

Space News Roundup

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No. 8

Astronauts see Soviet 'simplicity'

By Kelly Humphries

The first active American astronauts to witness a Soviet space shot were impressed with the relative simplicity of Soyuz launch preparations, but said it appears Soviet vehicles are becoming more complex.

The four-man delegation to Moscow and the Baikonour launch complex witnessed the launch of a Mir space station replacement crew—Cosmonauts Anatoly Solovyov and Alexander Balandin—on Feb. 11 and returned to JSC last week.

JSC Deputy Director P.J. Weitz and Chief Astronaut Dan Brandenstein said their "cosmonaut to astronaut" visit was interesting but provided no new revelations. Weitz and Brandenstein were joined by Astronauts Ron Grabe and Jerry Ross for the trip.

"There were no doors open to us that hadn't been opened within the past two years to someone else," Weitz said. "We got a little more personal attention from cosmonauts."

They saw essentially all of the manned space flight program vehicles and facilities and some of the unmanned, Brandenstein said. He got to take the stick of the TU-134 jet that flew the group between Moscow and Baikonour, and Ross took advantage of opportunities to step into a Soviet space suit and to fly a simulation of the Soviet version of the manned maneuvering unit or space backpack.

The group also visited the Gagarin Cosmonaut Training Center at Star City, and the Manned Spaceflight Control Center at Kaliningrad.

"Overall, their processing and their equipment appear to be less complicated than ours," Brandenstein said. "At L-2 (days) they hauled the Soyuz out to the pad, erected it and did their tests. At L-1 day, we were given the opportunity to go out to the pad and look at it. There was essentially nothing happening because everything checked out at L-2 and it was just sitting there and waiting for launch day."

"I think their Energia is coming our direction some," Brandenstein said. "That particular pad resembled ours more" with more access panels and platforms that surround the hydrogen-oxygen fueled rocket much like the space shuttle pad's Rotating Service Structure.

"Their Buran/Engergia system will not be that simple because its a more

Please see **SOVIET**, Page 4



JSC Photo by Bill Blunk

LOFTING SKYLAB—Employees of Space Tech Rigging hoist the lower section of the Skylab trainer's orbital workshop out of Bldg. 5. The Skylab exhibit's move to temporary storage in Bldg. 413 was completed last week after several months of painstaking planning, cataloging and disassembly. Plans for JSC's new visitor center, Space Center Houston, call for the 107-by-22 foot trainer to be suspended in flight configuration under the dome of the center's Starship Gallery. Visitors will be able to enter through a covered walkway.

Creighton illness, weather forecast postpone blast off

Launch of the Space Shuttle *Atlantis* on STS-36 was delayed twice this week when Commander J.O. Creighton came down with an upper respiratory infection.

Poor weather was a factor in the Mission Management Team's decision to postpone the launch, this time for a minimum of 24 hours.

The second delay means the earliest launch opportunity would be between 11 p.m. CST tonight and 3 a.m. Saturday morning. The

exact time will not be revealed until 9 minutes before launch.

The Mission Management Team planned a further review of the weather and Creighton's condition this morning.

The first 24-hour delay came Wednesday when Creighton reported his illness. The condition was not serious enough to consider replacing him as a crew member, according to Flight Crew Operations Director Don Puddy.

The second delay came late Thursday morning when Creighton's condition had not improved sufficiently. At the same time, the forecast called for weather conditions that would not be satisfactory for the loading of cryogenic fuels aboard *Atlantis* in time for an early Friday morning launch.

Doctors reported Creighton's condition showed some improvement Thursday, but that he still had some upper respiratory infection. They recommended a minimum 24-hour postponement.

Creighton, Pilot John Casper and Mission Specialists Mike Mullane, Dave Hilmers and Pierre Thuot remained at Kennedy Space Center.

The medical delay was only the second in the American space program's history. The Apollo 9 launch was delayed from Feb. 28 to March 3, 1969, when all three crew members—James McDivitt, David Scott and Russell Schweickart—came down with a mild viral respiratory illness.

There were no technical problems aboard *Atlantis* or at Pad 39A that threatened to delay the start of the Department of Defense-dedicated mission.

Earlier in the STS-36 processing flow, however, technicians had to remove and replace gasket seals between the safe-and-arm device and igniter on each solid rocket booster and replace the high-pressure fuel turbopump on *Atlantis'* number three main engine.

Shuttle managers decided to replace the gasket seals after a small depression was found in one of the seals recovered from the STS-32 mission set.

The turbopump change out was necessitated when paperwork did not verify that larger-than-allowable weld defects in the turbopump had been fixed. The pump was replaced as a safety precaution.

The 34th shuttle mission will be the fourth night launch in the shuttle program.



New launch target set for Hubble mission

Shuttle managers Wednesday announced that the target launch date for STS-31 has been moved up one week from April 18 to no earlier than April 12.

The primary objective of the STS-31 mission will be the deployment of the Hubble Space Telescope (HST) using the orbiter *Discovery*.

The original target date for STS-31 had been March 26, but in January officials concluded that the right aft solid rocket motor segment needed to be replaced and set April 18 as the

revised target date. Processing of the segment change out along with overall mission preparations have been completed well ahead of schedule, permitting the six-day advancement in the target launch date.

