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

Mars base

Heavy lift vehicles, aerobrakes and constructible habitats would all be part of human missions to Mars. Story on Page 3.

Black history

John Jacob, president of the Urban League, will be the main speaker at next week's black history month observance. Story on Page 4.

Space News Roundup

Vol. 29 | February 9, 1990 | No. 6

Astronauts to attend Soviet space launch

Four NASA astronauts are scheduled to arrive in Moscow today to tour space facilities in the Soviet Union and witness a Soviet manned space launch.

JSC Deputy Director P.J. Weitz, a former Skylab and shuttle astronaut, Chief Astronaut Dan Brandenstein and Astronauts Ron Grabe and Jerry Ross left JSC on Wednesday. They were scheduled to leave for Moscow on Thursday after a brief stay in Washington, D.C.

The group is traveling at the invitation of veteran cosmonaut Gen. Alexei Leonov, deputy head of the Y.A. Gagarin Cosmonaut Training Center. Brandenstein said the invitation evolved over several informal meetings with cosmonauts here and at Kennedy Space Center. Leonov spent several days in Houston during the Apollo 20th Anniversary celebration in July 1989, and extended the unofficial invitation to Brandenstein then. An official invitation arrived while Brandenstein was in orbit commanding STS-32.

"This really is just cosmonaut to astronaut," Weitz said. "I consider it a professional courtesy. It is very interesting from a professional point of view to understand how another organization goes about doing the same job that you're doing."

Brandenstein said he is looking forward to "talking shop," hearing about the recent flight of the Soviet equivalent of the Manned Maneuvering Unit (MMU), and seeing some of their hardware and training facilities.

"They're the other major manned space operators on the planet and it'll be interesting to see how they do their operations," Brandenstein said.

The group is to travel to Baikonour on Saturday to tour launch facilities for the Proton rocket and the Energia rocket, which is to boost the Soviet space shuttle, Buran, into orbit.

On Sunday or Monday, the delegation will watch the launch of the next Mir space station crew aboard a Soyuz spacecraft. This is the the first time active American astronauts have been invited to the Soviet launch complex.

The group also will travel to Star City, near Moscow, to visit the Gagarin Cosmonaut Training Center, and to Kaliningrad, to see the Manned Spaceflight Control Center, before returning on Feb. 14.

Weitz said he is curious about how freely the Soviets will discuss their space program. "What are they learning from their Mir flights? How are their crews coming back, really? I don't know if we're going to have any opportunity to talk to the Buran folks to see what it looks like."

Weitz has been to the Soviet Union before, and has packed his warm clothes because the long-range forecast is calling for highs of 0 degrees Fahrenheit. He made a one-week trip to Russia with his Skylab 1 crewmates in 1975 after the crew had met with former President Richard Nixon and Leonid Breshnev at San Clemente, Calif.

JSC Photo by Bob Walck

CUTTING CHICO—Sheetmetal and welding technicians Santiago Cruz (front) and David Kroen oversee the cutting of a 230 pound meteorite in Bldg. 10. The shop's high-pressure waterknife made the cut so that Douglas Bogard, a JSC planetary scientist, can study its nuclear products. The chondrite meteorite, formed by an asteroid impact some 500 million years ago, was named "Chico" for the New Mexico post office nearest its discovery site.

Reorganization readies JSC for future projects

By Kelly Humphries

In a significant reorganization, JSC Director Aaron Cohen has decided to move several Mission Support Directorate (MSD) responsibilities to the Mission Operations (MOD) and Engineering Directorates early this year.

Cohen said the move is designed to prepare the center for the future, when multiple programs such as space shuttle, space station and lunar-Mars exploration will be active at the same time.

"This reorganization will combine the management responsibility for flight hardware and software, place ground systems development responsibility with the users, and provide additional emphasis on institutional needs, thereby allowing significant long-term improvements in efficiency and productivity," Cohen said.

> **'This reorganization will combine the management responsibility for flight hardware and software, place ground systems development responsibility with the users, and provide additional emphasis on institutional needs.'**
>
> —JSC Director Aaron Cohen

In an effort to bring greater center focus to institutional data systems, MSD will retain responsibility for the Data Processing Systems Division and assume responsibility for some other instititutional information systems. MSD also will take on some "generic" software development responsibilities.

"The framework of the reorganization was developed with the cooperation of each of the involved directors, Ron Berry, Gene Kranz and Henry Pohl," Cohen said, "and I have appointed their deputies to prepare a detailed reorganization plan that I can approve by the end of February, and that can be implemented as quickly as possible."

Elric McHenry of MSD, Max Engert of Engineering, and John O'Neill of MOD will work with Jack Garman, MSD associate director for information systems, and Ted Boyes of the Human Resources Office, to develop the final plan.

According to preliminary plans, about 250 NASA civil servants will change directorates and a significant number of contractor employees will begin dealing with different organizations.

"We expect everyone involved in the reorganization to retain their current grade and pay levels," said Human Resources Director Jack Lister, "and we anticipate that most people will stay within their functional areas of expertise."

Under the preliminary plan:

- The Mission Support Directorate, under the direction of Ron Berry, will retain responsibility for institutional data systems support, such as those already handled by the Data Processing Systems Division, and assume responsibility for institutional networking and additional information systems that reside elsewhere, such as office automation and some common laboratory information systems. MSD's title probably will be changed to reflect these responsibilities.

Please see **REORGANIZATION**, page 4

Firm launch target expected tomorrow

By Kyle Herring

Shuttle managers are meeting today and tomorrow at Kennedy Space Center to determine the readiness of *Atlantis* to meet its planned Feb. 22 launch date for the STS-36 Department of Defense mission.

A firm target date and four-hour launch period will be announced at the conclusion of the Flight Readiness Review (FRR) meeting Saturday.

At launch complex 39A, *Atlantis* is undergoing final preparations for its sixth flight. Work completed this week includes the removal and replacement of gasket seals between the safe-and-arm device and igniter on each solid rocket booster.

Technicians could not identify if a particular inspection of the seals prior to installation was completed. Therefore, managers decided to change the seals as a precautionary measure.

STS-36

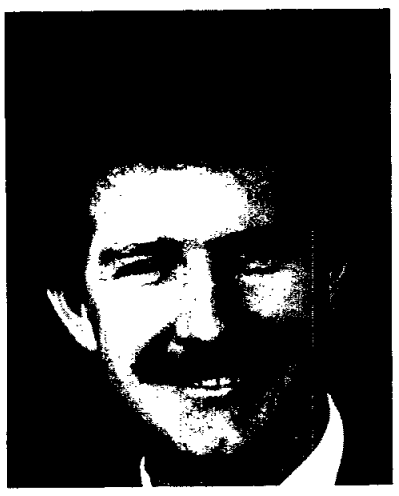
In addition to the gasket work, a decision was made to use a high-pressure fuel turbopump from the just-completed *Columbia* flight as a replacement for the suspect pump on *Atlantis*' number three main engine. The process was expected to take about eight hours and have been completed by Thursday.

Last weekend, the countdown demonstration test was successfully conducted with the crew, launch team and flight control team. The test concluded at about 10 a.m. at the T-minus 5 second mark with a simulated main engine shutdown.

Following the practice countdown, Commander J.O. Creighton, Pilot John Casper and Mission Specialists Dave Hilmers, Mike Mullane and Pierre Thuot returned to JSC for their final two weeks of mission training.

Two new flight directors appointed

Bantle, Engelauf join mission leadership team



Philip Engelauf

By Brian Welch

Two new flight directors have been named within JSC's Mission Operations Directorate—Jeffrey W. Bantle and Philip L. Engelauf. Both are veteran flight controllers.

