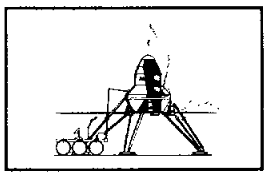
NASA
National Aeronautics and Space Administration
Lyndon B. Johnson Space Center
Houston, Texas



Advance guard

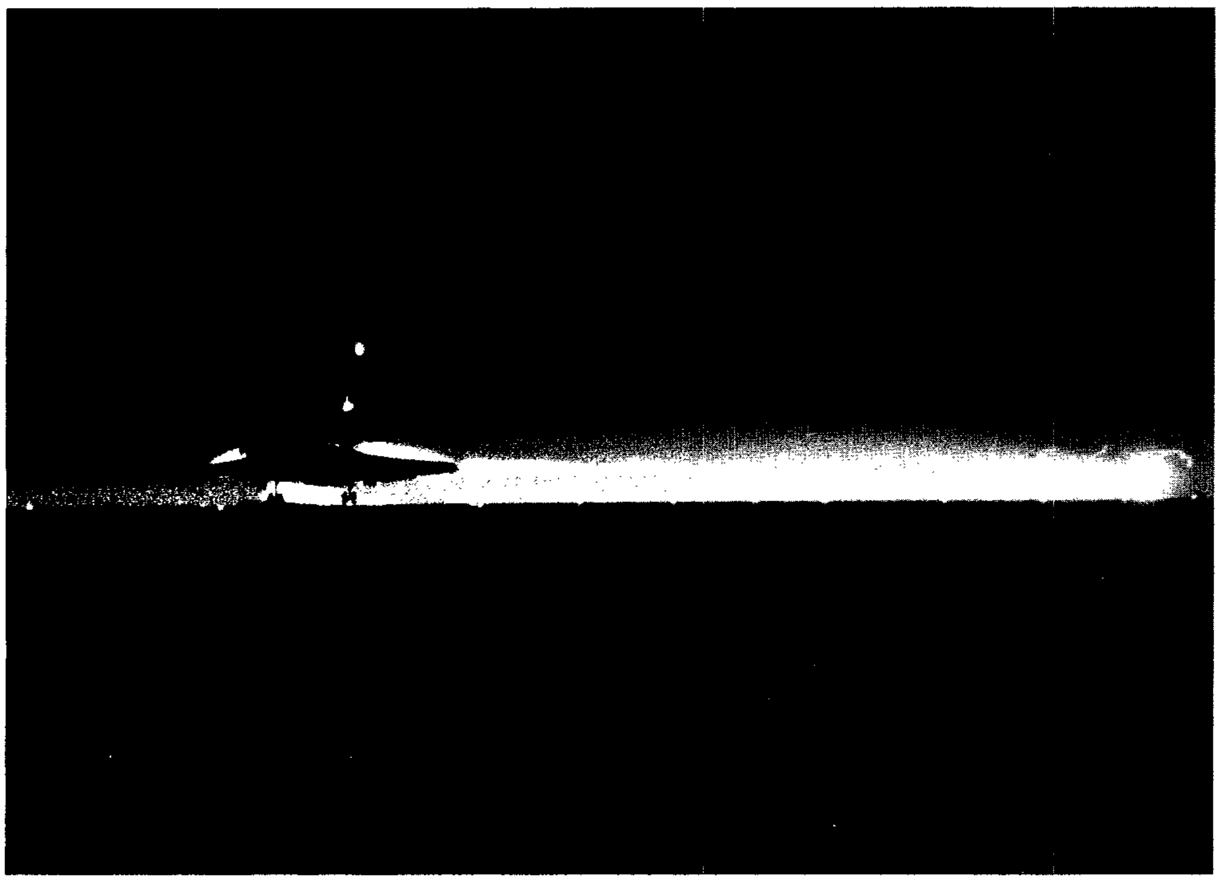
Robotic missions to the Moon and Mars will pave the way for future human exploration.
Story on Page 3.

Prunin' time

Tree trimming (not the Christmas kind) has been going on outside Bldg. 1 this week.
Story on Page 4.

Space News Roundup

Vol. 29 January 26, 1990 No. 4



Night landing fitting finale for *Columbia*

Columbia, shimmering in the early-morning glow of Edwards Air Force Base runway lights, returned to Earth on Saturday after accomplishing its goals and setting space shuttle endurance and landing weight records.

The orbiter and its crew — Commander Dan Brandenstein, Pilot Jim Wetherbee and Mission Specialists Bonnie Dunbar, Marsha Ivins and G. David Low — landed in California at 3:35 a.m. CST Saturday after spending 10 days, 21 hours and 38 seconds in orbit.

At an official landing weight of 228,335 pounds, the *Columbia* weighed in 4.5 tons heavier than the previous heaviest flight, STS-9 and Spacelab 1.

Landing was delayed one orbit by a last-minute computer problem, but Data Processing System experts on the ground worked with the crew to reconfigure software for landing. The computer problem was the last of several minor problems on a relatively clean flight.

Along the way, crew and vehicle deployed a fourth Syncom Navy communications satellite, retrieved the venerable Long Duration Exposure Facility (LDEF) and conducted numerous experiments that will help scientists better understand the effects of microgravity on the human body and crystal growth processes.

"It was a long mission and a lot to do and we certainly didn't do it alone," Brandenstein said during welcome home ceremonies at Ellington Field.

"There are four things I will remember about this flight," said Wetherbee. "Seven and a half million pounds of thrust, flying Mach 25, making the entry with our hair on fire and, fourthly, the people."

"Successes don't happen by accident," Low agreed. "Only by thousands of very dedicated people such as yourselves who pay attention to every single detail and they make it happen."

"I'd like to thank those of you who were here for me for the past year to support me with your care, support and understanding," Ivins added.

Columbia had made 172 orbits by the time it ended the mission, and LDEF had made 32,594 revolutions counting those in the payload bay.

Television views, astronaut commentary and post-retrieval photos
Please see **COLUMBIA**, Page 4

STS-32

The STS-32 crew will present an audiovisual briefing on its recent mission at 1 p.m. Wednesday in Teague Auditorium. All employees are invited to attend.

Above: *Columbia*'s nose hovers above the concrete as its main gear touches down on Edwards Air Force Base's Runway 22 on Saturday. It was only the third night landing in space shuttle history. Right: STS-32 Pilot Jim Wetherbee signs an autograph for a young fan during welcome home ceremonies at Ellington Field.

JSC Photo by Sheri Dunette

Hubble Space Telescope launch slips to April

Launch of the STS-31 mission to deploy the Hubble Space Telescope has been rescheduled for no earlier than April 19. NASA managers are still evaluating how the change will affect the rest of the manifest.

The delay is to allow time to remove and replace the aft solid rocket motor segment and nozzle of the right solid rocket booster (SRB) used to help boost *Discovery* into orbit.

Engineers decided to change the segment and nozzle because they could not verify that a critical joint in the SRB nozzle had been properly leak checked at the factory.

"The factory leak check in question is absolutely necessary to assure that the joint, or the O-ring on that joint, is not defective in any way," said Robert Crippen, shuttle program director. "In this case, we believe it was necessary to take a conservative approach and have decided to replace the joint with one that has an absolutely clean bill of health. All of us in the program are looking forward to launching the Hubble Space Telescope, which will be one of the most exciting missions of 1990."

The 43-foot Hubble Space Telescope will be the largest astronomical observatory ever placed in orbit. Hubble will be deployed from the shuttle 320 nautical miles above Earth, where it will observe the universe for 15 years or more.

The crew of STS-31 is Commander Loren Shriver, Pilot Charlie Bolden, and Mission Specialists Steve Hawley, Kathy Sullivan and Bruce McCandless.

The right SRB aft segment and nozzle were taken off the mobile launcher platform Tuesday in the Vehicle Assembly Building (VAB) at Kennedy Space Center. They will be replaced with hardware scheduled to be delivered this week from the Morton-Thiokol facility in Utah. Build up of the replacement aft booster segment will take several weeks since it includes installation of the external tank attach ring, outer stiffener bands and the aft skirt and nozzle extension.