"A lot of dedicated NASA and contractor employees were faced with a big challenge early this year and not only did they meet the challenge, they

surpassed it" said Space Shuttle Director Robert Crippen. "The new launch date permits adequate time for completing the work associated with the HST mission and also has time built in for the team to work issues which might come up before launch day."

The official launch date for STS-31 will be set at the flight readiness review

meeting conducted at the Kennedy Space Center about two weeks before launch. Should launch take place on April 12, the launch opportunity window would open at 8:21 a.m. CST. All shuttle flights after STS-31 keep the same target dates as shown in the January 1990 Mixed Fleet Manifest.

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



Voyager 1 snaps shots of solar system family

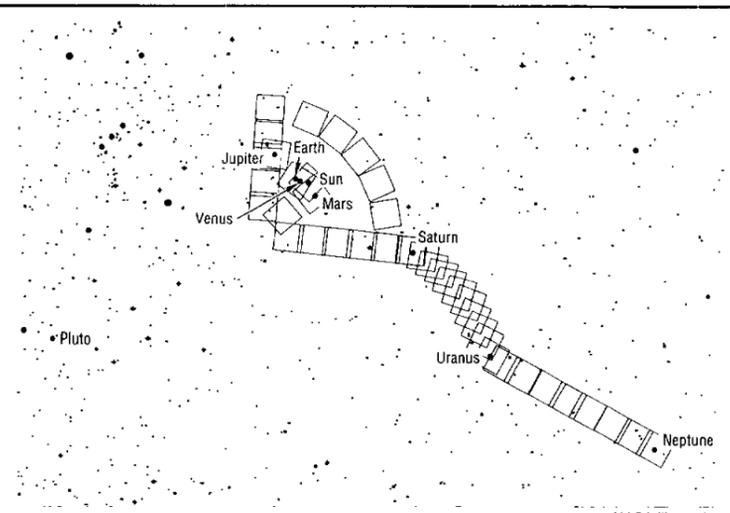
NASA's Voyager 1, having completed its mission along with Voyager 2 to explore the outer planets, last week used its cameras to take an unprecedented family portrait of most of our solar system.

The 64 images were taken from a unique point of view—looking down on the solar system from a position 32 degrees above the ecliptic plane in which the planets orbit the Sun. No other spacecraft has ever been in a position to attempt a similar series of photographs.

Voyager 1, launched in 1977, is now about 3.7 billion miles from Earth. "This is not just the first time, but perhaps the only time for decades that we'll be able to take a picture of the planets from outside the solar system," said Voyager Project Scientist Dr. Edward C. Stone of CalTech. No future space missions are planned that would fly a spacecraft so high above the ecliptic plane, he said.

Starting shortly after 7 p.m. CST Feb. 13 and continuing for four hours, Voyager 1 pointed its wide- and narrow-angle cameras at Neptune, Uranus, Saturn, Jupiter, Mars, Earth and Venus. Mercury is too close to the Sun to be photographed by Voyager's cameras, and Pluto is too far away and too small to show up.

The images will be played back to Earth March 16-27.



NASA Illustration

From high above the plane of the solar system, Voyager 1 took a "family portrait" of most of the planets Feb. 13 and 14. This chart shows the pattern of exposures. The series of photographs does not include Mercury, too close to the Sun, or Pluto, too far away.

Mullane to retire from NASA, USAF

Col. Richard M. "Mike" Mullane will retire from NASA and the Air Force, effective July 1.

Mullane, a mission specialist aboard *Atlantis* on STS-36, was selected as an astronaut in 1978 and is flying his third space shuttle mission.

He flew on *Discovery's* maiden flight, STS 41-D in August 1984 and on the third flight of *Atlantis*, STS-27, in December 1988.

After leaving NASA and the Air Force, Mullane will return to his hometown of Albuquerque, N.M.

Mullane graduated from the United States Military Academy at West Point in 1967 with a bachelor's degree in military engineering. He earned a master's in aeronautical engineering from the Air Force Institute of Technology in 1975.

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.
 "A Midsummer Night's Dream (8 p.m. Feb. 23, UHCL Bayou Theatre): \$3.50
 Rockets vs. Lakers (7:30 p.m. March 6, Summit): \$8.

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Gilruth Center News

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.

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. A six-week beginners only session will be held from 7:30-9 p.m. Tuesdays, beginning March 13; cost is \$20 per couple.

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

Tennis lessons—A six-week beginners course will be held from 5:15-6:45 p.m. Mondays, starting Feb. 26; advanced beginners class is on Wednesdays beginning Feb. 28; cost is \$32 and sign-ups begin immediately.

Men's open "C" softball tournament—Limited to 16 teams, the tournament will be March 3-4; entry fee is \$95 and must be paid by 6 p.m., March 1.

Country and Western dance—Six-week session begins March 12. Lessons are held each Monday night. Cost is \$20 per couple.

JSC

Swap Shop

Property

Sale or lease: Bayglen 3-2.5-2 w/loft, garden bath, security, hardwood floors, garage door opener, landscaped, \$1100/mo. or \$110,000 w/ 8.5% assum. Pick, x33117 or 480-4827.

Rent: Webster/Ellington, nice 2-1 apt, \$450/mo. Dave, x38156 or Eric, x38420.
 Rent: Lake Livingston, waterfront, 3-2, C/AH, FP, covered deck, pier, furnished, wknd or wk. 482-1582.

