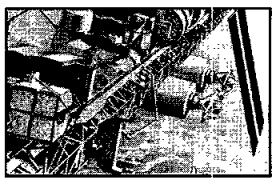
NASA
National Aeronautics and Space Administration
Lyndon B. Johnson Space Center
Houston, Texas



Forward or back?

Richard Darman, director of the Office of Management and Budget, presents the case for Space Station *Freedom*. Story on Page 3.

Dedication recognized

JSC employees earn kudos for their contributions from the Manned Flight Awareness program. Story on Page 4.

Space News Roundup

Vol. 30 | June 14, 1991 | No. 24

Synthesis Group maps four paths to future

'America at the Threshold' report recommends ambitious exploration effort

By Kelly Humphries

NASA's Synthesis Group set forth four possible paths for future U.S. space exploration Tuesday, each architecture emphasizing different areas of interest but all concentrating on human visits to the Moon and Mars.

The group proposed development of 14 supporting technologies, including a heavy-lift launch vehicle with a minimum capacity of 150 metric tons and a nuclear thermal propulsion system for Mars missions. It also made 10 recommendations on how to go about implementing whichever path is chosen.

"Leading world powers have always explored and profited from new frontiers and territories," Synthesis Group Chairman Thomas Stafford said at the Washington, D.C., press conference announcing completion of the report. "Space is the new frontier of the industrialized world in the 21st Century. As Americans, we must ask ourselves what our role will be in human exploration of the Solar System: to lead, follow or step aside?"

The four architectures suggested in the 180-page "America at the Threshold" report, which took the 27-member group of experts from government, industry and academia 10 months to complete, are:

• **Mars Exploration**: Emphasis on Mars exploration and science. First human mission to the Moon in 2005. Lunar infrastructure developed only to the degree necessary to test and gain experience with Mars systems and operations and to simulate Mars stay times. Robotic precursor missions scout the territory for a Mars landing site. First human landing on Mars in 2014, with a surface stay of 30 to 100 days. Next mission in 2016 is 600 day stay. Designed as a minimal approach to achieving Space Exploration Initiative objectives.

• **Science Emphasis for the Moon and Mars**: Moon and Mars emphasized equally. First human mission to the Moon in 2003. Life sciences data required for Martin missions generated through extensive lunar operations. Emphasis shifts to larger scientific experiments and instruments after developing surface capabilities for construction, maintenance and operations on the Moon. Human missions to Mars begin in 2014. All knowledge gained in lunar orbit and on the lunar surface become part of dress rehearsal for Mars mission.

Please see **SYNTHESIS**, Page 4

Atlantis' roll over nearing

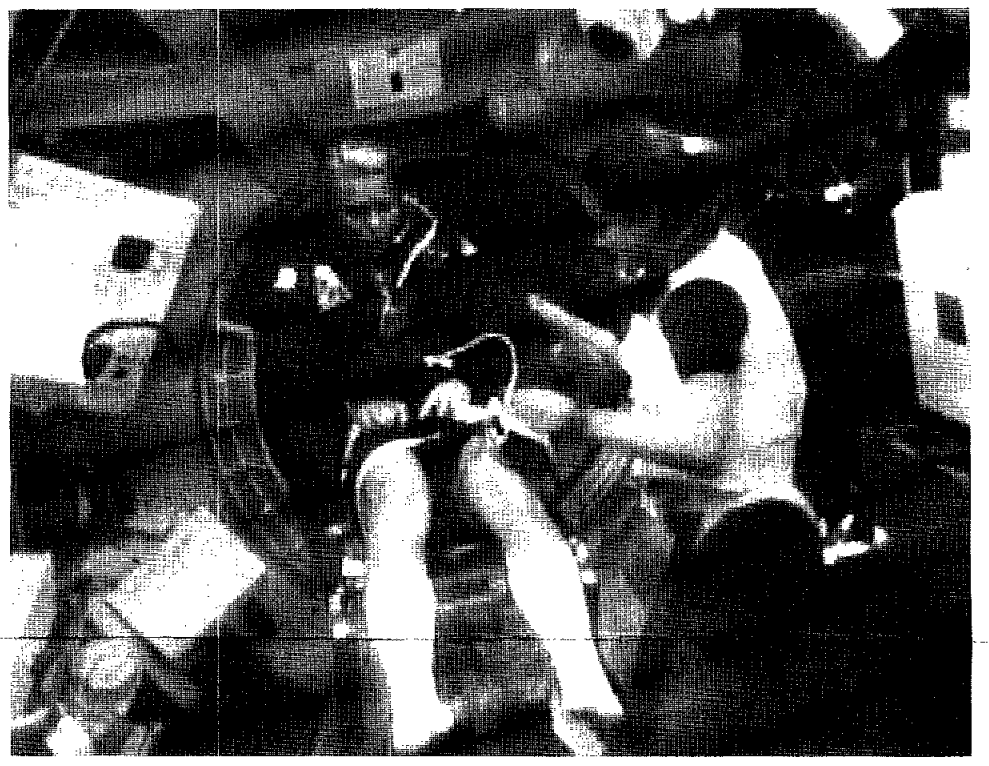
By James Hartsfield

Preparations to put the next shuttle in orbit are ahead of schedule at Kennedy Space Center, and *Atlantis* may be moved to the Vehicle Assembly Bldg. to be linked with the STS-43 solid rockets and fuel tank as early as Wednesday.

The payload for STS-43, Tracking and Data Relay Satellite-E, is planned to make its final terrestrial move Monday, when it will be carried out to Launch Pad 39A to await *Atlantis*. If all continues to go well, *Atlantis* may be moved to the launch pad as early as June 24.

STS-43 has been targeted for launch around July 25, but that launch might move a few days earlier if work remains ahead of schedule and managers decide on such a plan. An official launch date for *Atlantis* won't be set until the final management review of all aspects of the mission, the flight readiness review, usually held about two weeks prior to launch.

On *Atlantis* this week, technicians performed a final cleaning of the cargo bay and closed the payload bay doors. Final checks were also made of the main engines, main propulsion system plumbing, aerosurfaces and landing gear. *Atlantis* is now in Bay 2 of the processing hangar, a space that will be occupied by *Columbia* following its return to KSC.



NASA Electronic Photo

Tammy Jernigan helps Rhea Seddon strap herself into the Body Mass Measurement Device aboard the Spacelab module in *Columbia*'s payload bay. The mission specialists are working on the Fluid-Electrolyte Regulation During Space Flight experiment, which tracks the shift of body fluids from the lower limbs to the upper body in microgravity and looks at changes in kidney function, hormone levels and water, salt and mineral balance.

Senate takes up *Freedom* budget

After a heated debate on the future of America's manned space program, the full House of Representatives voted by a wide margin June 6 to restore funding for Space Station *Freedom* by taking money from other NASA programs.

The bill adds only $184.4 million to the overall budget that had been previously approved by the House appropriations committee, but reverses that group's decision to virtually eliminate space station funding.

Under the spending plan, now on its way to the Senate, $1.9 billion was approved for Space Station *Freedom*. But the money comes from a $463 million reduction in space science and applications funding; a $165 million decrease in physics and astronomy; a $170 million drop in planetary exploration; a $79 million decrease in aeronautics; an $11 million cut in academic programs: and a $233 million cut in shuttle operations. Those reductions plus the added $184 million compose the station spending plan for next year.

"The totally bipartisan vote in the House of Representatives to continue development of Space Station *Freedom* was a big victory for all America," NASA Administrator Richard Truly said. "But much work remains to be done to provide a final fiscal year 1992 budget for NASA that is well-balanced between science, manned space flight, exploration, aeronautical research, Earth observation and technology development.

Please see **QUAYLE**, Page 4

Spacelab crew bringing home science bonus

By Kelly Humphries

With experimenters on the ground reporting a "bonus" of unexpected data from the first Spacelab Life Sciences mission, the Space Shuttle *Columbia* and its crew of seven were preparing for landing today.

"Yesterday's program of mostly bonus science activities on the mission put us once again in the delightful position of returning more data from this mission than ever was planned," Dr. Ron White, program scientist for the Life Sciences Division at NASA Headquarters, said Wednesday. "We've done everything that we were supposed to do and more."

Landing is scheduled for 10:39 a.m. today at Edwards Air Force Base, Calif. Immediately after roll out, medical investigations of the crew's readaptation to gravity after nine days without will begin in the new Crew Transport Vehicle.

