



Space News Roundup

Vol. 28

March 3, 1989

No. 9

Survey will reevaluate JSC culture

By Linda Copley

A follow-up questionnaire to a NASA-wide culture survey completed in December 1986—including questions submitted by JSC about JSC—will be distributed next week.

JSC Director Aaron Cohen urged 100-percent participation by the center's 3,500 NASA employees. "I believe this is one of the best ways we have of clearly understanding how our employees feel about a wide variety of issues and (what they) believe should be important at this Center," he said.

NASA employees, including co-op, part-time, and military personnel assigned to JSC will receive their personally labeled surveys through the interoffice mail.

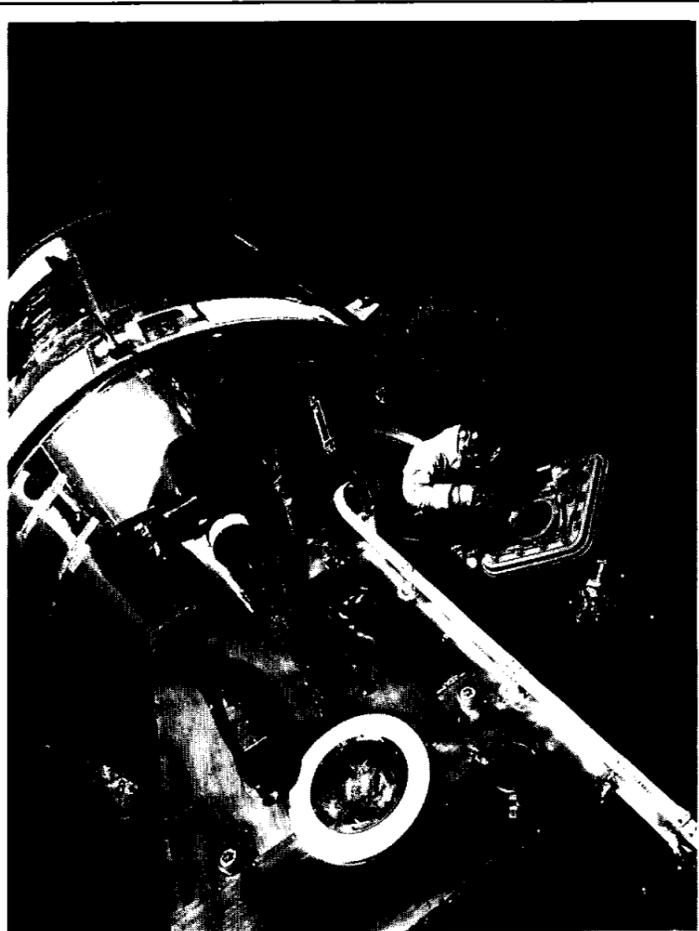
The 154 questions are to be completed and mailed within three days after receipt in a pre-addressed, pre-stamped envelope to the tabulators at W. Warner Burke Associates Inc. at New York's Columbia University. Warner Burke, the company that compiled the results and prepared the report from the 1986 survey, plans to submit a report on the 1989 findings to the NASA administrator and all center directors by late April.

The surveys are completed anonymously, with only an employee's directorate indicated. After tabulation at Warner Burke, the original answer sheets will be shredded and destroyed, without NASA management ever having seen the individual responses.

The questionnaire will be divided into five categories, Work Satisfaction; Your Work Unit Climate, NASA Culture, Johnson Space Center Culture, and Center Specific Items. The last category is a new addition to the 1989 survey, and includes center-specific questions submitted from NASA centers that chose to participate in this category.

The 30 questions in the JSC-specific section were developed by a senior staff working group led by Deputy Director P.J. Weitz. These questions address a number of current center issues and attempt to gauge JSC's progress since the 1986 survey. Members of the senior staff were consulted as these questions were developed. In addition, the Human Resources Development Branch conducted employee focus groups to understand the issues employees think should be targeted by the survey.

Please see **SURVEY**, Page 4



NASA Photo

Astronaut David Scott stands in the open hatch of the Apollo 9 Command Module during extravehicular activity. Lunar Module Pilot Russell Schweickart took the photo from the "front porch" of the LM.

Apollo 9 flight qualified first 'true' spacecraft

By Kelly Humphries

"Heat shields are for sissies!" That five-word challenge eloquently summarizes both the competitive spirit and the purpose of the first manned flight of the Apollo Lunar Module on Apollo 9.

During that mission, launched March 3, 1969, James McDivitt, David Scott and Russell "Rusty" Schweickart flew in the first true manned spacecraft—designed for

use only in the the vacuum of space and unable to safely reenter the Earth's atmosphere. It was an extremely successful test of the Lunar Module (LM), the Apollo spacesuit and backpack, the docking system and maneuvers, and

provided additional confidence in the Saturn V launch vehicle and the Command and Service Modules (CSM).

But in January 1969, the complexity of the mission with its two separate vehicles, two flight control teams, multiple docking maneuvers and space walk, loomed in the face of President Kennedy's end-of-the-decade deadline for landing Americans on the Moon.

The "heat shield" challenge was the motto of the LM flight controllers in the Lunar Module Systems Branch, says Fred Frere III, who then worked for Grumman Aircraft Engineering Corp. Please see **APOLLO 9**, Page 4



Atlantis tile damage won't delay STS-29

Damage to the tiles on the STS-27 flight of *Atlantis* in December was the result of insulation from the nose cone of the right-hand solid rocket booster coming loose and striking the Orbiter, according to the NASA review panel investigating the incident.

The team's findings, released Feb. 28, will not delay the launch of *Discovery* on the STS-29 mission, according to the report. The STS-29 hardware was determined ready to fly because of an improvement made to the suspect insulating material covering the booster nose caps.

