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

New manifest

NASA's new Mixed Fleet Manifest is presented in an easy-to-follow quick-reference format. Chart on Page 3.

Long runners

JSC's team places 12th in the Houston-Tenneco Marathon's corporate category. Story on Page 4.

Space News Roundup

Vol. 28 **January 20, 1989** No. 3

JSC Photo by Jack Jacob

SIDEWALK DIVERSION—A father-and-son team of sidewalk pavers—Raymond West Sr., left, and Raymond West Jr.—lays half-inch quarry tile outside JSC's Bldg. 2. The new sidewalk is designed to divert public visitors on their way to the Bldg. 3 cafeteria away from the heavily traveled sidewalk north of Bldg. 1. The Wests work for American Marble, a subcontractor of Alpha Construction, the primary contractor.

Discovery readied; solid rocket 'cold' test slated today

While final preparations are being made to mate *Discovery* with the rest of the Shuttle stack at Kennedy Space Center, the final full-scale test of a redesigned solid rocket motor (SRM) is scheduled today in Utah.

Qualification Motor-8 (QM-8), the last full-scale SRM firing, will test its performance in cold conditions. The test is planned at 2 p.m. CDT. The 122-second firing will be conducted at Morton Thiokol's northern Utah test site.

QM-8 will be mounted on a test stand that copies the stresses SRMs experience during a Shuttle launch via their connections with the external tank (ET). The solid propellant in QM-8 has been in a "cold soak" to drop its mean bulk temperature to 40 degrees Fahrenheit.

Although the propellant will be chilled, the heaters placed on SRM field joints as part of the redesign effort will be operating. At ignition, the field joints are targeted to be warmed to 85 degrees Fahrenheit, although a range of between 85 degrees and 122 degrees will be acceptable for the test.

The case-to-nozzle joint at the aft end of QM-8 is targeted to be at about 75 degrees, although a range from 75 degrees to 115 degrees would be acceptable. And the igniter joint, near the forward end of QM-8, also is targeted for 75 degrees, with an allowable range extending to 123 degrees Fahrenheit. No intentional flaws have been placed in any of the joints on QM-8.

The stresses the motor will experience during the test will mimic those that occur during an actual liftoff through the period of maximum dynamic pressure (Max Q). QM-8, originally scheduled for Wednesday, was delayed to assess any problems that could have resulted from an inadvertent gimballing of the SRM nozzle by technicians on Jan. 12. Also, test officials are monitoring weather conditions to ensure they meet criteria for the test today. The firing will be carried live on NASA Select television.

Meanwhile, at Kennedy, *Discovery* is scheduled to be rolled over to the Vehicle Assembly Building for mating the STS-29 ET and SRMs at 11:01 p.m. CDT Saturday. After mating, the Shuttle is expected to be rolled out to Launch Pad 39-B at 11:01 p.m. CDT on Jan. 28.

Launch of STS-29 remains on schedule for Feb. 23.

STS-29

JSC teams win Space Act Awards

Teams from Mission Support's Mission Planning and Analysis Division (MPAD) and Mission Operations' Systems Division have received two of JSC's largest ever monetary awards—$40,000 and $20,000—under the Space Act Awards program.

Robert T. Savely, head of the division's Artificial Intelligence Section, co-workers Christopher J. Culbert, Gary Riley and former JSC employee Frank Lopez will share the $40,000 award for development of a C Language Integration Production System (CLIPS).

John Muratore, MOD operational data project systems engineer, will share the $20,000 award for development of an INCO Expert System (IES) with JSC employees Terri Murphy, Troy Heindel, Daryl Brown, Marilyn Kimball; former JSC employee Robin Madison; Robert McFarland, Unisys; Arthur Rasmussen, Mitre; Glenn Binkley and Thomas Kalvelage, Rockwell Shuttle Operations Co.; and Erick Kindred and Cheryl Whittaker, Dual & Associates.

Savely's team developed CLIPS as part of its work in the area of expert systems that use computer programs to emulate complex human decision-making. Expert systems emphasize the use of stored human knowledge and experience to solve specific problems. CLIPS is a low-cost, portable software tool that makes it easier to develop and deliver expert systems with existing software. CLIPS, written in the common C

Please see **AWARDS,** Page 4

STS-27 crew claims gridiron mark

STS-27 crew commander Hoot Gibson and his "four horsemen" have staked their claim on "the longest kickoff and return" in the history of football.

In a Super Bowl pre-game ceremony at Joe Robbie Stadium in Miami, Gibson and crewmates Guy Gardner, Jerry Ross, Mike Mullane, and Bill Shepherd plan to present NFL commissioner Pete Rozelle with an official NFL football they carried aboard *Atlantis* last month as an item in their

Please see **CREW,** Page 4

Other worlds

JSC space scientists preview interplanetary year

[Editor's note: A decade has passed since NASA launched its last interplanetary probe, Pioneer Venus 2. This year, the Space Shuttle will play a large role in the resumption of America's unmanned exploration program, launching both Magellan and Galileo and deploying Hubble Space Telescope. This is the first part of a two-part article on how JSC space scientists view the year ahead. The conclusion will appear next week.]

By James Hartsfield

Other worlds, other moons and a search for the far reaches of the universe will dominate NASA's 1989 agenda.

Space Science

Space scientists at JSC have waited a long time for the launch and results of missions scheduled this year, and now they're on the edges of their seats. Magellan will be launched in April to map Venus with more geologic accuracy than Earth has been mapped. Galileo will be sent on its way in October to explore Jupiter's atmosphere and its moons, which may range from icy blocks to seething, tortured worlds.