Sale/lease: Nassau Bay townhouse, 4-2-2, over 2,000 sq. ft., 2-story den, deck, atrium, \$109,900 or \$1095/mo. Jerry, x38922 or 488-5307.

Sale: 2 lake lots on Toledo Bend Lake, Toledo Beach Subdiv., water, elect., septic tank, \$10,000. 944-5624.

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

Lease: Camino So. 4-2-2d, cent. A/H, fenced, no pets, dep., ref., avail. 1 Mar. 488-1301.

Lease: Pipers Meadow, 3-2, new carpet, tile, 1 yr. lease \$800/mo. Susan, 480-8259.

Rent: Nassau Bay Village Apt. 1 BR across from NASA, furnished, \$375/mo. neg. 333-4836.

Sale: League City 2.06 acres, city water and sewer, \$35,000. 554-6695.

Sale: Big Bend area, 160 acres, \$120/acre, CFD 20% down, 9% for 7 yrs. 337-4051.

Trade Houses: Custom canyon view 4-3, off 360 west of Austin, prefer 5 yr. old, open plan within 20 min. of JSC. 471-8795 or 333-6083.

Lease: Scarsdale, clean 3-1.5-2, fenced, cent. A/H, \$480/mo. George, 486-0315.

Sale: Meadowgreen, 3-2-2 David Weekly, 3 yr. old, formals, FPL, corner lot, deck, approx. 2,000 sq. ft., 8.5% assum. FHA, \$25,000 equity, no approv. or closing costs, \$116,000. 480-3909.

Sale/lease: 10 acres 1/2 mile west of Hwy 146 on FM 517, barn, ponds. Trey, 280-4381 or 484-7834.

Rent: Heavenly Valley at Lake Tahoe, NV, 2 BR condo, \$350 for week 3/26 to 4/2. Tom, x38298 or 488-4089.

Rent: Lake Travis cabin, private boat dock, cent. A/H, accom. 8, wkly/dly rental, \$325/\$75. 326-5652.

Rent: Waterview condo, 3-2-2 covered, split master, new paint, carpet, \$39,500. 333-2524.

Lease: Gatsby condo. across from College of the Mainland, Texas City, lg. 1 BR w/FPL, security, pool, \$330/mo. x37355 or 554-4974.

Sale: Country restaurant, well estab., and 3 BR home on 3 ac., pecan trees, 1 1/4 hr. west of Houston, \$175K, restaurant only, \$125K. Gene, x33016 or (409) 732-6321.

Rent: Mobile home lot on Hwy 3 in Dickinson, \$70/mo. 282-2802 or 332-0365.

Rent: Egret Bay Villas, 1 BR w/bay window, FPL, custom tile, appli., balcony, pool, boat ramp, entrance gate, \$475/mo., deposit. 332-7788

Cars & Trucks

'88 Acura Integra RS, standard, 5-dr., blue, cassette, tint, low mi., \$10,300. 486-7017.

'79 Triumph Spitfire convertible sport, \$2750. 331-3954.

Porsche 911S, 5-spd., A/C, new interior, ex. cond. 445-4037.

'84 Corvette coupe, auto., Bose sound, custom wheels, 62K mi., \$10,350. Wally, 280-1118 or 532-1953.

'89 Olds Calais, med. metal, grey, loaded, 5-spd. Quad 4, 20K mi., \$11,500. James, x37548 or 470-8759.

'79 Cadillac Seville, 51K mi., moonroof, leather, \$3500. Don, x38039 or 333-3313.

'76 Calica GT, new motor, trans. and rear end, mags, front susp., brakes, \$2000. 480-5426.

'77 T-bird, white w/maroon vinyl top, \$900. 480-3367.

'81 Olds Toronado, loaded, ex. cond., V-8, \$3300. x36158 or (409) 945-8787.

'79 BMW 320i, 4-spd., lt. blue, sunroof, AM/FM/cass., A/C, good cond., \$2900. 282-4582 or 337-3794.

'82 Mercedes Benz 240D, ex. cond., \$7900. 333-4836.

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

'85 Mercedes 500 SEL silver-grey/blue, 4-dr, fully loaded, seat heaters, sunroof, new tires, 60K mi., Dee, 332-4879.

'73 Plymouth Duster, 6-cyl., A/C, new tires, batt., front brakes, hoses, \$300. 280-2472 or 568-1425.

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

'83 Chevy Caprice Classic station wagon, 2-tone blue, maint. and repair records, shop man., 96K mi., \$2295. Jim x30038 or 488-3353.

'82 GMC 1/2-ton PU, 6.2L diesel, rebuilt eng., AC, PS, PB, auto., AM/FM w/tape, \$2700. Mike, x30115 or 996-1496.

'80 Pontiac Phoenix, 2-dr., PS, PB, new A/C, paint and trans., \$1000. Wayne, x31587.

'65 Olds Starfire Sport Coupe, 106K mi., good cond., \$3200, OBO. Tom, x38298 or 488-4089.

'79 Monte Carlo, needs work, \$500. x30425 or 941-2495.

'72 Mercedes Benz 220, gas engine, AC, auto., \$1500, OBO. Richard, x35104 or (409) 945-2187.

'79 Toyota Corona, 106K mi. mech. sound, \$650, OBO. Mark Rorvig, x37730 or 486-4806.

'83 Jeep CJ-7 Renegade, straight six, ex. cond., low mi., \$4900. Brian, 333-7315 or 480-5430.