The suspect material, known as Marshall Sprayable Ablator (MSA), was used for nose caps up to and including the STS-27 mission. Following fabrication of the STS-27 nose caps, changes were made in the material's properties, manufacturing process and application. The result was an improved product, MSA-2. The changes have been shown to produce stronger bonds between the insulating material and the surface on which it is applied.

The damage to *Atlantis*' thermal protection system occurred about 85 seconds into flight, when the Shuttle was traveling about two and a half times the speed of sound. At that speed, tests demonstrated that mate-

rial breaking away from forward portions of the vehicle can result in debris striking the orbiter with enough force to damage the tiles.

Inspection that took place immediately after the STS-27 landing at Edwards AFB on Dec. 6, 1988, revealed the *Atlantis* had sustained more than 700 tile impacts on the lower surface tiles on the right-hand side. One complete tile was missing from the damaged area below the crew compartment, and an insulation panel was missing from the right orbital maneuvering system (OMS) pod.

The review team examined the physical damage, went over pre-launch inspection records and the tracking camera footage, and interviewed the crew during their investigations. They also studied the flight hardware design and build records and conducted laboratory tests on the damaged tiles, looking for bits of the damaging debris material, before releasing their findings.

In addition to these tests, the panel's findings concerning probable cause were based on a determination that several manufacturing process variables on the right booster nose cap were very near their specification

Please see **TILE**, Page 4

Discovery nearly ready despite minor problems

By Kyle Herring

The internal target date for launch of *Discovery* on STS-29 has been moved back to March 11 because of some minor processing problems that have put the schedule behind by about two work shifts.

As workers Tuesday began the scheduled flight readiness test, which involves cycling main engine valves and checking out

the pneumatics system, the controller on main engine number 1 shut down. The problem was traced to a damaged solenoid on the fuel pre-burner oxidizer valve. Officials said the solenoid, which causes an actuator to open and close the valve, may have been damaged during the removal and replacement of that

engine's high pressure oxidizer turbopump

A new solenoid/actuator assembly was flown to the Kennedy Space Center Wednesday morning and installed late Wednesday and Thursday. The flight readiness test was scheduled to begin shortly after the

new assembly was installed.

Pad workers also loaded liquid hydrogen and liquid oxygen reactants aboard the storage tanks on the fixed service structure at launch complex 39-B in preparation for loading the Orbiter's on-board storage tanks during the launch countdown. The oxygen and hydrogen are used by *Discovery*'s fuel cells to generate power.

Please see **STS-29**, Page 4

Creighton to command STS-36

Mission specialists get seats aboard Spacelab

By Jeff Carr

NASA has appointed flight crew members to two Space Shuttle missions scheduled to fly in 1990.

The entire crew has been selected for STS-36, a dedicated Department of Defense (DOD) mission. Two mission specialists and two payload specialists have been chosen to fly on STS-40, a dedicated Space Life Sciences (SLS-1) mission.

The partial SLS-1 crew assignment will provide for long-range crew participation in payload training and integration. The remainder of the flight crew will be assigned later.

John O. Creighton, a Navy captain,

will command Shuttle mission STS-36 scheduled to lift off aboard *Atlantis* in February 1990. John H. Casper, an Air Force colonel, will serve as pilot. Mission specialists are David C. Hilmers, a Marine Corps lieutenant colonel, Richard M. Mullane, an Air Force colonel, and Pierre J. Thuot, a lieutenant commander in the Navy.

Creighton was pilot on mission STS-51G. Hilmers has flown as a mission specialist on STS-51J and STS-26. Mullane has flown as a mission specialist on STS-41D and STS-27. Casper and Thuot will be making their first space flights.

Two NASA astronauts also have been named as mission specialists aboard the Space Shuttle *Columbia* on mission STS-40. M. Rhea Seddon, M.D., and James P. Bagian, M.D., have been assigned to SLS-1, scheduled for launch in June 1990.

Seddon flew on STS-51D as a mission specialist. Bagian currently is preparing for his first space flight aboard *Discovery* on STS-29.

SLS-1 Payload Specialists F. Drew Gaffney, M.D., University of Texas Health Science Center, Dallas, and Robert W. Phillips, M.D., Colorado State University, Fort Collins, were assigned in April 1985.



This poster will give advance notice that an employee in the area soon will be receiving a Silver Snoopy Award.

Snoopy posters are clue award's coming

The Manned Flight Awareness (MFA) Program is planning to present about 100 Silver Snoopy Awards this month to JSC civil service and contractor employees.

Who will receive them? That's a surprise, but if you see a "Snoopy returns to space" poster in your area it could be you or a co-worker.

MFA Council Chairwoman Lois Walker says the posters will go up in each recipient's work area about a week before the presentation is made by an astronaut.

The Silver Snoopy is the astronauts' personal achievement award for exceptional work toward flight safety or mission success.

JSC

People

Boeing honors employee of year

Willie Mae Wilson, prelaunch assessment review (PAR) coordinator for Safety, Reliability and Quality Assurance Engineering, has been selected as Boeing's Houston Employee of the Year. She will receive a certificate of recognition and \$500 cash award at a



Wilson

lunch hosted by Boeing's Houston Operations Management.

Wilson joined Boeing as a secretary in 1974, has since earned her associates degree in computer science, and was named PAR coordinator in 1988. The PAR is a flight readiness review teleconference between NASA Headquarters, JSC, Marshall and Kennedy Space Flight Centers, hosted at Boeing's Houston facility. As PAR coordinator, Wilson produces an electronic script based on input from each teleconference participant and transmits to all NASA centers involved with the review. Her efforts make up about 70 percent of the critical responsibilities for each PAR.