In August, Voyager 2, in space for more than 12 years, will view Neptune, a gaseous giant near the edge of the Solar System, as never before. This spring, American scientists will share information gleaned by the Soviet Union's Phobos mission, a craft sent to explore the small, lumpy Martian satellite.

And the Hubble Space Telescope will be put into Earth orbit in December, setting the stage for scientists to see seven times farther than ever before, perhaps to chart the dimensions of the universe and look back in time 15 billion years.

The only certainty among all these missions is that they will give space scientists surprise after surprise. The scientific community is bracing for the unexpected.

"Every time you go out there, you're surprised," said Herb Zook of JSC's Space Science Branch. Zook is especially excited about the launch of Galileo, a probe that will carry a cosmic dust-detecting experiment with which he is working.

"We have an idea of how things work, of what's out there, but ... we never really know," Zook said. "It shows human imagination is nowhere near what nature has in store for us. It's nice to be surprised; it's exciting."

Zook's dust detector will search for a ring of dust he, along with a co-investigator, has theorized orbits the Sun and is shepherded by the Earth. It also will search for other interplanetary dust and dust orbiting Jupiter.

"It may be primordial dust," Zook said. "It could give us an idea on how fast the Solar System evolved and how quickly it is still evolving."

Galileo will fly once past Venus, twice past the Earth and once through the asteroid belt before arriving at Jupiter. At Jupiter, it will release a probe into the giant planet's atmosphere, explore at least four Jovian moons and study the planet from orbit for two years. One of those moons, Io, appears to be tortured into intense vulcanism by Jupiter's massive gravity and holds great interest, Zook said.

NASA's other planetary mission to be launched this

Please see **SCIENCE,** Page 4

NASA Illustration

The Space Shuttle *Discovery* moves away from Magellan and its inertial upper stage (IUS) booster after deployment.

JSC

People

Armendariz is cited by press

Lupita Armendariz, Hispanic employment manager at JSC, recently was cited by Houston Metropolitan magazine in an article concerning "89 Houstonians you can't ignore in 1989."

Armendariz

The magazine quoted Armendariz on her outlook for the future of Hispanics in Houston.

"By the year 2000, two-thirds of the workforce will be women, and in less than 15 years, Houston's largest population will be Hispanic," Armendariz said. "The business community needs to prepare now by recruiting, hiring and promoting Hispanics and by shattering the glass ceiling that blocks women from advancement to higher-level jobs."

"Tec" Roberts dies in December

Tecwyn "Tec" Roberts, a former NASA engineer responsible in large part for designing JSC's Mission Control Center and NASA's worldwide ground tracking network in the 1960s, died Dec. 27, 1988.

Roberts began his NASA career in 1959 at Langley Research Center, where he participated in planning for the first Earth-orbital Mercury flight.

At JSC in 1962, Roberts was assigned responsibilities for determination, coordination and implementation of all design requirements for the construction of the Mission Control Center. For his accomplishments in that area, Roberts received the NASA Outstanding Achievement Award.

In 1964, Roberts moved to the Goddard Space Flight Center as technical assistant to the deputy assistant director of tracking and data systems. Roberts received the NASA Exceptional Service Medal for his work in support of the Apollo 8 lunar orbital flight.

Roberts was named director of networks at Goddard in 1972, a position he retained until his retirement from NASA in 1979. Prior to his death, he was a consultant to Bendix Field Engineering Corp.

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 each.

AMC Theater (valid until May 31): 42.95 each.

Pericles, Prince of Tyre (April 22-28, 8 p.m., Satellite Theatre, UHCL): $4.

We need your data!

Send your 'People' and 'Dates & Data' column items to Roundup, AP3, or bring them by Bldg. 2, Rm. 147. The deadline for items is at least eight working days before the Friday they will appear.

JSC

Dates & Data

Today

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

Saturday

Arbor Day celebration—Armand Bayou Nature Center will celebrate Arbor Day with informal talks, planting demonstrations and a tree dedication Jan. 21-22. Free Loblolly pine seedlings will be distributed. Admission to the nature center, 8600 Bay Area Blvd., is $5.

Monday

Cafeteria menu—Entrees: braised beef ribs, chicken a la king, enchiladas with chili, Italian cutlet (special). Soup: cream of broccoli. Vegetables: navy beans, Brussels sprouts, whipped potatoes.

Tuesday

BAPCO meets—The next meeting of the Bay Area PC Organization (BAPCO) will be at 7:30 p.m. Jan. 24 at the League City Bank & Trust. For more information, call Earl Rubenstein, x34807, or Ron Waldbillig, 337-5074.

Soccer sign-ups—Registration for mixed soccer leagues will be held at the Rec Center on Tuesday. NASA-badged teams will sign up at 7 a.m., and non-badged teams at 5:30 p.m. For more information, call x30303.

Cafeteria menu—Entrees: turkey and dressing, round steak with hash browns, stuffed cabbage (special). Soup: beef and barley. Vegetables: corn cobette, okra and tomatoes, French beans.

Wednesday

NMA meets—The next meeting of the JSC Chapter of the National Management Association will be at 5 p.m. Jan. 25 in the Rec Center ballroom. Dinner will begin at 6 p.m. Local area high school students will make presentations on the American enterprise system. For more information, call Gerald Chapman, x34848.

Cafeteria menu—Entrees: catfish with hush puppies, roast pork with dressing, pepper steak (special). Soup: seafood gumbo. Vegetables: broccoli, macaroni and cheese, stewed tomatoes.

Thursday

Cafeteria menu—Entrees: beef tacos, barbecue ham steak, Hungarian goulash, chicken fried steak (special). Soup: turkey and vegetable. Vegetables: spinach, pinto beans, beets.

