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

Moon walker

The new DART robot is being tested as a virtual presence geologist. Story on Page 3.

New safety classes

The Safety Learning Center is taking reservations for the first quarter safety courses. Story on Page 4.

Space News Roundup

Vol. 34 **January 20, 1995** No. 3

Goldin says NASA must reach streamlining targets

NASA Administrator Daniel S. Goldin tackled some of the toughest issues facing the agency and its workers Thursday in an address broadcast to all employees.

At JSC, employees viewed the address on televisions throughout the center and in Teague Auditorium, where JSC Director Dr. Carolyn L. Huntoon answered follow-up questions.

The topic was streamlining, which Goldin said means down-sizing, reorganizing and finding new ways to do things. The big question, he said, is how the agency will pare itself down to a size it hasn't been since the early Apollo years. No one knows the answer yet, he added, but employees can be sure that NASA will continue to treat its people with respect and human dignity.

"We're doing it because Americans want a smaller, cheaper government," he said, "a government that does the right things, with the right number of people, at the right cost. Americans want government to be relevant."

Congress and President Bill Clinton are responding with big changes that affect all federal agencies, he said. Already, Congress has passed a law that calls for a cut of 272,900 federal employees—or 12 percent of the work force—by the end of fiscal year 1999. NASA's share is a 16.5 percent cut, which equates to more than 4,000 people. Goldin said the buyouts of 1994 have helped put NASA about a year ahead of schedule, but there are still 2,500 more people to go.

The administrator said it is not clear whether NASA can rely solely on attrition to achieve the reductions. He said he has challenged center directors and Headquarters leaders to be innovative in finding new management tools that will deliver a smaller but dynamic and relevant NASA fairly and humanely. This means cutting out some of the things NASA does and improving others, he said.

Another reason for streamlining is the National Performance Review, which has made specific recommendations for cutting government. For example, it tells agencies to cut their headquarters staffs and the number of supervisors in half by the end of fiscal '99. Agencies have been challenged to reach a supervisor-to-employee ratio of 1 to 15. NASA's goal has been set at 1 to 11, more than half of the 1-to-5-ratio at NASA when the streamlining efforts began.

"NASA's contractors are in the same boat, he said. Over the past year, Headquarters has reduced its support contract by roughly 25 percent or more than 300 jobs. The centers have made even deeper cuts, he added.

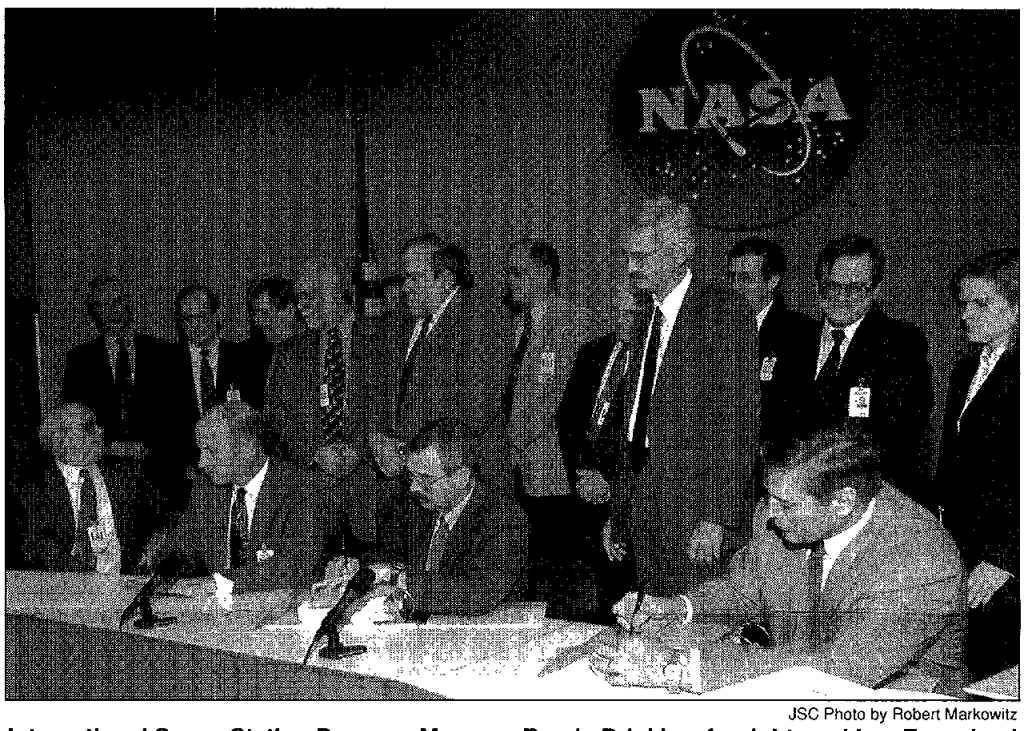
Please see **GOLDIN**, Page 4

Technicians press toward Feb. 2 launch

NASA technicians pressed ahead toward the planned launch of *Discovery* on STS-63 this week, as the six astronauts who will fly the first rendezvous and close approach to Russia's Mir Space Station completed a dress rehearsal for their liftoff.

Commander Jim Wetherbee, Pilot Eileen Collins and Mission Specialists Bernard Harris, Mike Foale, Janice Voss and Vladimir Titov climbed aboard *Discovery* on Launch Pad 39-B at Kennedy Space Center to simulate the final hours of countdown that will lead to a launch at 12:51 a.m. EST on Feb. 2. The terminal countdown demonstration test took place as engineers completed the replacement of a leaky jet thruster on *Discovery*'s right orbital maneuvering system pod and the repair of a leaky quick disconnect device on one of *Discovery*'s hydraulic power unit fuel pump assemblies.

If *Discovery* launches on time, Wetherbee and Collins will bring the shuttle to its close encounter with Mir on Feb. 5, in an exercise designed to refine procedures that will be used by the STS-71 astronauts aboard *Atlantis* in a few months as they maneuver the shuttle for the first docking with Mir.