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:

FBA membership cards (available to civil service employees and retirees): free.

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

AMC Theater (valid until May 31): \$2.95 each.

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

Revival (March 3,4,10,11,17, 8:15 p.m., League City Civic Center): \$5.

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

Delta Downs Trip (March 18, includes transportation, soft drinks, admission to clubhouse): \$16.

Delta Downs Overnight Trip (March 18-19, includes transportation, champagne welcome, admission, accommodations at Beaumont Hilton, Sunday brunch): \$50.

JSC

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

Property

Rent: Lake Livingston waterfront, 3-2, fully furnished, covered decks, pier, new cond., FPL, excellent fishing, week or weekend. 482-1582. Lease: Baywind I condo, 2-1.5-2, all appl. incl. W/D, fans, new paint, tiles, clean cond. 930 sq. ft., upstairs, near everything. \$360/mo. L. Das, x33235 or 488-5532.

Sale: Webster/Green Acres, residential lot, 1/2 acre w/all city util. avail., \$12,000. Boyd, x36866.

Sale/Rent: Galveston duplex, good area, 3 bks. from beach, \$665/mo. or \$51,900. x36869 or 534-3554.

Sale: Pasadena/Deer Park 1980 14' x 60' Redman Flamingo mobile home, 2-1.5, covered patio, shed, skirting, BO. Jim, 280-3843 or Faye, 998-0719.

Lease: Condo, 2-1.5, all appl., W/D, fans, new paint, floor tiles, lg. upstairs unit w/balcony, \$360/mo. plus dep. L. Das, x33235 or 488-5532.

Sale: 1982 14' x 72' Fleetwood Festival mobile home, 2-2, CA/H, appl., ex. cond., \$9,000, OBO. 474-4306 or 409-925-5554.

Sale: Friendswood/Forest Bend, 3-2-2, den, screened-in porch, ceiling fan, new paint, assume 9.5%, \$517/mo. Nick, x31920 or 996-7917.

Lease: Baywind II townhome, 2-2.5, lg. two-story unit, approx. 1,130 sq. ft., FPL, W/D, ceiling fans, pool, tennis, etc., \$490/mo. 280-8608 or x30715.

Lease: Friendswood/Forest Bend, 4-2-2, FPL, fence, miniblinds, gazebo, \$575. 488-2602.

Sale: Executive bachelor residence, 5 bks. from JSC west fence, ext. amenities, low maint., very private, \$98,000. 488-0397.

Sale: Rayburn Country acre lot convenient to Lake Rayburn, owner finance. 482-7330 or 282-5339.

Sale: Alvin area, 3-1-1 brown brick house, 25 min. from NASA, well estab. neighborhood, cul-de-sac, 2 bks. from high school, \$43,000. Kay, x32251 or 331-3379.

Rent: Mobile home lot, \$85/mo., \$50/dep., 4421 4th St., Bacliff and 4102 Kinne, Bacliff. 488-1758.

Rent: Stalls in Dickinson, 15 acres, \$45/mo., trails avail. 534-2806 or 333-7098.

Rent: Cancun, Mex. 2 BR villa, 5 star resort, sleeps six, satellite T.V., fully equipped kitchen, maid ser., many rec. amenities, \$135/night. 729-0654.

Sale: Omega Bay waterfront lot, all city util., 25 min. from NASA. 409-935-9250.

Rent: West Galveston beach house, 2-2, beach 100 yds., boat landing, marina w/pool, \$500/wk., weekend rates avail. Fendell, x31206 or 538-1147.

Lease: Friendswood/Forest Bend, formal dining, FPL, new paint, fence, lg. kitchen, new carpet, refrig., \$525/mo. 482-6609.

Sale: New Heritage Park, 3-2-2, ex. cond., sec. system, updated paint/carpet/blinds, ext. landscaping/decking, near schools/pool/shopping, assum., \$796/mo., low \$70's. 996-1990.

Sale: Taylor Lake Village/Timber Cove, 2 story, 6-3.5-2D, both formals, lg. country kitchen, breakfast room, oversized family room, FPL, new roof, A/C, gutters, sewer line, fenced

Cars & Trucks

'81 Honda Accord LX, 2 dr., hatchback, AM/FM cass., 5 spd., ex. cond., \$2,450. 482-1582.

'85 Honda Goldwing Limited edition, collector's item, 4K mi., mint cond., \$6,500. x37329 or 534-3802.

'86 Chrysler Fifth Avenue, fully equip., AM/FM/stereo tape, gunmetal metallic, wire wheel covers, low mi., like new, below NADA. \$9,900. 482-1535.

'85 Chevy S-10 Blazer, ex. cond., low mi., all optional equip. plus extras, \$6,800. Monty Moncrief, x32015 or 333-3672.

'87 Chevy IROC-Z Camaro, loaded, mint cond., V-8, 305 eng., black w/gray int., 17K mi., \$13,850. 997-2823 or 333-6697.

'79 VW Rabbit, fuel injection, 4 spd., 2 new tires, good eng., not running, new fuel injectors, \$220. Patel, x32103 or 484-5149.

'86 Corvette, ex. cond., white/silver, leather seats, new tires, tinted windows, clear coated, 37K mi., \$18,800. 331-8079.

'87 Toyota FX16, A/C, cruise control, new tires, very clean. Chris, 282-2667.

Venture Buckingham camping trailer w/inside/outside pullout kitchen, sleeps six, ex. cond., \$1,275. 326-5045.

'87 Subaru GL, 3 dr. coupe, selectable 4 WD, like new, 5 spd., A/C, AM/FM cass., cruise, \$6,500. 482-1650.