Jan. 27

Cafeteria menu—Entrees: liver and onions, deviled crabs, roast beef with dressing, tuna and noodle casserole (special). Soup: seafood gumbo. Vegetables: whipped potatoes, peas, cauliflower.

Jan. 28

Cystic fibrosis benefit—A bowl-a-thon will be held at 3:30 p.m. Jan. 28 at Alpha Bowl on Bay Area Blvd. to benefit the fight against cystic fibrosis, the number one genetic killer of children. Anyone with sponsors obligated to donate per pin can bowl three games free. Door prizes will be presented. For more information, call Barbara Svehla at 282-2569 or 996-8426.

Feb. 10

Information systems conference—JSC and the University of Houston-Clear Lake will co-sponsor an all-day conference entitled, "Information Systems for Project Management: Coordinating Large, Complex Computing Systems," on Feb. 22 at the Westin Oaks-Galleria in Houston. Brenda Dervin of Ohio State University will give the keynote speech on "Making Information Systems Work: The Human Dimension." Cost is $125 per person, or $100 for university and federal employees. Registration deadline is Feb. 10. Federal employees should call Glen Van Zandt, x33069, to register. For more information call 488-9433.

Feb. 15

Lunar pole conference—A Lunar Polar Probe Conference designed to formalize plans for the development, funding and launch of a small satellite to explore the polar regions of the Moon will be conduced March 11-12 at the Nassau Bay Hilton. The conference is sponsored by the National and Houston Space Societies, Milwaukee Lunar Reclamation Society, University Space Society, New Orleans Space Society, Space Studies Institute, Space Frontier Foundation, ETM Inc. and Third Millenium Inc. Speakers will include Dr. Wendell Mendell of JSC. Registration is $15, and banquet reservations are $25. Deadline for advance registration is Feb. 15. For more information, call 643-6373.

Feb. 23

Call for papers—The American Society of Quality Control (ASQC) is seeking innovative papers written on subjects such as applications in quality and productivity or the use of data systems for improving quality and productivity and competitiveness. The papers will be presented at the second annual South Texas Quality, Productivity and Data Systems Conference, Feb. 23-24 at the University of Houston's Hilton Conference Center. For consideration, and a brief abstract and biographical sketch, both less than 300 words each, a one page outline and a photograph to South Texas Q&P Conference, Attn. Eugene Berger, Box 890506, Houston, 77289. For more information, call Berger, 333-0967.

Swap Shop

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

Property

Sale/Lease: Nassau Bay townhouse, 4-2-2, over 2,000 sq. ft. w/2 story den, deck, atrium, FPL, oversize garage, $950/mo., or $99,900. Jerry, x38922 or 333-9003.

Sale: Hwy. 6 & Westheimer area, 2-2, brick, lg. fen. yard, FPL, $950/dn., $425/mo. 332-0365.

Rent: University Trace condo, 2-2-2PS-1 carport, W/D, dishwasher, icemaker, FPL, wetbar, sec. sys., great location, $450/mo. plus dep. Jerry, x38173 or 480-8220.

Lease: Sageglen, 4-2-2, 2154 Perry, cathedral ceiling, great room, track lights, fans, garage opener, security, $625/mo. 481-4190.

Sale: Bolivar Island, North Jetty, 2 lots, 25 x 140 each, 6K for both, or $100/dn., $82/mo. 332-0365.

Sale: Arrowhead Estates, near Willis, Texas, wooded lot, beautiful, quiet, $5,000, OBO. 482-2877.

Lease: Sterling Knoll subdivision, 2-1, new carpet, new paint, W/D hookup, ex. cond., $325/mo. 486-2048.

Sale: Middlebrook, 3-2-2, study, FPL, wet bar, covered patio, large lot, ex. cond., FHA assum., 10%. 480-9363.

Sale: Friendswood/Sun Meadow Estates, wooded lot in established neighborhood, cul-de-sac, bordered by stream and golf course on 2 sides, approx. 245' deep and up to 86' wide, util. on site, $31,500. Doug, x32860 or 486-7412.

Lease: 1 BR condo on Tranquility Lake, sec. gate, FPL, refrig. w/ice maker, microwave, cable TV hookup, covered parking and more, $325/mo. plus $150 dep. 554-6892.

Lease: Camino South, 3-2 split bedroom plan, $550/mo., 1st, last, dep., avail. 1st or 15th Feb. 333-2359.

Sale: '82 Fleetwood Festival mobile home, 14' x 72', 2-2, cen. A/H, appli., ex. cond., $9,000, OBO. (409) 925-5554 or 474-4306.

Sale: Lot in Kemah, 111' x 180', set up for home building, some trees, $7,500. 334-1883.

Sale: Edwards County near Barksdale, 163 plus acres, furnished house, spring fed well, deer blinds. 487-1568.

Sale/Rent: Middlebrook II, 3-2-2, Havenhurst St., FPL, fence, new paint, no pets, 1,940 sq. ft., detached garage w/door opener, $700/mo. or $78,900. 480-3260.

Sale: League City, 3-1-1, near Civic Center, fenced yard, $37,500. x30810 or 488-0597.

Sale: Big Bend area hunting land, 160 acres, $150/acre, OBO. 337-4051.

1983 Rivercrest mobile home, 2-1, one owner, ex. cond., deadbolt locks, storm windows, 2 ceiling fans, knotted pine paneling, large kitchen, take over payments. 534-7054.

Rent: League City, 2-1 frame, large lot, huge trees, 10' ceilings w/fans, new paint inside and out, quiet secure area, 2 mi. to NASA, $345/mo. Gene, x38020 or 334-1505.

Cars & Trucks

'86 Chrysler Fifth Avenue, fully equipped, low mi., like new, below NADA, $10,300. 482-1535.