Bantle, head of the Guidance and Control Systems Section in the Systems Division, has served as Guidance, Navigation and Control Officer (GNC) in Mission Control for several space shuttle missions. Engelauf joined JSC in 1982 and has supported several shuttle missions, beginning with STS-4, as a Flight Activities Officer (FAO).

During shuttle missions, flight directors lead the large cadre of operators within Mission Control Center who are responsible for monitoring spacecraft systems and operations. Flight directors have overall responsibility for the conduct of the mission and for real-time decision making as flight events unfold.

Bantle has a master's in aeronautical engineering from George Washington University, Washington, D.C., and worked in supersonic aircraft studies at NASA's Langley Research Center before coming to Houston in 1982. He worked for Ford Aerospace for two years, then became a NASA employee in 1984. Bantle was named section head in 1988. His console experience in Mission Control began with STS-6 in 1983.

Completed application forms, transcripts, scores, and materials must arrive no later than March 16. Forms are available in Bldg. 1, Rm. 840. Contact Mary O'Connell, x39168, for additional information.

Jeffrey Bantle

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. 9 and 16; League City Civic Center): adults, $6; students, $4.

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

Go Texas Bus Trip (1:30 p.m.-midnight, Feb. 24, Astrodome, includes bus trip, refreshments, Houston Livestock Show and Rodeo admission, Chutes Corral Club admission, Ricky Van Shelton concert): $13.

Rodeo tickets (George Strait—7:45 p.m., Feb. 21, upper level, $7.50; Rodney Crowell & Restless Heart—11 a.m., Feb. 24, mezzanine, $9; Bill Cosby—7:45 p.m., Feb. 26, club level, $10; Patti LaBelle and James Ingram—7:45 p.m., Feb. 28, mezzanine, $8; Anne Murray—11 a.m., March 3, mezzanine, $9; Highwaymen—7:45 p.m., March 3, upper level, $7.50; Alabama—4 p.m., upper level, $7.50) limit of six tickets per person.

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., March 17 and April 21; cost is $15.

Weight Safety—Required course for those wishing to use Rec Center weight room. The next classes will be from 8-9:30 Feb. 22. Cost is $4.

Ballroom dance—Professional instruction in beginning, intermediate, and advanced ballroom dancing. Classes begin March 1, and meet every Thursday for 8 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.

Tennis lessons—beginners classes, 5:15-6:45 p.m., Mondays, beginning Feb. 26; advanced beginners classes are offered on Wednesdays, beginning Feb. 28. Cost is $32 for 6 weeks.

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 March 12. Lessons are held each Monday night. Cost is $20 per couple.

JSC

Dates & Data

Today

Astronomical Society—The JSC Astronomical Society will present a program entitled "Beginning Astrophotography" at 7:30 p.m. Feb. 9 at the Lunar and Planetary Institute. For more information, call Bill Williams at x33849 or 339-1367.

Call for abstracts—The Joint Applications in Instrumentation, Process and Computer Control conference (JAICC '90) is seeking abstracts. Deadline is Feb. 9. The conference, sponsored by the local IEEE and ISA sections and the University of Houston-Clear Lake, is scheduled for March 22. For more information, call John Schuessler, 280-1520, Aamer Rizvi, 333-7282, or Dr. Joe Giarratano, 283-3874.

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.

Saturday

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

Monday

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. Contact Chris Burmeister, 333-6866, for information.

Cafeteria menu—Special: beef and macaroni. Entrees: ham steak, Parmesan steak. Soup: chicken and rice. Vegetables: green beans, carrots, au gratin potatoes.

Tuesday

Cafeteria menu—Special: Mexican dinner. Entrees: potato baked chicken, barbecue spare ribs. Soup: tomato. Vegetables: squash, ranch beans, Spanish rice, broccoli.

Wednesday

Threshold Group meeting—The Threshold Group will hold its coordinating committee meeting from 4 to 5 p.m., Feb. 14, Bldg. 45, room 251. For information, contact James Sturm at x33085.

Cafeteria menu—Special: baked meatloaf with Creole sauce. Entrees: baked scrod, liver and onions, ham steak. Soup: seafood gumbo. Vegetables: beets, Brussels sprouts, green beans, whipped potatoes.

Thursday

Cafeteria menu—Special: smothered steak with dressing. Entrees: chicken and dumplings, corned beef with cabbage. Soup: beef and barley. Vegetables: spinach, cabbage, cauliflower Au Gratin, parsley potatoes.

Feb. 16

Houston Space Society presentation—"Political Activism for Space" will be discussed by Bill Agosto, president of Lunar Industries, Inc., at 7:30 p.m., Feb. 16, in the Atlantic room at the University of Houston. Call 639-4221 for information.

Gem and Mineral Show—The Clear Lake Gem and Mineral Show, to be held Feb. 16-18 at the Pasadena Convention Center, 7902 Fairmont Parkway, Pasadena, will include a tour of Bldg. 31's Lunar Laboratory with Lunar Sample Curator John Dietrich, briefing the group. The tour will leave the convention center at 5:30 p.m. Friday, Feb. 16; those interested in attending must register at the show. Show hours are 9 a.m. to 8 p.m. Friday and Saturday, and 10 a.m. to 5 p.m. Sunday; contact Mack Robinson at x30803 or 534-4696 for more information.

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

Feb. 21

Houston Space Business—The monthly luncheon meeting of the Houston Space Business Roundtable will begin at 11:30 a.m., Feb. 21, at the American Host Hotel. The speaker is Viet Hanssen of Hanssen International; call 486-5068 for reservations.

Feb. 22

AIAA dinner meeting—The American Institute of Aeronautics and Astronautics will present Dr. Alan Binder, a planetary scientist for Lockheed Engineering, speaking on "The Lunar Prospector Mission: A Private Initiative for Lunar Exploration" at its monthly dinner meeting beginning at 5:30 p.m., Feb. 22, at the Gilruth Rec Center. Dinner begins at 6:30 and the program at 7:30. Reservations are required for dinner only and are $7 for members, $8 for non-members, and $6 for students. Call Sarah Leggio, 282-3160, by Feb. 16, for reservations and information.

JSC

Swap Shop

Property

Mobile home lot for rent, Hwy. 3, Dickinson, $70/mo. 282-2802 or 332-0365.

Sale: 3-2 country home, 1.33 acres, C. Creek ISD, 11 yrs. old, deep well, huge gar., CP, $85,000. 334-1883.; res. lot, Lewis Dr., Kemah, 111' by 180', trees, $7,200. 334-1883.

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

Ski Heavenly Valley, Lake Tahoe, NV, 2 BR condo, $350 for wk. 3/26-4/2. Tom, x38298 or 488-4089.

Lease: 1 BR/study condo, Univ. Trace, 10 min. JSC, W/D, fans, D/W, pool and exer. rm., $200/dep., $425/mo. 488-2946.

Rent: Mobile home lot, $85/mo., $50 dep., Bacliff. 488-1758.

Rent: Lake Livingston, waterfront, 3-2, CA/H, FPL, cov. deck, pier, new cond., furn., wknd./wk. 482-1582.

Rent: Lake Travis cabin, priv. boat dock, CA/H, equipped for 8, wkly./daily, $325/$75. 326-5652.

Sale: El Lago, assum., 4-2-2, remod., invest. prop., exc. lease, $79,900, OBO. 532-4237.

Sale: Beautiful log home, 90 plus acres, deck, spa, 3-C gar., trees, 2 ponds, creek, foreman's house, barn, pens, etc. 1/2 minerals, reduced to $225K. Rick, 996-8961 or 280-1500, x3323.

