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

Happy New Year!

Photographs tell the story of 1991 and another successful year at JSC. Photos on Page 3.

Mars art

A new artist's concept of the landing of the first human mission to Mars puts the event in 2019. Illustration on Page 4.

Space News Roundup

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JSC chisels footholds for exploration in 1991

Casts eyes to future with shuttle research, space station development

JSC cast its eyes to the future in 1991 as shuttle missions and research activities gave NASA additional footholds for mankind's permanent presence in space.

The space shuttle program added six more flights to its scorecard during 1991. STS-37, the first mission of the year, started the Gamma Ray Observatory on its journey in April. It was also included the first spacewalks in five years. Astronauts Jerry Ross and Jay Apt participated in an unplanned extravehicular activity to help with the deployment of GRO's high gain antenna. They later demonstrated several mobility aids that could be used on Space Station *Freedom*.

Later that same month, a seven-member crew completed one of the most complicated missions ever flown when *Discovery* performed dozens of maneuvers, deploying canisters from the cargo bay, and releasing and retrieving a payload with the robotic arm.

The activities allowed the Department of Defense to gather important plume observation data and information for the Strategic Defense Initiative Organization.

JSC took the lead role in the June flight of Spacelab Life Sciences-1, the first shuttle mission dedicated to the investigation of the effects of weightlessness on humans. Data from the flight will be used in NASA's planning for longer shuttle missions set for 1992 and in the planning of Space Station *Freedom*.

Preliminary findings indicate that previously observed decreases in white blood cell responsiveness, which helps the body fight infections, could be somewhat counteracted. Other studies indicated that the body's volume of blood decreases by 10 percent in the first 24 hours of space flight and suggested that much of the body's cardiovascular adaptation to space occurs on the launch pad and during launch.

A fourth Tracking and Data Relay Satellite was placed in orbit in August during STS-43, and NASA's Mission to Planet Earth got under way with the launching of the Upper Atmosphere Research Satellite in September. Preliminary data from UARS already has illustrated the link between low levels of ozone and high levels of chlorine monoxide, a key intermediate compound in the chemical chain reaction that leads to ozone depletion.

The shuttle program closed the year with the launch of STS-44 carrying the Defense Support Program, a dedicated mission for the Department of Defense. The mission, originally

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JSC Enhanced Photo by Mark Sowa and Kim Murray

The STS-42 crew poses for its official portrait along the shore of one of JSC's central quadrangle ponds. From left are Pilot Steve Oswald, Payload Specialist Roberta Bondar, Payload Commander Norm Thagard, Commander Ron Grabe, Mission Specialist Dave Hilmers, Payload Specialist Ulf Merbold and Mission Specialist Bill Readdy. The enhanced photo is a combination of two images manipulated on a Kodak Premier Workstation being tested by JSC's Imaging Sciences Division. Two photo negatives were digitized, then combined and manipulated on videotape. The videotape was converted back to film. Mark Sowa took the crew photograph conceived by Scott Wickes, and Kim Murray manipulated the images.

Crew sees flight as forerunner for cooperation

By Kelly Humphries

An excited STS-42 crew says it is looking forward to the first International Microgravity Mission as a forerunner of future space projects that will break important ground both technologically and politically.

"You can look at this flight as sort of a forerunner of the way that we're going to do operations in the space station era," Commander Ron Grabe said, "both from the standpoint of the way we're conducting the experimentation on orbit and by the international composition of the crew and the payload experiments."

The lessons learned during the preparation and execution of the seven-day mission also will be applicable to international cooperation that would be helpful in any effort to mount a human expedition to Mars, said Payload Specialists Roberta Bondar of Canada and Ulf Merbold of the European Space Agency.

"The Mars program is another program that offers us the tremendous resources of all the countries participating in these types of ventures that we can pool our talents and energies together to provide answers that any one of us alone could not do," Bondar said.

"It is also a beginning," Merbold said. "The space station is planned as an international space station and I think everything now leads also to this new tool, to this new future, with a permanent manned system in orbit. I think we can all learn how to cooperate and how to help each other."

Grabe said the seven-member crew has worked well together in training, and that bodes well for future efforts to integrate astronauts from disparate backgrounds.

"One of the key things we've learned is that folks from different countries in this arena are all very similar and that once you bring them together and give them an opportunity to work together for a period of time the problems really do go away," Grabe said. "We haven't uncovered any obstacles with regard to international cooperation, with regard to integrating astronaut corps from different countries, and certainly as Ulf mentioned that 's the wave of the future."

The STS-42 crew has been training for the mission for two years, but development of the experiments that will be conducted in the Spacelab module began five to seven years ago. The experiments will look at both materials science and human physiology in microgravity.

STS-42, scheduled for launch Jan. 22, will be Merbold's second flight, Grabe's third, and the fourth for both Payload Commander Norm Thagard and Mission Specialist Dave Hilmers. Pilot Steve Oswald, Mission Specialist Bill Readdy and Bondar will be making their first flights.

The crew will work in shifts to provide 24-hour operations aboard the Space Shutttle *Discovery*. Grabe, Oswald, Thagard and Bondar will constitute the blue shift, and Hilmers, Readdy and Merbold will make up

Please see **CREW**, Page 4

Power restored to *Discovery* on launch pad

By James Hartsfield

Preparations of *Discovery* at Launch Pad 39A geared up again Thursday when Kennedy Space Center technicians turned the spacecraft's power back on after a holiday break.

The crew of STS-42 — Commander Ron Grabe, Pilot Steve Oswald, Mission Specialists Norm Thagard, Bill Readdy and Dave Hilmers, and Payload Specialists Roberta Bondar and Ulf Merbold — is scheduled to depart Houston on Sunday for KSC and a dress rehearsal of the launch countdown Monday and Tuesday.

Discovery remains on schedule for launch Jan. 22, and shuttle managers plan to meet at KSC on Thursday for a final review of mission preparations and to set an official launch date. Power to *Discovery* had been shut off Dec. 20 and remained off through the holidays, as was power to *Atlantis,* currently in Bay 2 of KSC's processing hangar.

Atlantis' power was restored Thursday, and preparations are now under way to remove the shuttle's three main engines.