10' x 10' Ureka "Space II" family camping tent, never been used, still in box, was \$350, now \$245. Ken, x32514.

'85 Renault Alliance, 2 dr. coupe, AM/FM stereo tape, mint cond., 45K mi., \$3,200. x35542.

'73 Suburban 454, dual air, new exhaust, new battery, heavy duty draw-tite hitch, \$700. Barbara, 280-0469.

Cycles

'79 Goldwing, fairing, saddlebags, trunk, needs tuneup and some TLC, \$600, OBO. Boyd, x36866.

'85 Honda Rebel, 250cc, \$650. Rick, x36562.

Two new Mopeds, pedal start, never used, street legal, top speed 30 mph, \$270/ea. or \$500 for both. Patel, x32103 or 484-5149.

Boats & Planes

KR2 kit airplane, airframe is 80% complete, no engine, instruments or canopy, \$1,200, OBO. Boyd, x36866.

'81 17' Fabuglass, 115 Evinrude on galv. trailer, fish well, bait well, good cond., ex. bay boat, \$2,900. 534-3554 or x36869.

'86 19.5' Bowrider, Sea Sprite, all options, 140hp Mercruiser I/O, 25 operating hours, \$8,500, OBO, will consider trade for pool contracting work. 538-3129.

14' Glastron fiberglass boat w/65hp Evinrude Triumph motor, tilt trailer, new battery, tires and wheels, \$1,000. 474-3996.

Teel Centrifugal pump, 1.5hp, 93' max. pressure, 6,000 GPH, clog-resistant, self priming, water/mud/semi-solids, industrial, 115/230 VAC, was \$474, now \$150. 280-8796.

Tri-Q experimental aircraft, 2 place, 140mph, 75hp, 300 hr. T.T., based at Houston Gulf airport, was \$20K plus, now \$12,500 or trade for fishing boat, lake property, etc. Wood, x37007.

'88 Bayliner 2455 Ciera Sunbridge, OMC 230 I/O, CB, depthfinder, shore power, full instru-

mentation, curtains, AD/DC refrig., elec./alcohol stove, twin batteries/auto. charger, trim tabs, presently in water and better than new, \$24,500. Jim, x39872 or 333-4228.

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Today

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

Monday

NAMU meets—The NASA Area Macintosh Users (NAMU) will meet at 7 p.m. March 6 in the RSOC cafeteria at 600 Gemini. For more information, call Shawn Harrison, x33348 or 326-1608.

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

Cafeteria menu—Special: fried chicken. Entrees: shrimp creole, beef stew, sweet and sour pork chop with fried rice. Soup: beef and barley. Vegetables: stewed tomatoes, mixed vegetables, broccoli.

Wednesday

PSI meets—The Clear Lake/NASA Area Chapter of Professional Secretaries International (PSI) will meet at 5:30 p.m. March 8 at the Holiday Inn on NASA Road 1. A social hour and dinner will precede the 7 p.m. business meeting. Beatrice Nugent, assistant professor of speech in the Department of Arts and Humanities for the Univer-

sity of Houston-Downtown, will speak on "The Importance of Involvement." Cost of dinner is \$9. For reservations, call Mary Todd, 282-3942. For more information, call Lillian Hudson, x31032, or Rose Wilson, x30312.

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

Thursday

NPMA meets—The JSC Chapter of the National Property Management Association (NPMA) will meet at 5 p.m. March 9 at the Gilruth Recreation Center. John J. Culp, vice president and general manager of Omniplan Corp., will be the featured speaker. The program will be preceded by a social hour at 5 p.m. and dinner at 6 p.m. For more information, call R. Whitaker, x36695.

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.

March 10

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.

March 11

Lunar pole conference—A Lunar Polar Probe Conference is scheduled for March 11-12 at the Nassau Bay Hilton. The conference is designed to formalize plans for the development, funding and launch of a small satellite to explore the polar regions of the Moon.

March 13

Lunar conference—The 20th Lunar and Planetary Science Conference, sponsored by JSC, the Lunar and Planetary Institute (LPI) and six other professional societies, will be March 13-17 at the Rec Center. Mike Duke, chief of JSC's Solar System Exploration Division, and LPI Director David Black are co-chairmen.

March 15

Apollo reunion banquet—A reunion banquet for scientists, engineers, astronauts and managers who participated in the Apollo science programs will begin with a social hour at 6 p.m. March 15 at the South Shore Harbor Hotel. Dinner will be served at 7 p.m. Dr. George E. Mueller, associate administrator for space flight through the Apollo 11 mission, will be the featured speaker. A limited number of tickets will be available for \$25 per person. For more information, call Pam Jones at the Lunar and Planetary Institute, 486-2150.

Swap Shop

OBO. Cathy, x33851 or 996-8835. Queen size semi-motionless waterbed, mirrored headboard w/six drawers, mattress, pad and sheets, \$250, OBO. 280-8855. Large heavy glass table w/4 chairs, \$150. Kay, x32251 or 331-3379.

Audiovisual & Computers

Epson LX-800 dot matrix printer, 1 yr. old, seldom used, \$150; 3-position serial switch box, never used, \$50; USI B&W monitor, green screen, 80 characters by 25 lines, \$30. x35222 or 280-9441.

Tandy 1000, IBM comp., 640 K RAM, 2 disk drives, parallel printer port, mouse and joystick port, like new, w/monochrome monitor, \$750 or w/color monitor, \$950. Dan, 280-7576 or 332-4324.

Atari 1200XT w/joysticks and games, almost new, \$90. Kam, x35159.

Columbia VP-1600 portable computer, IBM comp. 2-360K disk drives, software, soft case, \$350. Matt, x34285 or 486-7260.