Rent: Vail, COL, Mar. 3-10, 1-2, sleeps 5, fully furn., FPL, great clubhs., $850. Jan, x33434 or 333-5266.

Sale: Univ. Trace condo, up, 1-1-1CP, all appli., fans, FPL, near pool, $37,500. x35570 or 480-1631.

Sale: League City, Ellis Landing, lg. 5-2.5-2, formals, den, master dwn., FPL, new A/C's, assum., $95,000. 332-1205.

Sale: Waterview condo, 3-2-2, split plan, new paint, carpet, counters, sinks, appli., fans, pool, sec. gates, boat slips avail., $39,500. 333-2524.

Sale/Lease: Shoreacres, 4-2-2, new paper, paint, carpet, no pets, ref. req., $65,000 or $650/mo. plus dep. Sally, x37485 or 488-5501.

Sale/Lease: 10 acres, 1/2 mi. west of Hwy. 146 on FM 517, barn, ponds, util., more. 280-4381 or 484-7834.

Sale: Univ. Trace condo, 1-1-1CP, W/D, refrig., DW, beige carpet, end unit up, $29,000, assum. 9.5%. 333-7000 or 480-1086.

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

Sale: 2 lakefront lots, Toledo Bend, water, elec., septic tank, $10,000. 944-5624.

Lease: El Dorado Trace, lg. 1BR condo, 2 balc., appli., W/D, alarm, CP, fan, miniblinds, no pets, $425 plus dep. Mark, x30131 or 332-2416.

Sale: League City, 2.06 acres, water, sewer avail., 15 min. from NASA, $35,000. 554-6695.

Lake country brick 2-story, 4-2.5-2, formals, 20' WBFP, 2 wet bars, blk. paneled gamerm., jacuzzi, Jennair, $159,000. 282-2958 or 532-2129.

Lease: Lg. 2-2.5 townhome, El Dorado Trace, FPL, W/D, fan, no pets, $575/mo. plus dep. Joe, 483-0255 or 480-5470.

Sale/Lease: Lg. Nassau Bay townhouse, 4-2-2, 2-story, den, deck, atrium, FPL, oversz. gar., $109,900 or $1,095/mo. Jerry, x38922 or 488-5307.

Sale: 60 acres, 3 mi. from Karnes City, TX, on Hwy. 80, 50 mi. from San Antonio; 2-story house on 1.5 lots, El Campo, fruit/nut trees. 783-9164.

Cars & Trucks

'77 24' Nomad travel trlr., equalizer hitch, very clean, $3,500. 334-1883.

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

'80 Mazda RX7, blk., 5-spd., AC, AM/FM cass./stereo, warr., $3,000. Cindy, 484-6261.

'77 L-82 Corvette, 65K mi., solid, all orig., $5,500. Bruce, 485-0396.

'79 BMW 320 I 4-spd., sunroof, good cond., new clutch, $4,995. 488-2946.

'83 Toyota Celica GT, clean, runs good, needs some body wk., $3,600. Terri, 333-5355 or (409) 925-6238.

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

'85 Cad. El Dorado, white w/leather int., loaded, dig. pkgs., ex. cond., $6,975. 333-2636.

'77 Mercury Capri, needs paint, under 12K mi. on '85 reb. eng., $650. Roger, x31909 or (409) 925-2621.

'88 white Hyundai Excel GL, 5-spd., sunroof, AM/FM cass., ex. cond., $6,000, OBO. x31420 or 488-0556.

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

'85 35' Mallard motor home, loaded, low mi., $32,000. 337-4051.

'88 Honda Prelude, ex. cond., auto., PWR moonroof, stereo/cass., $11,500. Kurt, x35572 or 337-2268.

'81 Datsun 280 ZX turbo, T-tops, 2-tone, auto., AC, AM/FM/cass., sport tires, ex. cond., $3,600. 283-4171 or 486-8574.

'71 Volvo, runs great, good cond., A/C, reliable, $950. 474-6977 or 326-2180.

'88 T-Bird turbo coupe, PWR windows, locks, moonroof, seats, auto., A/C, 5-spd., anti-lock brakes, keyless entry, $12,800. Paul, 282-3239 or 488-3653.

'78 Camaro 305, needs paint, no dents, runs good, $1,500. John, 538-1021.

'80 Datsun 200 SX coupe, $2,150. 486-5133.

'77 Ford T-Bird, white/maroon vinyl top, $1,200. 480-3367.

'79 Chev. Caprice, V8, 70K mi., AC, 4-dr., PS, PB, good cond., $2,500, OBO. 280-2028 or 488-8919; '82 VW Rabbit conv., 55K mi., AC, cass./stereo, good cond., $6,000, OBO. 280-2028 or 488-8919.

'65 Olds Starfire sport coupe, 106K mi., orig. owner, runs good, $3,400, OBO. Tom, x38298 or 488-4089.

'88 Dodge Caravan, mint cond., 2.5 I eng., AC, tilt, cruise, PB, AM/FM cass., new front tires, $11,100. J. Slight, 799-5434 or 471-0834.

'86 Toyota Celica GTS, PW, locks, seat, mirrors, sunroof, PS, PB, 2.0L, 5-spd., 70K mi., ex. cond., $8,950. x31188 or 428-1310.

'89 cust. Olds Calais, loaded, Quad-4, Fez susp. pkg., warr., 20K, $11,500. James, 483-7548 or 470-8759.

'73 240Z Datsun, blue, 91K mi., $950, OBO. Mike, x32808 or 532-1051.

'65 Chevy Corvair Monza, 4 spd., $1,500, OBO, also VW parts, BO. Ron, 483-5084 or 996-1663.

'89 Ford Tempo, 12K mi., 2-dr., 5-spd., 4 cyl., assume pmts., $227/mo. 282-2582 or (409) 925-8290.

'88 Ranger PU, 60K mi., runs good, 5-spd., AC, AM/FM, $5,000, OBO. John, 283-4104.

'88 Hyundai Excel SE, 2-tone, sunroof, 22K mi., $1,200, OBO and pick up the payments. Kim, 283-6150.

'84 Ford Mustang LX, 4 cyl., 4-spd., 55K, orig. owner, great shape, moonroof, cloth seats, hatchbk., $3,600, OBO. Kim, 280-9726.

'75 Ford E-150 van, 351 cu. in., V8, 3 captain seats, 2 couches/bed, AC, PS, PB, AM/FM, reb. trans. Cliff, x39142 or 488-0090.

Porsche 911S, 5-spd., new int., wndw. film. 445-4037.

'85 Chev. Tra Tech cust. van, loaded, front/rear air, alarm, ex. cond., $8,500. 482-2436.

Cycles

'81 Honda Goldwing Interstate, 1100cc, low mi., cover, helmet, $1,600, OBO. 484-4538.

'78 Kawasaki KZ650, less than 7K mi., w/helmet. Steve, x35806 or 333-4222.

'82 Honda NC50 Moped, $100, OBO. x32743 or 335-1865.

Boats & Planes

16' Chrysler fibergl. tri-hull boat, 120HP, waterski tow bar, ladder, galv. trlr., $800. Bob, 283-4146.

'88 Trac catamaran, all access., $1,995. 332-7908.

15' ski boat, 90hp Merc. OB/new trlr., boat cover, $2,000. 332-2229.

OMC control unit with 16' cables, never used, $125. 332-0365 or 282-2802.

18' Hobie Cat, galv. trlr., life jkts., etc., $2,250 or trade up/down for 21-23' pwr. boat, need repair. x31226 or 534-3710.

14' Glassmagic ski boat, 80hp Merc., galv. trlr., skis, ex. cond., 38mph, $1,595. 483-5180 or 326-3706.

