catcher in ex. cond., or grass blower and wheelbarrow. 488-5218 or 280-2047.
- Want to rent an RV for 1 week around Thanksgiving, must be reliable and should sleep 4-6. Karen, x38850 or Marie at x38875.
- Want to trade \$10,000 electronic organ for land, car, truck, or boat of equal value, OBO, 337-4051.
- Want part-time college instructor in math or physics. Bob Merrifield, 922-3426.

Photographic

- Complete color darkroom including Omega enlarger and all access., \$1,500, OBO, 534-6443.

Pets & Livestock

- Malaccan cockatoo, 4 yrs. old, beautiful, hand tamed, well behaved, w/cage, \$600, 326-5843.
- AKC collie puppies, shots & wormed, champion bloodlines, \$75 & \$100. x34815 or 333-4734.
- Full-blooded Keeshonds, \$75 ea., one male, one female. 473-2004.

Musical Instruments

- Clarinet, Buffet-Crampon, "Evette", good beginner instrument, ex. cond., w/case, \$150, 532-4766.
- 2 Pioneer HPM 100-watt speakers, \$75 ea. 326-3370.
- Altec custom voice of the theater sound reinforcement speaker system, \$1,000, 480-9363.
- Yamaha trombone w/case, ex. cond., \$225. Mary, x36369 or 326-7331.

Personal

- Square dance lessons, start 7:30 p.m. Monday, Sept. 12, St. Paul C. Church, 18326

- Point Lookout Dr., Nassau Bay, three no charge fun nights, casual w/comfortable shoes. 488-0653.

Miscellaneous

- Tire, Goodyear Eagle ST P205/70R14, \$25, 280-0828.
- Towbar fits compact cars, \$35, OBO. Bob, 280-1500, x3066.
- 2 Uniroyal tires, 235-75R-15, steel-belted radial, raised white letters, less than 10K actual mi., \$90, OBO; 2 chrome wheels, 5 spoke, 15x7, \$50, OBO, 438-0201.
- 4x4 tires, Dick Cepek Off Roaders, five new 27-950-15 tires, perfect for Suzuki Samauri or other small 4x4. Mike, 282-4180 or 996-9440.
- Catalytic converter, fits any auto, \$25; 24% leaded crystal by Tiffin, orig. \$30 per stem "Encanto Platinum", 8 stems per set, 2 sets ice tea & champagne, \$150. Donald Thompson, x39475 or 644-5044.
- VW type 1 rebuild engine, 2110CC, approx. 150hp, all new parts, bench run only, \$2,100; VW transmission, Porsche axles, Super-diff, Beef-a-diff, steel forks, new \$550. David, 554-2992.
- STS-26 jackets & T-shirt w/crew patch design, 480-1746 or 488-2454.
- Leer Macho Ltd. ed. longbed camper, fiberglass, \$350, OBO, 947-1060.
- Sears Craftsman 3hp edger, ex. cond., \$100. David, 282-3398.
- Fish tanks, one 75 gal., \$200; one 29 gal., \$75, both compl. w/lights, Eheim filters plus wood stands, DP Gympack 1500, \$100. Pam, 282-2945.
- Custom made pool table, 1" slate, made by Golden West Billiards, was, \$2,000, now, \$700, 332-2229.
- Aprica LaBelle baby stroller, was \$195, now, \$75, ex. cond. Carla, x30181.
- 8' x 16' aluminum patio cover, \$200. Ed, x39662 or 280-8077.
- Standard size Brunswick pool table, 1" slate bed, good cond., \$350, 488-0737.
- Girl's size 10-12 clothes, x37595 or 488-1359.
- Large pet carrier, 34" x 24" x 26" high, \$35, 997-1276.
- Winchester Mod. 12-Pre-64- 12 ga. pump shotgun, \$600; new Browning Citori O/U 12 ga. shotgun w/selective trig., never used, \$600, 471-0972.
- Custom made knives, all descriptions. Haines, x30425 or 941-2495.
- Sears 1hp air compressor, 110V, tank, 50' of hose, w/quick disconnect, \$250, 581-9242.
- Factory service manuals for 1983 Subaru and 1984 GMC truck or van, \$20 ea., OBO; Vic-20 and access., ex. cond., \$150, x30577.
- Hirsch metal utility shelf, 8 shelves, 11" deep x 30" wide x 60" high, \$7. Bauch, 333-3382.