Satellite maintenance

JSC seeks proposals for Satellite Servicer demo

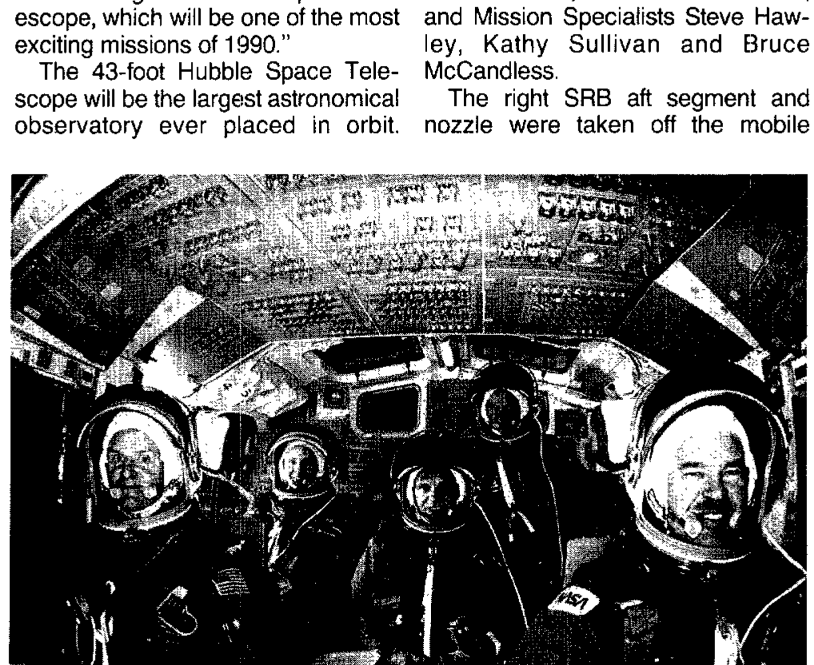
By Kari Fluegel

JSC has issued a call for proposals for definition studies and preliminary design of a Satellite Servicer System flight demonstration.

The demonstration will show the ability to maintain satellites in locations not readily accessible to humans (such as polar and high inclination orbits), to permit hazardous servicing, to reduce Space Transportation System extravehicular activity dependency and to improve cost efficiencies.

The system will be used in a three-phase, on-orbit flight demonstration launched from the space shuttle orbiter. The demonstration will exercise autonomous rendezvous and docking, orbital replacement unit exchange and fluid transfer capabilities, and will use existing technologies, including the Orbital Maneuvering Vehicle and elements of the Flight Telerobotic Servicer, to minimize costs and reduce technical risks.

The flight demonstration Phase B studies, estimated at $1.3 million each, will include the design and definition of the servicer system, a target vehicle, and ground and on-orbit control stations. Two firm, fixed-price, Phase B contracts, with a 12-month period of performance, are expected to be awarded this summer. Responses to the request for proposals, released Jan. 19, are due March 5.



JSC Photo by Bill Bowers

The STS-36 crew poses inside the shuttle mission simulator in Bldg. 5. From left are Pilot John Casper, Mission Specialist Pierre Thuot, Dave Hilmers and Mike Mullane, and Commander J. O. Creighton. The photograph was taken using a fish-eye lens. *Atlantis* was rolled out to launch pad 39A at Kennedy Space Center on Thursday. Launch is scheduled for Feb. 22. The flight will be the 34th space shuttle mission.

Atlantis rolls out; Feb. 22 launch set

By Kyle Herring

Atlantis was rolled to launch pad 39A at the Kennedy Space Center on Thursday with first motion at 5:55 a.m. CST for final preparations for next month's STS-36 Department of Defense shuttle mission.

Once at the pad, the helium signature leak test of the main propulsion system and three main engines will be performed to verify the integrity of the system.

Also, interface verification tests between the orbiter and launch pad will be performed prior to the crews arrival next week for the terminal countdown demonstration test (TCDT) now planned for Feb. 3. The 34th space shuttle mission is currently scheduled for launch Feb. 22.

Atlantis' sixth flight will be commanded by Navy Capt. J.O.
Please see **ATLANTIS**, Page 4

JSC

Ticket Window

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

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

AMC Theater (valid until May 1990): $3.50 each.

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

Barefoot in the Park (8:15 p.m., Feb. 2-3, 9, and 16; League City Civic Center): adults, $6; students, $4.

Harlem Globetrotters (2 p.m., Feb. 3, Summit):$9 each.

Sesame Street Live (10:30 a.m., Feb. 24, Summit):$7 each.

JSC Evening Sea Adventure (5:30 p.m.-3 a.m., Feb. 3, Europa Cruise Line out of Galveston; transportation from JSC parking lot J-2 to dockside and return; full casino; dining and entertainment included): $65 each.

JSC

Gilruth Center News

Sign up policy—All classes and athletic activities are first come, first served. To enroll, you must sign up in person at the Gilruth Recreation Center. Everyone will be required to show a badge or EAA membership card. Payment must be made in full at the time of registration. Classes tend to fill up four weeks in advance. For more information, call x35789 or x30304.

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

Defensive driving—Course is offered from 8 a.m.-5 p.m., Feb.3; cost is $15.

Ballroom dance—Professional instruction in beginning, intermediate, and advanced ballroom dancing. Classes begin March 1, and meet every Thursday for eight weeks. Beginning and advanced classes meet 7-8:15 p.m., intermediate class meets 8:15-9:30 p.m. Cost is $60 per couple.

Taekwondo/hapkido—Classes in the Korean art of self-defense, and mental and physical discipline are held Tuesday and Wednesday nights; cost is $40 monthly.

Low-impact aerobics and exercise—Each eight-week session runs twice a week from 5:15-6:15 p.m. Cost is $24.

Country and Western dance—Six-week session began Jan. 22. Lessons are held each Monday night. Cost is $20 per couple.

JSC

Dates & Data

Today

Cafeteria menu—Special: Salisbury steak. Entrees: fried shrimp, deviled crabs, ham steak. Soup: seafood gumbo. Vegetables: buttered carrots, green beans, June peas.

Sunday

Beyond Earth's Boundaries—The Lunar and Planetary Institute (LPI) and JSC will present a free program named "Explore the Solar System" from 3:30-5 p.m. Jan. 28 at the University of Houston-Clear Lake. Dr. David Black, LPI director, will present a panel discussion on human exploration of space. The panel includes Dr. Mike Duke, chief, Solar System Exploration Division; Dr. Wendell Mendell, chief scientist, Lunar Base Studies,; Mark Craig; manager of the Lunar and Mars Exploration Office; and Dr. Carolyn Huntoon, director of the Space and Life Sciences Directorate. No tickets or reserved seats are available, but students or Scout troops may be able to arrange group seating by calling Nancy Wood, 480-5939, or the UHCL at 283-2810, for information.

Monday

Cafeteria menu—Special: hamburger steak. Entrees: beef Burgundy over noodles, fried chicken. Soup: cream of chicken. Vegetables: buttered corn, carrots, green beans.

Tuesday

Cafeteria menu—Special: turkey and dressing. Entrees: baked meatloaf, liver and onions, barbecue spare ribs. Soup: beef noodle. Vegetables: Spanish rice, broccoli, buttered squash.

Wednesday

Thrift Savings Plan—Federal employees wishing to join or make changes during Thrift Savings Plan Open Season must do so by Jan. 31. For information, contact the benefits area at x32681.

Cafeteria menu—Special: Spanish macaroni. Entrees: broiled fish, tamales with chili. Soup: seafood gumbo. Vegetables: ranch beans, beets, parsley potatoes.

Thursday

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

Feb. 2

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

Feb. 6

Space Station conference—A conference on "Space Station Evolution: Beyond the Baseline", sponsored by NASA Headquarters' Strategic Plans and Program Division will be held Feb. 6-8 at the South Shore Harbour Resort and Conference Center. Registration is $75 for federal employees, $200 for non-federal, academic and international attendees, and $70 for students. Contact Carla Armstrong at x39071 for more information.

Feb. 10

Valentine dance—The Employee Activity Association (EAA) will hold a Valentine Dance at 7 p.m. Feb. 10, at the Gilruth Rec Center ballroom. Two bands, including the Sterling Silver Orchestra playing Big Band music and Kendrick, playing rock, country, and request tunes, will be featured. Tickets cost $12.50 each, include dinner and cocktails, and go on sale Jan. 29 in Bldg. 11. Contact Dick McMinimy, x34037, for information.