JSC Photo by Robert Markowitz

International Space Station Program Manager Randy Brinkley, far right, and Lee Evey, lead NASA negotiator, sign a $5.63 billion contract for the design and development of the station. They were joined at the signing table in Teague Auditorium by Doug Stone, Boeing's space station program manager, far right, and Bob Ingersoll, Boeing's lead negotiator. Looking on were other members of the negotiating teams.

Transportation Fair to clear air about pollution and regulations

JSC is sponsoring a Transportation Fair next month to enhance employees' environmental awareness and inform them about new federal regulations that will affect them.

The fair, which will run from 10:30 a.m.-1:30 p.m. Feb. 2 at the Gilruth Center ballroom, is designed to enlist support for environmental programs and promote understanding of the requirements of the Clean Air Act and the Employee Trip Reduction Program requirements

A number of local transportation service providers will be available to provide information on employee commuting options such as vans, taxis, buses and bicycles. The exhibits will be set up in the ballroom for employees to learn more about transportation alternatives.

JSC civil servants and contractors are encouraged to attend this all-hands event as workloads permit. If you have any questions or need additional information, contact the employee trip coordinator at x36506.

NASA, Boeing sign agreement to build station

NASA and Boeing signed a $5.63 billion contract last Friday for the design and development of the International Space Station.

The contract, which extends through June 2003, is a cost-plus-incentive-fee and award-fee agreement.

"We are extremely pleased to have a final agreement with our prime contractor," Space Station Program Manager Randy Brinkley said. "The NASA and Boeing team members involved in drawing up the agreement did an outstanding job, and have incorporated unique features to reduce cost and to reduce risks to the taxpaying public."

Under the agreement, Boeing is responsible for the integration and verification of the station. Other responsiblities include analysis, manufacture, verification and delivery of the U.S. on-orbit segments of the station. Boeing will interact with NASA's international partners at a technical level to ensure physical, functional, safety and operational compatibility between elements.

"The space station is a catalyst for global cooperation," said Space Station Program Director Wilbur Trafton. "As the largest international scientific and technological development ever undertaken, the International Space Station will bring together resources from the United States, Russia, Japan, member nations of the European Space Agency, Canada and Italy."

The 400-ton station will include laboratories from four space agencies that will support a variety of materials processing, microgravity sciences and life sciences experiments.

Fabrication of several elements already has begun. Assembly will begin in November 1997 with the launch of the U.S.-purchased Russian FGB power and propulsion module. The U.S. Lab Module and Canadian robotic arm will follow in 1998, the Japanese Experiment Module in 2000 and the European Columbus Orbital Facility in 2001. Assembly is scheduled to be completed in 2002.

Space telescope images record cosmic violence

Two new images taken by the Hubble Space Telescope provide details of the results from two violent cosmic events.

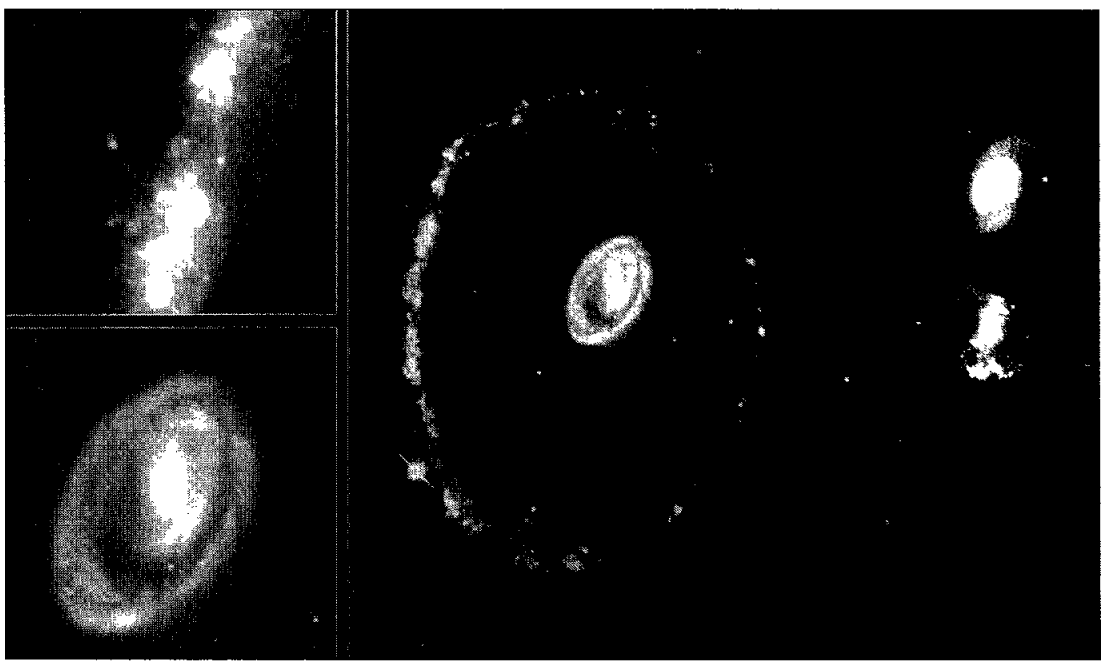
One image shows a single star that blew off its outer shell 1,000 years ago and the other shows the unusual result of two galaxies colliding. Both images were taken with the Wide Field and Planetary Camera.

An image nicknamed "Ring World" shows a rare and spectacular head-on collision between two galaxies 500 million light-years away in the constellation Sculptor. The galaxy, called the Cartwheel Galaxy, is surrounded by a ring-like feature which is a direct result of a smaller intruder galaxy—possibly one of two objects to the right of the ring—which careened through the core of the Cartwheel Galaxy.

The collision sent a ripple of energy into space, plowing gas and dust in front of it. The ring is now a birthplace for at least several billion new stars and is so large the entire Milky Way Galaxy would fit inside. Hubble resolves bright blue knots that are gigantic clusters of newborn stars and immense loops and bubbles blown into space by exploding stars going off like a string of firecrackers.