'82 Volvo GLT Turbo Wagon, pwr pkg, new turbo, good cond., \$3800, OBO. 482-6991.

'84 Ford Ranger V-6, 55K mi., \$3300. Shayla, x30167.

'81 Nissan 280ZX, \$1200. 532-4237.

'89 Cutlass Sierra, 4-dr., take over pmts. 280-0559.

'85 Fiero GT, 6-cyl, loaded, sunroof, 40K mi., ex. cond. x35140 or 488-0345.

Cycles

'81 Suzuki 850cc motorcycle, loaded, shaft drive, low mi., ex. cond., snow suit, helmets. \$1400. Patrick, x32635 or 488-1079.

'84 Honda VT500, 21K mi., great cond., \$1000. 480-9698.

'83 Suzuki GN125cc motorcycle, street legal, not a dirt bike, low mi. 474-7006.

'84 Kawasaki 440 Jet Ski, \$2000; '83 Kawasaki 550 Jet Ski, \$2000. Andy, 333-6671 or 332-9105.

'84 Kawasaki 3-wheel ATV, 200cc eng., ex. cond., \$400. 331-1710

Boats & Planes
 OMC control unit w/16' cables, never used, list \$250, sell for \$125. 332-0365 or 282-2802.
 Bennet hydraulic trim tabs for boat, 18" stainless, \$100. x38456 or (409) 935-4198.
 Sunfish sailboat and trlr., fully equip., fine cond., \$900. Jones, x38278 or 326-2995.
 Sabot (wooden shoe) sailboat, 7.5 ft., \$125. Jim, x30038 or 488-3353.
 14' Glassmagic skiboat, 80 HP Mercury, galv. trlr., 38 mph, \$1595. x35180 or 326-3706.
 '81 Hunter 22 sailboat, '85 Honda 7.5 outbd, roller jib, swing keel, new bottom paint, sleeps 4, good cond., \$7000. 488-1313.
 '78 19' Cobalt boat, 305 HP in-out OMC,

Today

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

Saturday

Spaceweek open house—Spaceweek, a national pro-space educational organization, will hold an open house at its offices from 10 a.m.-noon, Feb. 24, at Suite 100, 1110 NASA Road 1. The event will introduce the organization to prospective new volunteers and show them how they can help in the Houston programs.

Monday

Cafeteria menu—Special: breaded outlet. Entrees: beef chop suey, Polish sausage with potato salad. Soup: French onion. Vegetables: okra and tomatoes, green peas.

Tuesday

Cafeteria menu—Special: fried chicken. Entrees: Salisbury steak, shrimp Creole. Soup: split pea. Vegetables: mixed vegetables, beets, whipped potatoes.

Wednesday

BAPCO to meet—The Bay Area PC Organization will meet at 7:30 p.m. Feb. 27 at the League City Bank and Trust.

For more information, call Earl Rubenstein, x34807, or Ron Waldbillig at 337-5074.

Cafeteria menu—Special: stuffed bell pepper. Entrees: fried catfish with hush puppies, braised beef rib, barbecue plate, wieners and beans, shrimp salad. Soup: seafood gumbo. Vegetables: corn O'Brian, rice, Italian green beans.

Thursday

Blood drive—The next on-site blood drive will be from 8 a.m.-4:30 p.m., March 1 at the Gilruth Recreation Center. For more information, call Helon Crawford, x34159.

Solar System Exploration Seminar—The Solar System Exploration Division seminar series presents D.A.V. Murali, Lunar and Planetary Institute, speaking on "Deccan Volcanism: The Untold Story" at 3:15 p.m., March 1, in Bldg. 31, Rm. 129. Contact Nadine Barlow, x35044, for information.

Cafeteria menu—Special: barbecue smoked link. Entrees: beef stroganoff, turkey and dressing. Soup: chicken noodle. Vegetables: lima beans, buttered squash, Spanish rice.

Friday

Toastmasters club—The Space-Land Toastmasters Club is looking for members who wish to perfect their public speaking skills. The club meets at 7:15 a.m. each Wednesday morning

in the Bldg. 3 cafeteria. For more information, contact Jean Rudnicki at x31849 or 393-1536.

Cafeteria menu—Special: meat sauce and spaghetti. Entrees: baked scrod, liver and onions, fried shrimp. Soup: seafood gumbo. Vegetables: green beans, buttered broccoli, whipped potatoes.

March 7

Ground testing—The American Institute of Aeronautics and Astronautics (AIAA) Ground Testing and Simulation Technical Committee will hold a meeting from 11:30 to 12:15 p.m., March 7, Bldg. 3 cafeteria. Richard Bozeman, chief, Thermochemical Test Branch, will speak on Thermochemical Test Activities. Contact Sivaram Arepalli, x35910, for information.

March 8

AIAA Robotics Workshop—WAR '90, a one-day workshop on Automation and Robotics Applications organized by the Houston section of the American Institute of Aeronautics and Astronautics (AIAA) will be held from 8:30 a.m.-2:30 p.m., March 8, at the Gilruth Rec Center. The workshop, hosted by JSC's Systems Development and Simulation Division, is free. Luncheon tickets require reservations by March 1 and cost \$7 each. Contact Sharon Williams at x31525 for information and reservations.