'84 Toyota Celica GT, ex. cond., orig. owner, 77K mi., new tires, tinted windows, no A/C, great FM stereo, $5,200. Deena, x32427 or 338-2429.

'69 Olds Cutlass, V-8, P/S, P/B, A/C, needs new compressor, ex. first car for high school student, $1,000. Jon, x32163 or 554-2805.

'67 Mustang Classic, 289, V-8, 3 spd., new red paint, A/C, AM/FM stereo, mags, headers, new dual exhaust, $2,995, OBO. Mike, x38169 or 482-8496.

'74 Corvette Stingray, ex. cond., silver, T-tops, 30K on 350 engine, auto., $6,500. Lore, x38477 or 998-8067.

'84 Ford Escort GT, black, 2 dr. hatchback, tinted windows, mag wheels, 5 spd., A/C, AM/FM stereo cass., cruise control, sun roof, $3,500. Quintel, x35553 or 333-4285.

'84 T-Bird Elan, loaded with all options, $6,500. x31355 or 332-0709.

'79 Dodge 3/4 ton van, silver, customized, maroon int., Captain's chairs, bed, table, storage, CB radio, ex. mech. cond., Michelin tires, low mi., $2,895. Dean Thompson, 332-2229.

'86 Nissan Stanza wagon, A/C, auto. overdrive, cruise, 22/27 MPG, complete records, AM/FM/cass., dark tint, 61K mi., 100,000 mi., extended warr., $5,100, av. loan, $4,425, av. retail, $5,750. Dick, x32929 or 481-0126.

'82 Chevy Suburban Diesel, 6.2 L, A/C, 4 spd., auto. overdrive, AM/FM cass., 22 MPG, complete records, $4,550, some rust spots. Dick, x32929 or 481-0126.

'65 Mustang Fastback, built Dec. 64, 289 "A" mtr., loaded, needs paint, ex. cond., $6,800. Tony Griffith, x34415 or 480-2206.

'75 Mercedes Benz 450 SEL, blue, auto. trans., P/S, P/B, options, new Pirelli tires, newly installed AM/FM stereo w/cass. (4 speakers), newly installed A/C, pwr. sunroof, cruise control, pwr. windows, floor mats, int. very clean, ext. and engine in fine cond., $9,500, OBO. Gary, x30857 or 242-4799.

'74 MGB GT hard top, runs great, looks great, dove grey, wire wheels, A/C, AM/FM cass., $2,800. 488-0549.

'79 Pontiac Sunbird hatchback, auto. trans., AM/FM radio, A/C, new tires, belts and Die-Hard battery, needs body work, $250, OBO. Dianna, x34371.

'87 Fiero GT, blue, 16K mi., 6 cyl., alarm, 5 spd., $10,000. Richard, x34115 or 326-2022.

'87 Sterling 825 SL, luxury and performance auto., all options, low mi., take up notes or refinance. Ring, 486-1404.

'87 Toyota, 5 spd., loaded, sec. alarm, 7,600 mi. Jim, x36370.

'77 Dodge custom van, P/S, P/B, A/C, 4 Captain's chairs, sofa/bed, $1,895, OBO. Tom, x39040 or 332-6419.

'82 Chevrolet Celebrity, 2-tone blue, 4 dr., 50K mi., 4 cyl., auto., P/S, cruise control, A/C, AM/FM stereo, $3,300. x37139 or 532-2156.

Cycles

'82 Honda Nighthawk, runs great, looks good, new rubber, chain and sprockets, $800, OBO. Randy, 282-4857 or 486-4940.

Boats & Planes

15' V hull fiberglass boat on Sportsman galv. trailer, no motor, $475. 339-1957.

'74 Monark bass boat, 16' w/galv. trailer, 50hp Johnson, $950. 554-4316.

Audiovisual & Computers

Tandy CM-5 RGB color monitor for computer, ex. cond., used less than 1 mo., still in warranty, $190. Speier, 333-2263.

ITT Xtra, XT compatible with 80286 processor, fast, Mono screen, 640K, 1 floppy, 30Meg hard disk, all manuals, extremely fast, new, have boxes, $1,050. Mike, x34378 or 486-4983.

Apple Imagewriter w/manual, ex. cond. 488-2822.

IBM compatible computer, Zenith 159, 640K, two floppy drives, internal modem, 300/1200 baud, software, manuals, $950, OBO. Daryle, 282-4863 or 532-1977.

NEC Laptop computer, IBM compat., 640K, 2 720K floppies, supertwist, non-backlit screen, very fast, incl. pocket modem, case, manuals, $800. Mike, x34378 or 486-4983.

Household

Queen size mattress, box springs and frame, $100; round table and four chairs, $50; rectangular table w/o chairs, $40; swivel rocking chair, $40. 482-2138.

Electric stove top, yellow, $70. Jerry, x38173 or 480-8220.

Complete baby room furniture, dresses, toys and tricycles, all like new. 481-4190.

Super single waterbed w/heater and mirrored bookcase, ex. cond., $200. 480-6541.

G.E. elec. dryer, $75. Louis, 282-2835 or 487-4852.

1984 Whirlpool matching washer and elec. dryer, almond color, ex. cond., $200/each or $350/for the pair. Craig, 282-3731 or 485-5636.

Sears top of the line Kenmore washer and dryer, beige, only used 10 mos., was $850; old king size bed, springs and frame, BO. David, 333-6356.

Triple dresser, dark wood, ornate carvings on drawers/doors, large matching mirror, 1 yr. old., $150. Jana, x31653 or 532-3008.

Double size bed, w/frame, box spring and mattress, $50. Ken, x32514 or Marie, 333-6645.