Household

Antique round oak table, 6 chairs and china cabinet, \$750; antique Tiffany table lamp, \$250. x37324 or 337-5563.

Modern coffee table, inlaid bevel mirrored and matching lamp table, \$125; tall table lamp, \$25; pair of lg. carved chairs, new upholstery, \$250/ea.; Gilbert antique mantel clock, \$175. 488-5564.

Modern walnut dining room table and chairs, \$125; recliner, \$65; single bed w/mattress, \$50; rugs, 2 ft. blue, \$60/ea.; stainless steel kitchen knobs, \$1/ea.; tupperware, etc. x30550 or 333-2985.

Chromcraft dinette set, modern, executive walnut table, 4 diamond tufted black vinyl chairs, \$220. Boyd, 488-8806 or 482-5274.

Sofa chair, new, \$100; 2 Sears prof. tool chests, \$299; AT&T phone, \$20; 4 Thomasville ash dining chairs, \$400; ash rocking chair, \$60. x37192 or 996-9724.

Antiques, all oak and refinished; Singer treadle sewing machine, \$100; "Early" rocker, unusual, \$135; dresser base, 4 drawers w/brass pulls, \$125; framed bevel mirror, 22"x28", \$35; snow sled, \$25. x30021 or 479-7947.

Burnt-orange Danish modern sofa w/wooden armrests, BO; yellow rattan standing lamp, \$25; B/W console TV set, BO; brass lamps, \$50/pr.; assorted other lamps, \$10/ea.; pair of two-shelf pine bookshelves, \$20; baby clothes, .50-\$3.00/ea. 486-5247.

Sanyo microwave oven, 8x12x14 1/2", \$200. T.C., x35502 or 486-7111.

Antique walnut davenport table, ex. cond., \$40; ITT trimline dial telephone, \$5; 5-outlet surge protector, \$5. x34612 or 479-1004.

5-pc. bedroom set, 2 end tables, mirror, dresser, king size headboard, particle wood, dk. brown, \$300, OBO. Alan, x32554 or 334-5478.

Antique loveseat, Kroehler c.1905, ex. cond., appraised \$600, now \$300. Billie, 326-4387.

King size, full motion waterbed w/lighted mirrored headboard, padded siderails, 6 drawer pedestal, heater, liner, and fill/drain hardware. Jerry, x35385 or 480-9711.

Two 19" TV's, \$25/\$15; one 10" TV, \$10; mitcher, \$200. Matt, x34285 or 486-7260.

Hotpoint gas dryer, 1 yr. old, almond, ex. cond., \$175. 554-6701.

Modern off-white w/peach, tan and gray couch and chair, \$400. Jennifer, x34194 or 280-0993.

7 pc. French Provincial antique white w/gold trim girls/teens bedroom furniture, set incl. full size headboard, 2 night stands, dresser, hutch, desk, chair, ex. cond., \$500,

Wanted
Want used boat/motor/motorcycle needing repairs. 554-2476 or 333-7138. Want information about Pulse Jet engines. 332-4570. Want carpool from Alvin to JSC/CLC, 7:00-3:30, non-smoker. x38037 or 331-1136. Want roommate to share 3-2 Heritage Park home, 2 car garage, lots of extras, non-smoker, must like animals, \$250/mo. plus 1/2 util. Mace, x35544. Want large size mission operations patch (9 1/2") "new" design, need at least one, but could use three. Kyle, x38653. Want Macintosh SE or Plus, some hard disks, keyboard, printer. 337-3454. Want 24K RAM modules for Tandy 200 laptop. 947-7964. Want vanpool riders from Sugar Land, West Wood Mall, Fondren to JSC area. Alice, x35234 or Kam, 282-5163. Want manuals or other information for NEC APC-HO2 computer and NEC Spinwriter 5530 printer. 538-2299. Want couples interested in playing bridge. 486-0193.

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Lee Morley, x30809. Bicycle lost from Mission Control Center. 332-1473.

Miscellaneous

RCA video camera w/carrying case, like new, \$250, will trade for boat/motor/motorcycle or car. 554-2476 or 333-7138.

Hunter original "Old Type" white 36" ceiling fan, \$35; Western tan cowhide fringe coat, size 40, like new, \$75; Philco Model 60B antique cathedral radio, restored, \$120; Rugcrafters Safari jungle scene rug kit, \$30, OBO. Boyd, 488-8806 or 482-5274.

Spa w/gas heater. x37324 or 337-5563. Workbench w/vice, 3 1/2' x 7 3/4', \$125; backyard light, 750W, \$125. x30550 or 333-2985.

Pedestal wood fern stand, nice, \$12; new 12V auto compressor, \$25; antique fireplace bellows, \$50. 488-5564. Crosman pellet rifle, "140", \$20; Homelite E-2 model chainsaw, fair cond., \$50. Bill, x38257 or 996-5229.