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tandem galv. trlr., includes canvass top, boat cover, and skis, boat used only in fresh water (Lake Travis), serv. records, \$7950. 280-2055 or 554-2769.

Addicator Mini boat, built for circuit races in the Pacific, wave jumping, cruising and water skiing, w/acces. and trlr., was \$5500 now \$2200. 332-7788.

Audiovisual & Computers

Bang & Olufsen Beogram RX turntable, B&O MMC5 stylus, ex. cond., \$200. x34391 or 482-7473.

IBM-AT compat., 80286 processor, 12 MHz, 1 meg RAM, 40 mb HD, 1.2 floppy, AT keybd, amber mono. monitor, S/P ports, MSDOS 3.3, 6 mo. old, w/orig. boxes. Tracey, x36833 or 748-2252.

National and institutional impact will be

The Human Exploration Initiative

(Editor's note: This is the final installment in a series of articles summarizing the Report of the 90-Day Study on Human Exploration of the Moon and Mars. Copies of the full report are on file at the JSC Technical Library, Bldg. 45.)

The Human Exploration Initiative will draw heavily on NASA's personnel, facilities, and equipment. This resource base, the NASA institutional core capability, is built on 75 years of research, development, and operational experience and hundreds of unique national facilities.

The NASA institution provides the scientists, engineers, and technicians required for the research, design, and development of a program, and it provides the laboratories, wind tunnels, launch pads and control rooms, and similar facilities needed to conduct a program. The institution also provides the equipment and logistical support that enable the work to take place.

The scientists and engineers form the backbone of the agency's abilities in flight systems, materials and structures, power and propulsion, measurement, instrumentation, computer systems, and space and Earth sciences.

NASA will request a significant augmentation of civil servant positions to support the Human Exploration Initiative. These positions will provide the necessary technical expertise, program management, and administrative support to meet the objectives of the Initiative.

The second major component of NASA's institution, the facility infrastructure, consists of a unique array of research and development complexes, administrative areas, manufacturing facilities, and launch and payload processing facilities, with a replacement value of \$14.2 billion.

MANAGEMENT

The President and Congress recognized in 1958 that a civilian space agency would need exceptional authorities to conduct novel and urgent missions. Therefore, the National Aeronautics and Space Act of 1958 contained many special provisions.

Much has changed since 1958. New legislative and regulatory requirements have eroded many of the flexibilities originally granted. This erosion, coupled with the complexity of a 30-year program of lunar and Mars explo-

ration, once again necessitates a novel approach to administrative and management systems. Accomplishment of the President's initiative will be significantly enhanced by restoring the flexibility of the Space Act of 1958 so that it may operate as originally intended.

Three areas of concern, if successfully accommodated, will offer the greatest opportunity to realize significant efficiencies and enhanced effectiveness: the acquisition system, the budget process, and human resource management systems. NASA has already begun to address these areas internally, but there are elements that are outside NASA's control. In each of these areas, NASA will focus on changes unique to the nature of the enterprise rather than across-the-board changes to laws of general application.

ACQUISITION & BUDGET

The existing system is structured to accommodate every type of federal procurement activity, from routine administrative procurements to development and operation of ultra sophisticated space programs. Such a system of broad application is ill-suited to the needs of a research and development agency. Since the early 1980s, the time necessary to complete a major procurement has increased by about one-third, and the volume of supporting documentation has grown by about one-half. New or modified tools are needed to accommodate technology programs and the 30-year development of complex, large systems.

In its early years, NASA received so-called "no-year" research and development appropriations, which enabled realistic planning and efficient utilization of resources. This flexibility was reduced through congressional imposition of a two-year research and development appropriation. Broad transfer authority between appropriations has also significantly reduced. These factors have contributed to planning instability and unpredictable program continuity. The uncertainties for long-term programs under these circumstances will severely affect the Human Exploration Initiative, as well as potential international cooperation.

HUMAN RESOURCES

A critical element of the Human Exploration Initiative is the provision of

adequate human resources. Efficient management of those resources will require flexibility to make adjustments in the work force without artificial ceilings and related restraints.

An added impediment is the antiquated federal personnel system, which imposes severe constraints on recruitment, motivation, and retention of a quality work force. The system is unable to address shortages of scientists and engineers in critical disciplines and noncompetitive pay and benefits.

If NASA is to attract and retain the caliber of talent necessary to achieve the Human Exploration Initiative, the agency must secure greater flexibility in setting competitive pay levels, streamlining the hiring process, managing career progression, and strengthening the tie between performance and recognition.

NASA will explore a legislative package in the near future to strengthen the acquisition process and human resources management system. In the acquisition area, the legislative proposal would address long-term contracting authority and the use of "soft" options to meet the demands of a long-lived program. The proposal would also identify procurement streamlining features such as the authority to competitively select contractors on the basis of initial proposals without discussions. Further, NASA will explore the feasibility of using a modified Uniform Commercial Code contracting approach for the Human Exploration Initiative.

In the area of human resources management, the legislative proposal would include provisions for flexible personnel compensation levels, recruitment and staffing incentives, enhanced performance appraisal, and a modified personnel benefits program.

NASA will also explore budget process changes including "no year" appropriations, long-term program authorizations, transfer authority between appropriations accounts, and flexible reprogramming authority.