Feb. 12

AIAA lecture seminar—The American Section of the American Institute of Aeronautics and Astronautics (AIAA) will present a Guidance, Navigation and Control Invited Lecture Seminar from 8 a.m.-5:30 p.m. Feb. 12 at the Gilruth Rec Center. Admission is $25 for AIAA members, $30 for non-members, and $10 for students, and includes lunch and a copy of the proceedings. Reservations must be made by calling Chris Burmeister at 333-6866 by Feb. 7.

JSC

Swap Shop

Property

Sale: 60 acres, 3 mi. from Karnes City, TX, on Hwy. 80, 50 mi. from San Antonio; 2-story house, well-built, on 1.5 lots. 783-9164.

Sale: Meadowgreen, 3-2-2 David Weekley home, 2 yrs. old, FPL, lg. deck, near pool and tennis, 2,000 sq. ft., 8.5 assum., $119,000. 282-2810 or 480-3909.

Sale: 2312 Nassau, Seabrook, 3-2-2 renov., assum., existing 7% loan, $275/mo., $48,000, no qualifying, $5,000 down. 474-2857 or 859-4574.

Sale: Seabrook, 3-2-2, formals, lg. den w/FPL, 1,800 sq. ft., remod. w/new A/CH, roof, int., deck w/spa, trees, $4K move-in, $67,500. Richard, x30271 or 474-9334.

Sale/Lease: El Dorado Trace condo, 2-2, split plan, FPL, ceiling fan, $39,000 or $500/mo. x33003 or 480-6913.

Sale/Rent: Nassau Bay townhouse, 4-2-2, over 2,000 sq. ft., 2-story den, deck, atrium, FPL, oversize gar., $995/mo. or $109,900. Jerry, x38922 or 488-5307.

Sale: Kirkwood So., cus. built 2-story, 2,400 sq. ft., 4-2.5-2, formals, FPL, study, walk-in closets, lg. lot, $79,900. 488-5210.

Sale: 2 lots in La Porte near Hwy. 225, 75' x 220', $10,000. 944-5624.

Sale: 2 lake lots, Toledo Bend Lake, Toledo Beach subdiv., water, elec. septic tank, $10,000. 944-5624.

Lease: Heritage Park, 3-2-2, ex. cond., W/D/refrig. incl., $650/mo. 488-6267.

Sale: Lg. lots excl. subdiv., near NASA, mid $30's, can fin. Don, x38039 or 333-3313.

Sale: El Lago, rent prop., assum., renov., 4-2-2, $79,900. 532-4237.

Sale: Egret Bay Villas, 1 BR, bay window, FPL, cust. tile, appli., balc., pool, boat, ramp, sec. gate, FHA/APR, $38,000. 332-7788.

Lease: El Dorado Trace, 1 BR condo, super clean, 2 balc., near pool, appli.'s, full-size W/D, alarm sys., cov'd pkng., ceiling fan, miniblinds, no pets, $425 plus dep. Mark, x30131 or 332-2416.

Lease: 2-1 apt., Barringer Way fourplex, W/D conn., ex. cond., $350/mo., water incl. 486-2048.

Sale: Sycamore Valley, 3-2-2, assume FHA, no qual. 484-7877.

Sale: Ganado, TX, 1.5 acre lot, 5 min. from Lake Texana. 335-1250.

Sale: 4-2-2, near Ellington, 2,000 sq. ft., lg. oaks, cul-de-sac, 2-story, hot tub, sprinkler sys., $89,900. 481-6453 or 333-6535.

Trade: Custom canyon view 4-3 off 360 W. of Austin, prefer 5-yr.-old, open plan, near JSC. 471-8795 or 333-6083.

Sale: 5-yr.-old A-frame house on approx. 3 acre, furn., cov. patio, metal bldg., fruit trees, approx. 6 mi. from Crockett, TX, $18,000. 486-9760.

Cars & Trucks

'83 Buick Regal, ex. cond., 1 owner, $3,000. Mariann, x39238 or 332-7574.

'80 Chevy Monte Carlo, ex. cond., 2-dr., white, PS, PB, auto., A/C, 120,000 mi., $1,350. 464-8694.

'79 Buick S.W., 350 eng. w/new lifters, oilpump, tires, starter, batt., good cond., $800, OBO. 339-1337 or 333-6558.

'87 Mazda B2200 PU, tinted glass, rear bumper, 18K mi., ex. cond., $6,000. 488-3151.

'82 Subaru station wagon GL, 5-spd., AC, good cond., $2,000. Ron, 488-6549.

'82 Pontiac Grand Prix LJ, good cond., blue, vinyl top, V6, auto., AC, bucket seats, all pwr., $2,500. x34608 or 481-2890.

'81 Buick Regal LTD, ex. cond., PS, AC, tilt, cruise, maroon w/tan int., low mi., $2,975. 532-3515.

'75 Lincoln Towncar, needs paint, carpet, runs well, 460 eng., new steel radials, BO. 283-4402 or 480-6528.

'82 Chevy Caprice Classic, 4-dr., V6, auto., AC, PS, PB, 84K mi., reb. eng., $2,000. x33184 or 482-8230.

'83 Honda Accord, 4-dr., tan, PS, PB, AC, AM/FM stereo, good cond., $3,200. Tino, x30725 or 326-2540.

'81 Ford Bronco, fullsize, w/remov. top, 4x4 w/mudders, reb. 351, auto., AM/FM, new carpet/seat covers/gas tank, $2,800, OBO. Richard, x30271 or 474-9334.

'87 Toyota Supra, Targa top, maroon, 16K mi., very clean, $16,000. 473-5245.

'79 Camaro, 8-cyl., radio, tape, T-tops, $695. 482-3754.

'84 Chevy Celebrity, 4-dr., auto., AC, PW/DL, cruise, tilt, del. cloth uphol., bucket seats, AM/FM/cass., metallic brn., $3,200. Edward, x36250 or 481-4889.

'81 Chev. Caprice, 1-owner, 25,000 mi. on GM reman. diesel eng., ex. mi., $1,275. Hammack, 280-5159 or 326-2986.

'86 Toyota Celica GTS, PW/L, seat, sunroof, PS, PB, 5-spd., tinted windows, blue, 70K mi., ex. cond., $9,175. x31188 or 424-7556.

'84 Chevy Caprice Classic, ex. cond., loaded, 1-owner, 4-dr., 75,000 mi., $4,700. Bob Carlton, x33534 or 471-4539.

'63 Classic VW Beetle conv., all mech. sys. reb., runs super, flr. needs some rep., $3,000 firm. Anne, x36923 or 532-2003.

'79 Cutlass Supreme Brougham, V8, 2-dr., AC, PS, auto., tilt, del. uphol., stereo cass., clean, ex. cond., $1,895. 280-8796.

'80 Dodge window van, 3/4-ton, V8, seats 8, ex. cond., $1,950. 280-8796.

'65 Olds Starfire sport coupe, 106K mi., orig. owner, good cond., $3,500, OBO. Tom, x38298 or 488-4089.

'85 Ford F-150 Lariat, low mi., camper. 473-2505.

'86 Dodge Ram minivan, cus., auto., AC, tilt, AM/FM/cass., 67K, $6,400. 480-4589 or 280-4416.

'80 Chevette, 57,000 mi., std., new tires, reb. trans., runs good, need carpet, $800. Jack, x35337 or 482-2956.

'78 Plymouth Fury, V8/318, AM/FM, 100K mi., AC works, leaks freon, oil/water, runs fine, BO. Boykin, x36136 or 326-2223.

'79 Chrysler, V8/318, over 100K mi., AM/FM, looks bad/runs good, BO. Boykin, x36136 or 326-2223.

'84 Ford Ranger, V6, 55K mi., $3,300. Shayla, x30167.

'79 Ford Fiesta, $1,100. John, x30291 or 332-9976.

'74 450 SEL Mercedes, ex. cond., new tires/brakes/paint, lt. blue, $5,950. Michelle, 282-4714 or 484-2949.

'84 Jaguar XJS, low mi., like new, $17,500. x33939.

Cycles

Suzuki 850 touring bike, windscreen/fairing rests, shaft drive, bk. rest, low mi., ex. cond., $1,300. Patrick, x32635 or 488-1079.

'83 Suzuki GN125cc, per. for beginners/street legal, not a dirt bike, low mi. 474-7006.

'82 Yamaha XV 920 Virago, 20,500 mi., hard saddle bags, windjammer, full rain gear, 2 helmets, $1,900. Patrick, 482-5777.