The flight crew—Commander Bryan O'Connor, Pilot Sid Gutierrez and Mission Specialist Tammy Jernigan—will return to a welcome home ceremony tonight at Ellington Field about 10 hours after landing. If landing occurs on schedule, the ceremony should begin about 8:30 p.m.

The payload crew—Mission Specialists Rhea Seddon and Jim Bagian and Payload Specialists Drew Gaffney and Millie Hughes-Fulford—will remain at Edwards for about a week, undergoing extensive medical examinations.

"We obtained measurements in the various (body) systems at the very beginning of the mission and now we want to find out what happens at the end of the mission," White said, "and we want to compare what's happening here after about 10 days in space with what was happening initially and with what is happening on the ground when we make measurements of the systems the day after return and the day after that."

Flight controllers and the crew agreed that no spacewalk would be necessary to repair an environmental seal on the aft payload bay bulkhead that was damaged during launch, but were ready with a spacewalk timeline just in case. Concern that the misplaced seal might prevent the payload bay doors from closing was eased by worst-case scenario tests on *Discovery* at Kennedy Space Center.

Please see ***COLUMBIA***, Page 4

JSC Astronomical Society plans trip to witness solar eclipse from Mexico

The JSC Astronomical Society will be leading nearly 300 people on a trip to Mexico next month to see the longest total eclipse of the Sun for the next 140 years.

Paul Maley said the society has organized two main expeditions for the general public, amateur scientists and JSC employees to see the July 11 eclipse, one to Mazatlan, Mexico, and one to near Puerto Vallarta.

STS-46 crew members Jeff Hoffman and Claude Nicollier will accompany the latter expedition, and a crew from KUHT Channel 8 public television will trail the group as it views the eclipse from remote terrain about four hours north of Puerto Vallarta.

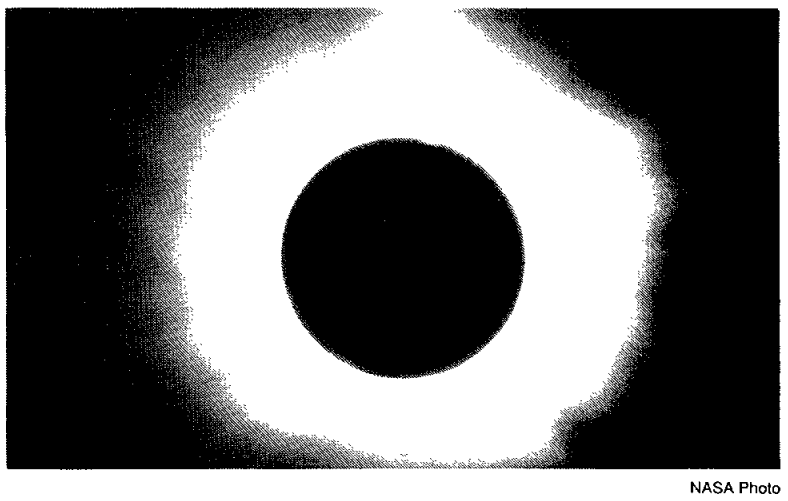
Maley said a few spaces remain on the eclipse tour going to Mazatlan. Deadline for reservations is June 25. Call 480-4020 for more information.

The eclipse may be seen from Houston but will cover only 60 percent of the solar surface. The last total eclipse viewed in Texas was in 1900, and the next one will not be until 2024.

The first hint of the eclipse will be at 12:59 p.m. CDT. Maximum coverage will be at 2:18 p.m., and the Moon will move completely away from the Sun by 3:32 p.m.

Maley urged viewers not to look directly at the Sun because serious eye injuries may result. Instead, he said, stand with your back to the Sun and use two index cards. Poke a pin hole in one card and align the cards so that the Sun's image is projected on the second.

The eclipse will douse a 6,000-mile-long region in midday darkness for nearly 7 minutes, Maley said. In addition to setting a record eclipse duration, the path will pass over nearly 40 million people, more than any in recorded history.



NASA Photo

The last total solar eclipse in Mexico was March 7, 1970, when the Moon totally blocked out the Sun for three and a half minutes. A team of Manned Spacecraft Center scientists took this photo from Miahuatlan, Mexico.

JSC

Ticket Window

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

General Cinema (valid for one year): $4.

AMC Theater (valid until May 1992): $3.75.

Loews Theater (valid for one year): $4.

Astroworld (valid 1991 season): season, $44.94; child less than 4-feet, $10.12; one day, $15.85; Waterworld, $8.15.

Seaworld of Texas (valid 1991 season): child (3-11), $12.25; adults, $17.25.

Six Flags (valid until Nov. 17, 1991): one-day, 15.95; child less than 4-feet, 14.95; two-day, 20.95.

JSC

Gilruth Center News

Defensive driving—Course is offered from 8 a.m.-5 p.m., Aug. 10, Sept. 21 or Oct. 12. Cost is $15.

Aerobic dance—High/low-impact classes meet from 5:15-6:15 p.m. Tuesdays and Thursdays. Cost is $24.

Exercise class—Low-impact class meets from 5:15-6:15 p.m. Monday and Wednesday nights. Cost is $24.

Weight safety—Required course for employees wishing to use the Gilruth weight room. The next class will be from 8-9:30 p.m. June 20. Cost is $5.

Ballroom dance—Eight-week beginning and advanced ballroom dancing class meets Thursdays from 7-8:15 p.m. starting Aug. 1. Beginning and intermediate class meets from 8:15-9:30 p.m. Cost is $60 per couple.

Country and western dance—Six weeks of Monday night sessions begin June 17. Cost is $20 per couple.

Aikido—Martial arts class meets Tuesdays for six weeks beginning June 25. Cost is $30 per person.

Tennis—Beginning tennis class meets Mondays from 5:15-6:45 p.m. starting June 17. Cost is #32.

Fiction workshop—Six-week Wednesday workshop begins June 26. Class is from 6:30-8 p.m., and after class events are from 8-10 p.m. Cost is $80 per person.

JSC

Technical Library News

The following selections are now available in JSC's Technical Library, Bldg. 45, Rm. 100.

Hazardous Waste Management: Regulatory Compliance and Liability Management. American Institute of Hazardous Materials Management; 1988. KF3958 .H39 1988.

What Black Educators Are Saying. Hawthorn Books; 1970. LC2801 .W95 1970.

Design and Analysis of Experiments. Douglas C. Montgomery; 1991. QA279 .M66 1991.

Report of the Hubble Space Telescope Strategy Panel: A Strategy for Recovery. Space Telescope Institute; 1991. QB500.268 .S62 1991.

JSC

Dates & Data

Today

CLCTS banquet—The Clear Lake Council of Technical Societies will host its eighth annual awards banquet at 5:30 p.m. June 7 at the Gilruth Center. Representatives from a dozen local technical societies will honor the technical person, technical educator and technical adminstrator of the year. Dr. Carolyn Sumner of the Houston Museum of Natural Science, will speak. For reservations, call Marcia Taylor at x30195.

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

Monday

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

Tuesday

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

Wednesday

Astronomy seminar—The JSC Astronomy Seminar will be at noon June 19 in Bldg. 31, Rm. 129. Dr. Rudolph Decker will speak on "Testing General Relativity in Space." For more information contact Al Jackson, 333-7679.

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

Thursday

NARFE service — The National Association of Retired Federal Employees' Retiree Advisory Service Center will be open from 10 a.m.-2 p.m. June 20 in Bldg. 45, Rm. 140. The center provides assistance for retirees, prospective retirees and survivors of deceased retirees. Call x33091 for more information.

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

June 21

Juneteenth celebration—The Black Programs Committee of JSC's Equal Opportunities Program will commemorate Juneteenth in the form of a traditional picnic at 4:30 p.m. June 21 at the Gilruth Center. Tickets are available from Pat Burke in the Equal Opportunity Programs Office in Bldg. 1, Rm. 172. Cost $6 adults; $3 children (8 and younger). For more information contact Freda Marks, x30603.

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

June 25

BAPCO meets—The Bay Area PC Organization will meet at 7:30 p.m. June 25 at the League City Bank and Trust. For more information contact Earl Rubenstein, x34807 or Tom Kelly, 996-5019.

June 26

Astronomy seminar—The JSC Astronomy Seminar will be at noon June 26 in Bldg. 31, Rm. 129. This will be an open discussion meeting. For more information contact Al Jackson 333-7679.