Work continued without interruption during the holidays on *Endeavour,* the newest shuttle being prepared for a springtime first flight. On *Endeavour,* technicians installed tile around the spacecraft's nosecap, closed out work on the mid-fuselage, and installed insulation around the plumbing for the main engines.

Former NASA administrator dies

Fletcher's two terms combine for longest tenure

James C. Fletcher, who in two terms served longer than any other NASA administrator, died of cancer Dec. 22 at Georgetown University Hospital in Washington, D.C.

Fletcher, 72, led the agency from April 1971 to May 1977, and returned "reluctantly" at then-President Ronald Reagan's request after the *Challenger* accident to serve a second term from May 1986 to April 1989.

Since his second retirement from NASA, Fletcher had been working as a consulting engineer and serving on the boards of several corporations. He also held a part-time teaching post at the University of Pittsburg.

During his first term as NASA administrator, Fletcher oversaw the last three lunar landings of the Apollo Program, the launches of Skylab and its three long-duration crews, the Apollo-Soyuz Test Project and planning and construction of the space shuttle.

During his second term, Fletcher supervised the efforts to restore the space shuttle program, and to upgrade the agency's management and safety procedures in accord with the recommendations of the Presidential Commission on the Space Shuttle *Challenger* Accident.

Fletcher began his career as a research physicist with the U.S. Navy during World War II. In 1941, he was a special research associate at Harvard University, and in 1942, he became an instructor at Princeton University.

Fletcher joined Hughes Aircraft in 1948, working as a laboratory director for six years. He then helped organize Space Electronics Corp. of Glendale, Calif., which developed the Able Star stage of the Thor-Able space carrier. The company later merged with part of Aerojet General Corp. Fletcher became president and chairman of the newly formed Space General Corp., and later was a vice president of Aerojet General.

During his nine years with NASA, Fletcher earned the NASA Distinguished Service Medal.

James Fletcher

Eight JSC projects among SBIR winners

NASA has selected 70 research proposals — eight managed by JSC — for immediate negotiation of Phase II contracts in NASA's Small Business Innovation Research Program. The proposals were submitted by 65 small, high technology firms in 21 states.

Selections were chosen competitively from 220 proposals. The total value is about $33 million.

SBIR projects are designed to stimulate technological innovation in the United States by using small business, including minority and disadvantaged firms, to help meet federal research and development needs and to encourage commercial applications of federally funded

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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.
FBA Rockets vs. Los Angeles Clippers (7:30 p.m. Jan. 23, Summit): $6.
FBA Entertainment '92 (coupon book): $27.

JSC

Gilruth Center News

Sign up policy — All classes and athletic activities are first come, first served. Sign up in person at the Gilruth Center and show a badge or EAA membership card. Classes tend to fill up four weeks in advance. For more information, call x30304.

Defensive driving — Course is offered from 8 a.m.-5 p.m. Feb. 8. Cost is $19.

Aerobic dance — High/low-impact classes meet from 5:15-6:15 p.m. Tuesdays and Thursdays. Cost is $32.

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

Country western dance — Beginning and intermediate class meets for six weeks starting Jan. 6. Cost is $20 per couple.

Ballroom dance — Beginner, beginner/intermediate, intermediate and advanced classes meet for eight weeks beginning Jan. 2. Cost is $60 per couple.

Aikido — Martial arts class meets Tuesdays and Fridays beginning Jan. 7. Cost is $35 per month.

Fitness program — Health Related Fitness Program includes medical examination screening, 12-week individually prescribed education program. Call Larry Wier, x30301.

JSC

Technical Library News

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

Space Station Freedom Toxic and Reactive Materials Handling. NASA, 1990. TL797 .S621 1990.

Workshop on Space Operations Automation and Robotics (SOAR '89). NASA,1990. TL870 .W67 1990.

AIAA/AHS Astrodynamics Conference, American Institute of Aeronautics and Astronautics, 1990. TL1050 .A87 1990.

JSC

Dates & Data

Today

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.

Monday

Cafeteria menu — Special: wieners with baked beans. Entrees: beef chop suey, breaded cutlet with cream gravy, grilled ham steak. Soup: beef and barley. Vegetables: buttered rice, Brussels sprouts, whipped potatoes.

Tuesday

Cafeteria menu — Special: pepper steak. Entrees: fried shrimp, pork chop with applesauce, turkey a la king. Soup: celery. Vegetables: au gratin potatoes, breaded squash, buttered spinach.

Wednesday

Astronomy seminar — The JSC Astronomy Seminar will present Allan Binder, project scientist for Lunar Prospector, at noon Jan. 8 in Bldg. 31, Rm. 129. Binder will discuss recent developments in the project. For more information, call Al Jackson, 333-7679.

Cafeteria menu — Special: Mexican dinner. Entrees: fried catfish with hush puppies, braised beef ribs. Soup: seafood gumbo. Vegetables: Spanish rice, ranch beans, buttered peas.

Thursday

Blood drive — The first on-site blood drive of the year will be from 8-11:30 a.m. and 1-3:30 p.m. Jan. 9 at the Gilruth Center. Appointments are required; call Helon Crawford, x34159; Mary O'Rear, x36531; or Dan Mangieri, x33003. For details, call Crawford.

IEEE meets — The Galveston Bay section of the Institute of Electrical and Electronics Engineers will meet at 11:30 a.m. Jan. 9 at the Gilruth Center. Robert Best, of Lockheed Engineering and Sciences Co., will discuss the "Dynamic Space Vehicle Communications Simulator." Reservations are due by 11 a.m. Jan. 6; call Marcia Taylor, x30195.

Cafeteria menu — Special: hamburger steak with onion gravy. Entrees: corned beef with cabbage and new potatoes, chicken and dumplings, tamales with chili. Soup: split pea. Vegetables: navy beans, buttered cabbage, green beans.

Jan. 10

Cafeteria menu — Special: barbecue link. Entrees: deviled crabs, broiled codfish, liver and onions. Soup: seafood gumbo. Vegetables: buttered corn, green beans, new potatoes.

Jan. 15

Astronomy seminar — The JSC Astronomy Seminar will present an open discussion meeting at noon Jan. 15 in Bldg. 31, Rm. 129. For more information, call Al Jackson at 333-7679.