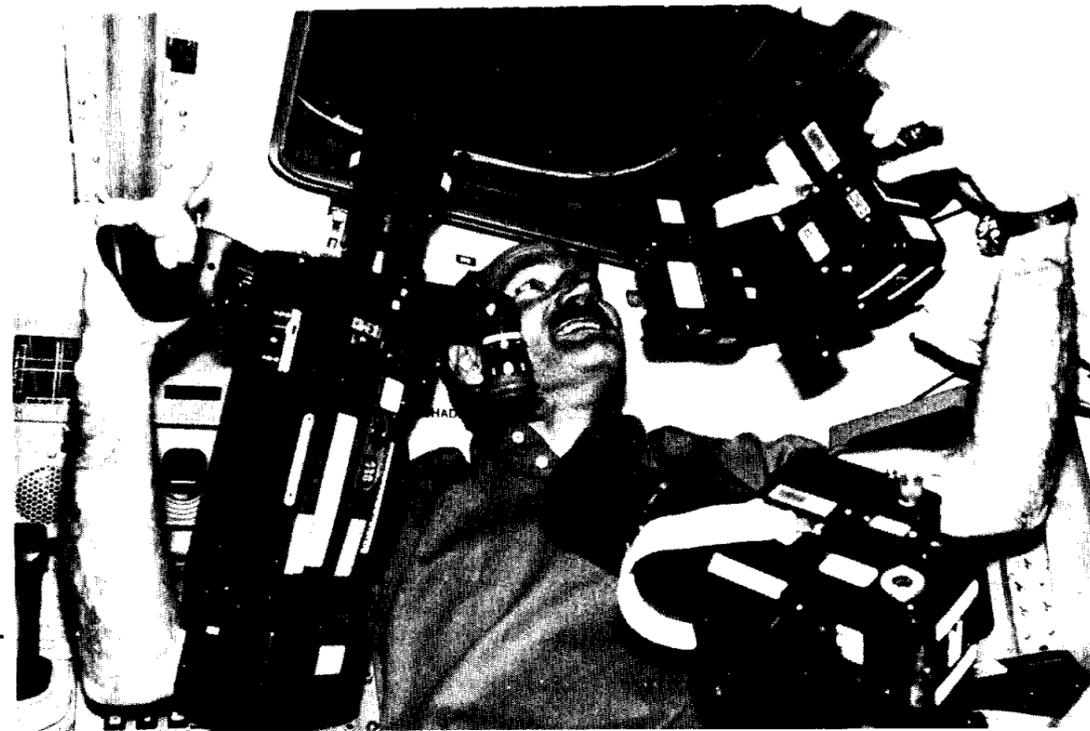
DP rowing machine, lg. rabbit hutch, wooden double bedframe, pine table, 40" x 70" plus leaves, \$30/



'Proud bird, fine crew, great mission'



NASA Photos
 The STS-27 mission flew in December 1988, but the on-board photography from the dedicated Department of Defense mission has just been released. Clockwise from top: Commander "Hoot" Gibson, Mission Specialists Mike Mullane, Jerry Ross, "Shep" Shepherd, and Pilot Guy Gardner pose with a football they later presented to NFL Commissioner Pete Rozelle after they made the "longest kickoff and return" in the history of football; Mullane keeps track of camera, binoculars and glasses; Gardner juggles no fewer than three cameras; Gardner juggles no fewer than one seated Shepherd on the middeck; and Gardner, Gibson and Shepherd make some on-orbit repairs of a reel of three-quarter-inch video that contained remote manipulator system (RMS) footage of *Atlantis* tile damage.



JSC doctors help analyze Cosmos experiments

By Linda Copley

Dr. Gerry Taylor, JSC's senior immunologist, first worked with Dr. Irena Konstantinova, his Soviet counterpart, during the Apollo-Soyuz Test Project (ASTP).

It would be more than a decade before they would work together on another joint U.S./USSR mission, this time named Cosmos 1887. "But the exciting results we see coming out of this effort make it almost worth the wait," Taylor says.

Cosmos 1887 was the sixth in a series of unmanned Soviet satellites launched for a 12-day mission in September 1987. Life science experiments for both the U.S. and the USSR were flown in keeping with the 1987 U.S./USSR agreement concerning Cooperation in the Exploration and

Use of Outer Space for Peaceful Purposes.

The U.S. experiments investigated the effects of space flight on the major body systems, including skeletal bones and muscles, nervous system, heart, liver, several glands and blood.

Special tissue culture studies using pituitary cells studied the growth hormone. Spleen and bone marrow cells were used to test the effects of microgravity on the immune system. The U.S. also had a radiation measurement experiment aboard the spacecraft.

The Soviet experiments were developed and managed by the Institute for Biomedical Problems, Moscow, where Konstantinova is lead immunologist. The USSR provided the U.S. tissue samples from five of the 10 rats

that were flown aboard the spacecraft.

Most of the scientific specimens for immunology studies were returned to the U.S. in late October 1987 and distributed to scientific teams throughout the country, managed by Dr. Gerald Sonnenfeld's program at the University of Louisville, and including Dr. Adrian Mandel, lead immunologist at Ames Research Center.

"The Soviets started opening up the Cosmos program about four years ago," explained Taylor. "They have a group of investigators that look at U.S. teams with which to share the subject (rat). Some of the samples are evaluated solely by Soviet scientists, while others are worked on in a preliminary manner in the USSR and then sent to the U.S."

So far, all the joint testing done in

this area has revealed that:

- Neither the Soviets nor the U.S. have demonstrated consistent changes in the fluid part of the immune system (antibodies) during spaceflight;

- Changes have *always* shown up, for both humans and animals, in the cellular parts of the blood; and

- U.S. scientists have shown, through working with the Soviets, that there are major decreases in the messenger molecules that carry the 'messages' between the cells of the immune system.

"We can conclude from these findings," said Taylor, "that there can be *decreased* immune competence in spaceflight." Problems noted by both Soviet and U.S. researchers in this area include:

- Repeated Soviet reports of a loss of activity in natural "killer" cells that rid the body of unwanted cells (including cancer cells); and

- Soviet reports that the ability of lymphocytes (cells that help prevent you from becoming ill) to respond to "challenge" is greatly reduced as a result of spaceflight.

The USSR has invited the U.S. to participate on the USSR 1989 and 1991 biosatellite missions. The Soviet flights provide nearly two weeks of weightlessness, while the typical Shuttle flight lasts from five to seven days. In turn, Soviet scientists have been invited to participate in analysis of specimens from the Space Life Sciences mission (SLS-1) to be launched on STS-40 in June 1990.