June 27

BANN meeting — The Bay Area NAFE (National Association of Female Executives) Network will meet at 6 p.m. June 27 at the South Shore Harbour Country Club. For more information Contact Wanda Spain 483-0125

NASACOM meets—NASACOM, a Commodore users' group for C64, 128 and Amiga computers, will meet at 7:30 p.m. June 27 at the Clear Lake Park Bldg. For more information, call Glenda at x31764.

July 9

SFEI meets — Space Family Education Inc., the non-profit corporation established to manage the JSC Child Care Center, will conduct a special general membership meeting to elect a new board of directors at 4:30 p.m. July 9 in the Bldg. 30 auditorium. The meeting is open to all members of the corporation. For more information or to nominate a candidate, contact Reese Squires at x37776 or Mike Evans at x37667.

July 11

Museum activities—The Houston Museum of Natural Science is offering several activities at 2:18 p.m. July 11 at the Museum and the George Observatory, to celebrate the upcoming solar eclipse. All the events are free except the parking fee at the George Observatory. Cost is $2. For more information contact 639-4600; or Mike Olson 639-4613.

JSC

Swap Shop

Property

Rent: Lake Travis cabin, private boat dock, CA/H, fully equip, accom 8, wkly/dly, $425/$85. 474-4922.

Lease: El Dorado Trace condo, 2-2, FPL, W/D, wet bar, sec sys, pool, tennis, Jacuzzi, avail June 15, $525/mo. 333-8707 or 480-4525.

Lease: Webster/Ellington, 2-1 condo, extras, W/D, $435/mo. Dave, x38156 or Erix, x38420.

Rent: Galveston condo, furn, sleeps six, cable TV, swimming pools, wknd/wkly/dly rates. Magdi Yassa, x38470 or 486-0788.

Rent: LC, Pecan Forest, 3-2-2, no pets, $795/mo. 554-6200.

Sale: LC, 3-1.5-1, mini blinds, fan, fence, deck, ceramic floor, FPL, assume w/no approval, $59.5K. 554-7727.

Sale: Dickinson, 3-2-2, lg LR, kitchen, master BR, well maint, avail July. x38078 or 538-1217.

Sale: Camino South, 3-2-2A, corner, lg den w/FPL in brick accent wall w/FPL, kitchen w/island, oak cabinets, ceramic tile, lg Saltillo tile patio w/trellises, jacuzzi, $74K. x33335 or 326-2582.

Sale: Nassau Bay Queen's Court townhome, 3-2-2A, new roof, wet bar, $99.5K. 282-3497 or 333-5598.

Sale: Lake Placid near Seguin, 90' waterfront lot, 3-2-2 rock lakehouse, 600 sq ft boat and fishing dock, $95K. 488-7387.

Sale: Pipers Meadow, 3-2.5-2, formal LR/DR, FPL, loft, wet bar, fans, gar dr opener, deck, landscaped, new paint, $88K. Dennis, x34405 or 480-5076.

Lease: El Lago, 4-2-2, formal LR, DR, family rm, FPL, fenced yard, $995/mo. Sylvia, 488-7363.

Rent: Lake Livingston, waterfront house, 3-2, CA/H, furn, covered decks, pier, new cond, wknd/wk rates. 482-1582.

Sale: Dickinson lot, util, gar, $4.8K. Linda, x35352 or 333-4842.

Sale: LC 3-2-2, no MUD taxes, $62K. 538-2299.

Sale: San Leon, one BR house on the water, $60K. x37898 or 333-2751.

Rent/Sale: Pipers Meadow, 3-2-2, $850/mo or $90K assum. 486-0610.

Lease: Pipers Meadow, 3-2-2, DR, FPL, gas util, fenced, new carpet, patio, $850/mo. 482-6609.

Rent: Pipers Meadow, 3-2-2, refrig, W/D, $825/mo. David, 282-3363 or 486-5906.

Sale: San Bernard River waterfront beach home, 3-2-3. 862-3929.

Sale: LC, 3-2-1, mini blinds, fans, fenced corner lot, deck and spa, $68.5K. 332-3516.

Lease: Nassau Bay, 4-2-2, park, no pets, 2 living areas, newly redec, deck, 1.5 story, 2000 sq ft, $890/mo. 333-6806 or 484-4944.

Sale: Hill Country, 10 acres between Kerrville and Harper, 400' frontage, util avail, VA qual. 472-8927.

Sale: Baywind I condo, 1-1, low util, lg FPL, all appl, new heavy duty W/D, res parking, $27.9K OBO. Carla or Paul, 488-0550.

Rent/Sale: CLC 2-story condo, 1-1.5-CP, W/D, alarm, FPL, fan, clean, patio, pool, $525/mo or $38K. 486-0508.

Sale: Nassau Bay townhome, 3-2.5-2, FPL, spa, $72K. 852-2436.

Cars & Trucks

'85 Jeep CJ-7, red, black hard top and bikini top, 6 cyl, 5 spd, A/C, P/S, AM/FM/cass, 59K mi, $6.5K. 470-0777.

'84 Olds Ciera, new rebuilt eng, ex cond, 4 dr, 4 cyl, lt blue, A/C, auto, $2.7K, 280-2192 or 480-6697.

'85 Nissan 300ZX, T-top, 5 spd, cruise, tint, low mi, new tires and battery, white/red leather int, trade for PU OBO. 771-0955.

'80 Chrysler LeBaron coupe, 6 cyl, 63K mi, some dents, no rust, good tires, $900. x38869 or 488-1432.

'85 Chev Silverado, LWB305, V-8, auto, AM/FM/cass, P/W, P/L, cruise, toolbox, headrack, dual tanks, P/S, P/B, $4K. x31495 or 326-4991.

'87 Toyota MR2, white, 5 spd, sunroof spoiler, ex cond, $10K OBO. Mike, 283-5579 or 332-1617.

'79 Ford Pinto, 70K mi, ex cond, new tires, 31 mpg. 282-4271 or 996-9646.

'79 Camaro Berlinetta, 62K mi. A/C, AM/FM, good cond, $3.5K. 488-1374.

'88 Ford Escort LX, 4 dr, loaded, ex cond, $3.5K. x37898 or 333-2751.

'57 Porsche speedster kit car, hi-perf eng and trans, over $17K invested, sell for $8K. David, 929-7120 or 332-9044.

'82 Mustang GT, T-tops, P/B, P/S, A/C, blk on blk, 70K mi, $3K. Jim, x36925 or 484-4396.

'77 Chev Monte Carlo, 350 V8, 116K, A/C, AM/FM/cass, new tires/trans, w/1 yr warr, $1.2K OBO. Mark, x37491 or 335-1494.

'89 Nissan Maxima SE, 5 spd, burgandy ext, black int, loaded, CD, 28K mi, $13.8K. Gary, x36203 or 532-3020.

'81 Buick Regal, blue, hard top, AM/FM, A/C, new tires, V6, 70K orig mi, $1995 OBO; '78 Spitfire convert 43K mi, new top, ex cond, $3250 OBO. 244-9738 or 554-6526.

'82 Datson King cab PU, 107K mi, A/C, 5 spd, bed liner, tool box, new battery, muffler, alter, shocks, front brake pads, and tires, 20/28 mpg, $3K; '80 Ford Fiesta, 97K mi, 4 spd, new water pump, front brakes, vol reg, muffler, alt, and tires, 25/33 mpg, $1K. 481-1543.

'85 Ford LTD Crown Victoria station wagon, 5.0 LEFI V-8, auto, P/S, P/B, A/C, P/W, P/L, cruise, tilt, cass stereo, 8 passenger, $3.5K OBO. Jeff, 282-7744 or 996-1907.

'89 Dodge Dynasty LE, good cond, 43K mi, blk w/champagne int, $7.9K. Andy, 333-6671 or 332-9105.

'90 Subaru Legacy LS, 4 dr, blk w/tan int, 4-wheel dosk brakes, elec sunroof, P/W, P/S, P/B, 38K mi, $12K OBO. Bob, 480-1225 or 474-4747.

'90 Chev Suburban, 4 spd, auto, OD, travel time pkg, loaded, $18.9K. 538-1019.

'84 Cadillac Fleetwood d'Elegance, ex cond, 65K mi, 1 owner, $5K OBO. 529-6914.

'72 Ford Maverick, 4 dr, 100K mi, runs, $200. x38160 or 482-8411.