AIAA meets — The American Institute of Aeronautics and Astronautics' Education Committee will meet at 10:15 a.m. Jan. 15 at the Gilruth Center. Nadine G. Barlow, planetary geoscientist, will present "More About Mars." Reservations for the free lecture are due by noon Jan. 12; call 333-6064.

Jan. 16

Lunch and learn — The American Institute of Aeronautics and Astronautics' Human Support Technical Committee will meet at 11:30 a.m. Jan. 16 in the Bldg. 3 cafeteria. Tandi Bagian will discuss "Human Factors at JSC." For more information, call 283-6536.

Jan. 23

AIAA meets — The Houston section of the American Institute of Aeronautics and Astronautics will meet at 5:30 p.m. Jan. 23 at the Gilruth Center. Dr. Virgil Sharpton of the Lunar and Planetary Institute will present "Venus Revealed: Magellan Results." Cost is $9 for members, $10 for non-members and $8 for students and young members. Dinner reservations are due by noon Jan. 20. For more information, call 333-6064, 283-4214, 283-6000 or 282-3160.

April 24

Brainbusters anniversary — The Brainbusters Model Airplane Club, formed in 1942 by NACA employees at Langley, will host a 50th anniversary reunion April 24-25. Former members may call organizer Edward M. Sullivan at 804-596-6104.

June 1

Fuzzy logic workshop — JSC and the University of Houston-Clear Lake will host the third International Joint Technology Workshop on Neural Networks and Fuzzy Logic June 1-3, 1992 at the Gilruth Center. For more information, call Carla Armstrong, x39071.

JSC

Swap Shop

Swap Shop ads are accepted from current and retired NASA civil service employees and on-site contractor employees. Each ad must be submitted on a separate full-sized, revised JSC Form 1452. Deadline is 5 p.m. every Friday, two weeks before the desired date of publication. Ads may be run only once. Send ads to Roundup Swap Shop, Code AP3, or deliver them to the deposit box outside Rm. 147 in Bldg. 2. No phone or Fax ads accepted.

Property

Sale: Santa Fe, 2.5 acres, well, septic, fenced w/trees, $21.9K or owner financing with 20 percent down. 534-2231.

Lease: Barringer Way, 2-1, W/D conn, pool, storage area, no pets, ex cond, avail 12/16/91, $425/mo. 486-2048.

Sale: Friendswood, 2 lots, 0.95 acre, all util, no flooding, $32K and $39K, both $55K. Ron, 996-9724.

Lease: Webster/Ellington condo, 2-1, $475/mo. Dave, x38156 or Herb x38161.

Sale: 5-2.5-2, 8.5 percent, FHA assum. 488-3191.

Lease: Tranquility Lake condo, 1 BR, FPL, W/D, sec gate, patio, covered parking. 333-4917.

Sale: Shore Acres, 2 lots, $3.2K/ea or reduced for both. Frank, x34185 or 471-2934.

Lease: 3-2-2, I-45 at Fuqua, remodeled, $595/mo. Minh, 333-6806 or 484-2456.

Lease: Pipers Meadow, 3-2-2, high ceiling, FPL, split BR, pets accepted, $775/mo plus deposit. 486-5527.

Sale/Lease: The Landing condo, 3-2-2, tennis courts, exercise rm, sauna, marina, $750/mo and fixed utility fee, $140/mo or $69.9K w/boat slip under roof. Ed Volick, 280-5801 or 326-2221.

Sale: East Texas, 45 acres, pine wooded, rolling hills, live spring, all util, 2/3 open land, assumption. Joe Guerrero, (903) 729-8458.

Sale: Pearland Dixie Hollow lot, concrete street, all util. x39530 or 482-5003.

Sale: Countryside, 4-2-2, shade trees, nearby pool, no flood. Dennis, x39012 or 554-4233.

Lease: Oakbrook West, 4-2.5-2, formals, den, FPL, fenced, no pets, $985/mo. 488-5210.

Sale: Pebblebrook condo, 1 BR, vaulted ceiling, W/D, new vinyl/wallpaper, kitchen/bath, 680 sq ft, $28K. Chris, 534-3046.

Sale: Egret Bay condo, 2-2, covered parking, all appli, FPL, blinds, fan, patio, storage, pools, boat ramp, $39.5K. 333-9281.

Sale: Four Crystal Beach lots on Bolivar, 50' x 100'. 921-7212.

Cars & Trucks

'88 Suzuki Samurai convertible, A/C, AM/FM/cass, ex cond, $4.8K OBO. Monte, 280-2532.

'78 Caprice Classic, 4 dr, 70K mi, ex cond, $700. Jeff, x38424 or 331-7166.

'78 Thunderbird, P/S, P/B, leather, cruise, stereo, $1.2K; '90 Lumina Eurosport, 3.1L V6, multiport fuel injection, 4 dr, auto, wht w/red int, ex cond, $8.2K. Steve, 480-4950 or 283-9398.

'83 Mazda 626 LX, light blue, loaded, good cond, $3K OBO. 471-1552.

'86 Mercury Cougar, red, auto, loaded, ex cond, 88K mi, $3.9K OBO. Sonda, x31914 or 332-0446.

'83 Ford Escort, 60K mi, needs work, $300. Bob, x32193 or 326-3984.

Jeep blk hardtop and blue/gray drs, make offer. Rich, x34818 or 480-8335.

'82 Plymouth Reliant, runs good, int needs work, $650. Dennis, x31409 or 488-0182.

'91 Nissan Sentra SER, 2 dr, red, pwr sunroof, A/C, stereo, 5.6K mi, $13K. Hannes, 283-9364 or 532-1995.

'84 Dodge Ramcharger, blue/dk blue, most options, Positrac, 67K mi, $3.9K. 333-2395.

'80 Ford Pinto, 4 cyl, standard, 4 spd, P/S, P/B, A/C, stereo, runs, needs body work, $500 OBO. Rudy, x33836 or 946-7028.

'78 Porsche 928, brwn w/leather int, ex cond, 75K mi, $8.9K. Bill, x39980.

'87 Honda CRX hatchback, 5 spd, A/C, AM/FM/cass, 37K mi, ex cond, $6K. 335-8539 or 992-5958.

'84 Porsche 944, auto, 59K mi, loaded, ex cond. 482-7643.

'82 Honda Accord, brwn/brwn, 104K mi, AM/FM/cass, A/C, P/S, P/B, $1.9K OBO. 992-4724.