Contractor tops small businesses

JSC contractor Life Systems Inc. has been named the 1989 Small Business Prime Contractor of the Year for Region V, Chicago.

Bob Dupstadt, JSC small and disadvantaged business specialist, said the regional award puts Life Systems in position for a possible national award during National Small Business Week, May 7-10, in Washington, D.C.

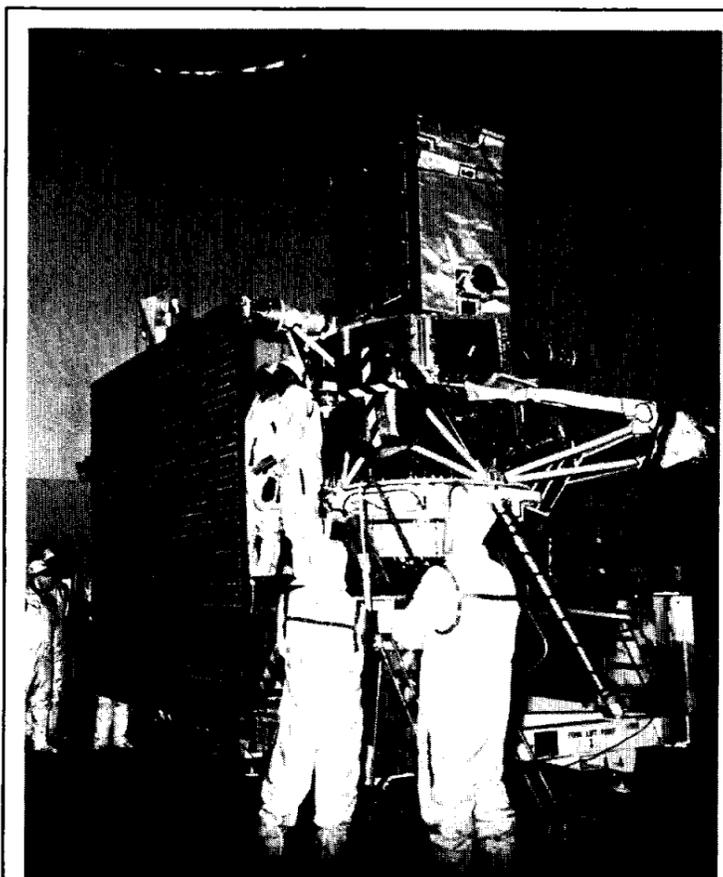
This is the third such regional small business award earned by a JSC contractor in the past nine years, Dupstadt said.

Life Systems has been instrumental in developing advanced life support hardware for the Space Shuttle and Space Station *Freedom*, said Al Behrend, chief of the Special Projects Branch in JSC's Crew and Thermal System's Division.

The company, which employs about 100 people and is led by Richard A. Wynveen, has been involved in research and development on regenerative processes. Its work has produced processes for removing carbon dioxide from cabin atmospheres electrochemically, and recovering potable water from wastewater, Behrend said. Both of those processes are being considered for use on the space station.

Life Systems has been named Grumman Aerospace's subcontractor for construction of the space station shower.

Life Systems developed a hydrogen separator that helps purify water produced by Shuttle fuel cells so that it may be consumed by the crew, according to Gene Winkler, deputy chief of the Shuttle Support Branch. The separator removes dissolved hydrogen gas from the water.



SOLAR CELLS—The solar panels for the Magellan spacecraft are attached in Kennedy Space Center's SAEF-2 facility.

NASA Photo

Cohen to share Goddard trophy

JSC Director Aaron Cohen will share this year's Dr. Robert H. Goddard Memorial Trophy, presented by the National Space Club.

Co-recipients of the award, one of the premier awards of the aerospace industry, will be Jerry Hlass, director of Stennis Space Center, Forrest McCartney, director of Kennedy Space Center, James R. Thompson Jr., director of Marshall Space Flight Center, and Rear Adm. Richard Truly, NASA associate administrator for space flight.

"The Space Shuttle return to flight required the efforts of thousands of individuals within the government, industry and academia. The successful launch and return of STS-26 was due to their combined efforts, persist-

ence, dedication, and more importantly, faith that it could be achieved," reads the award citation.

This year's trophy will be presented to the Space Shuttle return-to-flight team at the National Space Clubs memorial dinner March 10 at the Washington, D.C., Hilton Hotel.

JSC Director of Engineering Henry O. Pohl will receive the club's Astronautics Engineer Award.

Two other JSC workers will receive the club's 1989 Eagle Manned Mission Success Award. Jack Knight, deputy director of Mission Operations' Systems Division, and Bernard J. Rosenbaum, of Engineering's Propulsion and Power Systems Branch, both will receive Eagle awards.

Survey eyes JSC environment

(Continued from Page 1)

Once tabulated, the survey is expected to provide vital information on how work at NASA is viewed by its civil service employees, and provide comparative data to contrast with the findings of the previous study. When the overall report is completed, each JSC directorate will receive an individual report of its employee responses.

"We should be able to provide demographic and other cuts of the data," said John Duncan, manager of organizational development for the Human Resources Development Branch. "We should be able to tell where we've improved, and what new issues need to be addressed. Then we'll work with organizations to help them understand what the data means to them."

Tile damage caused by insulation

(Continued from Page 1)

limits; coupled with the discovery that minute bits of the booster nose cap insulation material and paint were embedded in the damaged tiles and OMS pod blankets.

The review team also reported that debris from other sources, including repaired external tank insulation and cork material covering the solid rocket motor joints, may have caused minor

tile damage.