In addition, NASA will explore an Executive Order or other appropriate Presidential directive to provide necessary authorities for the Human Exploration Initiative. The request may include exemption from the Office of Management and Budget Circular A-76 to permit management flexibility in determining the appropriate civil service and contractor skill mix. A class waiver to Office of Management and

Budget Circular A-109 may be requested as appropriate for program and procurement planning for the Initiative. NASA may also seek a blanket delegation of procurement authority from the General Services Administration for the acquisition of automated data processing equipment for other than routine administrative or business application. The request may include exemption from non-statutory requirements of the Federal Acquisition Regulations, when required to facilitate execution of the Human Exploration Initiative. Finally, NASA may request removal of full-time equivalent ceilings to permit management of the work force composition and size in accordance with budget levels.

INTERNATIONALITY

NASA has a 30-year history of cooperating with other nations on space projects. However, the present environment is considerably different from that of the past. Many U.S. allies are evolving from dependence to autonomy in space, with strong national commitments to develop indigenous space capabilities. In parallel, the Soviet Union has opened its programs for cooperation with Western nations. As a result of this changed international environment, NASA's current projects involve a mix of cooperation forms, including foreign participation in NASA missions, NASA participation in other nations' missions, coordination of independent national missions, and jointly defined programs.

Taking into account NASA's experience, particularly with long-term complex projects such as Space Station *Freedom*, and considering the growing competence and autonomy of its potential international partners, certain observations about large scale cooperative programs may be of value in the Human Exploration Initiative context.

First, it is important that prospective partners be included in the early definition of a program; exclusion from the definition process may make later acceptance of the program more difficult. This early consultation sounds out each partner's interest and level of commitment. Early consultation is also necessary to match planning, budget, and decision schedules.

Cooperation on large-scale, long-term, U.S.-led projects must increasingly provide foreign partners with operational roles as well as responsibility for developing hardware, especially if significant foreign investments are sought.

Technical commitments to the program must be matched by equally strong political commitments on the part of all parties. The larger and more expensive the program, the higher the level of political commitment and sustained engagement required.

Several characteristics of the Human Exploration Initiative are important to an assessment of cooperative possibilities. First, the Human Exploration Initiative is not a single program, but a series of programs extending over at least 30 years. Cooperative arrangements can thus be phased to reflect U.S. objectives, take into account partner capabilities

and interests, and build upon experience as it accrues. Further, the Initiative contains a large number of major end-item elements that provide many opportunities for others to participate.

The Human Exploration Initiative contains a hierarchy of critical and non-critical paths, providing opportunities for managing risk while still providing interested partners with significant technical challenges, operating responsibilities, and investment opportunities.

Finally, the planned program of sustained human exploration of the solar system will require a substantial increase in the NASA budget over time. For foreign partners to make significant contributions to the exploration program, they, like the United States, will have to make high-level political commitments involving major long-term outlays going significantly beyond currently approved or projected budgets.

CONCLUSION

The Human Exploration Initiative benefits the nation in a multitude of dimensions. The Initiative has the ability to reinvigorate the human spirit by responding to the imperative to explore new worlds. A wealth of new knowledge will flow from the exploration and science conducted within the Initiative. And international leadership and national pride will result from a successful, visible, long-term U.S. exploration program.

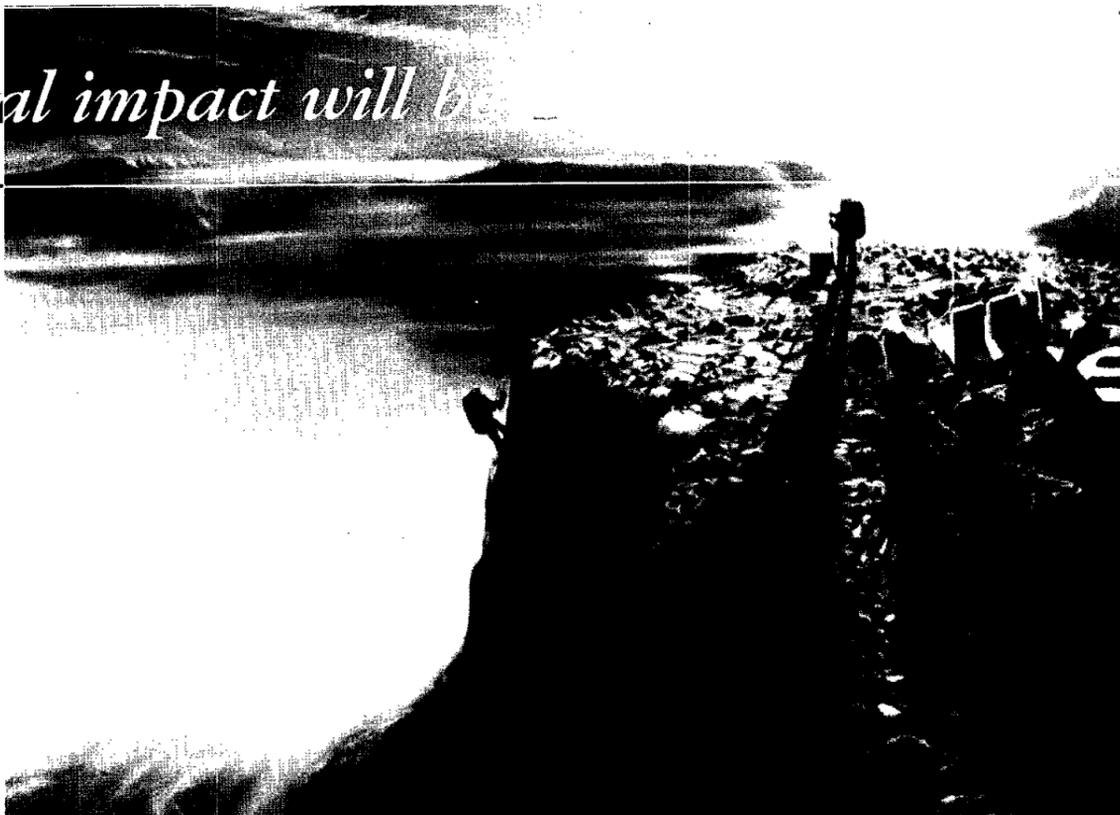
The Human Exploration Initiative provides a stimulus for science and engineering education; it strengthens our national technological capabilities; and it serves as a mechanism for national policy.