An image nicknamed "Cat's Eye Nebula" is a colorful preview of the possible eventual fate of Earth's Sun. The image shows a planetary nebula named NGC 6543 that is in the last stages of its life after an explosion about 1,000 years ago blew away the outer gas layers of the star.

This image reveals surprisingly intricate structures including concentric gas shells, jets of high-speed gas and unusual shock-induced knots of gas. The nebula, 3,000 light-years away in the northern constellation Draco, is a visual "fossil record" of the dynamics and late evolution of a dying star.



NASA Photo

COSMIC COLLISION—Right: A rare head-on collision between two galaxies 500 million light years away. The ring-like feature is a result of a smaller galaxy careening through the host galaxy. The collision sent a ripple of energy into space creating a firestorm of new stars. Top left: This knot-like structure of the ring shows new star formation. Bottom left: Bright pinpoints are gigantic young star clusters.

JSC

Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Store from 10 a.m.-2 p.m. Monday-Thursday and 9 a.m.-3 p.m. Friday. For more information, call x35350 or x30990.

Musical concert: Les Miserables at 2 p.m. Mar. 26 at the Wortham Center. Tickets cost $42. Tickets on sale through Feb. 10.

Rodeo tickets: Several performances to choose from. Tickets cost $9.

Hockey Tickets: Houston Aeros vs. Cincinnati 7 p.m. Feb. 3 at the Summit. Cost is $11 for lower prom. Tickets on sale through Jan. 25.

Moody Gardens: Discount tickets for two of three different attractions: $9.50

Space Center Houston: Discount tickets: adult, $8.75; child (3-11), $7.10.

Metro tickets: Passes, books and single tickets available.

Movie discounts: General Cinema, $4.75; AMC Theater, $4; Loew's Theater, $4.75.

Stamps: Book of 20, $6.40

JSC history: *Suddenly, Tomorrow Came: A History of the Johnson Space Center*. Cost is $11.

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 NASA badge or yellow EAA dependent badge. Classes tend to fill up two weeks in advance. Payment must be made in full, in exact change or by check, at the time of registration. No registration will be taken by telephone. For more information, call x30304.

EAA badges: Dependents and spouses may apply for photo identification badges from 7 a.m.-9 p.m. Monday-Friday; and 8 a.m.-4 p.m. Saturdays. Dependents must be between 16 and 23 years old.

Weight safety: Required course for employees wishing to use the weight room is offered from 8-9:30 p.m. Jan. 26 and Feb. 7. Pre-registration is required. Cost is $5.

Defensive driving: Course is offered from 8:15 a.m.-3 p.m. Saturday. Next class is Feb. 11. Cost is $19.

Aerobics: High/low-impact class meets from 5:15-6:15 p.m. Tuesdays and Thursdays. Cost is $32 for eight weeks.

Exercise: Low-impact class meets from 5:15-6:15 p.m. Mondays and Wednesdays.

Aikido: Martial arts class meets from 5-7 p.m. Tuesdays and Wednesdays. Cost is $25 per month. New classes begin the first of each month

Tennis league: A spring tennis league may be started if there is sufficient interest. Contact the Gilruth Center at x33345.

Country dancing: Beginners class meets from 7-9 p.m.; advanced class meets from 8:30-10 p.m. Partners are required. For additional information, contact the Gilruth Center at x33345.

Ballroom dancing: Ballroom dancing classes. Cost is $60 per couple. For additional information call the Gilruth Center at x33345.

Golf Association: Sign up for the 1995 league will begin in Feb. To join call Harry Kolkhorst at x33312.

Fitness program: Health Related Fitness Program includes a medical examination screening and a 12-week individually prescribed exercise program. For more information, call Larry Wier at x30301.

JSC

Dates & Data

Today

Cafeteria menu: Special: baked chicken. Total Health: roast beef au jus. Entrees: deviled crab, baked chicken, beef cannelloni, steamed pollock, Reuben sandwich. Soup: seafood gumbo. Vegetables: seasoned carrots, peas, breaded okra, steamed cauliflower.

Saturday

Career workshop: A Career Transition Workshop will be held from 9 a.m.-4 p.m. Jan. 21 at University of Houston Clear Lake. For additional information call Don Cravey at x30148.

Monday

Cafeteria menu: Special: hamburger steak. Total Health: vegetable lasagna. Entrees: beef Burgundy over noodles, barbecue smoked link, vegetable lasagna, steamed fish, French dip sandwich. Soup: chicken and wild rice. Vegetables: buttered corn, steamed spinach, vegetable sticks, navy beans.

Tuesday

Cafeteria menu: Special: turkey and dressing. Total Health: roast turkey. Entrees: barbecue spare ribs, liver and onions, baked chicken, steamed fish French dip sandwich. Soup: black bean and rice. Vegetables: steamed broccoli, California vegetables, breaded squash, savory dressing.

Wednesday

Blood Drive: Krug will host its annual blood drive from 8-11:30 a.m. Jan. 25 at the Krug Bldg. For additional information call Beth Brumley at 212-1204.

SBA workshop: The NASA Johnson Technology Commercialization Center will host a Small Business seminar and workshop from 3-5 p.m. Jan. 25 at 2200 Space Park Drive. For information call Jill Fabricant at 335-1250.

Astronomy seminar: The JSC Astronomy Seminar will meet at noon Jan. 25 in Bldg. 31, Rm. 129. An open discussion meeting is planned. For more information, call Al Jackson at 333-7679.

Toastmasters meet: The Spaceland Toastmasters meets at 7 a.m. Jan. 25 at House of Prayer Lutheran Church on Bay Area Blvd. For additional information, contact Darrell Boyd, x36803.

Bike ride: The JSC Bicycle Club will meet for a 1.1- and a 1.6-mile loop at 5:30 p.m. Jan. 25 behind the Grumman Bldg. at Ellington Field. For additional information call Juliette Wolfer at x38459.