The 13-person panel was chaired by John W. Thomas, SRB program manager at Marshall Space Flight Center, and included members from NASA Headquarters, Kennedy Space Center and JSC. The JSC members were Robert D. White, manager of the Systems Engineering Office; Gary Coen, flight director; and Astronaut Don McMonagle.

STS-29 launch date to be set today

(Continued from Page 1)

Also in *Discovery's* payload bay, flight batteries were installed aboard the inertial upper stage (IUS) and battery activation and charging of the Tracking and Data Relay Satellite (TDRS-D) was begun.

Crew for STS-29, Mike Coats, John Blaha, Jim Bagian, Jim Buchli

and Bob Springer, continued preparations for their flight by taking part in a nine-hour integrated simulation earlier this week. They will practice launch and entry sims before flying to KSC three days before launch.

Official launch date will be announced later today following the flight readiness review at KSC.

Apollo 9 included 'mini-maxi-double-bubble'

(Continued from Page 1)

which designed and built the lunar modules. Frere, now a Rockwell Lunar Operations Co. employee in JSC's Crew Integration Office, says the motto was frequently quoted to the CSM team, whose vehicle would have to chase down a stricken LM to rescue its crew in an emergency.

"The significance of Apollo 9 was basically to qualify the LM as a manned system in the same fashion that the Apollo 7 spacecraft Command and Service Modules had been qualified," remembers Mission Operations Director Eugene F. Kranz, then Apollo 9 lead flight director. "The Apollo 9 mission was interesting because it brought a second major manned spacecraft into the qualification/certification process. For the first time in history, with the exception of Gemini 7 and 6, we were working with two manned spacecraft simultaneously."

In addition to the operational concerns, there also were LM vehicle readiness concerns.

"We were having our troubles," says Owen Morris, who was then the LM project engineer under LM manager Brig. Gen. Carroll H. "Rip" Bolender.

In the fall of 1968, before the highly

successful Apollo 8 lunar orbital mission had flown, a critical Apollo 9 decision had to be made, says Morris, now president and chief executive officer of Eagle Aerospace. The first LM, designated LM-1, had flown unmanned on Apollo 5 in January 1968. LM-1 and LM-2 both contained wiring for automated control equipment that allowed them to be flown from the ground; LM-3, the first of the final configuration landers, was designed to be controlled by the astronauts flying it.

The problem, Morris recalls, was that LM-2 was leading LM-3 on the production line at Grumman's Bethpage, N.Y., plant. Should they use LM-2 with its extra wiring, or wait for LM-3? The decision was made to go with LM-3.

Most important among the items that were lagging behind was the critical rendezvous radar that would allow the LM to find and track the CSM. There also were problems with low-tensile strength wiring and the soldering on some circuit boards; concerns about electromagnetic interference at docking, and about an electrical discharge involving the LM's high-voltage tracking light that had shown up in ground tests; replacement of metal fittings that had shown stress corrosion cracks;

and scheduling problems caused by the lack of structural spares.

"They were not unusual problems—you almost always have those problems when you are getting a first manned vehicle out the door," he explains. "We were playing catch-up. 'Lem' (LM) design had not started until two years after the Command Module."

As 1968 wore on, morale was high in the LM branch and everyone was "working like crazy," Morris says. One by one, the problems with the first true space vehicle were fixed.

One other hardware concern Kranz recalls was caused by the "gutsy" decision to send Apollo 8 around the Moon. The Apollo 8 mission had picked up the CSM originally intended for use on Apollo 9.

"That was really late in the normal way of doing business," Kranz says.

"It was the first time both lunar spacecraft flew on the Saturn V," says Jim Hannigan, then chief of the LM Systems Branch and now senior staff engineer for Eagle. "It was the first time that the (ground tracking) network and the MCC (Mission Control Center) had to deal with two manned Apollo spacecraft in orbit at the same time."

"We approached it with what was

a realistic degree of apprehension, but also a considerable degree of confidence that the vehicle would function just as advertised," says Flight Crew Operations Director Donald Puddy, who was TELCOM for LM-3. TELCOM was the LM equivalent of the Electrical, Environmental and Communications Systems Engineer (EECOM) for the command module.

Kranz shows off a drawing given to him by the Flight Support Division after Apollo 9 that features a sputtering aircraft and pilot doing their best to keep flying in spite of a plethora of difficulties and remembers that at times it seemed like a low-budget production in comparison to the missions to come.

"When everybody else was looking toward the Moon, we were tied into Earth orbit," Kranz says. "In a similar fashion, the injection of Apollo 8 gave that crew priorities on the simulators and pushed our start of training into the late December, early January time frame."

Once the training had begun, a new wrinkle cropped up—a wrinkle that would prove to be extremely important a year later on Apollo 13.

The mission included a complex

rendezvous profile, called the "mini-maxi-double-bubble rendezvous." The objectives of the profile were to demonstrate the performance of the LM's rendezvous radar guidance navigation system and to go through all the scenarios that could conceivably be used for rendezvous and docking throughout the remainder of the program.

As the flight crew and control teams simulated these maneuvers, particularly the CSM rescue of a LM with disabled engines, a new scenario was discovered. What if the life support systems on the CSM were to fail? Could the LM become a lifeboat for the crew should the life support systems of the CSM mother ship fail?

"These procedures fortunately were available to us, along with the procedures for the docked descend propulsion system burns," Kranz says, "and those were two of the initial key capabilities we used to set up the Apollo 13 recovery."

But on Feb. 28, 1969, when all of the Apollo 9 vehicle and procedural concerns had been addressed, one last problem arose—all three astronauts had head colds. The launch would have to wait until March 3.