The study and programmatic assessment described have shown that the Human Exploration Initiative is indeed a feasible approach to achieving the President's goal. Several reasonable alternatives exist, but a long-range commitment and significant resources will be required. However, the value of the program and the benefits of the nation are immeasurable.

The last half of the 20th Century and the first half of the 21st Century will almost certainly be remembered as the era when humans broke the bonds that bound them to Earth and set forth on a journey into space.

That journey will, in time, extend human presence throughout the solar system. Historians will note that the Moon became a familiar place to Earthlings very early in that period. They returned there to follow in the bootprints of Armstrong, Aldrin, and their Apollo colleagues, to mine the lunar rocks and other resources and to establish an outpost for further exploration and expansion of human activities, on Mars and beyond.

Historians will further note that the journey to expand the human presence into the solar system began in earnest on July 20, 1969, the 20th anniversary of the Apollo 11 lunar landing. On that day, President George Bush announced his proposal for a long-range, continuing commitment to a bold program of human exploration of the solar system.



Above: An artist's concept shows the first human travelers to walk on the surface of Mars exploring Noctis Labyrinthus in the Valles Marineris canyons. Realization of the dream of putting humans on the Martian surface will require enhanced management systems, streamlined acquisition and budgeting processes and more efficient human resources management systems here on Earth. Right: Astronauts explore the rugged surface of Mars' moon, Phobos.



Informal talks latest Threshold project

Intimate discussions with influential and key decision makers from the center's past and present are the latest undertaking of JSC's Threshold Group.

Glynn Lunney, president of Rockwell Space Operations Co. and vice president and general manager for Houston operations for Rockwell International's Space Transportation Systems Division, will be the next guest in what the group is calling its "Forum." Participants meet at a Threshold Group member's home and sit down for conversation and questions. The Lunney session is scheduled for March 1.

Lunney follows former JSC Direc-

tor Christopher Kraft Jr. and Bill Huffstetler, manager of JSC's New Initiatives Office. Plans are being made for Forum sessions with JSC Director Aaron Cohen and former astronaut Joe Allen, now with Space Industries Inc.

Sign-ups for the upcoming Forum are open now. Anyone interested should call Audrey Schwartz, 283-5794.

Threshold membership is open to energetic, dedicated and enthusiastic civil service professionals who want to get involved in JSC activities beyond their assigned duties, said George Parma, member at large.

The group recently elected officers. They are James Sturm, coordinator; Janet Rowlands, vice coordinator; Denise Richards, recorder; Diane DeTroye, activity coordinator; and Parma, member at large.

Threshold participants also are helping plan the playground for JSC's new Child Care Center, and are hoping to recruit members who will help with the playground construction. The group is helping with new employee orientation and Speaker's Bureau recruitment, developing a shuttle middeck experiment and a new-hire peer adviser program, and doing building renovation with Habitat for Humanity.



Photo by George Parma

Bill Huffstetler (second from left), manager of JSC's New Initiatives Office, talks with members of the Threshold Group during an informal Forum session.



JSC Photo by Bob Walck

BLACK HISTORY—An overflow crowd of about 1,000 people attended last Friday's celebration of black history month in JSC's Teague Auditorium. Among the presentations was a reading of prose about the Rev. Martin Luther King Jr. by actress, choreographer and director Debbie Allen, center. Allen, a Houston native, was joined by her mother, Vivien Ayers, left, and Linda Lorelle, a Channel 2 news anchor.

Later this spring

Space Center Houston delays groundbreaking

Groundbreaking for Space Center Houston, the new visitor center at JSC, will be somewhat later than originally planned this spring.

JSC Public Affairs Director Harold S. Stall, president of the non-profit Manned Space Flight Education Foundation Inc. (MSFEFI) developing the "experience center," said details of the project's financing are taking longer than was expected because the project's current cost estimate exceeds the \$64 million Citicorp has committed to the foundation. "Our meetings with Citicorp have moved forward productively and on a positive note, just a bit more slowly than earlier anticipated," Stall said.

Vance Ablott, Space Center Houston general manager, said current

projections would place grand opening in the early fall 1991. Space Center Houston is expected to draw some 2.3 million visitors in its first year.

Ablott said the fall opening actually has some operational advantages.

"This allows adequate time to perfect all aspects of program performance by the time peak tourist season rolls around," he said.

Walt Disney Imagineering is

the design and development contractor for Space Center Houston, and CRSS/Linbeck and Pierce Goodwin Alexander & Linville hold the construction management and architectural and engineering services contracts, respectively. The new facility will be built on a site just west of JSC's main gate.