RCA VCR, $225; Litton micro., $165; Huffy men's 10 spd., $90; Garcia rod and reel, $90, all like new; dresser, $45; Sampo remote color TV, $175; Westinghouse antique sewing machine, $75, w/cabinet. Dahlia, 282-4046.

Queen size sofa sleeper, oatmeal and tan w/light oak trim, ex. cond., $250. M. Connealy, 484-3360.

Ethan Allen dining room table, chairs, buffet, distressed knotty pine, $800; cedar chest, $100; Broyhill pecan desk, $120, very good cond. Sue, x34008 or 482-9408.

Gas cook top, white, 4 burners, works fine but is hard to keep clean, $25, OBO. Dianna, x34371.

Large white metal eight-light chandelier w/metal shades, $60; multicolor floral metal chandelier, $45; white 2' x 3' bulletin board, $5. 326-3370.

King mattress, box spring, frame, $125; dark wood picture frame, 23" x 35", nonglare glass, $5. 326-3370.

Wanted

Want mature, responsible, experienced babysitter for three children, ages 6 mo., 1 yr., 2 yr, two families, in Nassau Bay home. Carol, 326-2864 or Donna, 335-1896.

Want two roommates, non smokers, to live in my 3-2 home in Friendswood, cable, W/D, microwave, VCR and all household priv., no dep. or lease to sign, $225/mo., all bills paid. Mike, x38169 or 482-8496.

Want a bookshelf and a home entertainment center. Pam Alloway, x35111.

Want computer games for an IBM PC Jr. 480-8052.

Van pool, West Loop Park and Ride to NASA, new 1988 Dodge van. Richard, x37557.

Single mother with child looking for same for roommate situation in Clear Lake area. John, x31929 or 334-3422.

Want garden tiller, good cond., 5hp or more. H. Stall, x33671.

Want to buy elec. trains. Don, x37832 or 996-1425.

Want carpool from Friendswood, Dunbar, near Pearland, to JSC. 474-5868.

Want to buy '77 or '78 Oldsmobile 98 Regency or Buick Electra w/403 engine, must have had only one owner and must be extra clean. Ray, x31375 or 534-4839.

Want to trade $8,000 electronic organ for land, car, truck, or boat of equal value, OBO. 337-4051.

Photographic

Complete video system, Minolta VHS, autofocus camera w/character generator, 5-head portable VCR, TV tuner, carrying cases, $700. Scott, x37294 or 332-2488.

Pets & Livestock

9 mo. old female cat, spayed, rabies shots, free to a good home. 996-9646 or 282-4271.

Free 1/2 collie, 1/2 chow female dog, 2 yrs. old. 333-4734.

Cockatiels, pair of pieds, $40, one grey female, $20. 333-4734.

Female Collie, spayed, 3 yrs. old, good disposition and appearance, needs home w/fenced yard, free. Doug, 326-1808.

Free to good home, AKC Reg. Old English Sheepdog, male, 3 yrs., very playful and friendly, needs room to run. x38455.

Free puppies, mixed breed black Lab, born 12-10-88, ready now. Anderson, 485-3025.

Lost & Found

Lost black star sapphire ring, gold setting, reward. Steve, x31049.

Miscellaneous

Marcy weight lifting set, includes many weights, bar bell, etc., $200. 480-6541.

Ash rocking chair, $60; 1 sofa chair, new, $105; 2 Sears prof. tool chests, $300. x37192 or 996-9724.

Fireplace insert, used once, $100, OBO. 482-2877.

Antique hump back steamer trunk, 34L x 21W x 28H, has 95% HDW/trim, $195; file cabinet, 2 DWR w/lock, $20; elec. dust collector for furnace, H/P, "Edison", w/pressure switch, 800-1600 CFM, was $380, now $150; Greco baby stroll-a-bed "Elite", 6 mo. old, $40; dehumidifier "White/Westinghouse" 21H x 12 x 12, 20 pts/24 hr., auto. shutoff, used 4 mos., $99; mirrors, gold-veined (2), 45 x 91 1/2, $100/ea. Doug, x32860 or 486-7412.

1hp Gould jet pump and 84 gal. storage tank, $175. Scott, x39032 or 554-2206.

1988 World Book Encyclopedia, 22 volumes, dark blue Imperial binding, was $799, now $600. Paula, 337-2703.

Blue fox fur jacket, size 12, shawl collar w/corduroy pattern, ex. cond., was $600, now $225. Connie, 282-3051.

Air conditioner, Emerson 8,000 BTU, 110 volt, $170. 482-8827.

Ex. 1/4" Farmer John style wet suit, knee pads, pocket, back pad, more, fits 180-190 lbs., 70-73 inch person, $40, OBO. 554-6628.

Lange ski boots, Lange Z-Pro women size 7 1/2, Thermofit, like new, used once, $100. x32527.

Ping pong table, $60, 40" x 80" met. cab., $60, drum set, $150, 20" pwr. mower, $30, gas powered Weed Eater, $30. Dick, 280-7411 or 332-3678.

Hotpoint 17.6 cu. ft. refrig./freezer w/icemaker, good cond., works great, $100; Captain's bed w/trundle and mattresses, $200; Sears Lifestyler 1000 rowing machine, like new, hardly used, $75; cockatiel w/cage and access., $100. Carol, x33819 or 337-6964.

Four P235/75R Goodyear Wrangler tires on 15" Ford truck rims, lots of tread, $100. Ted, x39374 or 481-3953.