MIXED
FLEET

M A N I F E S T

Space Shuttle

Flight	Date/Orbiter	Inclination/Altitude	Crew/Duration	Primary Payload	Carrier
26	9/88 <i>Discovery</i>	28.5° 160	5 4	TDRS-C	IUS
27	11/17/88 <i>Atlantis</i>	— —	5 —	DOD	Unique
29	2/18/89 <i>Discovery</i>	28.5° 160	5 5	TDRS-D	IUS
30	4/28/89 <i>Atlantis</i>	28.9° 160	5 4	Magellan	IUS
28	7/1/89 <i>Columbia</i>	— —	5 —	DOD	Unique
33	8/10/88 <i>Discovery</i>	— —	— —	DOD	Unique
34	10/12/89 <i>Atlantis</i>	34.3° 160	5 4	Galileo	IUS-2STA
32	11/13/89 <i>Columbia</i>	28.5° 190	5 5	SYNCOM IV-5 LDEF-1R	Unique Unique
36	12/11/89 <i>Discovery</i>	— —	— —	DOD	Unique
31	2/1/90 <i>Atlantis</i>	28.5° 320-330	5 5	HST	Unique
35	3/1/90 <i>Columbia</i>	28.5° 190	7 9	ASTRO-1 BBXRT	IG+2 PAL TAPS
37	4/5/90 <i>Discovery</i>	28.5° 243	5 4	GRO	Unique
38	5/10/90 <i>Atlantis</i>	— —	— —	DOD	Unique
40	6/7/90 <i>Columbia</i>	42.0° 129	7 8	SLS-1	LM
39	7/19/90 <i>Discovery</i>	55.0° 140	7 7	CIRRIS (DOD) IBSS (DOD) Teal Ruby(DOD)	Pallet SPAS Unique
41	9/10/90 <i>Columbia</i>	33.4° 175	7 7	Starlab (DOD)	LM+1 PAL
42	10/5/90 <i>Atlantis</i>	28.5° 160	5 4	Ulysses	IUS/PAM
43	11/8/90 <i>Discovery</i>	28.5° 160	5 4	TDRS-E	IUS
44	12/20/90 <i>Columbia</i>	57.0° 135	7 9	Atlas-1	IG+2PAL
45	1/31/91 <i>Atlantis</i>	28.5° 160	7 7	TSS-1 GPS-1	MPRESS+PAL PAM-D2
46	2/28/91 <i>Discovery</i>	— —	— —	DOD	Unique
47	4/11/91 <i>Columbia</i>	28.5° 160	7 9	IML-1	LM
48	5/2/91 <i>Atlantis</i>	28.5° 160	5 7	WAMDII GPS-2 EURECA-1L	Unique PAM-D2 EURECA-A
49	7/11/91 <i>Columbia</i>	44.0° 160	7 7	S/L-J	LM
50	8/15/91 <i>Atlantis</i>	28.5° 160	5 7	Spacehab-1 LAGEOS-2 INMARSAT-1	Unique IRIS PAM-D2
51	9/26/91 <i>Discovery</i>	57.0° 291	5 5	UARS	Unique
52	12/2/91 <i>Columbia</i>	44.0° 160	7 9	S/L-D2	LM + USS
53	12/23/91 <i>Discovery</i>	28.5° 190	7 7	ASTRO-2 EURECA-1R	IG+2 PAL EURECA-A
54	2/27/92 OV105	57.0° 160	7 7	SRL-1	PAL+MPRESS
55	3/30/92 <i>Columbia</i>	28.5° 160	7 9*	USML-1	LM+MPRESS
56	4/23/92 <i>Atlantis</i>	28.5° 160	5 7	SHEAL-2 GEOSTAR-1 ORFEUS	Unique+SP PAM-D2 SPAS