'87 Honda Spree scooter, only 1,500 mi., 50cc eng., red, perfect cond., incl. helmet, $525, OBO. Dave, x36838 or 482-9535.

Boats & Planes

16' Hobie Catamaran sailboat w/trlr., $800. Joe, x38496 or 480-6975.

Trade fiberglass, dbl. bottom, 10' boat for 8' John boat. Schmidt, x36424.

'81 TMI 27' sailboat, $24,500, Yanmar diesel, ex. tall rig, VHF Loran, roller furling, Spinnaker, auto. pilot, dinghy w/eng., more. 337-2773.

'87 18' Celebrity Bowrider, 183VBR, 165hp I/O, SS prop., full teak swim platform, tilt/trim, cover, bimini, sportsman trlr., mint cond. 333-1640.

Audiovisual & Computers

Sega base and access., was $700, now $350, OBO, great cond., incl. 3-D glasses, 12 games, laser guns and extra joysticks. Jay, 482-2231.

2 lg. Wharfedale stereo spkrs., like new, $50. Ron, 488-6549.

150 watt/chan. Carver receiver, 1 yr. left on warr., $450; TEAC ZD-700 CD player, $150. David, 554-2997.

Sansui stereo receiver, fisher dual cass., JVC spkrs., $275. Dave, x32592 or 482-6673.

IBM PC Jr. plus software, $200, OBO. 282-3788 or 480-2188.

TI-994A comp. w/assorted software cartridges and access., $150. Ed, x36969 or 332-0442.

AT&T 6300, monochrome, 30 Meg, 640k, datadesk 101 keyboard, orig. keyboard, AT&T mouse, CopyII PC option board, glare guard screen, ext. cables, software, $650. 334-1934.

IBM XT clone, 32 Meg HD, 640K, dual floppy, color monitor, mouse, 1200 Baud modem, $850. 480-7317.

Commodore 64C, 1571 disk drive, joy stick, games, copied disk drive, programs w/disk drive, all books, 1 yr. old, ex. cond., $350. 333-7472 or 996-9634.

Apple IIe w/mon. and disk drive, 80 col. card, joystick and software, $700. 480-8780.

Household

Sears 19" color TV w/rem., $225. Dave, x32592 or 482-6673.

5" B/W TV w/AM/FM radio, AC/DC/batt., ext./int. antenna or cable, $35; 5" color TV/monitor, AC/DC/batt., ext./int. ant. or cable, $85 or both for $100. 334-1934.

RCA 25" color TV w/rem., ex. cond., $100. 280-8394 or 488-1083.

25" color TV, $90. x36091 or 333-5326.

Microwave oven, sm., used little, $50; table top refrig., 1 yr. old, $50 or $75/both. 326-1303.

Sofa, $100; loveseat, $75; wall unit/desk, $75; chest of drawers, $40. 481-6453 or 333-6535.

5-pc. L-shape sec. couch, lt. brn., $290; Danish mod. end table, $25. x31588 or 488-1326.

Couch and loveseat, like new, $500; dinette, glass top and 4 chrome chairs, $175; sq. coffee table, $75; end table, $75; bed (no matt.) and matching dresser, $175. x31588 or 488-1326.

Contemp. solid oak king size waterbed w/6 drwrs. under and mirrored hdbd. w/matching high boy, dresser, and nightstand, like new, $850; Scandinavian style entertainment center, $250; Magnavox 25" T.V., $175. 282-3985.

Ward's frostless refrig., 21 cu. ft., harvest gold, $125. David, x33109 or 332-5676.

King size wtrbd. w/all access., $75; Kenmore port. dishwasher, 3 mos. old, delay start, color panels, can be built in, $300; Toshiba full sz. micro. oven, $125. Brian, x37916 or 484-2958.

Desk chair, 4-legged, nonswivel, $15. Ed, x36250.

Dishwasher, works fine, almond deg., energy saver, $75. Jon, 483-0011 or 488-8466.

GE built-in dbl. oven, ex. cond.; full sz. matt. and boxsprings. 488-2822.

Unfinished cedar bar, 6' long, lots of stor. under, drwrs.; formica counter top. x34236.

Queen Anne-style antique loveseat, cherry w/yellow velvet uphol., $200, OBO; East Lake antique chair, $50, OBO. Richard, x31440 or 332-2381.

Rattan furn., 2 chairs/cushions, chest, glass top lamp tbl., $150, OBO; 6-pc. LR set, couch, loveseat, coffee tbl., couch tbl., 2 glass inlay lamp tbl., $400, OBO. Johnson, 480-0903.

11-pc. matching Moha Dixie, walnut, queen BR set, triple dresser/mirror, platform frame, hdbd., 2 dresser/lamp tbls., 2 end tbls., matt./box spring, $450, OBO. Johnson, 480-0903.

Buckeye maple dbl. bed, $175, OBO; coffee table, $60; lamp, $30. Joey, x39233 or 482-7265.

Sofabed and matching loveseat, good cond., $300; DR set, leaves, 4 chairs, $175; 3 solid oak accent tables, $125. 480-9482.

Elec. dryer, works fine, $100, OBO. 283-5579 or 332-1614.

Sofa pit group, contemp., 4 pcs., brn./blk./white/tan, $300. Fran, 333-6277 or 339-3562.

China cab., solid oak, beveled glass sides, front 38"Wx72"Hx18"D, lighted, was $2,200, now $800. Fran, 333-6277 or 339-3562.

Sofa, chair, loveseat, lt. blue, $150; DR table and 4 blk. folding chairs, $100; office desk, $50; queen sz. bed, $180. x36091 or 333-5326.

Full sz. bedframe, matt. set. Shayla, x30167.

Perfection sofa, multicolor pastel, rayon/poly, Fabricare stain resist. coat, was $750, now $300. 283-4116 or 996-9415.

Musical Instruments

2 band/PA spkrs., ovation 6119 inst. div. of Kaman, four 12" spkr. per case, $300. Jessie, x35981.

Gibson semi-hollow body jazz guitar w/hardshell custom case, was $1,800, now $795; Fender concert tube type amp., $295, will fin. Ed, 896-1035.

5'10" Grand piano, polish ebony, 4 mos. old, $6,500, 10-yr. full warr. transferable. Joe, x32099 or 946-8198.

Thomas Troubador 183 upright elec. organ and seat, 2 44-note keyboards, foot pedals, settings for 7 inst., 10 rhythms, pre-prog. rhythm patterns, pre-set chords, more, $575, OBO. 326-3459.

Blk. pearl drum set w/cymbals, all hardware, ex. cond., $650. Cherri, 280-2039.

Gibson L6-5 elec. guitar, silver sunburst color; Roland RS-09 organ and strings keyboard. Kim, x38894 or 554-7653.

Fender Stratocaster guitar, good cond., $275. 482-9172.

Lost & Found

Lost, Fri., Jan. 12, JSC area, blk. cocker spaniel, 9 yrs. old, med. prob., brn. collar, reward. Kim, x32541 or 480-2417.

Lost, bifocal sunglasses. 333-6083.

Lost, 6-spd. Raleigh bike, Mission Control Center area. Jon, x37671.

Photographic

Nikkon AF 50mm F/1.8, new w/polarizing and UV-haze filters, $40. 334-1934.

Fujica ST-701 SLR 35mm camera, F1.8 lens, Spiralite elec. flash, $40, OBO. 486-8266.

Pets & Livestock

AKC min. Schnauzer pups, males only, born 10-18-89, shots, housebroken, $200. 996-6826.

Himalayan cat, fem., about 1 yr. old, $195, OBO. Marianne, x31707 or 333-7343 or 480-6528.

Personal

Gospel musicians who responded to the previous adv. I lost list of names and phones. Call again. Jim, 283-4402 or 480-6528.

Wanted

Armand Bayou Nature Center is collecting recyclables, call the Center for details. 474-2551.

Want cheap work car or truck. 482-4156.

Want to breed AKC Cocker Spaniel w/reg. fem. Tamela or Janet, x36159 or 472-6323.

Want vanpool riders from Little York Park and Ride to JSC and area, starts 1/29/90, $70/mo. Ed, 333-6963 or Ram, 333-6490.

Want motorcycle trlr. for 2 or 3 bikes, will pay up to $150. Schmidt, x36424.

Want roommate to share rec. res. house off Egret Bay Blvd., $210/mo., half util. Rick Davis, x36042 or 332-7695.