'76 Dodge PU, 1/2 ton, step-side, new tires, clutch, starter, flywheel, $750 OBO. Mark, 283-5761.

Boats & Planes

'79 Cape Dory 30'. 15 hp Volvo, 5 sails, Marine A/C, heat, Bimini, wheel, head, H/C press water, galley, shower, VHF, depth, knot, $35.5K. 474-5414.

'84 Chris Craft, 260 hp, gas enclosed Bimini w/screening, sleeps 6, shower, galley, radio, fishfinder, depth sounder for cruising, $22K. x31724 or 538-3319.

Audiovisual & Computers

JVC KD-95, cass deck, $50; lamp, $25 OBO. 482-2138.

Commodore 64, 1541 dr, Gemini IOX prtr, pwr strip, joysticks, $200. 482-2138.

Tandy 1000, 384K, two 360K FD, mono, $200; Tandy DWP220 wide-carriage daisy wheel prtr, $125; computer table, $40. 335-8539 or 992-5958.

IBM PS/1, 512K, 3.5 FD, modem, mouse, DOS 4.01, Microsoft Word 2.0, Prodigy, IBM users club SW, $550. 333-6753.

Two stereo speakers, 3-way w/cross, 10 by 4.5 by 2.5, 8 ohms, $45; programmable thermostat, "Hunter Energy Monitor II Plus", $40; 19" Sony color TV, MDL KV1711, fair cond, $20; 11" B/W Panasonic TV, $30. Doug, x32860 or 486-7412.

Eighty MB Corner FD w/controller, 2400 baud modem, 40 MB plus hardcard II w/SW, serial card w/manual and SW, Intel aboveboard 2 Mbyte expanded memory, Eprom Programmer 27xxx family, 4 eproms slot, Ethernet network card-Dlink, EGA Paradise Wonder card. x36186.

Apple II Plus w/80-col card, green, mono moni, 5 1/4", Olivetti PR2300 Ink-Jet, SW, $250 OBO. Brantley, 331-0361.

Genesis games, Target Earth, Sagaia, Space Harrier, Phelios, Arrow Flash, etc, $15 to $40. Rod, 280-4503 or 482-4247.

New Atari computer 800 XL, w/11 games, basic, joysticks, ex cond, $50; Atari 800 XL computer, DD, prtr, SW, ex cond, $100 OBO. 486-8266.

Photographic

Minolta X700 w/50 mm lens, 500 mm mirrored lens, $400; Panasonic 5000 word processor w/3.5 DD and 640K memory, $350. Julye, 326-4197.

Pets & Livestock

Keeshond puppies, wolf gray, $200. Chris or Julie, 474-3152.

Persians CFA Registered, male red, adult spayed female tortoise shell, blk female adult, $75 to $500. Kristy, x33418 or 286-0146.

Free, shepherd/doberman spayed female, all shots. Matt, 493-5747.

Lab/chow, blk, female, shots, 9 mo old, $45. 929-7208 or 489-9337.

Household

Matching sofa and chair, lt blue floral, ex cond, $260. Ignacio, 282-4818 or 486-1078.

New Hotpoint washer, used 4 mo, $175 OBO. Pam, 335-6833.

Nine drwr dresser w/2 mirrors, $25; brwn tweed sofa sleeper, ex cond, $75. Lorraine, 480-0014 ext 58.

GE washer and gas dryer, wht, both need repair, $60. Kirk, 282-2911 or 332-5876.

King sz motionless waterbed, dressing table, 2 end bedside cabinets, $750; rose velvet couch, $250; 2 blue wing back chairs, $175/ea, all in ex cond. Judy, x37906 or 326-5805.

Neutral weave chair, extra wide, $50 OBO; pottery lamp, $25 OBO; dinette w/leaf, 6 chairs, $75 OBO. 482-2138.

Oak qn sz waterbed w/padded side rails, $225. 476-4872.

Three full sz bedspreads, navy, yellow, and brwn, C&W 8 track tapes, load-lock for semi van, $50; ceramics and decorated sweat shirts. 943-1694.

Dinette table w/4 upholstered chairs, ash color, solid wood, ex cond. $115. 486-5247.

Round oak antique dining rm table, 54". 474-3449.

Circa '60's Sears Kenmore sewing machine, ex cond, needs adjustment, cabinet and access, $100 OBO; qn sz comforter, shams, orange/blue, $10; '40's Zenith console w/AM/FM/phonograph, ex cond, $250 OBO. 996-6932.

Wanted

Want Tandy word processing SW for model 2000, will buy or trade other SW. 534-2231.

Want non-smoking mature responsible adult to care for 4 mo old infant, prefer in my Bay Glen home, 3-5 pm, 4 days/wk. 480-4918.

Want roommate to share 4-2 house, $300 plus 1/2 bills. Todd, 282-6300 or pager 883-7828.

Want nonsmoking roommate to share 3 BR CLC house, $250/mo plus 1/2 util. Rich, 480-2570.

Want to trade or buy NASA & space related patches, pins, decals, etc. Andrew, 280-0647.

Want Oak dining table w/6 chairs in good cond. x30554 or 486-4369.

Want Time, Life, Newsweek, Rolling Stones magazines featuring John Lennon's assassination/solo career, no Beatles material. 488-9080 ext 3314 or 333-2435.

Want 1847 Rogers Bros Vintage, grape pattern silverware, particularly knives. Joan, x36516 or 941-9508.

Miscellaneous

Norman Rockwell estate authorized plates, edged in gold. 474-5414.

Double stroller, $70; tool box for small pickup, $50. Tom, x31710 or 538-1581.

Maternity clothes, sz 5-7, ex cond. Jan, 283-5338 or 280-0620.

Childs rocking horse, seat 12" high, $10; Little Tykes Jr activity gym, ex cond, $50; Graco, stroller, umbrella, $20; Fisher Price, carseat, $25. Doug, x32860 or 486-7412.

President and First Lady family membership, $1.7K; kg sz waterbed, $100. Julye, 326-4197.

Bottled water machine, $100, OBO; Everex 286/16 Mhz machine, $1K; preschooler child learning system, $350 OBO; new baseball card factory sets, $25/ea. Tony, 335-4299 or 482-4156.

Outers clay target thrower for shotguns, ex cond, $10. 482-5837.