Cafeteria menu: Special: Mexican dinner. Total Health: ground turkey tacos. Entrees: beef cannelloni, turkey tacos, steamed fish, Reuben sandwich. Soup: seafood gumbo. Vegetables: peas and carrots, ranch beans, mustard greens, Spanish rice.

Thursday

SOLE meets: The Society of Logistics Engineers will meet at 5:30 p.m. Jan. 19 at the South Shore Harbour Country Club. For additional information call Richard Wolfe at 283-6863.

Cafeteria menu: Special: smothered steak. Total Health: steamed pollock. Entrees: chicken and dumplings, corned beef and cabbage, broccoli cheese quiche, steamed fish, French dip sandwich. Soup: navy bean soup. Vegetables: steamed cabbage, cauliflower au gratin, buttered carrots, lima beans.

Friday

AIAA meeting: The American Institute of Aeronautics and Astronautics will host a dinner at 6 p.m. Jan. 27 at the Lone Star Flight Museum. For additional information call Tanya Bryant at x31175 or Fran Jamison at 333-6277.

Cafeteria menu: Special: baked meatloaf. Total Health: baked potato. Entrees: chicken fajitias, ham steak, pork and beef eggrolls, steamed fish, Reuben sandwich. Soup: seafood gumbo. Vegetables: stewed tomatoes, seasoned spinach, cut corn, macaroni and cheese.

Feb. 1

Astronomy seminar: The JSC Astronomy Seminar will meet at noon Feb. 1 in Bldg. 31, Rm. 129. An open discussion meeting is planned. For more information, call Al Jackson at 333-7679.

Toastmasters meet: The Spaceland Toastmasters meets at 7 a.m. Feb. 1 at House of Prayer Lutheran Church on Bay Area Blvd. For additional information, contact Darrell Boyd, x36803.

Bike ride: The JSC Bicycle Club will meet for a 1.1- and a 1.6-mile loop at 5:30 p.m. Feb. 1 behind the Grumman Bldg. at Ellington Field. For more information call Juliette Wolfer at x38459.

AIAA Luncheon: The American Institute of Aeronautics and Astronautics will host a luncheon at 11:45 a.m. Feb. 1 in Rm. 206 at the Gilruth Center. For additional information call Naz Bedrossian at 333-2127.

Feb. 6

Aggies meet: Dr. Ray Bowen will present an address on the State of Texas A&M University at 7 p.m. Feb. 6 at the San Luis Resort. For tickets and additional information call Rob Way at 332-3077.

JSC

Swap Shop

Property

Sale: Heritage Park, 3-2-2, new roof, A/C, in/ext paint, landscaped, spiral staircase to loft/gameroom, 2000 sq ft, $91.5k/obo. 996-6062.

Sale: Baywind II, 2-2-2, W/D, FPL, ceiling fans, upstairs, no pets, available immediately, $515/mo + $250 deposit. x32168 or 474-7982.

Sale/Rent: Egret Bay waterfront condo, 1-1, FPL, fans, W/D, dishwasher, microwave, balcony, cov parking, boat ramp, dock, pool, entry gate. $530 + deposit. Karl, x33031 or 334-1164.

Rent: Galveston condo, furnished, sleeps 6, Seawall Blvd & 61st, cable TV, wnd/wkly/dly rates. Magdi Yassa, 333-4760 or 486-0788.

Sale/Rent: Baywind I condo, 1-1-1, appliances, ceiling fans, private balcony, $380/mo + deposit or $22k. bill, 471-3999.

Rent: Tranquility Lake condo, 1-1, 600 sq ft. new full sz W/D, new A/C, FPL, cov parking, $450/mo. 333-2173.

Sale: 5-10 acres, Alvin, cleared, new barn. x30737.

Sale/Lease: Clear Lake Forest, lg 5 BR, 1-story house on oversized wooded lot, new carpet, updated kitchen, lg walkin closets, covered patio, $129.9k or $1.3/mo. 474-3507.

Lease: Clear Lake City, condo, 1 BR, W/D connections, FPL, no pets, unit JAB, $435/mo + $435 deposit. Charli, 488-8102.

Sale: Clear Lake City, 4-2-2, lg fenced lot, near schools, park, pool, new appliances, $90k. 282-3479 or 532-1112.

Sale: Alvin/Santa Fe, 2 BR, brick home on 1.17 acres, stock pond & horse ready, loan assumable @ 7.25%, $68.5k. Eric, x39491.

Cars & Trucks

'85 Nissan Sentra, 5 speed, A/C, 2 door, silver/gray, 140k mi, $1.2k/obo. 332-2571.

'82 Cadillac Sedan deVille, ex cond, loaded, 21k mi, $6.9/obo. Rich, x41089 or 480-8335.

'92 Mazda Miata MX-5, red/black, B-pkg, 24k mi, 6yr/100k warr, ex cond, $16k/obo. James, x31064 or 334-1766.

'85 Porsche 944, black, 5-spd, sunroof, A/C, AM/FM/cass, $4,995. x35180 or 326-3706.

'91 Toyota Camry, black, 5-spd, tinted windows, 4-dr, A/C, AM/FM/cass, ex cond, $6.5k. x48779 or 432-0742.

'87 VW Golf, 4-dr, 5-spd, A/C, sunroof, hi-mileage, needs work, can be driven as is, $2.4k. Kirsten, 283-9236 or Reed, 480-3838.

'80 GMC 1/2 ton PU, good cond, auto, long bed, 350 V-8. Carole, 486-2103 or 482-2741.

'91 Peugeot 405S, loaded, ABS pwr door locks, sunroof, cell phone, leather interior, ex cond, $4,875. 554-4799.

'81 Toyota Corolla, new engine, good cond, $800/obo. Mike, x33300 or 480-5168.

'87 Ford Escort wagon, A/C, 4-spd, 108k mi, reliable transportation, $1.1k. 286-8060.

'86 Chevette, auto, good A/C, clean, one owner, 78k mi, $1.3k. Juan, x38833 or 333-0406.