'80 Fiat Spider convert, 61K mi, white w/blue int, new paint/tires, ex cond, $3K. Mark, 474-2195.

'84 Ford Bronco II, 4X4, 5 spd, OD, stereo, A/C, P/S, P/B, cruise, tilt, CB, ex cond, $3850. Scott, x34614 or 334-2278.

'77 Ford E150 van, 351 W eng, auto, A/C, ex maint, $1.2K . Bauch, 333-3382.

'88 Toyota Supra, ex cond, loaded, low mi, 5 spd, 3.0 L, 6 cyl, sec sys, $12K. 482-9108.

'79 Toyota 4WD PU, good eng, trans, and mech, $1.5K. Bob, x34409 or 393-1670.

'70 Plymouth Duster, 340, 4 spd, good cond, $2.5K OBO. Tim, x49744.

'81 Thunderbird, A/C, cruise, AM/FM/cass, runs good, $800. Bob, 283-4146 or 482-4320.

'74 Datsun 710, std, needs repairs, as is, $300. 332-3334.

'84 Ford Thunderbird, 2.3 L turbo coupe, auto, good cond, pwr, cruise, tinted glass, keyless entry sys, $3.8K. Mark, x36318 or 337-4656.

Cycles

'80 Yamaha 650 Special, 10K mi, good cond, $700 OBO. 334-4868.

'89 Ninja 600R, 7.5K mi, new rubber, rare, b/w factory paint, looks and runs good, $2.8K. Randy, 282-4845 or 486-4940.

'89 Kawasaki 500 Ninja EX, blk/red, 3K mi, ex cond, lower fairing, cargo net, $2.4K OBO. Daryle, 282-4284 or 286-9218.

'84 Kawasaki GPZ 750, 8.5K mi, ex cond, $2K OBO. Shannon, x32646 or 484-5412.

'87 Honda Spree scooter, red, $300. 335-4325 or 484-7659.

'80 Yamaha 400XS, good cond, blk, windshield/fairing, $800. Bob A., x34409 or 393-1670.

Boats & Planes

Boat slip on Clear Lake w/roof, motorized boat hoist for power boats, $125/mo. 474-4922.

'83 Renken 18' sailboat, roller furling jib, 4hp aux, galv trlr, sleeps 4, good cond, $4K. 339-3476.

'86 14' Grumman FB, 15hp. Sea King galv trlr, 4 seats, ex cond, $1.5K. 282-4869 or 487-0926.

'84 Mark Twain, 19', Bowrider, 200hp, I/O Merc, good cond, $4295. 488-9080, x3661 or 480-9159..

Evinrude, 25hp, elec start, new, $1.4K. Jerry Craig, 283-5311 or 420-2936.

Crestline, 19' boat, I/O, 165 hp, 862-3929.

'85 Bayliner, 2450 Sunbridge, Chevy 305 V-8 w/Volvo I/O, $14.6K. 333-7755 or 532-1509.

'86 Sea Ray Seville, 17', 140hp, I/O, AM/FM/cass, trlr, access, $6.5K. Bob, x36926.

'88 Sea Ray sport ski boat, green and white, 130 hp, I/O Mercruiser, rearview mirror, speedometer, boarding ladder, boat cover, Murray trlr, was $7890, now $6890. Max Kilbourn, x38127 or 482-7879.

Sensenich aircraft propeller, 74 DMG-0-58, overhauled, yellow tag, fits some Beech, Piper PA-18, PA-22, PA-28, series aircraft, $900. 538-2299.

Audiovisual & Computers

Cerwin-Vega HED-15 high efficiency speakers, 100w, $250 OBO. Steve, 282-4108 or 333-3176.

Altec Model 19 speakers, good cond, oak, $900; Altec 1570 amps, 1pr, good cond, $500/pr. 334-4868.

Commodore 64, modem, printer, all manuals, approx 25 SW pkgs, $350 OBO. Linda, x35352 or 333-4842.

Nintendo games, $20/ea or all 10/$150; Nintendo power pad w/cart, $50; ex cond. 333-7180 or 333-9581.

AT&T 6300 dual FD computer, color mon, backup mono mon, Panasonic KX-1091 printer w/ex cart, SW, $450 OBO. 333-3807.

Mac Plus, 4MB RAM, 60 MB HD, ImageWriter II, ext FD, 101 kbd, SW, $1.5K. 282-3580 or 488-3545.

XT clone, 20 MB HD, dual 360K FD, multifunction card, color-RGB/CGA, printer, $700. Bob, x34409 or 393-1670.

PC tools deluxe 6.0, new, 5.25" and 3.5" disks, incl data recovery, HD, backup, DOS shell and desk top mgr, $50. x30852.

IBM compatible 286 AT, 32 MB HD, 1 MB RAM, 1.2 MB and 360K 5.25" FD's, 2 ser ports, 3 para ports, 1 game port, 101 kybd, 14" CGA color monitor, Epson FX85 printer, ex cond, $900 OBO. 482-8998.

Musical Instruments

Magnavox elec organ, dual kybd/pedals, 12 inst voices, oak finish, stool, $250. George, 280-2307 or 471-0150.

Gibson acoustic guitar, student model, mid 60's vintage, needs minor repair, $100 OBO. Todd, 280-2734.

Pets & Livestock

AKC reg yellow Lab puppies, $250. Mary Anne, x34413 or Rob, 280-8125.

Free pond goldfish. 481-1518.

AKC registered Yorkshire Terriers, sm puppies, 4 wks old, 2 male and 2 female. 532-1562.

Free, baby golden hamsters. x35813.

Baby handfed cockatiels, Linda, 484-7834.

Household

Samsung 19" color TV, remote, ex cond, $100. Greg, 333-7160 or 488-5015.

Antique green BR suite, full sz bed, mirrored dresser, 5 drwr chest, 2 night stands, $700; GE dishwasher w/pot scrubber, almond, built-in, 10 yrs old, needs adjust, $70. Magdi Yassa, x38470 or 486-0788.

Swivel rockers, 2, blue, good cond, $100; oak finish coffee table and 2 end tables, good cond, $150. 480-9446.

New queen sz matt/bxspring, ex firm, was $699, now $350 OBO. Carol, x34279 or 286-7619.

Thomasville pecan DR set, table w/4 chairs, buffet, $400; sofa and chair, beige, brn and white, $200. Robert, x33742 or 554-6631.

'89 GE S/S refrig/frzr, 23.6 cu ft, white, ex cond, loaded water/ice dispenser w/filter, adjust glass shelves, frost free, energy saver, $1K OBO. Theresa, 282-6679 or 286-6527.

King sz waterbed frame, bookcase headbd, 6 drwr pedestal, liner, heater, fill kit, good cond, $150. x31495 or 326-4991.

Jenny Lind crib w/matt, $80; Jenny Lind chg tbl, $30; 20 gal fish tank w/stnd, light, and air pump, $60; two bar stools w/seat back, $25; girls 3 spd 26" bike, $20; Brothers port sewing mach; GTE phone answering mach, needs minor repairs, $10. 486-4701.

Norge Dryer, single heat, $25. 282-4271 or 996-9646.

Frigadaire refrig, lg, ice and water dispenser, ice maker needs repair, $300. 482-1582.

Graeber new cloth vertical blinds, ivory/almond, 78"x84", w/valence, $175. 480-1243.

Wards 18 cu ft refrig/frzr, ex cond, harvest gold. $150. x36828 or 538-1627.

Queen sz waterbed w/liner, htr, matt and platform, all wood, ex cond, $145 OBO. x30768.

Oriental rugs, new, several colors/styles, 9'x13', $100 ea. Brad, x37999 or 474-5609.

Couch, chair w/ottoman, brown vinyl, good cond, $180; curtains, beige, 1 pr, good cond, $20; antique gold leaf end tbls, good cond, $100. 480-6539.

Sofa and love seat, lg, $200; from Mexico lg DR table, 8 chairs and hutch, $300, all ex cond. 488-4412.

DR table w/4 chairs, wood, contemp style, ex cond, $85. Kam or Mary, 486-5247.

King sz bed, frame, foam matt pad, new pillows, sheet set, spread and matt cover, $150. 332-5629

25" color TV w/cable remote box, $100; full sz BR suite, $150 OBO. x36351 or 996-9164.

GE refrig, tan, 1 yr old, ex cond, warr, $550; tan sofa and loveseat, $150. Michelle, x38032 or 286-2509.