Mens sport coats, Cricketeer and Evan-Picone, navy and tan, sz 36-38, ex cond, $50/ea. 482-5837.

Lady ski boots, Caber 22, rear-entry, sz 6 1/2, wht, ex cond, $25. x34459 or 992-5031.

Chain link dog kennel w/gate and roof, 6' x 6' x 6', ex cond, $150. 929-7208 or 489-9337.

Wet suit, XL, O'Neill reactor, ex cond. David, 554-6242.

Crib, single mattress, exercise bike, rowing machine, stroller, carpet shampoo machine, sofa. 488-3191.

Twin sz box springs, $15; evening dresses sz 8 and 10. 480-3424.

Space art print, "Saturn from Dione", 729/950 by Poor, BO. 333-7075 or 480-1024.

Shoei motorcycle helmet, med, 7 1/4-1/2; Eddie Lawson signature, red/wht. Frank, 326-5868.

New two solid gold heavy bracelets, BO. 326-2995.

Poulan chain saw w/case, has 16" bar and 2.3 CID, $145. x34116.

Frame mount trlr hitch for '82 or later Monte Carlo, Cutlass, etc, $40. x34790.

3M copier, was $2K, now $600; GE dryer, good cond, $125; twin mattress and box springs, $120/both. Barbara, 332-0094.

Kirby Tradition sweeper, attachments, carpet cleaning tools, $160. 280-8746.

Running boards for long wheelbase Toyota PU 4-Runner, $60. Greg, 554-2504.

Free firewood, near Hobby Airport. Joe Canniff, 333-7357 or 944-6513.

Gym quality workbench, leg extension, squat rack, 255 lb Olympic weight set, weight stand, two 10, 35, and 55 lb dumbbells, was $750, now $500; 3 yr old Lexicon Encyclopedias inc year books, 484-8772.

Paintings, "Claudia", New Orleans portrait w/male companion, 35 x 45 1/2, Fishing Sloop, Pacific, 24 x 36, Spanish Cavalier, raised surface, 29 x 42, Four Bears, Russian, 14 x 24, Owl on Blue Background, Sailing Ship, on blk velvet, 20 x 24, White Horse on blk velvet, 27 x 32, Flower, Fruit Basket Puzzle, Portuguese Seashore, etc. 326-2221.

Designer wedding gown, Ilissa by Demetrius satin sheath gown w/cathedral train, French lace and beading on bodice, sleeves, hem, veil, sz 10, $700. x31495 or 326-4991.

Round diamond solitaire, .75 caret, JSI quality, was $4K, now $2K OBO. Peter, x38429 or 286-8346.

Moving sale: misc items, microwave, stand, tools, toys, Estes model rocket engines, non-running 3/4 ton pickup, VW bus, etc. Dennis, x39012 or 554-4233.

Long brwn leather coat, ex cond, a Karen Silton, sz 9/10. $150. TJ, 333-5107.

Fifty-five gallon aquarium, air pump, light, extras, $70; Sansui tuner, $25. 332-2453.

Free 24 x 3.5 above ground pool, pump, misc equip. 333-7478.

Avocado elec GE double oven, $100; stove top, $75; hood vent, $25; or all for $175 OBO; '78 VW Rabbit, 1.5L diesel eng, 4 spd, $400 OBO, all good cond; free cut down 2 Arizona ash trees and keep wood. Boykin, x37341 or 326-1267.

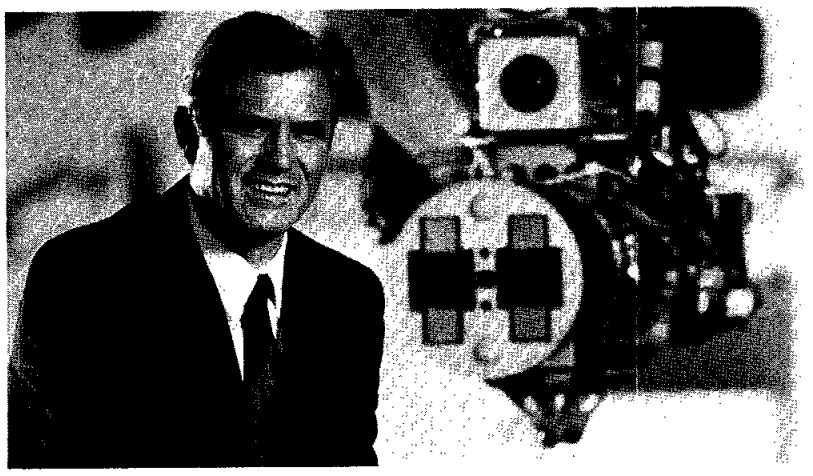
EE text books, UH Central ELEE 6370/5440 Adv Digital Design, ex cond. Youm, 283-4813.

Three Jaw lathe chuck 6", 1.5" x 8 threads, $85, 1/4, 1/2, and 1 hp motors. 921-7212.

Compaq portable computer, w/carrying case, 2 FD, $500; exercise bike, $40. Sue, x37213.

1991: Another Year of Progress

JANUARY — A new state-of-the-art computer-driven projector was installed behind the 10-by-20 screen in the Mission Control Center. Project manager Adrianne Blume, left, and Marty Kuddlarek, right, discussed the installation with Hughes Aircraft technician Bruce Ahrns.



FEBRUARY— JSC's Leo Monford, developer of a new precision method of aligning the shuttle's robot arm — the Targeting and Reflective Alignment Concept — was honored as NASA's Inventor of the Year.

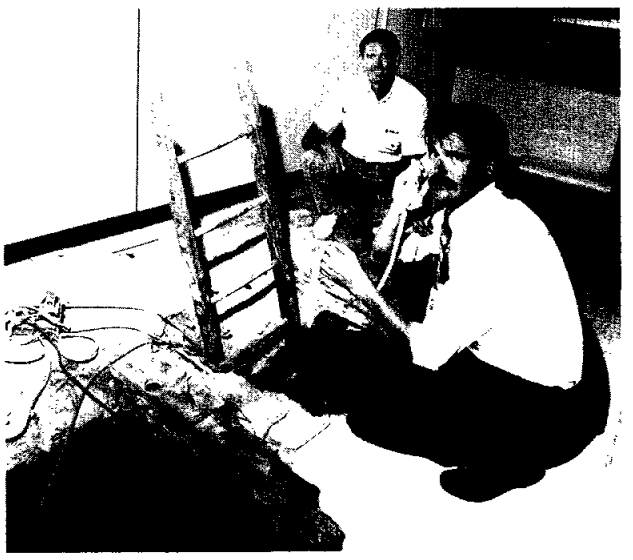
JUNE — Five members of the House Subcommittee on Space visited JSC, getting a close-up look at progress being made on the new Space Station Control Center and voicing support for *Freedom* during a time of critical budget debates.