'93 Model 27' Aljo Deluxe fithwheel camp trailer w/hitch, ex cond, $13k. x33437 or 332-2705.

'83 Mazda truck, 7' bed, AM/FM/cass, toolbox, good mileage, recent paint, $950/obo. 286-9727.

'91 Toyota MR2, white, auto, sunroof, 50K mi, ex cond, factory manuals, $12k/obo. 996-8516.

'94 Ford Ranger XLT, ext cab, 5-spd, maroon & sandstone, ex cond, A/C, stereo, chrome wheels, 21k mi, capt chairs, $12.2k. 997-7567.

'81 Rabbit diesel engine, complete, block damaged in crash, head & other parts ok, parts from other car also, hatch, seats, etc. Dennis, x39012 or 992-5285.

Cycles

'87 specialized Sirrus road bike, 58 cm frame, Shimano 105 components, Campagnolo aerodynamic rims. Time pedals, $250/obo. x48112 or 480-1800.

'89 Trek 2000 road bike, 54 cm frame, Shimano 600 Ultrega components, $450/obo. x48112 or 480-1800.

'80 Suzuki GS550L. low miles, minor work, looks good, HJC helmet, $700. 332-8041.

Boats & Planes

'85 Glouster 20' sailboat w/trailer, sails, & '91 Evinrude 9.9hp O/B, $3k. Carlos, 870-9512.

'94 galvanized trailer for 17' to 19' boat, $950/obo. Bob, x44431 or 326-5616.

'95 Searay BR, 18', 135hp Mercruiser I/O, galvanized trailer, skis, vests, boat cover, less than 20 hrs, $12k/obo. x37739.

Kawasaki 440 cc Jet Skis, 2 w/trailer, ex cond, $3.5k. Joe, x32464 or 486-4026.

'95 Seadoo XP w/trailer, cover, custom grate, rear step, ex cond, $3.7/obo. Mark, x38211 or 331-9345.

Inflatable dinghy, good cond, appprox 9' long. x38278 or 334-7358.

Audiovisual & Computers

CSX-140 Citizen printer w/GSX color option, $250. Magdi Yassa, 333-4760 or 486-0788.

Sony car Discman w/car kit & wireless remote, $200/obo. Thanh, x31464.

Loudspeaker system, Infinity SM120 200w 3-way speakers, $500/pr; Proton, D1200 100w/ channel power amp & Proton P1100 preamp, $350 or $800/all. Chris, 280-4394 or 474-7263.

Laptop 386 SX25 w/4 MB RAM & 120 MB HD, mono screen, mouse, ports for ext kybd & monitor, 9600 fax & 2400 data modem, $500. David, x34282 or 992-5859.

IBM PC Clone cpu & kybd, two 5" FDs, no HD or monitor, 640 k memory, good cond, some software, $50. Musgrove, x38356 or 488-3966.

Panasonic phone w/answering machine, ex cond; NCI telecaption machine, $69/ea. Tom, 282-5236.

486/DX2/66, 4MB 420 HD, 3.5 FD, 2XCD, SVGA, 58, 14.4k FX/MD w/printer, $1.2k; new 270 HD, $150. x35549 or 554-7104.

Novatel cellular phone, car mounted, ex cond, $65. 554-4799.

Apple Macintosh LC II 4/80 w/monitor & kybd, $650/obo or will sell LC II separately, $425/obo. x38871 or 538-1887.

Atari 800 computers, monitors, modem, accessories & program discs, $150/obo. Steve, x37152 or 992-7049.

Mac SE computer, 5 MB, 20 MB Apple HD, $450. 488-7771.

Commodore 128 color monitor disk drive, mouse, joysticks, software, Koala pad, $200. Bob, x34409 or 393-1670.

Photography

Mamiya, M645, 6 x 4.5 cm single lens, Reflex; PD-Prism viewfinder; lens; 45 mm 2.8 Sekor; 80 mm 2.8 Sekor w/lens hoods; 120 & 220 roll film inserts; Delux "L" Grip; closeup kit; flashbracket; alumn case, ex cond, make offer. John, 326-2461.

Beseler PM2 color analyzer, trays, tanks/ reels, safelights, easels, print washer, dryer, etc. Steve, x37152 or 992-7049.

Musical Instruments

Yamaha Pacifica 721 electric guitar, w/case & some music. 482-2369.

Pets & Livestock

Free red, toy poodle, female, spayed, 11 mos, house trained. 333-2263.

AKC Chihuahuas, shots, wormed, male/ $150 ea; female/$175 ea. 337-9218.

American Eskimo puppy, 4/mos, no papers but purebred, shots, wormed, $75. Susan, x36534 or 486-7428.

Free cats, females, 1 tiger gold, shots, declawed, spayed, 1 calico, shots, both 10/mos. Diane, 212-1227 or 335-1245.

Free puppies, Golden/Labrador retriever mix, born 11/94. x47089 or 488-7982.

Household

Jenny Lind cradle, w/mattress, pillow, bumper pad set & comforter, $75; W/D, $100/ea. Dennis, x39012 or 992-5285.

Fisher Price infant carseat w/canopy, $25; Nuline portable crib w/mattress, bumper pads, $60; lg sz playpen, $30; primary colors bumper pad set w/sheets, dust ruffle & comforter, $35. Ginny, 486-4870.

Super twin-size waterbed w/heater & solid wood frame w/bookcase headboard, ex cond, $65/obo. x31913 or 326-4003.

Danish style dining set, 4-capt chairs, lg table, blue tweed upholstery, oak, $250; white French Provencal dresser, mirror, chest, $250; white French canopy bed, triple dresser, mirror, desk, hutch, box-spring/mattress, linens, $400. x9419 or 332-2697.

King size black lacquer air bed, $150; kg sz orthopedic mattress/boxsprings & frame, $500. Joe, x32464 or 486-4026.

Light brown sectional w/hide-a-bed, $300. Bob, x35900 or 332-1782.

RCA 25" color console TV, works good, $125/ obo. Sam, 332-3168.