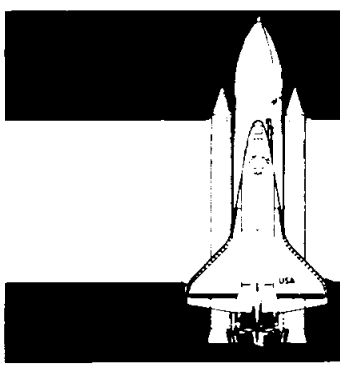
Wedding dress, ivory, summer style, tea-length, size 8, w/gloves and shoes, $150. 481-4889.

Sears Craftsman riding lawnmower, 11hp, 5 spd. trans., 36" cut, rear bagger incl., used 1 summer, $900. Steve, x35450.

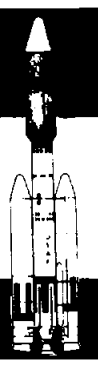
Large tire, like new, 32 x 11.50 R15 LT Wild Country radial RVT, raised letters, only one, $25. Ray, x31375 or 534-4839.

Garage sale, Sat., Jan. 28, 9 a.m.-5 p.m., student desk; '73 Chevelle; stereo, games; clothes; kitchen items; other items, 1102 Newport Blvd., League City. 554-5900.

Oak firewood, 1/2 cord $40 and you haul. Boykin, x37341 or 326-1267 after 5.



MIXED FLEET MANIFEST



Space Shuttle

Flight	Date/ Orbiter	Inclination/ Altitude	Crew/ Duration	Primary Payload	Carrier
29	2/89	28.5‡	5	TDRS-D	IUS
	Discovery	160	5		
30	4/28/89	28.9	5	Magellan	IUS
	Atlantis	160	4		
28	7/1/89	—	5	DOD	
	Columbia	—	—		
33	8/10/89	—	5	DOD	
	Discovery	—	—		
34	10/12/89	34.3	5	Galileo	IUS
	Atlantis	160	4		
32	11/13/89	28.5	5	Syncom IV-05	Unique
	Columbia	190	5*	LDEF-1R	
31	12/11/89	28.5	5	HST	
	Discovery	310 - 330	5		
36	2/1/90	—	—	DOD	
	Atlantis	—	—		
35	3/1/90	28.5	7	Astro-01	IG+2 PAL
	Columbia	190	9*	BBXRT-01	TAPS
37	4/5/90	28.5	5	GRO	
	Discovery	243	5		
38	5/10/90	—	5	DOD	
	Atlantis	—	—		
40	6/7/90	39.0	7	SLS-01	LM
	Columbia	160	8		
39	1/19/90	57.0	7	CIRRS (DOD)	Pallet
	Discovery	140	7	IBSS (DOD	SPAS
				STP-01 (DOD)	HH-M
41	10/5/90	28.5	5	Ulysses	IUS/PAM
	Atlantis	160	4		
42	11/1/90	33.4	7	Starlab (DOD)	LM+1P
	Columbia	175	7		
43	12/10/90	28.5	5	TDRS-E	IUS
	Discovery	160	5		
44	1/31/91	28.5	7	TSS-01	MPESS+PAL
	Atlantis	160	7	GPS-01 (DOD)	PAM-02
45	2/21/91	28.5	7	IML-01	LM
	Columbia	106	10		
46	3/28/91	—	5	DOD	
	Discovery	—			
47	5/2/91	57.0	5	Atlas-01	IG+PAL
	Atlantis	135	7		
48	7/1/91	44.0	7	S/L-J	
	Discovery	160	7		
49	8/1/91	28.5	5	GPS-02 (DOD)	PAM-D2
	Atlantis	160	7	Eureca-IL	Eureca-A
				Lageos-02	Iris
50	10/10/91	57.0	5	UARS	
	Discovery	281	5		
51	11/14/91	28.5	5	Spacehab-01	
	Atlantis	160	7	INMARSAT-01	PAM-D2
				WAMDII	TAPS
52	12/19/91	44.0	7	S/L-D2	LM+USS
	Columbia	160	10		
53	12/19/92	28.5	6	Geostar-01	PAM-D
	OV105	160	7	Eureca-1R	Eureca-A
54	3/30/92	28.5	7	USML-01	LM+MPESS
	Columbia	160	10*		
55	5/7/92	57.0	5	SRL-01	PAL+MPESS
	Discovery	160	7		
56	5/28/92	28.5	5	PUR-1	
	Atlantis	160	7	USMP-01	MSL+MPESS
57	6/11/92	57.0	5	Atlas-02	IG+PAL
	OV105	135	7		
58	7/16/92	39.0	7	SLS-02	LM
	Columbia	160	8		
59	8/13/92	28.5	7	Astro-02	IG+2PAL
	Discovery	190	7		

*Possibility of extension to 10 days

Expendables

Date	Launch Vehicle	Orbit	Launch Site	Payload
6/89	Delta 184	SS	WSMC	COBE
7/89	Scout	TBD	WSMC	MACSAT (DOD)
9/89	Atlas Centaur 68	GSO	ESMC	FLTSATCOM—F8 (DOD)
9/89	Scout	TBD	WSMC	SALT (DOD)
12/89	Atlas 50E	SS	WSMC	NOAA-D
2/90	Delta	LEO	ESMC	ROSAT
6/90	Atlas Centaur	GTO	ESMC	CRRES
7/90	Atlas I	GSO	ESMC	GOES-I
3/91	Scout	TBD	TBD	USAF-1 (DOD)
5/91	Atlas 34E	SS	WSMC	NOAA-I
8/91	Delta	LEO	ESMC	EUVE
11/91	Atlas I	GSO	ESMC	GOES-J
12/91	Scout	LEO	TBD	Small Expl-01
5/92	Atlas I	GSO	ESMC	Goes-K
5/92	Scout S-215C	LEO	SMR	CRRES-01
6/92	Scout	LEO	TBD	Small Expl-02
7/92	Atlas 11E	SS	WSMC	NOAA-J
7/92	TBD	HE	ESMC	GEOTAIL
9/92	Titan III	EO	ESMC	Mars Observer
12/92	TBD	LEO	TBD	Small Expl-03**
12/92	TBD	HE	ESMC	Wind
3/93	TBD	GSO	ESMC	MSAT**
6/93	TBD	LEO	TBD	Small Expl-04**
6/93	TBD	HE	WSMC	Polar
11/93	Titan II	SS	WSMC	NOAA-K
12/93	TBD	LEO	TBD	Small Expl-05**
6/94	TBD	LEO	TBD	Small Expl-06**
6/94	TBD	LEO	WSMC	Radarsat**
9/94	Titan II	SS	WSMC	NOAA-L