Want to buy '78 through '81 Honda Accords for parts. David, 486-5259.

Want roommate to share expenses in 3-2 house in LC, rent $250/mo. furn., $225/mo. unfurn., bills split evenly. Russ, 332-4336.

Want Starwars spaceships, toys, figures and books. Ron, 482-1385.

Want used dinette, informal, w/4-6 swivel chairs, prefer vinyl seatcovers. Gloria, x39802 or 998-9168.

Want appli., working or not. 333-6558 or 339-1337.

Want tandem bicycle, 2-seat. Terry, x33814 or 486-5126.

Want blk. fem. Dachshund puppy, 1 yr. old. Sue, x33938 or 944-1994.

Want roommate to share lg. 2 BD apt. in Seabrook, $385/mo., all bills pd., male or fem., nonsmokers only. 326-1228.

Want 17' to 18' V-hull ski boat, walk thru windshield, open bow, w/or w/out motor/trlr. Andy, 333-6671 or 332-9105.

Want motocross chest protector and motocross leathers. 333-6671.

Want color monitor for Apple IIe. x30725 or 326-2540.

Want roommate for Nassau Bay townhouse, 2-2.5, W/D, $200 plus half elec. Jim, x32508 or 333-2238.

Want nonsmoker to carpool from SW Houston (Bissonnet and Hwy. 59) to JSC, hrs. 7:30 to 4 or 7:30 to 4:30. x38072.

Miscellaneous

Lawn mower, $40; rower, $25; card table, $10; custom wardrobe closet, $100. 282-3788 or 480-2188.

Bearcat/Uniden scanner, 10-chan. prog. base unit, fire/med./police/etc., perf. cond., $100. 474-7006.

Zenith 25" rem. control console T.V., $200; clean water filter appli., $120. 482-4156.

Antiques, wheel chair, heavy wooden, good cond., iron bed, sewing mach., walking plow, 1847 Wm. Rogers silverplate set of 56 plus 7 extra pcs. 783-9164.

PU cover, good cond., solid styrofoam insul., Birch paneled, sliding window, screw outside wndws w/side curtains, trucks from 57" to 62" wide and 87" to 89" long, gar. stored for 5 yrs., $100, OBO. R.H. Underhill, 326-1303.

Solar collectors, 2 10-spd. bikes, $25, $40; F2 windsurfer and gear; 40 gal hex aquarium, $75; Senco nails for gun. 481-6453 or 333-6535.

52" ceiling fan, $30; misc. x36091 or 333-5326.

White metal Venetian blinds, 62x42, $15; Pentax MV-1 camera body, needs repair, $20; lenses avail., 2x, 28mm, 50mm, 200mm. John, 532-1745.

Body glove spring suit, mens sz. sm. like new, $45, OBO. Dave, x36838 or 482-9535.

2 Techna 235/75B-15 bias-ply tires, fair cond. and 2 Michelin XH P235/75R-15 radial tires, ex. cond., on Chevy steel truck wheels, will sell sep. Joe, 334-1628 or 280-7329.

Free dishwasher (G&S), needs minor work. 482-5393.

Red Shoei motorcycle helmet RF-108V, $125; Hein Gericke street/racing boots (11 1/2), $75; lg. rain suit, $25. David, 554-2992.

New-style Corvette bra, $60; '85 Corvette manual, new, $10. David, 554-2992.

10x14 canvas tent, used once, $75; 3-pc. Palmer poly./wool suits, 40L, 34W, $50; elec. corr. typewriter/case, $75. John, 532-1745.

Mens 27" 10-spd., $35; ladies 26" 10-spd., $50; backpack w/alum. frame, $20. Alan, x34703 or 484-3317.

Baby walker, swing, kangarockaroo infant carrier, misc. access., toys, clothing. Pat, 332-0442.

Seat, 60/40 from '90 Chevy truck, red, never used, was $510, now $350, OBO. Anne Stroop, 282-4907 or 335-1482.

Patrick Nagel commemorative prints, $7-$15, make great gifts. Mike, x32439 or 280-9005.

Mike Myers 5'9" twin fin surfboard, ex. cond., $150; Smith Corona typewriter model #300, built-in dictionary/autospell/expandable dictionary, $200. Richard, x30415 or 480-0524.

10-spd. bicycle, 28", $20; B/W T.V., ex. cond., $20; many D&D items, books, modules, etc., call for prices and descriptions. 474-5601.

New Balance jog shoes, new, #996, sz. 12W, $45. x30024.

Cloth car cover for '89-'90 Chrysler LeBaron H/T or convertible, incl. cable for securing, like new, used approx. 10 times, $75. Vicki, x36043 or 554-2896.

.52 carat pear-shaped diamond VS1 quality, G.H. color on wide (7-8mm), 14K yellow gold band, $1,500. 283-4116 or 996-9415.

Mini-trampoline, $10. 474-3517.

46-pc. set Franciscan Hacienda green earthenware, $200; 24-pc. matching glassware and dessert set, $50. 474-3517.

Bell Pro-Star motorcycle helmet, red/white/blue w/visor, like new, $85. x31588 or 488-1326.

300-watt MTX loudspkr. for car, truck, or boat, $100. Rusty, x38167 or 484-1637.

New, beige-toned carpet, 33 sq. yds. w/pad, $250, OBO. x32258.

DP stomach/back exer. mach., $150, incl. adj. seat and foot rests, max. wt. 150 lbs. Johnny, x36778 or 922-1811.

Wedding gown, white w/Queen Anne neckline, tiers of lace, chapel length train, sz. 5/6, $250. Sue, x33938 or 944-1994.

Collection of faceted gemstones, incl. amethyst, blue topaz, aquamarine, peridot, garnet, sapphire and opal. Nathan, 480-5596.

Graco high chair, $30; Cosco baby walker, $25; baby crib w/matt. and sheet, $50; all new, all $100. Youm Nguyen, x32142.

PhoneMate telephone and answering mach., $80; Fisher Price children's kit. w/dishes, $50; big wheel, $20; girl's bicycle w/training wheels, $30. Joe, x35896 or 488-7982.

Nose mask (bra) for '89 Nissan Maxima, in orig. carton, $80, OBO. Ed, x36969 or 332-0442.

Wheelchair, Invacare/Rolls model 1200, lightweight model, ex. cond., was $600, now $299. 471-8956.

U.S. coins from the 1800's, 1-cent to $1 - circ./uncirc., Buffalo's, Merc's, Walker's, Morgan's, etc., buy or sell. 282-3584 or 488-4859.

10" Sears radial arm saw with accessories, used 2 or 3 times, $200. Don, 282-2537 or 326-3278.

4 Outflow II American Racing Wheels w/tires, 14" x 7", 4 lug, for '79 - present Mustang/Capri, $150. Alan, 996-1229.

Saloman, SX 91, ski boots, sz. 360, fit 11/12; red down jacket w/hood, ex. cond. Kevin, x38210 or 480-6863.

One-horse-collar-type buoyancy compensator, never used, orange/black, $30; tool-kraft 6" x 48" sander with 9" disc on bench, $100. 997-2013.

Set of 4 Keystone chrome mods, 15" x 10", 6-lug bolt pattern, fits Chev-GM-Toyota 4x4, ex. cond., $100. 280-9751.

4-15" x 8" wide chrome directionals, 6 lug, fits Chevy, $100. Bev, x34015 or 339-1432.

Two Murray 10-spd. bicycles, $75/ea.; one Brother typewriter w/carrying case, $250, ex. cond., prices nego. Leslie, 280-5920 or 996-1884.