Rolltop desk w/chair, solid wood, ex cond, $350 firm. 474-9779.

Dresser 4 drawers w/mirror, $50; 5-drawer dresser, tall, $60: dbl bed w/mattress, $25; table lamp w/stand, $15. x49691.

Dining set, chrome & glass table w/4 upholstered chairs, burgundy, $100/obo. Mark, x37591 or 488-0056.

Jenn-Air downdraft cooktop, stainless steel, coil elements, grill, 2 element cartridges, griddle, $225; natural wood table & 4 chairs, $125. Jeff, x31975 or 286-1935.

Qn sz waterbed w/6 drawers, bookcase headboard w/mirror, mattress/heater, liner/rails, $80. 922-4117.

Zenith brand 24" console TV, $100. James, x36666 or 487-5730.

Stereo cabinet w/3 shelves & smoked glass door, $35. 538-2696.

Antique oak hdbd/ftbd, full sz, metal frame, $150; antique oak dresser w/3 drwrs, $200; antique armoire w/2 hanging compart & 5 sm drwrs, $200. 538-2696.

Living room 3 pc sectional, $350; mirrored coffee table, $50/obo. 332-1793.

Dark wood, qn sz waterbed w/centered mirror hdbd, bladder has 50% wave reduction, $50. Jenny, x47583, 538-2675.

Bunkbeds w/mattresses, solid wood, $100. x33131 or 486-5217.

Sofa/sleeper, $175; chair & ottoman, $10; kitchen table & 6 chairs, $75. Mark, x37370.

Wanted

Want personnel to join VPSI vanpool, West Loop Park & Ride lot at 6:50 p.m. to NASA/ contractors. Richard Heetderks, x37557 or Ed Rangel, x36124.

Want personnel to join VPSI Vanpool departing Meyerland Park & Ride lot at 7:05 a.m. for JSC, vanpool consists of on-site personnel working the 8 a.m.4:30 p.m. shift. Travis Moebes, x45765 or Don Pipkins, x35346.

Want low priced school/work car or truck. 271-7011.

Want roommate, 4 BR, 2-story modern house in Seabrook, 12 min from NASA, separate living area w/loft, $375. 474-4742.

Want full time, live-in or live-out nanny position available in Seabrook. Mike or Debbie. 474-5471.

Want exterior plywood, 2 x 8's, roofing felt, sheet rock, exterior paint & primer, shingles, carpet. Tim, x38843.

Want roommate, non-smoker, 4-2, Friendswood, cable, W/D, microwave, VCR, gas grill, FPL, & household privileges, $250/ mo, all bills pd. Michael, x38169 or 482-8496.

Want STS-63/STS-71, Commerative T-shirt, $7.50. x31633 or 486-9766.

Want roommate to share house in Clear Lake, $300/mo + 1/2 utilities. 286-8434.

Want non-smoking roommate to share new LC house w/couple, no pets, $350/mo, bill pd. 338-2026.

Want housemate to share new house, Kemah, 4-2.5, garage, $300/mo + 1.2 util, + dep. Jeri, 333-7552.

Want a garage apt or private living quarters in CL area, ASAP. 990-5543.

Miscellaneous

Wedding ring set, 3/4 carat total weight, 14k gold, $450. 280-8383.

Color 24" TV console in walnut, ex cond, $250; dk blue sleeper sofa, love seat, rocker & ottoman, $350/set; gas edger, $120. 992-3642.

Filigreed heart charm, 14kt w/18" box chain, $70; 14kt gold dia-cut rope bracelet, 7", 3mm wide, $70; 14kt shrimp earrings, $40. Eric, x31917.

Day-timers planners w/zipper notebook, full 8.5 x 11sz, desk paper punch, fillers through Sept '95, $75; telephone ans mach, $25. Eric, x31917.

President & First Lady lifetime membership, incl daycare, $350, $10/mo fee beginning 2/1/95. x31025.

Child's set of golf irons, golf clubs, $20; sm thin, free pieces of plexiglas; infant inter clothes, $4-$8/ea; infant year round wear, $3/ea; 2 dress suits for sm boys, 1 navy blue, 1 yellow, $10/ea; Texas barbed wire wreaths, $10/ea. x38217.

A season pass to Astroworld & Waterworld, good for both parks during '95, $50. x32264.

Chevy wire spoke hubcaps w/locks, set of 4, $75/obo. Mike, 484-0987.

Gerrybooster seat, V clean, MDL #675, $25; 2 ship masthead lamps, brass & copper w/curved glass 7 1/4 dia x 12"H, $40/ea or $70/pr; rigid foam attic ceiling door insulation kit for R.O. 22" x 54" or 25.5" x 54", $15; camp cook set, enamel on steel, $15; stoneware, incomplete place set for 6, $20. Doug, x48851 or 486-7412.

Impex Quik-Step model QS 900SR, new $150 to $200, sell $75/obo; briefcase that attaches to bike, new $175, sell $75/obo. Kim, x38276 or David, 280-8693.

Vitamaster exercycle, speed/odometer, $100; Gympac 1000 wt/exercise unit, ex cond, $250. Carol, x34704 or 482-0935.

RX7 car cover, $30; Alpine subwoofer, $50; Chilton's manual for Mazda car, '78-'93, $10. Jim, x35366.

Sears Lifestlyer 2808 treadmill, 1.25 hp, 8 mph, auto incline, 50 miles use, new $450, sell $300/obo. Michelle, x31109 or 474-7263.

Presidents & First Lady charter gold membership, $700. Mike, 282-4180 or 996-9440.

Bearcrafter Windsurfing racks, $75; bridal slip, sz 6, $10; women's roller blades, sz 8, $25; juicer, $20; beige mini-blinds, four 35" x 46", one 43" x 46", $7/ea; wedding cake top, $15; black graduation cap & gown, sz med, $5; two tennis rackets, $10/ea. Su, x45722.