Dinette, octagonal wood and glass top, 4 chairs, 1 yr old, ex cond, $65 OBO. Mark, x36193 or 480-8918.

Couch, $50; 2 gold chairs, $30/ea; chair/rocker, $25; recliner, $50; 4 low coffee tables, $25/ea; 2 twin beds, $25/ea; trundle bed, $65; kitchen tbl w/4 chairs, $125; console TV, $100; 4 drwr dresser w/stand, $50; stereo cabinet w/spk end tbls, $150. 488-1374.

Photographic

Canon A-1 camera w/50 mm 1.4 Canon FD lens, camera case, Canon 35-70 mm FD lens w/case, Soligar 2x entender w/case, Tiffen Sky 1-A 52 mm filter, ex cond, $500. Keith, x33501 or 486-9700.

Lost & Found

Lost owl keychain, gray metal, approx. 2" long, w/short chain attached, lost 5/17/91 in Bldg 45 at 4:30pm, reward. Dana, x35461.

Lost ladies Pulsar watch w/missing safety chain. x35376.

Wanted

Want non-smoking female tenant for 1 BR apt, lg walk in closet, paid util, $310/mo plus pay 1/3 phone, new carpet, kitchen, full patio. Doris, x37545 or 333-2373.

Want partner for '82 Mooney Turbo, hangared at Arcola (AXH) Airport, full IFR required, half interest, owner fin avail, $45K. Alan, 997-2506.

Want local area acreage, five to twenty w/ or w/out house, cash or fin, no more than $3K/acre. 339-1337.

Want used Mac computer, cheap. Randy, 282-4845 or 486-4940.

Want children's sm bicycle and push pedal cars, good cond. Jeff, 333-7010.

Want Video 8 to VHS, 35 mm slides to VHS, fades spec F/X. x30003.

Want sm single axle trlr, $100 - $200. Andy, x32503 or 334-2647.

Want old watches, any cond, will pay top dollar for Rolexes any cond. 333-6020 or 334-3392.

Want good stereo sys w/four spkrs. 326-5155.

Want someone to carpool from Heights area to NASA/Clear Lake. Todd, 869-7162.

Miscellaneous

Drop spreader, $10; child's co-pilot seat, $10; video camera, $150; child's tricycle, $10; 3 wooden paddles, $3 ea. x35178 or 944-2391.

Lawnmower, $95, gas washer/gas dryer, $350; triple dresser w/2 mirrors, $65; side-by-side refrig, ice and water on dr, $450; concrete picnic tables, several concrete benches; pool vac $250; pool chem, $100. x32661 or 485-5636.

Record albums, 33 1/3 RPM, 75 for $150. 283-5465 or 332-1725.

Slalom ski, O'Brien Tournament 66" titanium core ex cond, $160; Seiko combination analog and digital watch, black and gold, many functions, ex cond, $75. 554-2728.

One 18570SR13 steel belted tire w/wheel, new, BO. Dave, 282-4519 or 486-5732.

Silver plated 6", Revere serving bowl, new, $12. 486-8716.

Aerostar trlr hitch and ball, 3500 lb, $75. 282-4869 or 487-0926.

Dbl dog kennel 8'x8' w/top, ex cond, $600. x37435 or 280-8249.

Engagement ring, 18 karat yel gold, round diamond solitaire, .68 cwt w/6 round diamonds .18 cwt, was $1.5K now $1.2K; 2 dr legal sz cabinet, was $200 now $100. x30874 or 333-1316.

Salt water aquarium, 40 gal, w/stand, light, glass top, and Eheim filter. $275 OBO. Crystal, x35711 or 480-4821.

Antiques, wooden wheel chair w/wooden back, seat, arm rests, and foot rests; sewing mach; lightning rods; egg crate; and quills. Ruby. 783-9164.

Motorola Ultra Classic cellular phone w/extra batt pk, and 12 volt chging unit, was $800, now $550. 488-5019.

Walkmate treadmill, non-elec spd, distance, timer, tension, $90. 333-7180 or 333-9581.

Pepsi 6-pk commem young astronaut program July 1985, $50 OBO. x30768.

Front dozer blade plus wheel weights for 16/18 hp Sears garden tractor, $20. Ron, x31959 or 482-5952.

Craftsman lawn tracker, 12 hp, 5 spd, 38" mowing deck, 2 yrs old, $750. 538-1019.

Wedding dress, new, sz 10, never worn. x34686 or 333-9216.

5'x15'x6' dog run, $75; king sz matt and box springs, $50. Bruce Snyder, 283-0463 or 431-2296.

Sabino crystal collection 6 pcs, BO. Bob, x33149 or 488-7036.

Port typewriter, $25; extra tbl, 84", $150; men's SAS athletic shoes, sz 7 1/2, new, $25. 333-9733.

Firestone Supreme all season radial tire, P215/70K 14M+S, BO. 455-0128.

Schrade 4" scrimshaw Kachina and custom leather sheath, limited ed, never used. $49. 486-8716.

Above-ground pool, approx 20'x12' w/alum decking making it approx 24'x20', all pumps, new liner, timer, taken down, was $3995, now $1.1K. 339-1337.

All leather dress, gold color, sz 5/6, rhinestone studded, was $200, now $70 OBO. Katie, x33185.

8' swimming pool slide, needs some work, $75. Richard, 481-1518.

Wilson golf clubs, $90 OBO. J.P., 795-5962.

Designer wedding dress and veil, satin, candle light sheath dress, sz 10, w/French lace, beaded bodice, detach cathedral length train w/lace and beading, ex cond, was $1200, now $700. 326-4991.

Toshiba BD-7815 copier w/cabinet/std, zoom 65% to 154%, letter, legal, 11x17, energy saver, needs adjust, $1K OBO. Bob, 480-1225 or 474-4747.

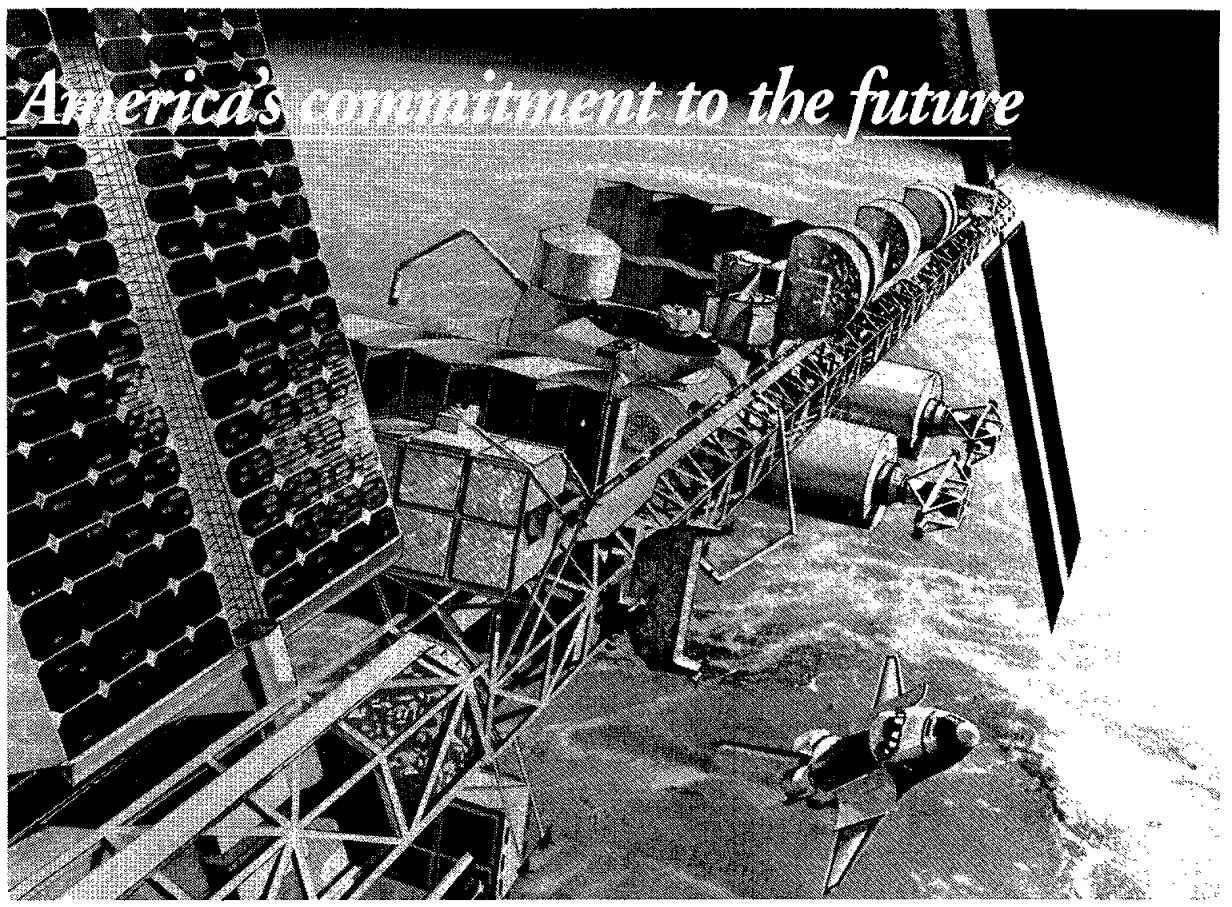
AB Dick model 970Z copier, ex cond, $300. Shawn, x31786.