JULY — JSC employees got a chance to look at a nearly total eclipse of the Sun. The JSC Astronomical Society set up telescopes outside the Visitor Center for safe viewing of the rare event.

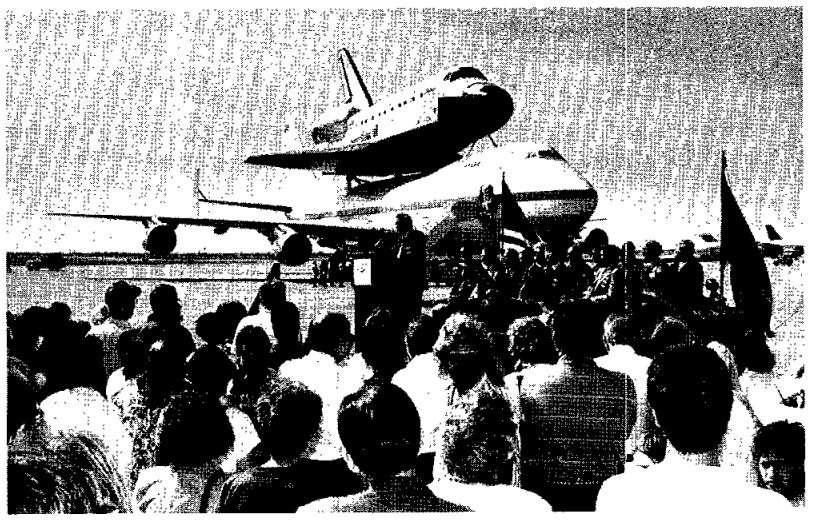
MARCH — JSC Director Aaron Cohen received the National Space Trophy, presented by the Rotary National Award for Space Achievement Foundation. NASA Administrator Richard Truly congratulated him and admired the Steuben Glass lead crystal trophy.

AUGUST — Construction began on Space Center Houston, the new $70 million visitor center being built by the Manned Space Flight Education Foundation. National and local elected officials had joined with JSC and MSFEFI officials in breaking ground for the project earlier in the year.

APRIL — Students from across the country communicated with *Atlantis* astronauts through the Space Shuttle Amateur Radio Experiment. Local-area students who made contact with the STS-37 crew included, from left, Joey Kramer, Tracy Singleton, Kyle Beasley and Steven White. Public Services Branch Chief Chuck Biggs, far right, helped coordinate the local contacts.

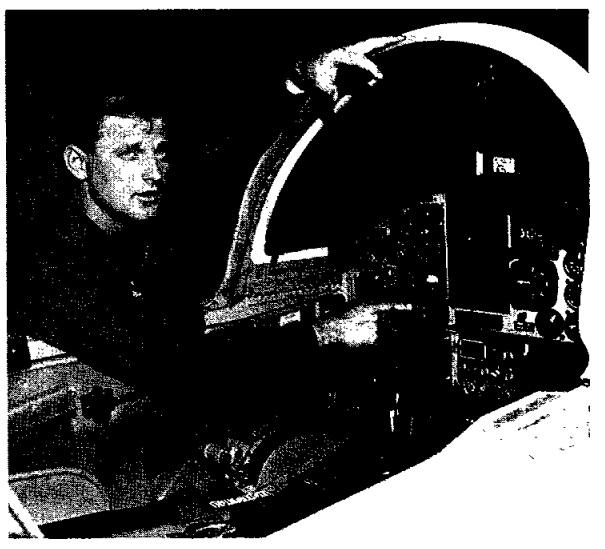


SEPTEMBER — Two JSC workers were ousted from their Bldg. 2 office when a water line broke, flooding the building and requiring workers to dig a 6-foot-deep hole through their office floor. Kyle Herring, left, and James Hartsfield, returned to their office when repairs were completed in several weeks.



MAY— America's newest space shuttle, *Endeavour*, was welcomed by an estimated 10,000 people during a stop-over at Ellington Field.

NOVEMBER — JSC scientists including Tinh Trinh participated in the first flight of the rotating wall vessel on STS-44. The bioreactor is already showing promising results in ground-based research.



OCTOBER — Project Manager Scott Reagan showed off Flight Crew Operations' prototype for upgrades to NASA's fleet of T-38 astronaut training aircraft. The "glass cockpit" is expected to make flying safer with weather and other flight information upgrades.

DECEMBER — STS-44 crew members returned home to a warm welcome. Mission Specialist Story Musgrave got a big hug from his son, Lane.

Pressure-sensitive paint passes with flying colors

NASA has successfully tested a new method to measure surface pressure on airplanes during flight that could replace the sensing devices traditionally used to gather such data.

Aerospace experts hail the pressure-sensitive paint as revolutionary because it could lead to large areas of a test aircraft being studied at once. The light pink paint is quick and easy to apply and the entire test surface can be "mapped." Plus, an aircraft doesn't have to be modified with wires and tubing needed for a conventional data collection system, although video or photo cameras and ultraviolet light systems are required.

Pressure measurements give engineers information on the strength of an aircraft's wings and tail, knowledge that lets them certify or improve the plane's design.

The NASA tests used paint that becomes luminescent under ultraviolet light. The intensity of the light radiated by the paint results from the pressure it receives in flight. Researchers use videotapes or photographs taken in ultraviolet light to study the pressure patterns.

Data from the research flights on an F-l04 aircraft at Ames-Dryden Flight Research Facility show that "surface pressure measurements from the luminescent paint are comparable to those collected the conventional way," said Dr. Blair McLachlan, Project Scientist at Ames Research Center.

More laboratory work to improve the paint's characteristics will be done before the next series of flights.