Triple action exercise bicycle, displays spd/ distance/time/calories burned & scan, ex cond, $100/obo; white qn sz waterbed mattress cover, ex cond, $20; stuffed Kola Bear dresser lamp, $5; various stuffed animals. 992-1768.

Stationary bike, 40 lb flywheel, Vitamaster ergometer, $75. 482-7945.

Full size pool table w/ball & 6 cue sticks, $200. Plauche, x39034 or 474-2660.

British .303 Lee-Enfield #4, new, 1950 production w/bayonet & scabbard, $200. x37346.

Genuine Mont Blanc fountain pen, $65; tennis bracelet, sapphire & diamond, $250/obo; 3 eelskin portfolios, beige, blue, black, $75/ea; Motorola cellular phone w/charger, $100; lg unfinished armoire, $100. 992-7120.

Five-wheel custom in-line skates, Riedell boot, sz 8, Airlite plate, sidewinder indoor wheels, very fast, $225. Jeff, 482-9576.

Ladies silver fox fur jacket, $300. Linda, 484-0987.

Baseball card collection, sets, individual stars, commons, other misc memorabilia, sell all or part. 479-4463.

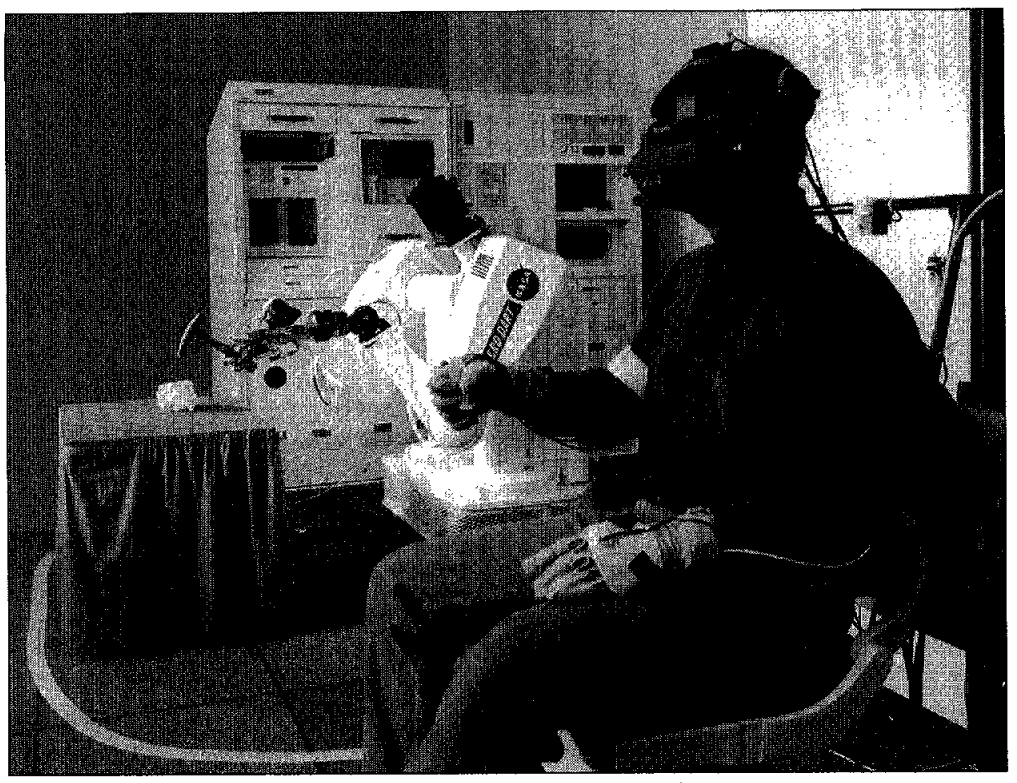
Wood open entertainment center; 2 chain fire rescue ladder; Pioneer stereo dual cassette tape deck; Technics digital stereo receiver; 1 pr Hitachi speakers, Dell 286 w/20 mg HD, 5 1/4 fd, EGA monitor; Graco premier stroller; wood table. 480-7257.

Soloflex muscle machine w/instruction video, $295; President & First Lady premier plus membership w/1 yr free & $6/mthly after '95. $450. Eric, x39491.

Ladies 14kt gold, 1.3 carat heart shaped diamond ring, "D" color SI clarity, stairstepping mounting on sides w/4 rows of 30.02 diamonds in each row channel, appraised $13.5k sell $6.5k. Cindy, 282-4122.

Tropical plants, all in permanent pots, large to small sz, various kinds, $5 & up. Bob, x33149.

1988 Fleer, '88-'89-'90 Donruss, '90 Score, '90 Bowman, '91 Donruss unopened factory sets, $100 for all 7 sets; nine 1909-1911 Tobacco baseball cards, $100; Sparkling water/juice carbonation unit, $20/obo. Tony, x47401 or 482-4156.



Virtual Presence

DART robot turns geologist as scientists, engineers team up

[Editor's note: This is the final installment in a two-part series on the development and application of the Dexterous Anthropomorphic Robotic Testbed.]

By Nancy Ann Budden

The scene is a human cloaked in a pair of wired gloves and a helmet, seated in a rotating chair. As the human slowly moves his hands and body, a large white robot behind him grasps rock tongs, picks up a rock, drops it into a sample container, closes the container and places it on a table. The human operator performs as if in mime, without tongs, without rocks, gloved hands empty.

This is a demonstration of full immersion telepresence, using a robot to perform routine geological tasks. It's also the marriage of two cultures, two areas of expertise—planetary science and exploration—working together with intelligent systems and robotics.