18' Phantom 180 Illusion, 175 I/O, 30 hrs., ex. cond., stereo/cass., $11,500. Kurt, x35572 or 337-2268.

'80 Catalina 30', Diesel, 3 sails, knot, depth, VHF, hot/cold press. water, refrig., stereo, bimini, dodger, CNG stove/oven, $28,000. 554-5002.

'87 Bayliner 19', ex. cond., pwr. tilt/trim, AM/FM stereo, ski tripod, SS prop, 125hp OB, $6,900. 282-2715 or 554-4974.

'83 Catalina 25', 7.5hp Johnson, 6 sails, incl. Spinnaker, VHF, galley, head, sleeps 6, EZ loader dbl. tandem trlr., AM/FM stereo, $13,500. 474-5414.

24' San Juan, 2 headsails, sleeps 5, galley, Honda 7.5 OB, sacrifice $8,500, cons. trade car or boat. 332-2271.

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

Audiovisual & Computers

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

Compaq deskpro XT, 2 floppy drives, 20 MB HD, 640K, Mono, DOS, $750, Toshiba printer, 24 pin, $450. Bob, 283-3389 or 488-4828.

Complete camcorder video sys., lights, tripods, carry case, video camcorder, etc., new, $900. David, 486-5259.

Complete VHS industrial video editing sys., incl. Panasonic NV-A500 ed. controller, NV-500 recorder, ed. and AG-6200 recorder. x31600 or 482-1461.

Sears stereo sys., dbl. cass. player, turntable, AM/FM stereo, 2 spkrs., $25. Lea, 333-7306.

2 band/PA spkrs. Ovation 6119 div. of Kaman, 4 spkrs. per case 400W per case, $300. Jessie, x35981.

Twin box springs, ex. cond., $35. 532-1673.

Sony CDP-C10 10-disk changer, 9 cartridges, $250. 480-1086 or 333-7000.

Kenwood AM/FM cass. car stereo w/passive eq. Sanyo 100 watt amp., pair 10" M&M subwoofers, all or sep. Eddie, x34580 or 337-5424.

JVC stereo w/turntable, cass., receiver, spkrs., $150. Kathy, 332-0823.

Sony ICF short wave receiver, 2010, 1 yr. old, $330. Debbie, x35978.

Household

Elec. dryer, $75. Cindy, 484-6261.

Contemp. solid oak king sz. waterbed, 6 drwrs. under, mirrored hdbd., dresser, nightstand, like new, $850. 282-3985 or 488-0151; Scandinavian style entertain. cen., $250; Magnavox 25" color TV, $175; La-Z-Boy rocker/recl., $150, all ex. cond., 282-3985 or 488-0151.

King sz. semi-motionless waterbed, mirror hdbd./shelves, padded rails, $200. Mike, 282-4696 or 554-7614.

King sz. waterbed matt., blue, $50. Larry, x30428.

Loveseat sofa brn./wood trim, $200. Frances, x33306 or Rick x33659.

Student roll-top desk, 3 drwrs., 30" pull-out writing area, $150. x36665 or 333-9733.

Zenith color remote cont. 25" console TV, $200; clean water appli./filter for bottled water, $120. 482-4156.

Above-ground pool 16x32, full decking, sand filter, all access., $1,000, OBO. 333-6558 or 339-1337.

Claw foot table, 48" round, 2/leaves, $300; 4 Bentwood chairs, $300. x34502 or 532-4260.

Sealy queen sz. matt., box springs, frame, solid oak hdbd., ex. cond., $325. Laurie, x33748 or David, 283-5374.

Riding lawn mower, 8hp rear eng., elec. start, used 3 times, ex. cond., $625. 483-6986 or 326-3711.

Queen full motion waterbed, velour rails, dk. wood, sm. hdbd., $150, OBO. Lea, 333-7306.

Antique oak dbl. bed, matt., chest, dresser w/oval mirror, ex. cond., $495. Pager # 886-3942.

Sofa, matching chair, trad. blue/brn/bg floral, ex. cond., $200. 488-6521.

Coffee table, $30; brass standing lamp, $20; ceil. fan, 52", $30; BBQ grill, $40. x36091 or 333-5326.

Somma queen, soft-side waterbed, like new, $100. 482-3169.

Sears 19" color TV, remote, $225. Dave, x32592 or 482-6673.

Contemp. couch, 9', $125; chair, blue, $75; wal. lamps/hanging, 2, $25-35; backyd. light, 750W, $100. 486-9604.

Perfection sofa, multi-color pastel, rayon/poly., Fabricare stain-resis., new cond., $300. Ursula, 283-4116 or 996-9415.

Coffee table, walnut, 54"x18"x15", ex. cond., $20. 488-2735.

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

Japanese Futon bed w/folding frame, $200; wood TV stand, 2 shelves, $25; 3-pc. wood dinette, $100, all furn. 4 mos. old, ex. cond., BO. 334-4265.

New king sz. bed, Simmons matt., frame, triple dresser, chest, 2 night stands, $1,500. 534-4260.

2-pc. contemp. sec. couches, 177" w/ottoman, rust, $80. 480-9545.

Edger w/2hp Briggs-Stratton motor, $65. Bob, 283-4146.

Kingsz. blk. lacq. semi-motionless waterbed w/hdbd., lights, mirror, $325. 484-5547.

Avon 1876 Cape Cod dish collection, 44 pcs. (23 in orig. boxes), $300; trundle-type daybed, $250. 483-3151 or 486-6913.

Floor lamp, $20; portable gas grill, $100. Kathy, 332-0823.

Musical Instruments

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

Korg Poly 800 synthesizer, $400; Yamaha RX-21 digital drum mach., $250. Jim, x30742 or 484-7721.

Photographic

Fujica ST-701 SLR 35mm camera, f1.8 lens, Spiralite elec. flash, $40, OBO. 486-8266.

Canon 35mm camera, rarely used, $75, OBO. 283-5579 or 332-1614.

Pets & Livestock

Cocker Spaniel, male, AKC, to breed to reg. fem. AKC cocker. Tamela or Janet. x36159 or 472-6323.

German Shepherd, 12 wks., blk./tan, champion sired, $400 nego. x36474 or 482-4219.

Purebred Yorkshire Terrier pups, males, born 11/28/89, wormed, shots, $350. George, x38959 or 488-8241.

Obedience trained, spayed Rottweiler, 1 yr. old, parents Natl. champs, gentle. Jim, 483-1270 or 332-6858.

Wanted

Want good home (no other cats) for lovable, blk. indoor cat, moving. Dave, 283-5763 or 947-7964.

Want Chevy S-10 Blazer or Ford Bronco II, must be clean, low mi., cash. 486-5133.

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

Want to buy color monitor for Apple IIe. Tino, x30725.

Want to trade concert/church elec. organ for 30' cabin cruiser. 337-4051.

Want cheap work car/truck. 482-4156.

Want roommate to share lg. 2-2 apt., Seabrook, $385/mo., bills pd., not reqd. to sign lease, M or F, non-smokers. 326-1228.

Want roommate to share 4 BR home, Sagemont, priv. w/bath, half gar., W/D, appli. 483-9417 or 484-6460.

Want Volvo 15" turbo wheel, 5 spokes, in good cond. Vincent, x30874 or 333-1316.

Atten. Lacrosse players! Anyone interested in playing or forming a league, call Scott, 283-4109.

Want roommate to share 2 BR house off Egret Bay Blvd., 5-7 min. from NASA, $210/mo. plus 1/2 util. Rick, x36042 or 332-7695.