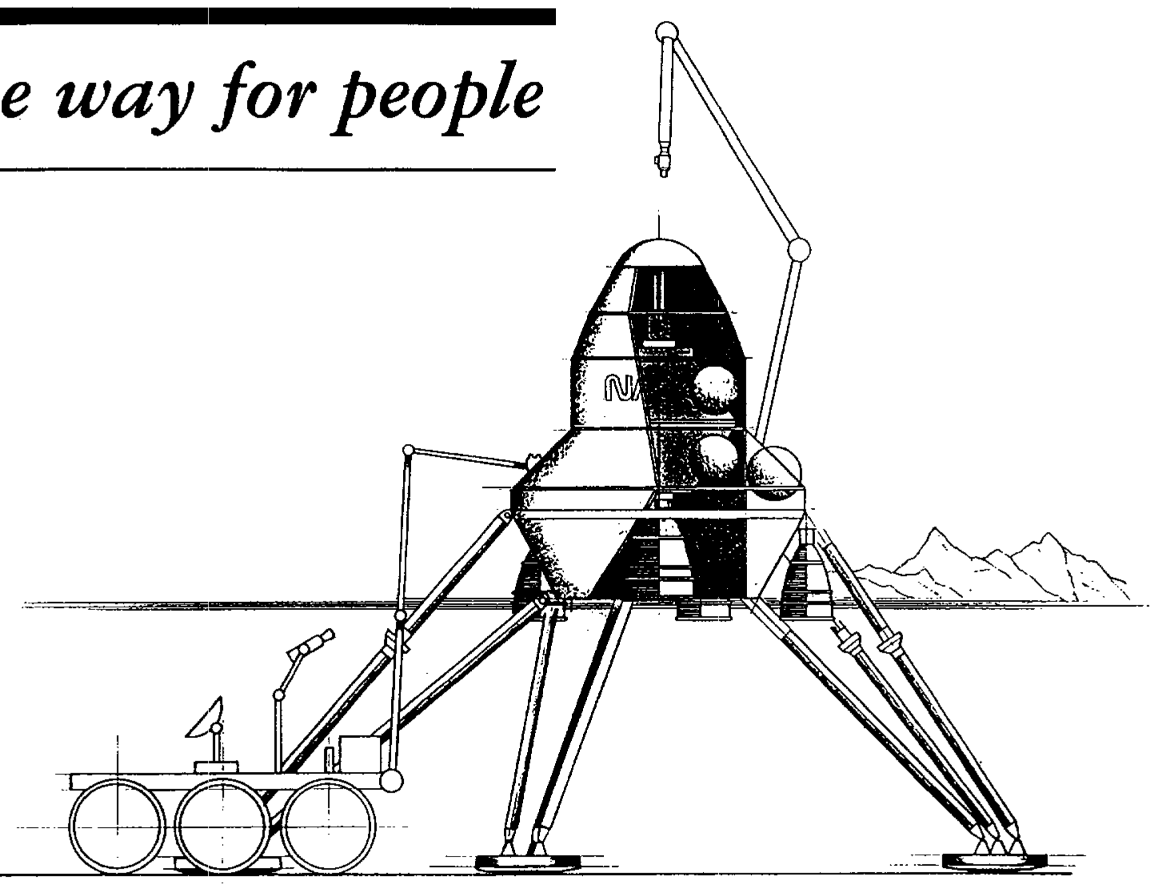
Scuba Dacor mask, 3-view, silicon skirt, used once, w/case, $47, OBO. Darwin or Youm, 483-2142.

Strolee brand stroller for twins w/face-to-face seating, remov. pouches, sunshades, ex. cond., $65. Paul, x33571 or 559-2528.

Corelle dish set, white w/yellow trim, 8 lg. and 8 med. sz. plates, 4 bowls, 4 cups and saucers, $15. 486-8716.

Robotic missions will pave way for people

The Human Exploration Initiative



(Editor's note: This is the third installment in a series of articles summarizing the Report of the 90-Day Study on Human Exploration of the Moon and Mars. JSC Director Aaron Cohen directed the study, which was completed in November. Excerpts will continue next week.)

THE STRATEGY

The overarching goal of the Human Exploration Initiative is to expand human presence in the solar system, developing nearly self-sufficient communities on new worlds and promoting significant advances in science and technology. The Initiative will follow an evolutionary pathway over a 30-year horizon beginning with Space Station *Freedom* in the 1990s, followed by a permanent outpost on the Moon at the beginning of the next century, and culminating with Mars expeditions that lead to a permanent Martian outpost.

Space Station *Freedom*, the first step on the pathway, will provide the essential scientific and technological foundation for later human missions to the planets. For example, a particularly critical factor in planning human exploration is the determination of the physiological and psychological effects of low gravity and long-term habitation of the space environment, which will be studied on *Freedom*.

Freedom will serve as a controlled test-bed for developing and validating systems and elements, such as habitation and laboratory modules and life support systems, to be used later on the Moon and Mars. In addition, *Freedom* will support technology experiments and advanced development in mission-critical areas, such as spacecraft assembly, servicing, and system development. When the exploration missions begin, *Freedom* will become a transportation node where both lunar and Mars vehicles will be assembled, tested, launched, and refurbished to fly again.

Rovers and crew will explore the geology and geophysics of the Moon itself, and rock and soil samples will be analyzed in a lunar laboratory. The Moon also provides an ideal location, just a three-day trip from Earth, at which human beings can learn to live and work productively in an extraterrestrial environment with increasing self-sufficiency, using local lunar resources to support the outpost.

Once the lunar outpost has verified the techniques and demonstrated the systems, the next evolutionary step will be to launch the first human expedition to Mars. Initial missions to Mars will prove the systems and techniques required for continuing human missions and will conduct further reconnaissance of selected landing sites. Later missions will establish a Mars outpost with the objective of conducting science and exploration on the solar system's most Earth-like planet, expanding mankind's sphere of influence in the solar system, and living and working in an extraterrestrial environment with a high degree of self-sufficiency.

FOUR PHASES

The strategy begins with the preparatory phase of robotic exploration to obtain early scientific and technical data prior to the human exploration missions. Once the robotic missions have satisfied this requirement, the development of permanent, largely self-sufficient outposts on the Moon and Mars proceeds through three progressive phases: emplacement, consolidation, and operation.

The emplacement phase emphasizes accommodating basic habitation needs, establishing surface equipment and science instruments, and laying the foundation for future, more complex instrument networks and surface operations by testing prototypes of later systems. In the process, human explorers begin to learn to live and work on another planetary body, conducting local geologic investigations, performing experiments in mining the lunar soil to demonstrate the feasibility of oxygen production on the Moon, and examining the possibility of oxygen and water extraction on Mars. By the end of the emplacement phase, the support facilities include landing vehicle servicing equipment to prepare for longer visits.

The consolidation phase further extends human presence, both in complexity of operations and in distances traveled from the outpost, and continues to develop experience in living and working in a planetary environment. Outpost capabilities, scientific facilities, and instruments are improved, and power and pressurized volume are increased. A constructible habitat is erected at the outpost to provide the increased volume required for both extended crew residence and laboratory sciences research. Human operations expand to a range of hundreds of kilometers from the outpost.

Learning to become more independent of Earth now takes on paramount importance. More efficient systems for life support are emplaced, prototypes of lunar resource processing plants are tested, and day-to-day activities are conducted without continual supervision and guidance from Earth.

The objectives of the operation phase are to make routine use of in situ resources, and to continue to live and work at the outpost with minimal dependence on Earth. The area of exploration opportunities is expanded to include routine human access to more distant points on the planet.

The result envisioned by the year 2025 is two permanent operating outposts—one on the Moon, one on Mars—with the knowledge base and experience to begin to seriously set our sights for further exploration.

The robotic exploration missions will obtain data to assist in the design and development of subsequent human exploration missions and systems, demonstrate technology and long communications time operations concepts, and dramatically advance scientific knowledge of the Moon and Mars.

ROBOTIC MISSIONS

In formulating the robotic exploration mission set, the prime issues were properly sequencing the acquisition of global lunar and Mars data and systematically reducing the number of candidate sites.

Ranger, Surveyor, Lunar Orbiter, and Apollo have amassed a general knowledge base for the Moon, but these data are limited to a band about the equator.

Lunar Observer will significantly enhance the global lunar data base to verify the requirements for surface equipment and excursion vehicles, select the outpost site, and plan lunar surface operations. These data will also help to resolve important issues related to long-duration human presence on the Moon, including the selection of sites of high scientific potential for human exploration, minimization of risks for human landing and habitation, and assessment of resource availability.

The primary objectives of robotic missions to Mars are to advance our understanding of the planet and its origin, history, and current conditions; to provide science and engineering data to support selection and certification of the expeditionary and permanent outpost sites; to return a sample of Mars to Earth for scientific analysis and determination of the potential of back-contamination; to conduct studies that diminish risks to human explorers; to provide data to assist in designing piloted vehicles and surface systems; to search for Martian resources; and to generally demonstrate readiness to proceed with a human Mars mission.

The 1992 Mars Observer, enhanced to allow additional high resolution mosaics, higher data rates, and an extended operations period, will establish global Martian data bases.