Expendables

Date	Launch Vehicle	Orbit	Launch Site	Payload
9/88*	Atlas 63E	SS	WSMC	NOAA-H
5/89	Delta 184	SS	WSMC	COBE
5/89	Atlas 50E	SS	WSMC	NOAA-D
9/89	Atlas Centaur 68	GSO	ESMC	FLTSATCOM-F8
2/90	Delta	LEO	ESMC	ROSAT
2/90	Scouts S-218C	LEO	WSMC	Transit-27
6/90	Atlas Centaur	GTO	ESMC	CRRES
7/90	Atlas Centaur	GSO	ESMC	GOES-1
8/90	Scout S-210C	LEO	WSMC	Transit-28
9/90	Atlas 34	SS	WSMC	NOAA-1
5/91	Titan IV IUS	EO	ESMC	Planetary Alt.
6/91	TBD	LEO	TBD	Small Expl-01**
8/91	Delta	LEO	ESMC	EUVE
9/91	TBD	LEO	TBD	Small Expl-02**
10/91	Scout S-215C	LEO	SMR	CRRES
11/91	Atlas Centaur	GSO	ESMC	GOES-J
12/91	Atlas 11E	SS	WSMC	NOAA-J
1/92	TBD	LEO	TBD	Small Expl-03**
5/92	Atlas Centaur	GSO	ESMC	GOES-K
6/92	TBD	LEO	TBD	Small Expl-04**
7/92	TBD	HE	ESMC	GEOTAIL
9/92*	Titan III	EO	ESMC	Mars Observer
12/92	TBD	HE	ESMC	WIND
1/93	TBD	LEO	TBD	Small Expl-05**
3/93	TBD**	GSO	ESMC	MSAT**
4/93	Titan II**	SS	WSMC	NOAA-K
6/93	TBD	HE	WSMC	POLAR
6/93	TBD	LEO	TBD	Small Expl-06**

*Not before this date. ** For NASA planning purpose.

Glossary

ASTRO	Ultraviolet Astronomy Telescope	LEO	Low Earth Orbit
ATLAS	Atmospheric Laboratory for Applications and Science	MAGELLAN	Venus Radar Mapping Probe
BBXRT	Broad Band X-Ray Telescope	MSAT	Mobile Satellite
CIRRIS	Cryogenic Infrared Radiance Instrument for Shuttle	NOAA	National Oceanic and Atmospheric Administration
COBE	Cosmic Background Explorer	NOVA	Advanced Navy Navigation Satellite
CRRES	Combined Radiation Release Experimental Satellite	PAM	Payload Assist Module
DOD	Department of Defense	ROSAT	Roentgen Satellite
EO	Escape Orbit	SAN MARCO	NASA/Italian Earth Physics Satellite
ESMC	Eastern Space and Mission Center	SKYNET	United Kingdom Military Communication Satellite
EURECA	European Retrievable Carrier	S/L	Spacelab
EUVE	Extreme Ultraviolet Explorer	SLS	Space Life Sciences
FLTSATCOM	Fleet Communication Satellite	SRL	Space Radar Laboratory
GALILEO	Jupiter Probe	SS	Sun Synchronous Orbit
GOES	Geostationary Operational Environmental Satellite	STARLAB	DOD Spacelab
GPS	Global Positioning System	SYNCOM	Hughes Geosynchronous Communication Satellite
GRO	Gamma Ray Observatory	TDRS	Tracking Data Relay Satellite
GSO	Geosynchronous Orbit	TRANSIT	Navy Navigation Satellite
GTO	Geosynchronous Transfer Orbit	TSS	Tethered Satellite System
HST	Hubble Space Telescope	UARS	Upper Atmosphere Research Satellite
IBSS	infrared Background Signature Survey	ULYSSES	Formerly International Solar Polar Mission
IML	International Microgravity Laboratory	USML	U.S. Microgravity Laboratory
INMARST	International Maritime Satellite	WAMDII	Wide Angle Michelson Doppler Imaging Interferometer
ITV	Instrumented Test Vehicle	WFF	Wallops Flight Facility
IUS	Inertial Upper Stage	WSMC	Western Space and Missile Center
LAGEOS	Laser Geodynamics Satellite		
LDEF	Long Duration Exposure Facility		

Safer T-38 fuel response to last year's lightning fire

The dog days of summer didn't stop critical cold-weather flight testing of a new, safer T-38 jet fuel recently—workers in JSC aircraft operations simply created their own winter.

Gerry Kraynik, flight test project engineer, and Tim Ames, aerospace engineer, came up with the idea of using a refrigerated truck to cool the fuel and conduct the tests. The T-38 Alternate Fuel Effects Flight Tests were completed Sept. 2 thanks to their innovative efforts, said Dave Finney,

head of the Aircraft Engineering Section.