Miscellaneous

Pool cue w/2 tops, $20; Kodak 110 Instamatic, $7; blue carpet runner, 6'x2', $5. Stacey, x32649 or 480-9793.

Wedding dress, white, sz. 9, med. length scalloped train, can be altered for size, slip and headpiece, was $950, now $400. Robert, 282-3098 or Yvonne, 996-7622.

AC/DC arc welding mach., 60-225 amp, ex. cond., low hrs., Lincoln, $150. Bruce, 485-0396.

Dk. brn. Marmink coat, stroller length, lg. sz., $250; Bolivian, lg. fur wall hanging, artwork woven in rug, $100; Gilbert antique shelf clock, $175; Singer port. sewing mach., $60; Royal elec. typewriter, $90; barometer/thermometer, $15. 488-5564.

Set of 4 rims, tires, fits Chevy S-10 5 on 4 3/4 bolt pattern, 14" diam. w/gen. radials, $150, OBO. 282-4070 or 996-7622.

Wheelchair, $800, OBO; Jay cushion, $300, OBO; hospital bed, $500, OBO, matt., $200, OBO; commode chair, $150, OBO; shower bench, $200, OBO; shower chair w/commode, $900, OBO; 1 walker, $80, OBO; 4-prong walker, $35; hospital bed table, $200, OBO.

14-kt gold/diamond marquis cut solitaire, 1 carat, 1/4" band plus, $2,400, OBO. Michelle, x31165 or 337-5424.

30-gal. aquarium, tank, top, stand, pump, access., $100. Kim, 333-4743 or 488-3644.

Diamond dinner ring rainfall design, 2 1/4 carats, $1,500. x30692 or 664-5579.

Set of 4 Chev. S-10 truck rims and hubcaps, $100, new. x33182 or 474-7262.

Sony turntable, $5; 300 plus lbs. weights, bench, $45; woman's 3-spd. bike, $15; woman's trail blazer 10-spd. mountain bike, $65; men's 10-spd., $20; men's 10-spd. mountain bike, used once, $65, OBO. 333-6558 or 339-1337.

Man's 14K chain link bracelet, half price at $100. Linda, 480-3909.

VHS movies, $10/ea., What's Up Doc?, Change of Habit (Elvis), Calamity Jane (Doris Day), G.I. Blues, Star Wars, Empire Strikes Back, Return of the Jedi. Linda, x34044 or 280-0909.

Wedding dress veil, slip, sz. 8, white, off-shoulder style, $150; JVC stereo w/turntable, cass., receiver, spkrs., $150; floor lamp, $20, port. gas grill, $100. Kathy, 332-0823.

Sears elec. correc. typewriter, works good, $50. 283-5579 or 332-1614.

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

Car top carrier used once, $50; exer. cycle w/speedometer/odometer, $40. Ken or Lisa, 532-1065.

Studio 360 knitting mach. w/ribbing attach., lace/intarsia carriage, yarn changer, $600. 282-2582 or (409) 925-8290.

Antiques: Hvy. wood wheel chair, good cond.; iron bed; sewing mach.; walking plow; new 1847 Wm. Rogers Silverplate, 56-pc., 8 pl. set, 7 extra pcs. 783-9164.

Coin collection, all in beautiful frames, $150. 482-7546.

Noritake china serv. for 12, 64 pcs. Kathleen pattern, perf., $500, OBO. 326-3459.

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

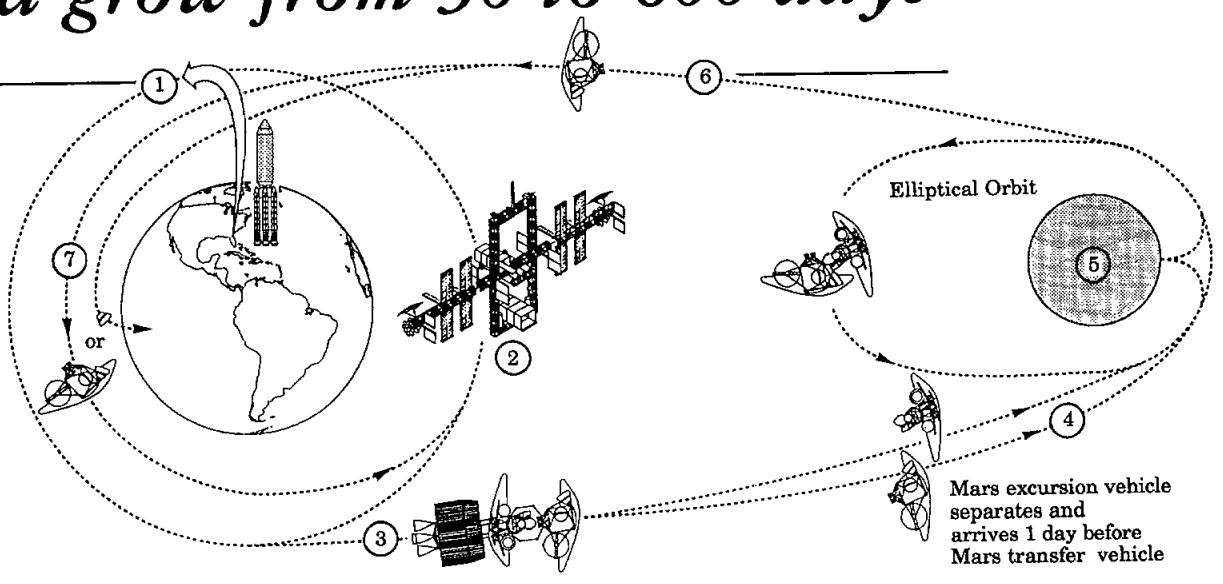
Univ. of Houston-CL is offering non-credit eve. classes in French, German, Russian, Spanish, starting wk. of 2/26. 283-3033.

Engagement ring, 18K yellow gold, round diamond solitaire (.68 carats) w/6 round diamonds, .18 carats, $1,300, OBO. x30874 or 333-1316.

Western tan suede cowhide fringe coat, sz. 40, $85, OBO. Boyd, 488-8806 or 482-5274.

Mars surface stays would grow from 30 to 600 days

The Human Exploration Initiative



1. Payload delivered to Space Station *Freedom*
2. Mars transfer vehicle mated with payload at *Freedom*
3. Trans-Mars phase with Mars transfer vehicle
4. Mars transfer vehicle remains in Mars orbit; Mars excursion vehicle descends to surface
5. Excursion vehicle to/from Mars surface
6. Trans-Earth phase with transfer vehicle
7. Transfer vehicle aerobrake maneuver and return

(Editor's note: This is the fifth 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.)

MARS OUTPOST

The next step in the strategy is the development of a permanent Mars outpost, which begins with the launch of the crew, surface payload, transportation vehicles, and propellant from Earth to Space Station *Freedom*. The transfer and excursion vehicles are assembled, checked out, and fueled at or in the vicinity of *Freedom*.

Upon approach to Mars, the transfer and excursion vehicles separate and perform aerobraking maneuvers to enter the martian atmosphere separately. The vehicles rendezvous in Mars orbit, and the crew of four transfers to the excursion vehicle, which descends to the surface using the same aerobrake. When their tour of duty is complete, the crew leaves the surface in the ascent module of the Mars excursion vehicle to rendezvous with the transfer vehicle in Mars orbit. The transfer vehicle leaves Mars orbit and returns the crew to Space Station *Freedom*.

For cargo flights, an integrated configuration of two excursion vehicles is launched. Upon approach to Mars, the two vehicles separate and enter Mars orbit using aerobrakes. The first cargo flight in the Mars outpost mission sequence delivers the habitat facility to the outpost site, and both excursion vehicles are left on the Martian surface.