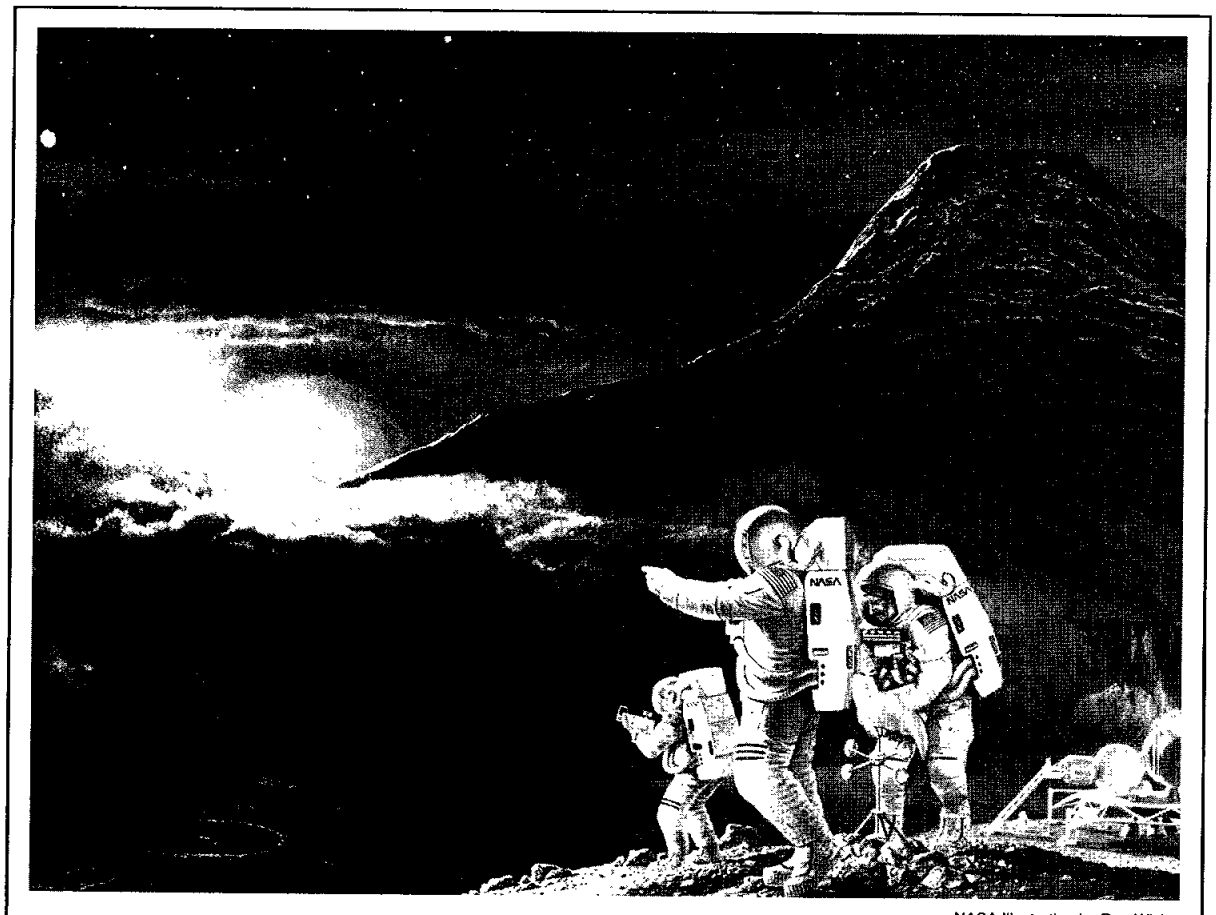
Surface pressure is normally measured with sensors and small openings that are part of a data collection system on the aircraft. But this method produces data only from single, fixed points and the systems are expensive and time-consuming to install. To measure large areas such as an entire wing, hundreds of sensors are needed and the pressure readings still do not represent 100 percent of the test surface.

The luminescent paint test is based on a concept called oxygen quenching. The paint "senses" the amount of oxygen on the surface and responds by varying the light it emits. As surface pressure increases, the oxygen concentration also rises and the light emitted by the luminescent molecules decreases. The resulting light pattern can be photographed and processed to produce a map of pressures across the test surface.

The NASA F-104 carried the paint experiment in a belly-flight test pylon where a video system recorded the pressure variations. The paint was tested on three flights in a varied flight environment in which the plane reached nearly 1,200 mph (1.6 times the speed of sound) and 30,000 feet.

The luminescent paint development is a cooperative research program between the chemistry department at the University of Washington and the Fluid Mechanics Laboratory at Ames Research Center. The effort began in 1987, followed by wind tunnel tests at Ames in 1989.

Ames Research Center manages the project. Lisa Bjarke is the Project Flight Test Engineer at Ames-Dryden.



NASA Illustration by Ren Wicks

MARS ON MASONITE—In the year 2019, three NASA astronauts conduct scientific observations during the first human landing on Mars. The artist's concept envisions wind speed observations with an anemometer and recording of planetary features with a hand-held camera. A dust storm is approaching the landing site, and the Martian moons Phobos and Deimos are visible in the twilight sky. In the background is a Mars excursion vehicle that serves as crew quarters during surface operations. The painting is oil on masonite.

White Sands council also picked

Fifteen members chosen to serve on Exchange Council

Fifteen JSC employees have been selected to serve on the NASA Exchange Council-JSC throughout the next calendar year, and six White Sands Test Facility employees have been chosen to serve on its council.

The NASA Exchange is a government non-appropriated fund activity established to provide for services that contribute to the efficiency, welfare and morale of NASA personnel.

The councils are responsible for reviewing the operations of the exchange at their respective locations and providing recommendations regarding the policies, organization, scope of activity, rules and business practices.

At JSC, the council serves as a board of directors reviewing the operations of the Gilruth Center, the cafeterias and the Exchange Store gift shops.

The JSC council officers, selected by JSC Director Aaron Cohen, are Harvey L. Hartman, chairman, NASA Exchange-JSC; Virginia L. Gibson, president, Employee Activities Association; Melody A. Nation, acting executive vice president, EAA; Clayton C. Anderson, vice president-athletics, EAA; Clyde L. Lowrimore, treasurer; Cynthia C. Draughon, secretary; Teresa R. Sullivan, operations manager; Curtis C. Collins, alternate manager; and Richard U. Lea, legal adviser.