The goal of the flight tests was to check the performance of Jet A fuel in the T-38, conducting afterburner and airstart tests. Jet A, commonly used by commercial airlines, has a higher "flash point" than the current T-38 fuel used by NASA, JP-4, thus making it less flammable.

A series of five normal-temperature flight tests was completed quickly by the test crew in July. But the remaining

two flight tests had to check the performance of the fuel in cold weather, and waiting for winter didn't sit well with the test crew. So Ames enlisted the help of NWASI Aircraft Maintenance, flight crew operations' Ground Safety Officer John Starnes, Southwest Aviation and a rented UPS freezer truck.

The truck cooled the fuel to freezing, and the test team rose at dawn Aug. 17 to conduct its first test using the chilled fuel. In a second test flown Sept.

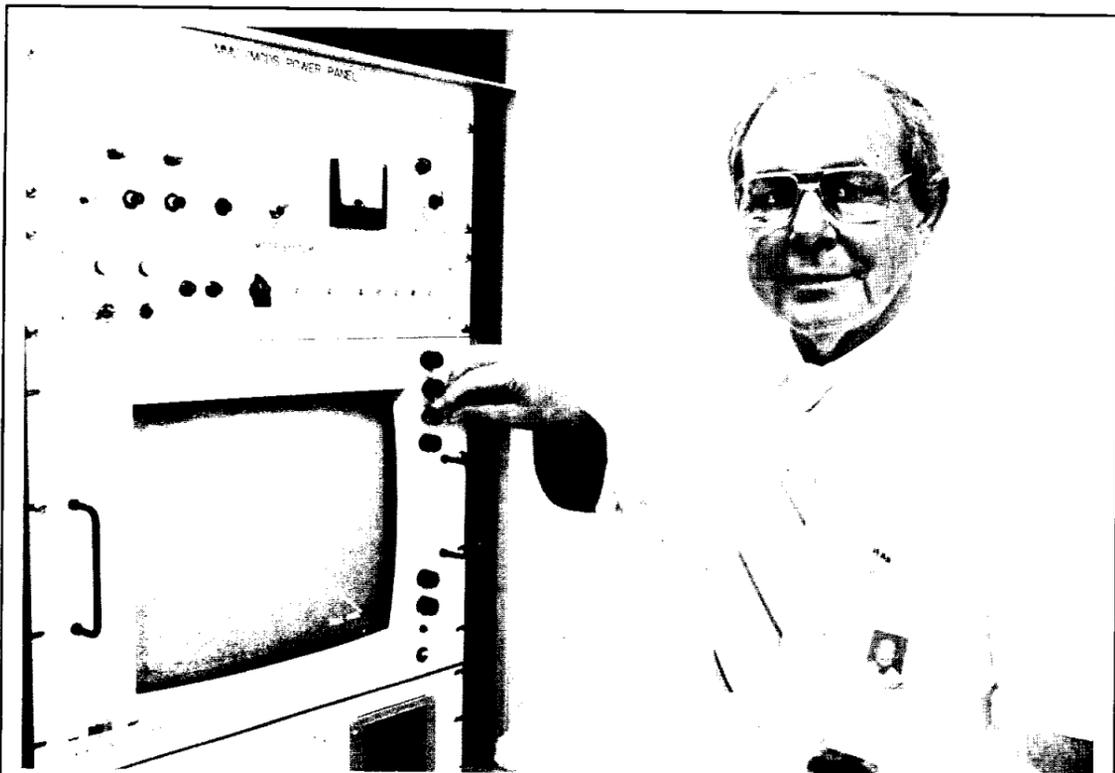
2, the fuel was chilled to between 14 and 25 degrees Fahrenheit. The two tests verified the performance of the T-38 afterburner at 45,000 feet and the engine air start at 26,000 feet using cold Jet A, clearing the way for the new fuel as an alternate for routine use in T-38s, Finney said.

"Jet A got very good results," he said. "The switch could now occur pretty quickly."

Rob Rivers, the pilot for the final test flight, had a special interest in the fuel

tests. On Feb. 24, 1987, Rivers and Astronaut Brewster Shaw were flying a T-38 in California when a lightning strike set the plane on fire, forcing an emergency landing. That emergency prompted the investigation of switching fuels, Finney said.

"Rivers' successful test flight Sept. 2 put the icing on the cake for an innovative and hard-working test team, and it cleared the way for a change to the safer fuel," he said.