Piloted flights to Mars employ two different trajectory classes, distinguished by round-trip mission time: 500-day round-trip missions with short stays (up to 100 days) on the surface; and 1,000-day round-trip missions with much longer surface stays of approximately 600 days. The 500-day missions will be used for the first flights to Mars, whereas the 1,000-day missions will be used later in the sequence for outpost buildup when longer stays are necessary. For the piloted flights, a zero-gravity Mars transfer vehicle will serve as the crew's living quarters during interplanetary transit. The feasibility of using zero gravity for such long trip times, and the required countermeasures, will have been previously determined on *Freedom* and the Moon. If long-term zero gravity is not feasible, an artificial gravity vehicle will be developed.

All scenarios under consideration begin with an initial four-crew expedition. The surface stay-time for this first flight is approximately 30 days, and the total mission duration is approximately 500 days. During these short stays on the surface, the crew will live in a fully integrated habitation module, similar to that used on the Moon. However, in order to accommodate crew stay times up to 600 days, a constructible habitat facility is erected after delivery on a one-way cargo mission. The crew's early activities include local geologic exploration and characterization of the Mars outpost area and the search for resources, water environments, and past and present life. In later years, the outpost can support scientific exploration activities distant from the outpost using a manned pressurized rover for regional access.

The large masses required to undertake Mars missions necessitate the development of a larger class of heavy lift launch vehicle, with a capability approximately double that required for lunar missions. The Mars heavy lift vehicle will also require larger payload compartments to accommodate the volume of the Mars exploration systems.

Further modifications and enhancements to the lunar node configuration of *Freedom* will be required to perform Mars vehicle operations in addition to the continued processing of the lunar transfer vehicle. With the lunar configuration as a baseline, additional structure is added to accommodate the processing facilities for the Mars mission vehicles.

MARS TRANSPORTATION

The Mars transportation system consists of the Mars transfer vehicle and Mars excursion vehicle. The Mars transportation system must support a piloted mission mode to deliver a crew of four and 25 metric tons of payload to the surface of Mars and return the crew and 1 metric ton to Earth, and it must support a cargo mode that delivers 100 metric tons of cargo to Mars using two Mars excursion vehicles. Other key mission design requirements include the zero-gravity Mars transfer vehicle, direct entry capability for Earth return, extravehicular activity capability, in-transit science activities, and expendable excursion vehicles.

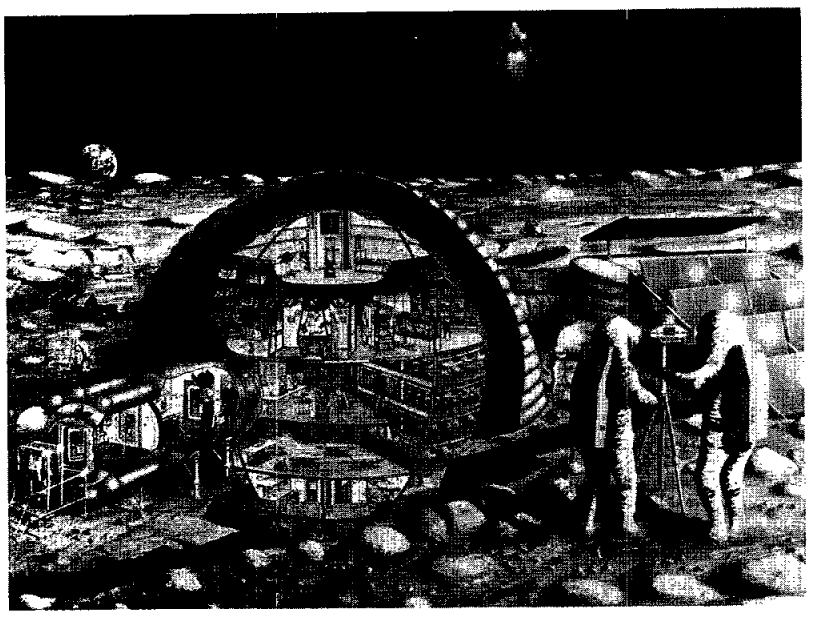
The Mars transfer vehicle carries a crew and the excursion vehicle to Mars and returns a crew to Earth. The transfer vehicle provides long-duration crew accommodations for the transfers from Earth to Mars and back, and it also includes an Earth crew capture vehicle, an Apollo-like capsule designed to return the crew directly to Earth's surface after the early expeditionary Mars missions.

The crew module is a single, pressurized structure 7.6 meters in diameter and 9 meters in length with an internal bulkhead to provide redundant pressure volumes, and a life support system that recycles water and oxygen. The crew is provided private quarters, exercise equipment, and space suits that are appropriate for the long (up to 3 years) mission.

The Mars excursion vehicle is designed to transport 25 metric tons of payload and the ascent stage from the transfer vehicle to the surface of Mars. For manned missions, the crew pilots the Mars excursion vehicle.

The Mars excursion vehicle crew module supports the crew during descent and ascent and allows the crew to control Mars excursion vehicle maneuvers. It provides spartan crew accommodations for up to 30 days to cover contingencies in activating a surface habitat. The Mars excursion vehicle design presumes that the crew members, once on the surface, live in and operate out of a surface habitat.

The Mars excursion vehicle aerobrake, which is identical in shape and size to the Mars transfer vehicle aerobrake, provides enough lift to maneuver from Mars parking orbit to a preselected landing site. Landing legs are deployed after the aerobrake is dropped. The five Mars excursion vehicle descent engines, like the lunar excursion vehicle engines, provide single engine-out capability and can be throttled to 15 percent of rated thrust to enable a soft landing.



Right: Constructible habitats would add to the living and laboratory space at both lunar and Mars outposts. The lunar constructible habitat, in addition to being an important expansion of the Moon base, would serve as a testing ground for materials and construction and operation techniques for the Mars habitat. An 11-meter-diameter inflatable habitat would be partially buried in a crater or a prepared hole and covered by soil for radiation shielding. The habitat would have hatch ports for connection to pressurized equipment and the previously placed space station-derived habitation and laboratory modules.

SURFACE SYSTEMS

Concepts have been identified and defined for lunar and Mars surface habitats, power systems, vehicles, and in situ resource utilization systems that will satisfy the requirements of a focused set of mission objectives. First and foremost, these systems fulfill the overall objective of expanding human presence in the solar system while providing for crew health and safety throughout each mission.

The habitat, extravehicular mobility units, and airlock are designed to use the lunar missions as a proving ground for subsystem technologies, system lifetime and reliability, and increasingly autonomous operations. The human systems elements to be used on the Moon and Mars are expected to be essentially the same.

The initial habitat module for both outposts is a horizontal Space Station *Freedom*-derived cylinder 4.45 meters in diameter and 8.2 meters long.

A laboratory module is subsequently attached to the habitat to provide expanded habitable volume. This module is identical to the habitat in size, structure, life support system, and thermal control system with regolith containers. When filled with lunar soil, the containers will protect the habitat from radiation.

The *Freedom*-derived initial habitat and laboratory modules use a regenerative life support system that recovers more than 90 percent of the oxygen from carbon dioxide and reclaims potable water from hygiene and waste water. In addition to oxygen and water recovery, this system provides temperature and humidity control, atmosphere and pressure control, stowage for refrigerated and frozen food, trash compaction, and shower, dishwashing, and laundry facilities.

To accommodate larger crews and longer stays, and to provide larger pressurized volume for outpost and science operations, an expanded habitat is required. This habitat, is a constructible 11-meter diameter inflatable structure partially buried in a crater or a prepared hole. This structure is an order of magnitude lighter than multi-module configurations of equivalent volume. Its internal structure includes self-deploying columns that telescope upward and lock into place when the structure is inflated. When fully assembled and outfitted, the constructible habitat provides three levels, and has the volume required for expansion.