**For Nasa Planning Purposes

Glossary

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

Rumors of stellar 'corpse's' death greatly exaggerated

A group of astronomers has discovered evidence of vigorous activity in a white-dwarf star previously thought to be a stellar "corpse" incapable of such lively behavior. This new and unexpected behavior may offer astronomers new insight into how stars are born, evolve and ultimately die.

When stars such as our Sun exhaust their nuclear fuel, they end their lives as inert white dwarfs, compact objects about the size of the Earth. Astronomers have long believed that white dwarfs are incapable of further evolution other than a gradual cooling off.

The white-dwarf star, cataloged as 0950139, lies at the center of a faint nebula called EGB 6 and is located about 1,500 light-years from Earth in the direction of the constellation Leo. The nebula was formed an estimated 50,000 years ago when the star was in the red-giant stage, which occurs late in a star's evolution. When red giants subsequently exhaust their nuclear fuel and "burn out," they contract to become white dwarfs.

Astronomers commonly believe that white-dwarf stars mark the end of any further stellar activity other than a gradual cooling off over billions of years. The researchers found, however, that 0950139 is surrounded by a glowing cloud of gas about the size of our own solar system. The star apparently has very recently shed additional gas long after entering the white-dwarf stage.

Howard E. Bond of the Space Telescope Science Institute in Baltimore, James Liebert and T. Fleming of the University of Arizona, Richard Green of Kitt Peak National Observatory, J.B.

Holberg and K. Kidder of the Lunar and Planetary Laboratory, and F. Wesemael of the University of Montreal, presented their findings at the 173rd meeting of the American Astronomical Society, in Boston. The research was supported by NASA and the National Science Foundation.

These findings are based on spectroscopic observations of the star made at Palomar, Kitt Peak, and Steward Observatories, and by NASA's International Ultraviolet Explorer satellite. "A spectrum like this, with unmistakable signs of a surrounding gas cloud has never been seen before in such a highly evolved star," says Bond. "My coworkers and I believe the gas indicates that the star has very recently undergone additional mass loss."

One possible explanation is that the white dwarf is continually losing mass into space through some unknown mechanism. "Such behavior," says Bond, "is unexpected once a star has become a white dwarf because of the tremendous gravitational force at the surface of a white dwarf."

Another possibility is that nuclear-fusion processes re-ignited below the white dwarf's surface, causing it to balloon back to the red-giant phase. Most of the star then re-collapsed back into the white dwarf observed today, while the outer layers escaped to form the observed second shell of material around the star.

"This re-birth as a 'born-again' red giant may only have lasted for a few years and could well have gone unnoticed by astronomers," says Bond.

Recent theoretical studies by I. Iben and J. MacDonald at the University of Illinois have revealed a possible explanation for such unusual behavior. Hydrogen may diffuse below the white dwarf's surface to mix with carbon rising up from the dwarf's interior, leading to re-ignition of nuclear fusion. Because this diffusion process is extremely slow, a star could have existed as a white dwarf for some time until the re-kindling of nuclear fusion.

Photo by John Lowery

Among the runners on the JSC marathon team were, front row, from left: Leonard Topolski, Dwight Andrews, Gloria Araiza, Keith Grimm, Richard Jackson, Bill McArthur and David Low; and back row: Mike Evans, Richard Armstrong, Jim Gardner, Dan Hawley, Dennis Halpin, Ed McKenney, and Kevin Chilton.

JSC makes it in long run

Marathon team places 12th among corporations

By James Hartsfield

A team of 19 NASA workers proved JSC has what it takes to make it in the long run Sunday, placing 12th among 33 corporate teams in the Houston-Tenneco Marathon.

The NASA team featured male and female runners of all ages. Their finishes were placed according to divisions among corporate teams, for example, Dan Hawley placed ninth in the corporate team division for men age 50 and over. Other high finishers included Debbie Langan, 10th in the women's open; Leonard Topolski, 12th in the men's open and 70th overall among corporate runners; Lisa Spence, 18th in the women's open; Tom Grubbs, 20th in the men's ages 45-49; and Robert Stanley, 20th in the men ages 50 and over.

Langan's 10th place finish among women also qualifies her to run in the Boston Marathon if she wishes, and the Houston event was the first marathon she had ever entered.

Mike Evans, organizer of the NASA team, said the members are proud of the group's 12th place finish. Competition is fierce among corporate teams, and many of the larger corporations' teams featured Olympic-class athletes, Evans said. The top corporate team, AT&T, came in with an overall score of 6 on the marathon's scale. The NASA group finished with a score of 49.

"I think that when you consider that the teams that took the top five places all had pseudo-professional athletes, and we were strictly an intramural team, we've got every right to be proud of our finish," Evans said.

In fact, placing wasn't the most important objective for many on the NASA team. Simply finishing or accomplishing a personal goal was the greatest source of pride.