The Mars Global Network Mission will provide essential data to address scientific issues and develop specific engineering requirements for subsequent robotic and human presence on Mars. Two identical flight systems carrying an orbiter and multiple landers will be launched within a 20-day period using two expendable launch vehicles. The landers will provide high-resolution surface data at multiple locations and will obtain extended-duration seismic and meteorological measurements.

SAMPLE RETURN

A Mars Sample Return with Local Rover mission is the centerpiece of the robotic Mars missions. This mission will demonstrate technologies that will be used in the piloted missions, and it will serve as a flight test of technologies that include aerocapture and aeromaneuvering, hazard avoidance for landing, automatic rendezvous and docking, and long communication delay time technologies used for operations at Mars.

Five kilograms of Martian rocks, soil, and atmosphere will be returned to Earth prior to the development of the human mission vehicles and surface systems. Scientific analysis of Martian samples should resolve a great deal of speculation about the nature and composition of Martian surface rocks and soils and enable a detailed assessment of the surface environment for incorporation into design of the human exploration elements. The mission will also provide an Earth-Mars-Earth engineering test and a first test of surface mobility. Samples will be contained to preclude release on Earth until adequate testing of potential biological activity can be completed.

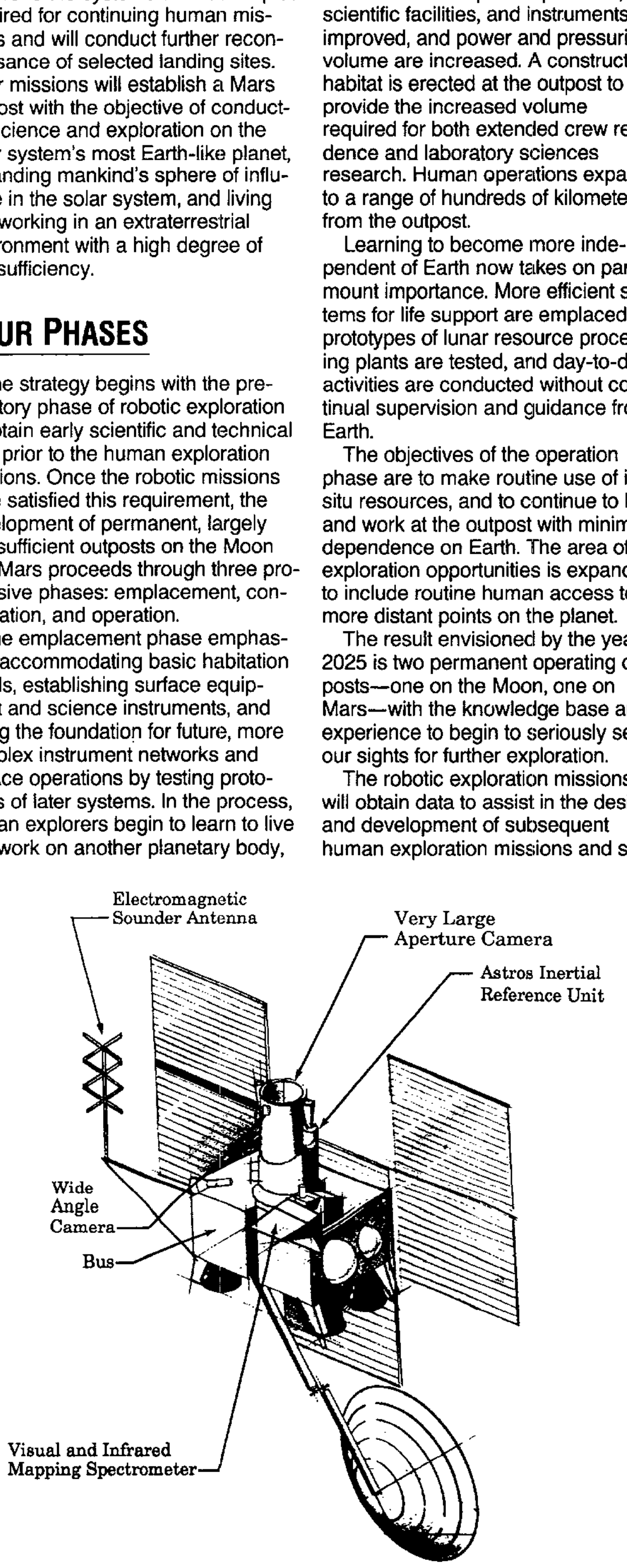
Two identical flight systems will be launched within a 20-day period using two expendable launch vehicles. The flight systems will be aerocaptured into a circular orbit around Mars at an altitude of 400 to 500 kilometers. A deorbit burn is executed by the landing segment, and aeromaneuvering techniques are used to land the Mars ascent vehicle with its local rover near one of the global network lander sites while the sample return orbiter remains in orbit. After landing, the local rover, capable of traverses to about 100 meters from the lander, will be deployed to collect samples outside the area contaminated by the lander's propulsion system.

Mars ascent is planned about a year later with autonomous rendezvous and docking of the upper stage of the Mars ascent vehicle and the sample return orbiter. Once docking is completed, the sample canister assembly will be transferred to the sample return capsule of the Earth return vehicle portion of the sample return orbiter. Departure from the vicinity of Mars is planned approximately one month after ascent.

SITE SEEING

The Mars Site Reconnaissance Orbiter mission consists of two orbiters and two communications satellites. It will provide detailed imaging to characterize landing sites, assess landing site hazards, and provide a data base for subsequent rover traverses and piloted surface operations. The orbiters will provide moderate resolution visual maps of 30 to 50 percent of Mars.

Up to five Mars Rover missions will certify three sites selected using the data gathered by the Mars Observer, Mars Global Network, and Mars Site Reconnaissance missions to determine the sites with the greatest potential for piloted vehicle landing and outpost establishment. The rovers will characterize available resources at these sites, provide data for determining the suitability of the sites for a human outpost, and collect diverse geological samples for return to Earth by later sample return missions or by piloted flights. The rovers will also emplace infrastructure elements, such as navigation aids and meteorological stations, to support piloted missions.



Above: The Mars Sample Return Mission lander with its local rover are the centerpiece of the robotic Mars missions. They will demonstrate the technologies and test the maneuvers that will be needed for human missions to the Red Planet. Up to five Mars Rover missions will characterize the available resources, help determine the suitability of potential outpost sites and collect diverse geological samples for return to Earth. Right: Mars Site Reconnaissance Orbiters such as the one in this concept, along with data gathered from Mars Observer, Mars Sample Return and the Mars Global Network, will help select the Martian sites with the greatest potential for piloted vehicle landing and outpost establishment.

JSC managers are meritorius


Harlan Engert Holloway Hickmon Murray

Three top JSC managers—Charles S. Harlan, Max Engert and Tommy W. Holloway—have been selected as 1989 Presidential Rank Meritorious Executives.

They are among 33 NASA Senior Executive Service members chosen by President George Bush for exceptional career achievements. Only 5 percent of all federal SES executives may receive the rank of meritorious executive, which carries with it a $10,000 stipend.

Harlan is the head of JSC's Safety, Reliability and Quality Assurance Directorate; Engert is deputy director of Engineering; and Holloway is assistant director for NSTS Programs in the Mission Operations Directorate.

JSC People

Hickmon new deputy Logisitics chief

James A. Hickmon has been appointed deputy chief of the Logistics Division in the Center Operations Directorate.

As deputy chief, Hickmon will assist Chief Al Scioneaux in the management of a comprehensive logistics program involving acquisition, storage, accountability and disposal of supplies and equipment, as well as transportation management. He will also serve as JSC supply and equipment management officer.

Hickmon joined JSC in 1978 as a logistics management specialist, and headed the Supply Operations Section from 1980-1983, and the Supply Branch from 1983-1990.

Murray top secretary

Ann M. Murray, secretary to the manager of the Crew Emergency Return Vehicle (CERV) Office, has received the Marilyn J. Bockting Secretarial Excellence Award.

Murray was given accolades for her help in establishing the new office in the Vanguard Bldg., and for the extraordinary organizational ability she demonstrated while helping develop office procedures to complement the structure of the organization.

She received a plaque and $500 stipend with the award.

JSC worker to receive Rotary award

Richard Brown, supervisor of electrical and environmental systems for Rockwell Space Operations Co. (RSOC) at JSC, will receive one of four 1990 Stellar Awards at ceremonies in Houston's Hyatt Regency on Feb. 15.