Kids pool, 12' diam, 3' dep, plus pump, tools, $85. Gail, x34401.

Wedding/anniv ring, 14K gold, Marq and Bag diamonds, approx 1 ctwt, appraised at $2500, BO. Robert, x37143 or 480-0355.

Space Station Freedom *and America's commitment to the future*

Toward the Next Frontier



[Editor's note: The following is the abridged text of a statement delivered June 4, 1991, by Richard Darman, director of the Office of Management and Budget, to the House Committee on Science, Space and Technology. Darman testified before the committee after the House Appropriations Committee voted to virtually eliminate Space Station Freedom *funding in 1992. The full House reinstated much of that funding June 6, and the issue now goes before the Senate and President Bush.]*

The appropriations committee vote to cancel *Freedom* is, at this stage, a preliminary action in a process that will involve several opportunities to bring broader perspective to bear. Nonetheless, it is, in its way, a pathetic commentary . . . .

America is the world's number one politico-economic power, an inspiring beacon of hope, a continually self-renewing pioneer of new frontiers. America did not rise to this remarkable position on the strength of votes for the status quo. America will not preserve its position—or fulfill its historic responsibility—with short-sighted votes of retreat.

The moving concept, "the American Dream," has never been static or closed or merely material. Our culture has defined itself as uniquely open, expansive, courageous, risk-taking, and forward-looking not intimidated by limits, but challenged by them; not cowered by technology, but determined to use it to advance man's highest aspirations.

It was in this spirit that President Kennedy delivered perhaps the most resonant of inaugural addresses, seeking to invoke "the wonders of science instead of its terrors." He inspired future generations with the call, "Together let us explore the stars . . . " (His inaugural would surely have been less inspirational if he had advanced the wisdom of the appropriations committee, "Together let us fund a Miami parking garage and a hundred lesser special interest projects.")

Space Station *Freedom* is a direct outgrowth of the spirit of the Kennedy inaugural—the American spirit. I believe that spirit to be irrepressible. So I am confident that, in due course, the Congress will live up to America's tradition, responsibility, dreams, and mission—and will set us firmly on the path toward manned exploration of the next frontier. For the moment, however, we are obliged to address a misguided "Detour" sign that would steer us away from America's historic pioneering path.

It is difficult to discern any satisfactorily defensible logic in a vote to kill Space Station *Freedom* at this point. The arguments for cancellation simply do not withstand inspection. Indeed, each of the major arguments represents a curious fallacy:

The Deficit-Reduction Fallacy

From a fiscal perspective, the failure to appropriate $2 billion for Space Station *Freedom* would not "save" a dime. Under the budget agreement, total discretionary spending is set. What is at issue is the allocation, not the total. Indeed, the appropriations committee has already proposed to reallocate and spend every single penny that would otherwise go to *Freedom*.

It is true that the failure to fund *Freedom* would have the following effects:

- It would reduce related jobs in 24 states.
- It would break international commitments to Canadian, European, and Japanese partners.
- And it would renounce the specific funding guidance provided by the legislative process less than a year ago. That guidance called for NASA budget increases of 8-10 percent. The appropriators have now switched to minus 1 percent. The legislative guidance called for a redesigned space station, increasing in cost at the rate of 10 percent per year, up to a level of $2.5 billion. The administration has met that test. The House, in effect, approved it by voting 361-36—only a month ago—to reauthorize NASA and the Administration's proposed funding level for Space Station *Freedom*. Yet now, all the redesign work and commitments would be thrown to the wind if the action of the House appropriations committee were to stand.

I do not deny that this is Congress' prerogative. And I favor making tough choices on the merits. But we should be clear: The case for cancellation has not been made on the merits. And breaking faith on Space Station *Freedom* should not be confused with deficit reduction.

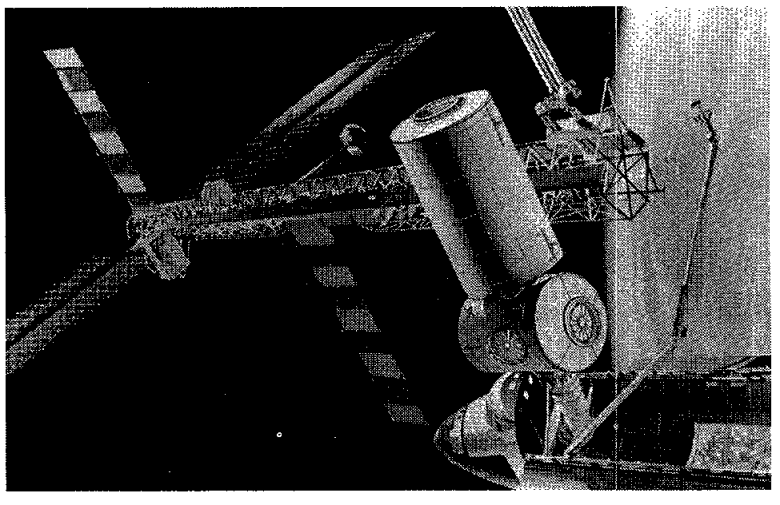
The There's-Gotta-Be-a-Better-Way Fallacy

There are several respectable designers and analysts who have offered paper alternatives to *Freedom* as would-be better approaches to manned exploration of space. With the benefit of hindsight, one can admit that there may have been better approaches to have pursued—if the political system had recognized and adopted them years ago. But it did not. Looking forward, one can confidently predict that there will be better approaches than the current design which may be used in the future. . . . There is almost always a better way coming along to replace the way of the moment. But that is not the point.

Progress does not come without beginnings. And if the rule were never to proceed if better alternatives might be conceived, there would be no beginnings.

A decision not to wait for the "better way" to space would be a bit like telling the 19th-century wagon masters who led Americans west, "Don't go to California now. Wait a century and your descendants will be able to fly to San Francisco by air!"

There is a partially appealing logic to such visionary wisdom. Presumable detail-people would solve the problem of there being no "there" there when one were ready to fly—no California aerospace industry, and no place to land, for that matter! Indeed, maybe the generations of 20th century air travelers could be told, "Postpone the California trip until mankind has invented the hovering spacecraft!"—unless, of course, someone were to have in mind an even better way.



The practical reality of the moment is this: A failure to fund the redesigned Station *Freedom* will effectively postpone manned exploration by at least a decade. If one is serious, the time to commit is now.

The Spend-the-'Savings'-on-Science Fallacy

There is a group of well meaning scientists and science advocates who favor Freedom's cancellation in order to allocate the "savings" to purer forms of science. Their position rests on two premises:

First, that space exploration is not "science." This is partially correct—although it ignores the extent to which exploration can enable, stimulate, and inspire science.

Second, that "savings" from reduced exploration will be allocated to increased science. This is politically naive. . . . The reality is that appropriators will tend to do exactly what the station-killing committee has proposed to do: give no more to science than in the President's Budget; reduce station to zero, and reallocate every single dollar thus "saved" to non-science—to subsidies for the type of housing programs that have proven to be failures, to a quarter of a billion dollars in unrequested special interest earmarks, etc. . . .

The Bush Administration has been a strong proponent of both science and space, proposing higher levels of science and space investment than any Administration in history. And we have achieved record levels of investment—in part, because of the strength of the science-and-space coalition supporting the President's proposals. It is, therefore, with the deepest of regret that we have observed the recent outbreak of factional cannibalism. Indeed, the unfortunate irony is that, given the cannibalism, the resources available for both space and science may not be less than they would have been if there had been no outbreak of cannibalism.