Above: Ned Trahan takes a look at one of several consoles in the JSC Avionics Engineering Lab (JAEL) that displays readouts from the Orbiter's General Purpose Computers (GPCs). Below: The new, advanced version of the Orbiter's onboard GPCs, right, is half the size and twice as powerful as the GPCs now flying, left.

Computer flight sets 'burning in'

(Continued from Page 1)

of third-generation GPCs today, the results would be even more impressive when completed in the 1990s. So goes the seemingly infinite race, he added.

Improved integrated circuits cut down the size of the new GPCs, and instead of the iron core memories in the current flight computers, the new ones have a Complementary Metal Oxide Silicon (CMOS) memory.

IBM, manufacturer of the current GPCs, also manufactures the new GPCs and began delivery of the actual flight-types to JSC in February. The JAEL had been working with pre-production prototypes of the computers since 1986, refining the design and operations.

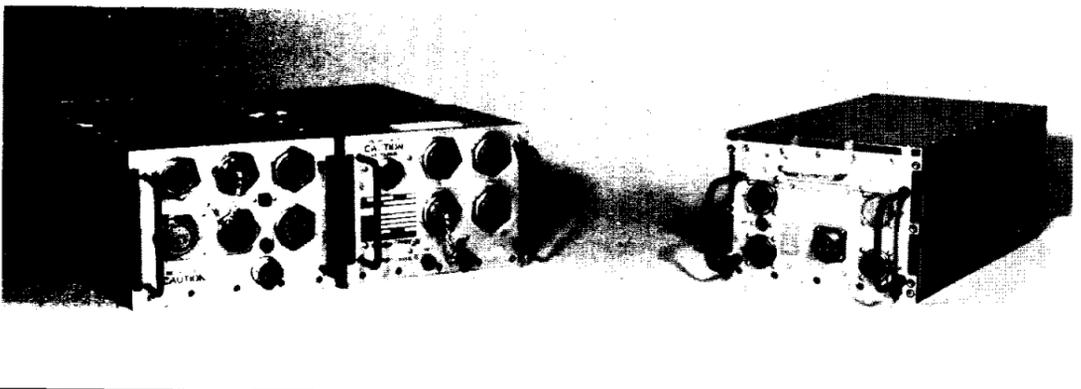
Now the JAEL has six GPCs actually designated for flight, and they differ from the prototypes very little except in their parts. Prototypes were built with off-the-shelf, commercial hardware; flight GPCs are built with high-

reliability, space-qualified components.

"With the actual flight units, and the first flight set of five, we're now doing what we call burning them in," Trahan said. "It's a process where we put as many operating hours on them as we can, hoping that any weak components in the system will fail." JAEL workers plan to put at least 500 hours on each GPC.

While the flight computers are burning in, the prototypes are being used in simulated flights via a link between the test bays in the JAEL and the high-fidelity Orbiter simulator in the Shuttle Avionics Integration Laboratory (SAIL). So far, the new GPCs have lived up to their billing. "In preliminary testing, they've performed as well as advertised," Trahan said.

At least 19 more of the second-generation GPCs will be delivered to the JAEL, enough to outfit four Orbiters plus a spare flight set. The lab should continue to receive about one new GPC a month, Trahan said.



Completion of 9B nears

(Continued from Page 1)

enhanced and moved to Bldg. 9B this month. "We'll also have room for a sample of the truss structure, which we don't have in Bldg. 15," Perner said. "We're excited about it. It's been a long time. This has been nearly six years in the making. This will give us the room we've needed for a long time. It's going to be a heck of a facility."

A 6,000 square-foot wing of 9B will house offices for support contractors that are now around the edges of the 9A high bay. The one-story office wing is built so that a future second story may be added. The 9B high bay has a 65-foot ceiling, matching the dimensions of the 9A bay, said Jesse Goodson, project engineer for the

facility.

But the completion of 9B means only that two-thirds of the final construction project will be finished, Perner added. Another addition, Bldg. 9C, will be built on the east end of 9A and is to be completed within two years. 9C will feature a high bay plus a three-story office area. The Preflight Adaptation Trainer also will eventually be housed in the facility.