Lew Allen, director of NASA's Jet Propulsion Laboratory, will be honored with this year's National Space Trophy, to be presented at the annual banquet sponsored by the Rotary National Award for Space Achievement Foundation.

In addition, NASA Administrator Richard Truly and Dr. Lennard Fisk, associate administrator for space sciences and applications at NASA Headquarters, will participate in the executive forum portion of the event held earlier that day.

The Stellar Awards are presented to American citizens who have made stellar contributions to the space program throughout their careers.

Brown's award in the flight control category is for his work in pioneering the flight control concepts and techniques used in all U.S. manned space missions. Brown's expertise developing emergency procedures to enable the safe return of the Apollo 13 mission, and enabling Skylab carrying on its experiments despite the failure of a solar panel to deploy, also were cited when the award announcements were made.

Stellar Awards also will be presented to Robert T. McCall, artist, in the Visual Arts category, for his elaborate space illustrations; to Marcia Smith, specialist in aerospace policy at the Library of Congress and executive director of the U.S. National Commission on Space, in the legislative support category; and to Craig P. Covault, senior space technology editor of Aviation Week and Space Technology, in the news media category.

Sam F. Iacobellis, executive vice president and chief operating officer for Rockwell International Corp., is the featured speaker. Additional information is available by contacting John Francis or Cynthia Griffin, at 333-5986.


JSC Photo

PRUNIN' TIME—Groundskeepers trim the trees outside Bldg. 1 in preparation for the upcoming growing season. Roy Blanchard works from a ladder while Bennie Esquivel steadies the platform. The pruning is designed to reshape, revitalize and remove dead and dying material from the trees during their dormant state.

Atlantis rolls to launch pad

(Continued on Page 4)

Creighton. Pilot is Air Force Col. John Casper. Three mission specialists are also part of the crew, and include Marine Lt. Col. Dave Hilmers, USAF Col. Mike Mullane and Navy Lt. Commander Pierre Thuot.

Creighton is making his second shuttle flight. He previously flew as pilot on STS-51G. STS-36 is Hilmers' and Mullane's third flight. Hilmers was a mission specialist on STS-51J and STS-26. Mullane was a mission specialist on STS-41D and STS-27. Casper and Thuot are making their first shuttle flights.

Earlier this week, following mating with the solid rocket booster/external tank stack, *Atlantis* was powered up for the shuttle interface test. The test verified critical connections between the vehicle elements and the mobile launch platform.

The yaw rate gyro assembly on the left solid rocket booster was replaced Tuesday and retest was to be in work today. This unit provides information to the orbiter's computers and guidance, navigation and control system during ascent in conjunction with the orbiter's roll rate gyros.

Payload specialists picked for microgravity laboratory

NASA, in consultation with the Canadian Space Agency (CSA) and the European Space Agency (ESA), has chosen Dr. Ulf D. Merbold and Dr. Roberta L. Bondar as the prime flight payload specialists for the first International Microgravity Laboratory mission (IML-I).

ESA's Merbold and CSA's Bondar, will fly STS-42 aboard the Space Shuttle *Columbia* currently scheduled for launch in December.

Dr. Kenneth E. Money, CSA, and Dr. Roger K. Crouch, NASA Headquarters, have been selected as the backup payload specialists.

Money and Crouch will be principle communicators with the laboratory during the mission from the Payload Operations Control Center at the Marshall Space Flight Center. They will be trained to substitute for the prime payload specialists if necessary.

The designations were based on recommendations of the IML-I Investigators Working Group.

IML-I will be the first of a series of microgravity investigations using the Spacelab module. An international team consisting of more than 200 investigators from more than a dozen countries will focus on materials and life sciences, two disciplines needing crew participation and access to reduced gravity. IML-I will use the Spacelab long module and is a dedicated microgravity mission.

The investigations will use four life sciences experiment facilities, designed for multiple experiments, including biorack, gravitational plant physiology facility, microgravity vestibular investigations and space physiology experiments.

Six materials experiment facilities also will be used, including fluid experiment system, vapor crystal growth system, mercury-iodide crystal growth system, organic crystal growth facility, the critical point facility and protein crystal growth facilities. These multi-experiment facilities have been built by the U.S., European, Canadian and Japanese investigators and organizations.

Columbia will fly in a l65 nautical mile-high, 28.5 degree orbit. Mission duration is planned for nine days. A tenth day will be flown if flight resources allow. The orbiter will fly in a "gravity gradient" attitude (tail toward Earth) thereby producing the least gravitational disturbance on the Spacelab.

Vehicle pass requests being accepted for 1990

Requests for vehicle passes to watch launches and/or landings of this year's shuttle flights are now being accepted by the Public Services Branch. NASA, contractor, and Air Force badged JSC employees may be issued passes on a first-come, first-served basis.

A pass permits the occupants of one standard-sized passenger vehicle, including vans, to view a launch or landing from a specific site. Special passes are available for larger vehicles.

To apply, submit a written request to the Public Services Branch, AP4, that includes your name, telephone extension, complete mailing address, whether you want a launch and/or landing pass, specific shuttle flight requested, and whether your vehicle is a standard (including vans) or oversized vehicle.

For exact shuttle dates, consult a current manifest. Remember that only badged occupants will be permitted to view the launches and landings of Department of Defense (DOD) flights, while vehicles at other flights will be admitted with non-badged friends and family members aboard.

Instructions to guests planning to attend the launch or landing will be provided along with the vehicle pass, which is mailed to the requestor about three weeks before launch. Requests received fewer than 30 days before a specific flight are placed on a waiting list.

Columbia returns from successful mission

(Continued from Page 1)

suggest that the condition of LDEF is about as NASA officials expected.

The objective of LDEF, which orbited Earth for nearly six years, was to measure the effects of atomic oxygen, space radiation, micrometeoroids, man-made debris, vacuum and other space-related phenomena on more than 10,000 test specimens. Some of those effects were immediately observable on LDEF during in-flight recovery operations.

"We hope that the benefits of what we've done in the last 11 days will reach far into the future, from the materials end of it, the medical end of it, and from the biology end of it," Dunbar said.

Some thin film test specimens appeared to be degraded or completely eroded. Some thin film balloon material test specimens were broken away at one end. The Kapton thermal covers on two Heavy Ions in Space experiment trays were partially peeled back "like a sardine can" in the words of Brandenstein. In addition, the thermal cover strips around the detectors of a space plasma high voltage drainage experiment appear to have eroded away.

Columbia and LDEF were expected to arrive back at Kennedy Space Center today. The orbiter will be demated from the Shuttle Carrier Aircraft and towed to the Orbiter Processing Facility (OPF) shortly thereafter. Current plans call for the removal of LDEF from *Columbia*'s payload bay Monday.

Program officials estimate that removal of the experiment trays will begin around Feb. 22.

Columbia performed almost flawlessly, except for minor glitches in an Inertial Measurement Unit (IMU) and the avionics bay's smoke detection system, both of which set off false alarms and awakened the crew on two nights.

"It just so happened I was running on the treadmill when the fire alarm went off. And I have documented evidence that will make your heart rate go up," Brandenstein recalled.

A state vector that was damaged during transmission to *Columbia* from Mission Control also caused the reaction control system to make incorrect firings on the crew's planned next-to-last night. However, the problem was quickly straightened out.

Also, a problem was noted early in the flight with one of two dehumidifiers, or humidity separators on board. The prime unit was turned off after it leaked an estimated two gallons of water into an area below the middeck floor, resulting in several hours of extra housekeeping work. A back-up unit was put into service. It leaked smaller quantities of water, but the leakage was contained using towels and plastic bags rigged to the unit by the crew.

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.

Swap Shop deadline is every Friday, two weeks before the desired date of publication.

Editor .... Kelly Humphries

Associate Editor .... Linda Copley

Early booking advised

Launch, landing fares discounted for JSC travelers

The Ask Mr. Foster Travel Service has announced discounted air fares to any shuttle launch or landing in 1990.

The special fares are available to any JSC employees who want to plan personal travel to Kennedy Space Center for launches or Edwards Air Force Base for landings.

The travel service on Bldg. 1's first floor will offer a 50 percent discount off regular coach fares to JSC employees traveling for this purpose.

The travel must be for personal reasons. There are no restrictions, but space is limited and early booking is advised. Contact Dottie or Jan at x38688 for more information.