The Poor-Return-on-Investment Fallacy

(Type one: Methodological Error.) Some critics of Space Station *Freedom* criticize it as if it were a single-purpose enterprise. Thus, it can be shown that there may be more cost-effective means to do some types of microgravity research (alone); or that *Freedom*'s infrastructure investment is excessive for the amount of life sciences research (alone) that it permits in its early stages. But, of course, Space Station *Freedom* is intended to serve multiple purposes, and to expand incrementally with relatively low-cost modular additions. The appropriate methodology for evaluating it must give weight to its capacity to serve multiple purposes, to expand over time, and to bridge forward across generations. When evaluated from this perspective, the return promises to be well worth the investment.

The Poor-Return-on-Investment Fallacy

(Type two: Imaginative Error). There is a more fundamental problem with narrow-purpose evaluations of *Freedom*. Simply put, they show a remarkable lack of imagination. If Columbus' trip to America had been similarly evaluated, he would have been forbidden to sail on the grounds that the Nina, the Pinta and the Santa Maria were not the most cost-effective means to research motion sickness! The obvious point is: Exploration is up to something somewhat larger than narrowly focused evaluations can capture—larger even that the pioneering participants themselves can imagine.

So it has been with the expansion of all frontiers: In 1803, the Louisiana purchase was completed for what seemed like the large and fair sum of $15 million ($137 million, if inflated to today's dollars). The frontier thus purchased is now 15 states, producing almost $200 billion in federal taxes each year. By that crude measure, the original purchase is repaid again and again at the rate of several times each day!

In 1867, Alaska was purchased for $7.2 million (about $70 million, if inflated to today's dollars). The purchase was subject to considerably more criticism than Space Station *Freedom*. It was ridiculed as "Seward's Folly" out of disrespect for the Secretary of State who negotiated the terms with Russia. Today, Alaska's proven oil reserves alone exceed $125 billion. And no one is rushing forward to propose the return of Alaska.

And so it will be, one day, with the vast resources of space: Future generations will be delighted to have developed them—and may even take them for granted.

We cannot now know exactly how all this will transpire. We can point to potential leaps forward in telecommunications, materials processing, energy and mineral resource development, environmental protection, and the expansion of the human frontier for living and work. But we can only trust that, as with every other great frontier, the returns on investment in exploration will exceed the imaginative grasp of the pioneers—and will mark still further triumphs of the expansive human spirit.

Moonwalks and the Future

There are several tests that define whether or not a culture is, in the most basic sense, "civilized." Does it create symbols and communicate with them? Does it plan and invest for the future? Does it organize itself to transfer value and values in a way that builds across generations? From this perspective, the decision whether or not to commit to *Freedom* may be seen as a defining test of our civilization.

When President Kennedy ignored his science advisors, took the leap of faith, and committed man to walk on the Moon, he helped reaffirm America as a pioneering civilization. It is only from that perspective that the famous Neil Armstrong phrase has meaning: "One small step for man, one giant leap for mankind." The moonwalk was not intended or understood as a mere stunt. It was part of a very much larger process intended to build across the generations.

School children now have come into a world in which the walk on the Moon has long since taken place. In their lifetimes, the only miraculous "moonwalk" has been Michael Jackson's backward glide. For them, the next big step in space is Space Station *Freedom*. That is what some of them do their science projects about. That is what they understand to be America's next intended leap for all mankind—on the path toward the next frontier.

So, using the moonwalk metaphors, the question before the Congress might be simply put: Does the Congress mean to affirm the next leap forward? Or would it rather content itself with a backward glide?

Colossal impacts revise origin of life theory

A revised theory of the origin of life on Earth has been developed from new findings by NASA about the frequency and sizes of colossal impacts on the planet.

The work proposes that life may have begun more than once. It suggests that ancient organisms, much like those still found in the deep oceans, may be ancestors of all life on Earth. It provides a maximum time period for the complex origin-of-life process to take place on Earth.

NASA scientists and other researchers say that life may have begun and then been completely wiped out several times by very rare, planet-melting super-impacts on the Earth. Without these super-impacts, life could have begun in the time periods between the more frequent, medium-sized impacts through an origin-of-life process on the Earth's surface.

Once life did get started, it may have hidden in the deep oceans and continued to evolve there — even if life on the surface and the origin-of-life process itself were wiped out repeatedly by medium-sized impacts that vaporized large parts of the oceans.

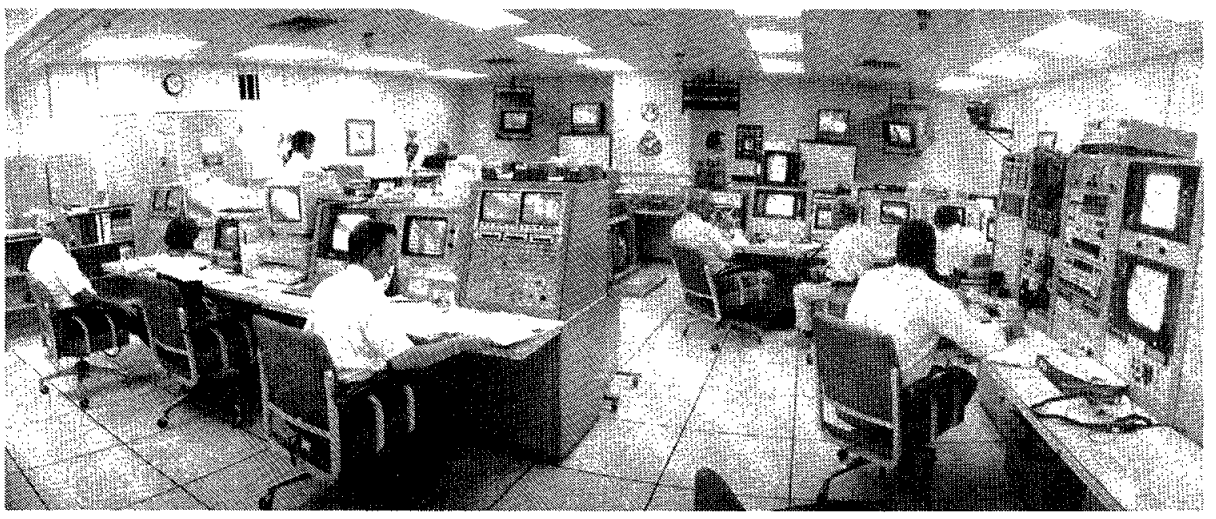
Verne Oberbeck and Guy Fogleman, planetologists at NASA's Ames Research Center calculated the maximum time period available for chemical evolution of life to occur in the primordial oceans. Their work modifies and extends earlier impact scenarios by Drs. Kevin Maher and David Stevenson of CalTech. Dr. Kevin Zahnle, also of Ames, calculated the power and effects of various sizes of impacts. Zahnle also worked with Dr. Norman Sleep of Stanford University.

Scientists have come to these conclusions by using Apollo data, which shows the history of impacts on the Moon. With this data, scientists have found a pattern in the barrage of asteroid-like bodies that smashed into the early Earth during its first billion years — between 3.5 and 4.5 billion years ago.

Conclusions depend on the size of the impacting bodies and the frequency of their arrival. The largest and very rare bodies would have totally destroyed any life that had already begun by vaporizing the early oceans entirely and melting the upper layers of the Earth's crust. Much more frequent impacts of smaller bodies would have repeatedly wiped out any life on the shores or surfaces of the early oceans by vaporizing the upper layers of water.

On the Moon — unlike on Earth — evidence of these early impacts is well-preserved. These data have allowed researchers to reconstruct the bombardment of Earth, which was hit by far larger bodies than those that hit the Moon. These roughly spherical bodies, coming in at about 40,000 mph, were left over from the formation of the planets. The big ones ranged from roughly the size of West Virginia to as large as California and were 150 to 500 miles in diameter.

Over Earth's first billion years, NASA scientists say, perhaps two "super impacts" by 500-mile-diameter, California-sized bodies may have totally sterilized our planet. Life may have begun, been destroyed by a planet-altering impact and then begun again and perhaps yet again.



JSC Photo by Andrew Patnesky

STS-40 principal investigators and their teams monitor the Spacelab Life Sciences-1 experiments in the Science Monitoring Area of JSC's Bldg. 36. The SMA completes a three-pronged control operation including the Mission Control Center at JSC and the Payload Operations Control Center at Marshall Space Flight Center. STS-40 is the first mission for which the SMA has been used.