Extravehicular mobility units for lunar and Mars exploration will be designed for long-term use and maintainability. The suit is a hybrid structure of both hard and fabric components, designed for mobility on uneven, rugged, partial gravity terrain, and it is modular to facilitate resizing and maintenance of individual parts, and a back-entry design will expedite donning and doffing in a partial gravity environment. To minimize mobility unit mass and size, the portable life support system will use a four-hour regenerable system that can be quickly recharged or replaced.

A reliable, long life power system is required to support virtually all surface system activities. For initial outpost emplacement, the system consists of three photovoltaic array/regenerative fuel cell assemblies, each of which provides 25 kilowatts during the day and 12.5 kilowatts at night.

As outpost development proceeds, power demands rapidly increase. In addition, the 354-hour lunar night makes reliance on photovoltaic systems, which convert light to electricity, impractical for long-term lunar operations because of fuel cell limitations. Nuclear power systems will both meet these increasing demands and allow progress toward increasing operational capability.

The 12-hour Martian night does not impact the mass of the regenerative fuel cells as much as the 354-hour lunar night. Therefore, the need for nuclear power on Mars is not as great until large power increases are required.

SURFACE ROVERS

Offloading cargo, surveying, and setting up the lunar outpost heavily utilize surface rovers remotely controlled from Earth. Rovers with onboard continuous power systems, such as radioisotope thermoelectric generators or dynamic isotope power systems, could be fully utilized, since they will not need any recharge. Local transport and construction and mining vehicles would use rechargeable energy storage.

The requirement for lunar and Martian surface transportation of crew and payloads for outpost operations and for exploration and science missions will be satisfied by an unpressurized rover similar to the Apollo lunar rover, but enhanced in range and payload capability and able to be operated telerobotically.

An unpressurized manned/robotic rover is used to transport both crew and cargo about the outpost, and to perform human exploration and science missions up to 50 kilometers from the outpost.

For greater distances, the rover will be reconfigured either to be controlled by a telerobot that autonomously navigates the rover, or to be teleoperator-controlled from the outpost. The reconfigured rover will be able to travel to distances of up to 1,000 kilometers from the outpost for 1- to 2-year missions.

Cargo will be unloaded from the lunar excursion vehicles by a moveable gantry crane called a payload unloader. Six degrees of freedom of the overhead platform enable alignment of one component, such as an airlock, with a stationary one such as a habitat module. A set of interchangeable "implements" enables the payload unloader to perform construction tasks such as excavating, relocating and smoothing regolith, and grasping and lifting objects. The implement set also includes mining and hauling equipment for lunar soil.

Boykin new orbiter projects deputy

Jack Boykin, deputy manager of the Shuttle Engineering Integration Office, has been named deputy manager of the Orbiter and GFE Projects Office effective Monday.

He brings almost 25 years of NASA experience to the position vacated last December by Dan Germany, who became head of the office.

Boykin began his NASA career in 1965 as a coop student in the Electrical Power Distribution System Branch. He has held increasingly responsible positions in the shuttle program, including assistant, and then deputy manager of the Orbiter Avionics Systems Office.

Prior to his work in the Engineering Integration Office, Boykin was manager of the NSTS Avionics Office responsible for avionics program management, including management of Shuttle flight software.

JSC People

Buzzard new deputy for engineering integration

Frank Buzzard has been selected to replace Boykin as the deputy manager of the Engineering Integration Office under direction of Larry Williams. His new responsibilities also become effective Monday.

He most recently served as assistant manager of the NSTS Program Office.

Buzzard's 14 years of NASA experience began in 1976 in the mission planning and analysis division where he assisted in formulating and developing shuttle powered-flight guidance functions for all mission phases. Prior to becoming assistant manager of the NSTS office, Buzzard served for more than two years as the manager of the Project Integration Office.

Boykin Buzzard Henderson

Henderson heads SBIR

Grady P. Henderson of the Technology and Commercial Projects Office in New Initiatives has been appointed acting manager of JSC's Small Business Innovation Research (SBIR) program.

Henderson also will serve as the JSC focal point for the independent research and development (IR&D) activities.

Henderson joined JSC in 1962 and has been involved in a variety of operations, engineering and administrative activities, and has been involved in SBIR and IR&D programs since October 1984. He succeeds M.E. Goodhart, who retired in December.

Inspector General seeks theft tips

The Office of the Inspector General is seeking information about the theft of $20,000 worth of computer equipment from a JSC building.

The equipment was taken from Bldg. 49, Rm. 205, during the STS-32 mission, sometime between 4:30 p.m. Jan. 12 and 7:40 a.m. Jan. 16, said Special Agent Keith Ulrich. It is believed to have been removed from the north emergency exit.

The stolen equipment includes an Everex Step 386/33 personal computer, Zenith monitor, keyboard, surge protector, laser printer and software.

Anyone who has information should call the Inspector General's Office at x30483, or Crime Stoppers of the Bay Area at 480-TIPS. Crime Stoppers is offering a reward.

Affordable housing sought for co-ops

JSC's Human Resources Office is trying to help participants in the cooperative education and summer hire programs find affordable short-term lodging.

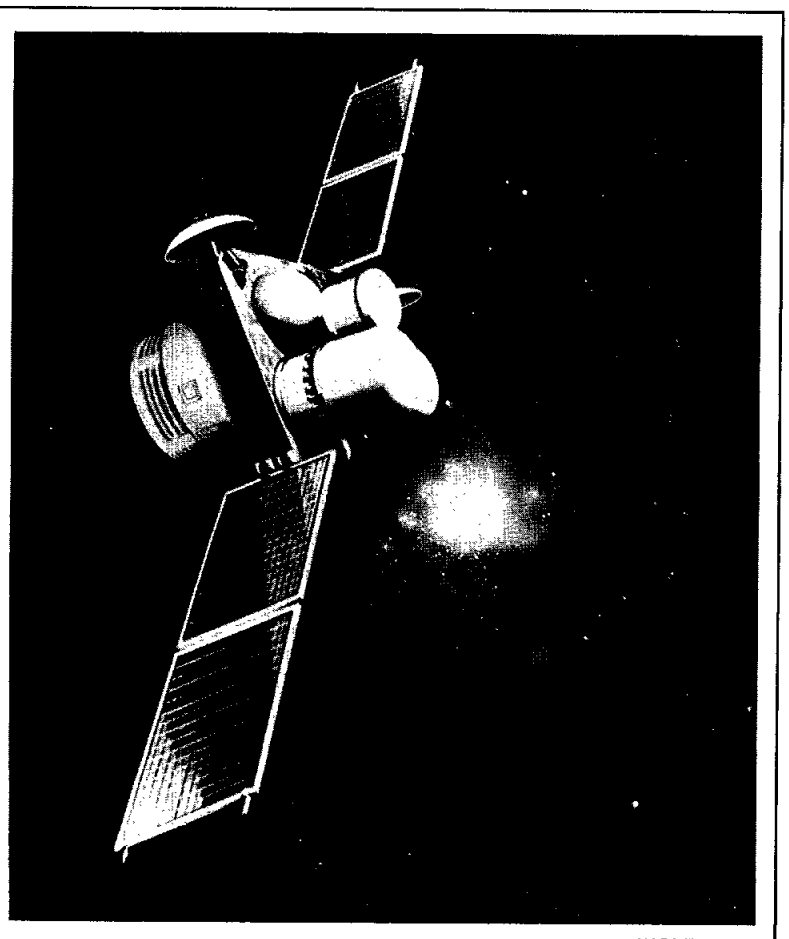
If you have an extra room or want to rent a house, apartment or condominium for 3-6 months at $150 to $250 a month, please send a note to the co-op office, AH3, with your name, office and home telephone numbers, and a brief description of your offering. Someone will contact you for more details.