"You get a lot of personal satisfaction. You set goals for yourself," Evans said. "For me, it was finishing. When you consider it's 26.2 miles—that's usually more than four hours on your feet running—that's a pretty big accomplishment."

The size of this year's NASA team eclipsed the seven-member group that competed for the agency last year, Evans said.

"Everyone I called gave me the names of two or three more people who were running in the marathon," he added. "We missed some people who were out there running individually, and, next year, we'd like to get everyone who's out there running to be a part of the team."

Other members of the NASA team included: Ed McKenney, Coye Mae Jones, Gloria Araiza, Richard Armstrong, Kevin Chilton, William McArthur, Richard Jackson, Frank Moreno, David Low, Dennis Halpan, Robert Kelso and Keith Grimm.

Computer fair to mark opening of new facility

A Feb. 9 display of the latest in computer hardware and software will mark the grand opening of JSC's new Central Computing Facility, the first completely new major facility to be opened at the center in more than 18 years.

All JSC civil service and contractor employees, both on- and off-site, will be invited to tour the new building and browse through more than 75 booths set up by various computer manufacturers, center directorates and others during a grand opening exposition. The exposition will be open from 11 a.m. to 6 p.m. Feb. 9 for employees, said organizer Dianne Robinson of the Data Processing Systems Division.

Refreshments will be available on the first floor of the three-story, 66,500 square-foot facility, to be designated Bldg. 46, and booths will fill the top two floors, Robinson said. Hardware manufacturers represented at the event will include Apple, IBM, GRiD and Cray. Software displays will include Micrografx, Persoft, Software Publishing and Lotus Development.

"There will be lots of new state-of-the-art technology on display," Robinson said. When normal operations begin, the facility will be a secure area, so the grand opening is planned to give employees a chance to see the building now.

"We're really proud of the facility and welcome the chance to show it off. I hope everyone comes to see it," she said.

Guided tours of the building will be given at the opening. The Central Computing Facility will house data processing equipment and its support systems plus offices for operations personnel. The building also provides the space for computer equipment that is needed as JSC advances with Space Station *Freedom*.

Brochures describing the building and its use will be available at the opening. Along with computer manufacturers, many areas of JSC will have displays at the event, including space and life sciences, engineering, the photography lab and the printing office. Other displays and entertainment, still in the works, also may be featured, Robinson added.

Space Act awards presented to two JSC groups recently

(Continued from Page 1)

language, requires a small amount of computer memory, can be easily tranferred among different computer systems, and can be purchased commercially for only $250.

CLIPS already has been used to develop several expert systems at JSC, including TRACKEX, a radar tracking expert system being developed to support the Space Shuttle's on-orbit navigation flight controllers, and the IES developed by Muratore and his team.

CLIPS is in use at other NASA centers and other government agencies, such as the Central Intelligence Agency, Internal Revenue Service, Department of Agriculture, Army, Navy, Air Force and Federal Highway Administration. More than 90 universities also use CLIPS.

The INCO Expert System, so-named because it assists the Instrumentation and Communications Systems Engineer (INCO), is the first expert system to be tested in the Mission Control Center during Shuttle missions. IES helps INCO flight controllers reduce data, automate fault detection routines and display data in graphic schematic form.

In using existing text display formats, flight controllers must first evaluate the data to construct a mental "picture" of the system before attempting to evaluate the configuration. IES displays the information in picture form and highlights anomolies, allowing the controller to concentrate on problem solving.

The Space Act Awards were presented to the CLIPS team on Jan. 6, and to the IES team on Dec. 23.

Planetary probes

Eploration dominates NASA's 1989

(Continued from Page 1)

year is Magellan, a radar mapper that will lay Venus' cloud-covered terrain bare in great detail.

Magellan will reach Venus before year's end, and, "in a matter of months, we'll have a high-detail topographic map of an entire planet," said Chuck Wood, manager of the Shuttle Earth Observations Office. Wood is an expert on Venus and the author of a recent paper theorizing that it has a "living" rather than a "dead" geology.

Magellan will map almost the entire surface of Venus with a detail 10 times greater than any previous mission, a detail great enough to determine if the planet has telltale signs of active geology. Magellan's maps may be compared to older radar maps of Venus to search for signs of recent volcanic eruptions, wind erosion or other changes. Their existence, or lack thereof, could settle the debate on Venus' "alive" or "dead" status, Wood said.

"We'll have the excitement, the joy, of the first good look at a planet," he said. "It's just an unparalleled opportunity to understand the geology of another world."

Venus is similar to Earth in its gross physical characteristics, but startlingly different in other ways. Understanding those differences could lead to a better idea of how each evolved and of the Solar System's evolution in general.

"We're going to start mapping Venus at a more consistent, high level than we've done of Earth," Wood added. "It's like being alive when Columbus was alive. We'll see a new world."

Mankind will see another world up close for the very first time this year, when Voyager 2, a veteran of several planetary encounters, flies by Neptune on its way toward interstellar space.

Next week: Close encounter with Neptune

Space News Roundup

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

Editor..... Kelly Humphries

Asst. Editor... James Hartsfield

Crew to present gift at Super Bowl

(Continued from Page 1)

official flight kit (OFK).

The football will be presented along with a plaque that reads, "Be it known that this official NFL football was 'kicked' into low Earth orbit on December 2, 1988, from the John F. Kennedy Space Center, Florida, and carried by the crew of the Space Shuttle Atlantis, approximately 2 billion, 992 million yards (1.7 million miles), for the longest 'kickoff and return' at Edwards Air Force Base, California on December 6, 1988."

During the mission, the five space gridders loosely inflated the ceremonial pigskin for a "scrimmage."

NASA-JSC