Columbia crew closing up laboratory

(Continued from Page 1)

To be sure that the payload bay doors would close properly for protection during reentry, Bagian was to remain in the Spacelab module to view the door closing through an observation port.

Randy Stone, chief of the Flight Director Office, said Wednesday that Columbia continued to be a relatively trouble-free vehicle, and Mission Manager Dan Womack said he was "very pleased" with the way things were going on the Spacelab module.

Most of the laboratory's systems were working well, although the temperatures in the two Spacelab specimen refrigerator freezers at times were higher than normal. The crew was awakened twice Wednesday night to transfer body fluid samples between freezers in an effort to preserve the samples for post-flight analysis.

The crew's sleep also was interrupted Wednesday when a water line that cools the Research Animal Holding Facility did not work properly. Bagian activated a backup line, and cages' air conditioning was restored.

Also, Womack noted that the 29 rats onboard had been drinking more water than expected. The crew inserted small "gel packs" filled with a gelatin-like substance into each cage in the Research Animal Holding Facility. The gelatin contains enough moisture to carry the rats through a nominal landing plus two days.

Mission Scientist Howard Schneider said Wednesday that the 18 experiments on the first shuttle mission devoted exclusively to life sciences research were nearing completion.

Employees honored for contributions

The Manned Flight Awareness Program recently honored 28 JSC employees, 13 of them in conjunction with the Space Shuttle Program's 10th anniversary.

Thirteen mid-management honorees were praised for their contributions to the STS-1 flight and their continued support of the program. NASA Administrator Richard Truly addressed the group during a reception at the National Air and Space Museum in Washington, D.C., at which STS-1 Commander John Young and Pilot Robert Crippen received trophies commemorating the shuttle anniversary.

Honorees were L.J. Corcoran, Administration; Bob Savely, Information Systems; Bobby Martin, Safety, Reliability and Quality Assurance; Jean Ellis, Flight Crew Operations; Phil Cota and Larry McWharter, Engineering; Pleddie Baker, White Sands; Phil Glynn, Orbiter and GFE Projects Office; Ted Boyes, Human Resources; Bill Langdoc, Space and Life Sciences; Larry Bell, Space Shuttle Integration and Operations; Charles Ragan, Center Operations; and Gary Coen, Mission Operations.

Fifteen more employees received an all expenses paid trip to Kennedy Space Center, where they joined more than 200 other honorees from across the country in a tour of KSC's facilities and a look at the Space Shuttle *Discovery* on the launch pad prior to STS-39.

Honorees were Grace Germany and Bill Drastata, Administration; Avis Nettles, Center Operations; Jeanie Bale, Space Shuttle Integration and Operations; Mary Gibson, Safety, Reliability and Quality Assurance; Diane Thoren, Space Shuttle Engineering Integration; David McCann and Sue Bobo, Engineering; Betsy Hodges, Center Operations; Dot Davis, Flight Crew Operations; Kathy Pacheco, White Sands; Huey Hernandez, Orbiter and GFE Projects; Chuck Moede and Maurice Walters, Mission Operations; and David Miller, Information Systems.

The Manned Flight Awareness Honoree Award is a means of recognizing employees for dedication to excellence in the manned space flight program.

Synthesis Group draws from thousands of Outreach Program ideas

(Continued from Page 1)

• **The Moon to Stay and Mars Exploration**: Emphasizes permanent human presence on the Moon, combined with the exploration of Mars. Builds toward life support self-sufficiency for breathing gasses and food production on the Moon. Permanent human presence on Moon begins in 2004. Traverses in pressurized rovers permit detailed study of lunar features and processes. Advanced astronomical observatories installed and maintained. Lunar operations provide necessary life sciences and engineering data to prepare for exploration of Mars in 2014 with a surface stay of 30 to 100 days.

• **Space Resource Utilization**: Makes maximum use of available space resrouces to support exploration missions directly. Seeks to develop a large class of available resources for a broader range of transportation, habitation, life sciences, energy production, construction and other long-term activities. Robotic experimental resource plant landed on the Moon in 2003. First human mission to Moon in 2004 and to Mars in 2016. Basic Mars exploration on first two missions. With addition of more resource development, missions could be expanded beyond first two. Long-term possible benefits to Earth include providing Helium-3 for Earth-based fusion reactors and beaming solar-produced electricity to Earth.

In accepting the report, Vice President Dan Quayle noted that it includes ideas submitted through the Outreach Program, which actively solicited innovative ideas and technologies from inside and outside the government.

"There were at least 1,700 valid recommendations that came from outside of government," Quayle said. "This shows the net was cast wide. We went to universities, we went to industry, we went to scientists, there were no limits to where we were going to go for ideas."

The report builds on President Bush's call for a permanent lunar base and Mars exploration and the administration's plan for a collaborative effort led by NASA and including major roles for the Department of Defense and the Department of Energy.

"We look forward to leading the NASA/DOE/DOD effort to evaluate the ideas and innovations and to factoring them into our SEI implementation plans," said NASA Administrator Richard H. Truly.

Quayle said the administration would continue to push for implementation of the report and for space exploration funding.

According to the report, the technologies that will be needed to carry out the initiative are:

• Heavy-lift launch vehicle with minimum capacity of 150 metric tons and growth potential to 250 metric tons.
• Nuclear thermal propulsion.
• Nuclear electric surface power to megawatt levels.
• Extravehicular activity suit.
• Cryogenic transfer and long-term storage.
• Automated rendezvous and docking of large masses.
• Zero-gravity countermeasures.
• Radiation effects and shielding.
• Telerobotics.
• Closed loop life support systems.
• Human factors for long duration space missions.
• Lightweight structural materials and fabrication.
• Nuclear electric propulsion for follow-on cargo missions.
• In situ resource evaluation and processing.

The group's 10 implementation recommendations are: establishing within NASA a strategic plan for the nation's civil space program with SEI as its centerpiece, establishing by executive order a multi-agency National Program Office, appointing NASA's associate administrator for exploration as the program director; establishing a new, aggressive acquisition strategy for SEI contracts, incorporating SEI requirements in the NASA/DOD heavy-lift program, initiating a nuclear thermal rocket technology development program, initiating a space nuclear power development program, conducting focused life sciences experiments, establishing education as a principal theme of SEI, and continuing and expanding the Outreach Program.

Quayle: House vote 'strong statement'

Truly confident of Senate support for Space Station Freedom

(Continued from Page 1)

"I remain committed to work toward that end," he added. The 1992 NASA budget will now go to the Senate for debate, and Truly said he is confident that the space station will win support in that arena.

Vice President Dan Quayle, chairman of the National Space Council, echoed Truly's sentiments following the vote.

"The House has made a strong statement for space station. It is now up to the Senate hopefully to not only concur on the space station, but to see what other budget adjustments can be made within the NASA account," Quayle said. "This was an extremely important test vote on the political support for the station. I am convinced by that vote that there is enough political will in the Congress to support the President in his manned space exploration program."

Space Station *Freedom* received another boost this week when the Synthesis Group, led by former astronaut Tom Stafford, released its report on methods for carrying out the exploration of the Moon and Mars. The Synthesis Group's research pointed to the need for *Freedom* as a life sciences stepping stone for solar system exploration.

At a conference releasing those results, Quayle repeated its findings.

"Without a space station, you're basically saying that manned exploration of space will not be permanent. It will be only temporary ... we want a balanced approach. We want manned and unmanned," Quayle said. "This report, as well as the Augustine report, has been extremely supportive of the space station."

The Synthesis Group report detailed four scenarios for future explorations, all including a return to the Moon prior to a Mars journey. The report also recommended the development of many advanced technologies, such as nuclear propulsion systems, in pursuit of any scenario.

Space News Roundup

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Editor .....Kelly Humphries
Associate Editors .....Pam Alloway
Kari Fluegel

Roundup won't be published July 5

Because of production and distribution scheduling problems associated with the Independence Day holiday, Space News Roundup will not be published for the week of July 5.

Some deadlines will be affected.

Swap Shop ads for the June 28 issue will be accepted until June 19. The deadline for Swap Shop ads for the July 12 issue will be June 28. The deadline for Swap Shop ads for the July 19 issue will be July 5.

Dates and Data items for the week of June 28 will be accepted until June 19, and that issue will include events scheduled through July 12. Dates and Data items for the July 12 Roundup will be accepted until July 3.