"Actually, 9B will only look the way it's going to at first for a short time," he said. "Then, when 9C is finished, the whole facility will be rearranged. Some Shuttle mockups will be moved into 9B, and another air-bearing floor will be built to evaluate heavy trusses in zero-G."

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Keep disease away from flight crews before missions

The number of people who have access to Space Shuttle flight crews will be limited beginning seven days before launch to help protect them from infectious diseases.

Under the Health Stabilization Program (HSP) for the National Space Transportation System, people who are allowed to have contact with flight crews will be identified and badged as Primary Contacts. Only Primary Contacts will be admitted to or allowed to remain in areas where the flight crew is working. The limited access to these areas will be assured by security personnel at designated entrances.

"With STS-26, this is first time we've initiated our health awareness campaign," said Dr. Patricia Santy, health stabilization officer. "We're trying to make all employees at JSC and KSC aware they have an impact on the crew, and to tell them if they're sick to stay home."

Santy also is deputy crew surgeon for STS-26, and she said with launch tentatively scheduled for the last week in September, people at JSC should start following the HSP about Sept. 19.

She said planning for the formal

HSP started in late 1985 when physicians noticed more and more people involved in launches continuing to work in spite of illness, not realizing the potential impact on the crews.

Under the HSP, when it is necessary for the flight crew to be outside of primary areas, surgical masks will be worn by anyone not a Primary Contact who needs to be within six feet of a crew member.

Anyone who is not a Primary Contact should take heed of the following procedures during the seven days prior to launch:

- Minimize contact with the flight crew;
- Hold meetings with the flight crew in large areas to provide adequate spacing of people;
- Restrict the number of people at meetings with the flight crew to those required to be present;
- Assist in reminding non-Primary Contacts to stay more than six feet from a flight crew; and
- Do not enter a primary area or come in contact with the flight crew if you become ill or have been exposed recently to someone who is ill.

No JSC car passes expected for launch

JSC is not expected to receive any vehicle passes for the STS-26 launch because of anticipated decisions on range safety at Kennedy Space Center.

Range safety issues are expected to close both the Banana Creek Road and Static Test Road viewing sites, leaving only the NASA Causeway site.

In the past, 40,000 to 50,000 guests were allowed to witness the launches from all three viewing sites.

But because all NASA guest viewing of *Discovery's* launch will be restricted to the NASA Causeway site, only 13,000 to 15,000 people can be accommodated. Guests previously nominated by the administrator, asso-

ciate administrators and center directors will take up all of those slots.

A limited number of vehicle passes will be issued from Kennedy, but they have been allocated to the requests already on file there.

"I wish we didn't have to cut down the numbers," said Public Affairs Specialist Stella Luna, who had been coordinating JSC employee and public requests for car passes. She said she already has received 300 requests that she will not be able to approve.

JSC employees who have requested STS-26 vehicle passes will not receive individual notices that their requests cannot be honored, she said.

Terminal countdown test gives final dress rehearsal

(Continued from Page 1)

Rockwell and are scheduled to arrive back at Kennedy in time to support a late September launch.

Chet Vaughn, chief of JSC's Propulsion and Power Division, said Wednesday that the clamshell repair is holding well on a leaky fitting in *Discovery's* left Orbital Maneuvering System (OMS) pod. After cutting through the Orbiter's aft bulkhead, Rockwell engineers finished installing the clamshell-like device and pumping it full of Furmanite sealant Aug. 19. Vaughn said the repair of the Reaction Control System (RCS) oxidizer tank overflow vent continues to seal well under pressure on *Discovery* and several test articles.

During the TCDT on Wednesday, the five-man crew practiced emergency escape training and received detailed briefings on the status of STS-26. After a traditional pre-launch breakfast, they donned their partial

pressure suits and boarded *Discovery* about 7 a.m. CDT.

After the test was completed, crew members were scheduled to receive some additional egress training wearing their new partial pressure suits and return to Houston late Thursday.

Also this week, the end-to-end test, a verification of the connections between the Orbiter, payload and ground systems, was conducted along with a check of the sensors on the OASIS payload. OASIS, the Orbiter Experiments Autonomous Supporting Instrumentation System, is designed to record environmental data in the Orbiter's payload bay during STS-26 flight phases.

Last weekend, mission specialists Dave Hilmers and Mike Lounge participated in the interface verification test, a check of critical connections between the Orbiter, the Tracking and Data Relay Satellite and the Inertial Upper Stage.