Information received by Feb. 16 will be included in the summer and fall 1990 housing brochure.

EAA eyes Gilruth plans

The general assembly of the Employee Activities Association (EAA) will meet at 1:30 p.m. Tuesday in Rm. 204 of the Gilruth Recreation Center.

Harvey Hartman will discuss plans for Space Center Houston, JSC's new visitor center, and the recreation center Master Plan will be discussed.



NASA Illustration

The Gamma-Ray Observatory, shown in an artist's concept, will investigate gamma radiation, the most energetic of all forms, and its violent sources—pulsars, quasars and black holes.

Gamma-Ray arrives at Cape

The Gamma-Ray Observatory (GRO), one of NASA'S four great observatories, arrived at Kennedy Space Center on Tuesday to begin preparations for its launch aboard the Space Shuttle *Atlantis* in November.

Following the shuttle launch, GRO will be deployed into a near-circular orbit 279 miles above Earth, where it will gather data on gamma-rays generated at the beginning of time—perhaps 15 billion years ago—in a comprehensive scientific effort to learn more about the origin and fate of the universe.

The satellite was airlifted from builder TRW's Redondo Beach, Calif., facility to Kennedy aboard an Air Force transport plane.

GRO will be the heaviest spacecraft ever deployed from the shuttle, weighing nearly 17 tons. It is among the first spacecraft designed exclusively by computer techniques. Its four scientific instruments are the largest, most advanced and most sensitive of their type ever flown in space. After an initial two-year mission, GRO may continue to function for eight years or longer.

JSC enlists stars to help celebrate black history month

By Linda Copley

John Jacob, president of the National Urban League, and Houston-born sisters Phylicia Rashad of the Cosby Show and actress and choreographer Debbie Allen will headline JSC's 1990 observance of black history month.

The program, scheduled from 1-3:30 p.m. Feb. 16 in Teague auditorium, is dedicated to the memory of Carter G. Woodson (1875-1950), the "Father of Black History." Howard Renfro, JSC 1990 Black History Program chairman, will serve as master of ceremonies and JSC Director Aaron Cohen will welcome participants.

"We will be honoring the research and documentation done by Carter Woodson, whose work preserving the memory of important figures in black history serves as the basis for role models for the kids of today," Renfro said. "We need to build on that information to impress upon our young people the important role blacks played in helping mold our American culture."

Jacob will be guest speaker, and Rashad will participate in cultural expressions.The presentation of the Dr. Ronald E. McNair Scholarship, sponsored by the JSC Black Cultural Association, will be made to University of Houston student Jacquelyn Johnson by the late astronaut's widow, Cheryl.

Johnson, a native Houstonian and 1987 graduate of Waltrip High School, is considering pursuing a doctorate in computer science or mathematics.

Linda Lorelle, Channel 2 News anchorwoman, will moderate a panel discussion by Jacob; Allen; Dr. John King, president emeritus, Huston Tillotson College; Rev. Kirbyjon Caldwell, Windsor Village United Methodist Church, and Robert Muhammed, Houston-area Nation of Islam. A question and answer session with the audience concerning black history will follow the presentation.

Students from the Carter G. Woodson Middle School and the Zion Temple Anointed Choir and the Gifted Band will provide musical entertainment during the program.

Refreshments will be served immediately following the program. Employees are also invited to view an art exhibit of works relating to black history entitled "Harvest," which will be displayed throughout the day in the Bldg. 2 lobby.

Fluor-Daniel gets support contract

JSC has selected Fluor-Daniel Services Inc., Greenville, S.C., for negotiations leading to a cost-plus-award-fee contract for construction support services. The first contract year will begin on or about Feb. 1, 1990.

The contract covers a five-year performance period that includes a one-year basic period plus four one-year options. The proposed cost and fee for the program, including yearly options, is approximately $27.5 million.

Services to be provided include the management, planning, and execution of a broad variety of construction tasks at the center, including the alteration of an existing physical plant. The contract normally does not include large new construction or modification tasks.

Reorganization to streamline directorate interaction

(Continued from Page 1)

"The bottom line is that the reorganization decision that the center director has made will be a net positive for JSC," Berry said, "and I intend to fully support it in all my thinking and actions, and I urge all the mission support folks to do the same.

"I think this reorganization clears the way for a significant reduction in some of the chronic problems at the center in the area of overlapping and competing functions and associated complex interfaces between directorates. This change should give us the opportunity to greatly increase the efficiency of the overall center by providing clearer and cleaner accountability."

Berry said the people in his organization are enthusiastic about being able to focus on centerwide general-purpose information systems and their associated services, and information resources management functions.

- The Mission Operations Directorate, under the leadership of Eugene Kranz, will accept responsibility for ground operations support systems facility development, maintenance and operations; and mission planning and analysis related to shuttle flight design.

Kranz' deputy, John O'Neill, said the changes would promote efficiency and strengthen the operations team for the busy decade ahead. "I think you'll see a closer interaction between the developers of systems and the users of those same systems," he said. "The result should be a really good mix of the organizational and functional responsibilities we need to go forward with the shuttle, Space Station *Freedom* and the other tasks at hand in the '90s."

- The Engineering Directorate, under the supervision of Henry Pohl, will accept responsibility for all other mission planning and analysis activities, except for those associated with shuttle flight design; combined flight hardware and software activities; spacecraft software environment activities for Space Station *Freedom*; and all robotics, and most of the artificial intelligence and expert systems work.

"Hopefully, consolidation of like tasks and like efforts will give us more resources to bring to bear on the work we have before us," Pohl said. "We have so much work on our plate right now we don't have room for duplication."

Scholarship applications due in March

Two scholarship programs available to the dependents of JSC federal employees have set March deadlines for their applications for 1990.

The first, the JSC Exchange Scholarship Program, provides $4,000 (up to $1,000 per year) for study at any college or university for three scholarship applicants this year.

Scholarships are open to dependents of JSC federal employees who have worked at the center at least two years. Applicants will be judged on scholastic achievement, extent of financial need, and breadth of school and community activities.

Applications are required by March 30. Application forms and agreements are available in Bldg. 45, Room 706. Contact Nicky Dinick, x33161, for additional information.

The NASA College Scholarship Fund is a separate program to provide scholarships to federal employee dependents. Established by Pulitzer Prize winning author James A. Michener, the fund will award three scholarships this year.

Each scholarship provides $6,000 (up to $1,500 per year) for engineering or science degrees at an accredited U.S. college or university.

Rankings will be based on academic preparation, school and community activities, performance on recognized tests (SAT, ACT, etc.), written recommendation from instructors, and a one-page statement of academic purpose by the applicant.

Completed application forms, transcripts, scores, and materials must be mailed no later than March 16. Forms are available in Bldg. 1, Rm. 840. Contact Mary O'Connell, x39168, for additional information.

Space News Roundup

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

Editor .....Kelly Humphries
Assoc. Editor .....Linda Copley

Science teachers seek presentations

Houston will host the National Science Teachers Association's annual meeting March 27-30, 1991, and the group has issued a call for abstracts.

A committee is soliciting program proposals for 60-minute hands-on workshops, 30- and 60-minute demonstrations, 15-and 60-minute papers, and 60-minute panel discussions. The deadline for proposals is June 1, 1990..

For more information, call JSC's education coordinator, Jim Poindexter, x38624.

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