Child Care Center seeking director, employees

First module of building arrives at center site; opening scheduled for May 1

Plans for the May 1 opening of JSC's Child Care Center are well under way following a lottery to select the first children to be placed in the center.

The first modular section of the child care facility was delivered to the site south of the Gilruth Recreation Center last week. Once all of the sections are assembled, volunteers will be needed to construct ramps, fences, skirting and a playground, as well as decorate and customize the interior, according to Michael Evans, president of Space Family Education Inc., the non-profit organization formed to manage the day care center.

"The building design was a compromise between a very tight budget and the desire by JSC management to support quality child care," said Evans. "All of our equipment must be donated or purchased, and the work must be completed by April 23, in order to be ready for the opening." Volunteers should contact Evans at x37667 for information on how they can help.

"Out of the 127 eligible employee members, 50 children's names were entered into the lottery," said Lori Beauregard, policy and procedure committee chairman. "As of now, 49 places have been secured, with

seven on a waiting list."

The slots that remain unfilled include three openings in the young pre-schooler (ages 23 to 36 months) group, and five in the preschooler (36 months to five and a half years) category.

"Any JSC employee with a child in those age groups interested in filling one of these slots should call me at x36600 and fill out the paperwork right away," Beauregard said.

Space Family Education's board of directors is seeking day care center employees as well. Estella Gillette, x33077, can provide the necessary application forms and information.

Positions open include that of facility director, toddler and pre-school lead and assistant teachers, infant program coordinator, infant caregivers, and part-time infant room assistants.

The facility director position application period closes March 1. Minimum qualifications include a bachelor's degree in child development, early childhood education, or a related field. Three years experience with pre-school children and/or experience as an administrator in a child care center is also necessary. Applicants holding a masters degree in this field are preferred.

Requirements for the other open positions include a bachelor's degree in early childhood education, with experience, for the assistant facility director/lead pre-school teacher position and associate degrees in early childhood education, with experience, for the pre-school assistant teacher, toddler lead teacher, and infant program coordinator positions.

High school diplomas, with relevant experience, will be required for the toddler assistant teacher, the infant caregivers, and the part-time infant assistants. The janitor position for the facility is open as well.

Soviet space shuttle carries over uncomplicated design philosophy

(Continued from Page 1)

complicated, state-of-the-art kind of vehicle," Brandenstein added. "As you get more advanced vehicles, they become more complicated and the time it takes to stack them and launch them increases."

Weitz said the group was allowed to walk about the Buran space shuttle, but didn't get to look inside the flight deck or cargo bay. Brandenstein said the simpler design philosophy evident in the Soyuz preparations is carrying over to the new vehicles to some extent.

"The example is the wing leading edge. The reinforced carbon-carbon attachment scheme is significantly less sophisticated appearing than ours. They just bolt them on with four bolts whereas we have an intricate structural mounting system."

Weitz and Brandenstein said the

Baikonour launch complex covers a much larger area than Kennedy Space Center and that the facilities were larger, too. The building used for Energia processing probably has a larger volume than Kennedy's Vehicle Assembly Building, and the Soviets' four-bay orbiter processing facility for their Buran space shuttle is much larger than Kennedy's.

The group saw the Soyuz launch from about a mile away on a clear, cold, windy day. A thick blanket of ice fog obstructed their view of the launch, Weitz said, and "I was giving them points for guts."

The weather at the pad was clear, however, and the astronauts saw the rocket rise above the fog at about 2,000 feet.

"It's not a big vehicle. It almost takes you back to Gemini days," Weitz said.

Weitz said the group's days were

all carefully planned, apparently to be hospitable. They met few "men in the street," he said, but the English-speaking aerospace workers and 20 cosmonauts they talked to seemed quite open about the political changes going on in their country.

"The impression I got was that they are very much happier with their political plight now than they were a few years ago," Brandenstein said. "Although, on the other side of the coin, they are suffering through some of the things we do in that funding is not as forthcoming as they thought it was in the past."

Weitz, who visited Moscow about 15 years ago with his Skylab crew mates, said one change that stood out was that there were very few automobiles on the streets in Moscow then. Now, he said, there are rush hours and cars in the streets most of the time.

Space News Roundup

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Editor Kelly Humphries
Assoc. Editor Linda Copley

Roundup distribution moves to afternoons

This year's budget cuts in the research and program management (R&PM) area have forced a change in the distribution time for Space News Roundup.

Beginning with this issue, the Roundup will be delivered in the afternoon mail run. This means the employee newspaper will arrive at on-site offices between 1 and 2:30 p.m., and at off-site offices between 2:30 and 3 p.m.

STS-36 homecoming plans pending

A welcome home ceremony for the crew of STS-36 will take place about 7 hours and 45 minutes after landing at Edwards Air Force Base in California.

Because STS-36 is a Department of Defense mission, a landing day is not expected to be announced until 24 hours after launch. An exact landing time is expected to be announced only 24 hours before landing.

If the crew's return to Houston turns out to be on a weekday during normal business hours, the ceremony will be held outside the north side of Bldg. 1. If arrival comes at any other time, the ceremony will be held near Hangar 990 at Ellington Field.

For the latest information on welcome home ceremonies, call the Employee Information Service at x36765.