Members are Debra L. Johnson, Richard E. Thompson, James D. Shannon, William A. Langdoc, Robert D. Schwartz and John R. Arnold.

The two new members on the JSC council are Melody Nation and John Arnold.

The White Sands council members are: James H. Powell, chairman, NASA Exchange-WSTF; William E. Waldrip, treasurer; Pleddie M. Baker, secretary; and Donald R. Visness and Jack S. Stradling, members.

The council members' terms will expire Jan. 31, 1993.

1991 was year of accomplishment, change for NASA and JSC

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planned for 10 days, was shortened when an inertial measurement unit failed on the sixth day of the mission. Space Shuttle *Atlantis* landed safely at the Dryden Flight Research Facility, Edwards, Calif., the next day.

STS-44 also was the first test of JSC's rotating wall bioreactor, a tissue growth chamber that already has shown promising results in its Earth-based research. During the mission, crew members conducted fluid dynamics experiments with the bioreactor hardware. Investigators hope to culture cells with the device on future shuttle flights and the space station.

This year, one of the many anticipated highlights will be the first flight of the Space Shuttle *Endeavour* which was delivered to NASA in 1991. *Endeavour* visited Ellington Field for a few hours in May while being flown to the Kennedy Space Center atop the Shuttle Carrier Aircraft.

1991 was a year of change for the Space Station *Freedom* program. A congressionally mandated restructuring of the *Freedom* program was completed in the spring of 1991. A 1991 fiscal year budget shortfall of more than $550 million along with congressional direction to reduce out-year spending by nearly $6 billion prompted NASA to start the restructuring of the *Freedom* program in late 1990.

Freedom's new design is less expensive, smaller, easier to assemble in orbit and requires fewer shuttle flights to build.

Major new features of the redesigned station include shorter modules that can be launched fully outfitted and a pre-integrated truss structure that is assembled and verified on the ground, thus reducing on-orbit extravehicular activity.

The program completed a major milestone in November with the preliminary design review of the man-tended configuration. The man-tended phase begins once the U.S. laboratory module is placed on orbit, permitting crews to work inside the research module while the shuttle is docked nearby.

Here, construction of the Space Station Control Center, which will house the mission controllers, has been completed and underfloor power and data trays are being installed. Integrated simulation training will begin in the facility in June 1995.

Construction of the Space Station Training Facility was completed in July, and the first part-task trainer has been delivered. The facility will be ready for training simulations in March 1995.

As 1991 closed, planetary probes launched from the shuttle in earlier years were continuing their missions. The Magellan spacecraft has radar mapped nearly the entire surface of Venus.

Galileo passed by the asteroid Gaspra on its way to Jupiter and returned the first close-up image ever taken of an asteroid, while the Ulysses spacecraft set its trajectory for Jupiter on its way to study the poles of the Sun.

Also during the course of 1991, several major management changes were initiated by NASA Administrator Richard H. Truly.

Truly announced in August the selection of Dr. Michael D. Griffin as associate administrator of the newly established Office of Exploration. The office will lead NASA's efforts to expand exploration beyond Earth orbit into the solar system.

In the same month, a new Office of Human Resources and Education was created and Lt. Gen. Sam M. Armstrong was appointed associate administrator. In announcing the appointment, Truly said that Armstrong would be responsible for developing NASA's human resources strategic plan and for furthering NASA's emphasis on national education goals.

NASA Deputy Administrator J.R. Thompson announced his resignation in September and left the agency in November. No replacement has been nominated.

Robert L. Crippen was named director of the Kennedy Space Center replacing Forrest S. McCartney, who left NASA on Jan. 1.

Leonard S. Nicholson was named director of the shuttle program replacing Crippen in December.

Crew will have busy schedule

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the red crew.

Readdy, who as flight engineer with fill out the orbiter crew, said he, Grabe and Oswald are glad they will be helping conduct some of the IML experiments, which is unusual for a Spacelab mission.

"The IML payload consists of 16 payloads or subpayloads," said Payload Commander Thagard. "But that's sort of deceptive. The fact is that Biorack alone constitutes 17 experiments. If you total up all of the experiments in the IML complement — and this ignores the GAS cans, the middeck and student experiments — the count is about 54 or 55. So everyone on this flight is fairly heavily involved in payload activities. Their involvement is so much that the distinction almost blurs."

Hilmers said that when he was growing up, his father owned greenhouses so his favorite experiments are in the Gravitational Plant Physiology Facility. "It's sort of like having your own mini-green house on orbit," he said.

The experiments will attempt to separate the influences of gravity and light on plant growth by exposing plans to various levels of gravity with and without light, and vice versa.

One experiment that will be of interest to many people will look at lower back pain that is sometimes reported by astronauts in flight. Bondar said measuring the mechanical forces exerted on verterbrae might help those who suffer lower back pain on Earth.

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Associate Editor .....Kari Fluegel

SBIR projects managed at JSC

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research innovations.

SBIR Phase II continues development for the most promising projects demonstrating technical feasibility and highest potential value to NASA. Funding for additional Phase II selections, to be announced next month, are expected to bring the total number of selections to more than 130 worth about $65 million.

The eight projects managed by JSC are:

Barrett Technology Inc., Cambridge, Mass., for an Integrated, Arm-Wrist-Hand System for Whole-Arm Manipulation;

Electronic Imagery Inc., Delray Beach, Fla., for an Orbiter System Imaging Card for High-Definition, Full-Color, Virtual-Image Processing;

MATSI Inc., Atlanta, for Sealed, Rechargeable, Zinc-Oxygen Batteries;

Exos Inc., Burlington, Mass., for a Sensory Exoskeleton Arm-Master for Robot Control;

Foster-Miller Inc., Waltham, Mass., for Recovery of Oxygen from Lunar Soils in a Plasma Reactor;

Boston Advanced Technologies Inc., Boston, Mass., for a Noninvasive Blood Analysis During Manned Space Flight;

Coherent Systems Inc., Houston, for a Hand-Held, Medical Diagnostic, Ultrasound, B-Mode Scanner with Doppler; and

Bio-Technical Resources, Manitowac, Wis., for Chemiluminescent, Deoxyoligonucleotide Probes for Rapid Detection of Intact Coliform Bacteria and Total Bacteria.