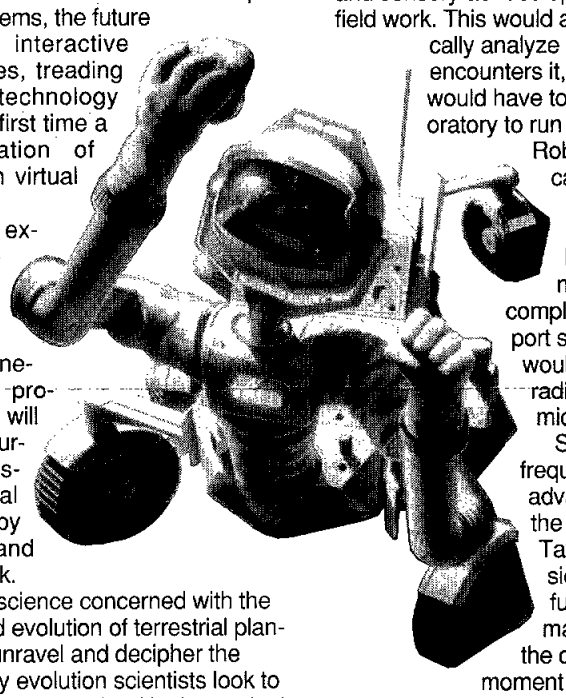
Planetary scientists in Space and Life Sciences' Earth Science and Solar System Exploration Division and robotics engineers in Engineering's Automation and Robotics and Simulation Division have teamed up at JSC with a common goal: to study the feasibility of using virtual reality and telepresent robots to explore the planetary surfaces of the Moon and Mars.

The effort focuses on how to use the capabilities and applications of the Dexterous Anthropomorphic Robotic Testbed, developed by a team led by robotics expert Larry Li, for human and robotic missions to the Moon and Mars.

Mission analysts in the Planetary Missions and Materials Branch are developing options on where to go, how to get there, how many crew members are needed, what equipment and supplies are needed, and what will be accomplished on the surface. Such planning has in the past included the use of robots for routine scientific tasks and exploring planetary surfaces. Robots of this type require human operation (telepresence) and are highly interactive. These "robotic field geologists" are like the Star Wars CP3O with a rock hammer.

Early this year, mission planner and geologist Nancy Ann Budden and engineer Joyce Carpenter teamed up to answer the question: "Can DART really perform basic geology tasks?" The primary objective of the collaborative effort is to simulate an interactive teleoperated robot conducting geologic field work on the Moon or Mars, and derive information that will benefit both the robotics team and the planetary exploration team in the areas of robot design and development, and mission planning and analysis.

The goal of this activity is to team up a group of scientists and engineers that come from two different NASA cultures, providing mutual benefit to both. The Earth Science and Solar System Exploration Division combines the past with the future contributing experience from Apollo crews exploring the lunar surface, knowledge of reduced gravity environments, the performance limits of space suits, and future goals for the human exploration beyond low earth orbit. The Automation and Robotics Division brings to the table the technical expertise of robotic systems, the future goals of highly interactive robotic capabilities, treading on the edge of technology by joining for the first time a unique combination of telepresence with virtual reality.



The geologic exploration of the Moon and Mars will be one of the primary functions of any planetary exploration program. Exploration will consist of early surface reconnaissance at regional scales, followed by more detailed and localized field work.

Geology is the science concerned with the origin, history, and evolution of terrestrial planetary bodies. To unravel and decipher the record of planetary evolution scientists look to the historical archives contained in the geologic record. This involves studying the rocks in their natural environment or "field work." This type of exploration is a highly iterative process that may require repeated visits to the same site interspersed with laboratory analyses and revision of the working hypothesis. The course of study may be completely changed by the clues contributed by a single significant rock sample.

The key elements necessary for geologic exploration are intensive work capabilities and the guiding influence of human intelligence and experience. Only humans can take brand new observations, integrate them into the brain's stored memory of geologic settings encountered in person and in study, and come up with a novel idea.

Because many regions of a planet may be hostile or inaccessible for humans (too hot, too cold, too steep, too stormy, too dangerous), the idea of using robots to explore planetary surfaces is a desirable mission option. Lunar scientists Paul Spudis of the Lunar and Planetary Institute and Jeff Taylor of University of Hawaii first suggested that the most effective way to accomplish the goals of geologic field study on the Moon is through the use of teleoperated robots under the direct control of a human geologist that remains at a lunar base or on Earth.

The use of teleoperated robots have many potential advantages over humans. They could be built with a global traverse range and optical and sensory abilities optimized for geologic field work. This would allow the robot to chemically analyze a rock as soon as it encounters it, where the human would have to return the rock to a laboratory to run analyses on it later.

Robots can possess physical strength superior to humans, and have the ability to work in a harsh lunar or Martian environment unencumbered by complex and massive life-support systems. Robots also would be less affected by radiation exposure and micrometeorite impacts.

Scientific discovery most frequently makes its greatest advances by the unveiling of the unexpected. Spudis and Taylor came to the decision that pre-programmed fully autonomous machines are incapable of the on-site spur-of-the-moment decision making necessary to change and revise an ever-improving hypothesis of study. Human intelligence, experiential analog base, and interaction during the field work is an absolute necessity to explore the unexpected or never-encountered.

As good as it sounds to offload exploratory tasks on a robot, the fact remains that nobody has ever attempted to test just how capable a teleoperated robot would be. Can robots really be employed on an extraterrestrial surface? The goal of this collaboration was a reality check. Budden and Carpenter decided to simulate planetary exploration using an actual robot, give it real geologic tasks to accomplish, using real Apollo lunar geology tools, and real earth rocks.

In fact, DART is very similar to the robot that future planners include in their missions. For this reason, it was the perfect candidate to test-run exploration tasks, in an attempt to see just how difficult it would be to do planetary geology in a telepresent mode.

Testing DART for geologic ability first required generating a list of tasks that would be required for a robotic field geologist to perform on the Moon or Mars. These tasks fell into three categories: dexterity, tool operation, and optics and imaging. To evaluate dexterity, DART was asked to perform such actions as picking up and rotating a rock, placing it in a sample bag and closing the bag.

Tool operation was assessed by having DART use a collection of Apollo-style geology hand tools. DART had to hold and move an independent light source, pick up a rock hammer, strike and chip a rock, pick up and operate a rake, hoe, rock retriever, core tube, set up a gnomon (a color and orientation device), and pick up and operate a Mossbauer iron analyzer.

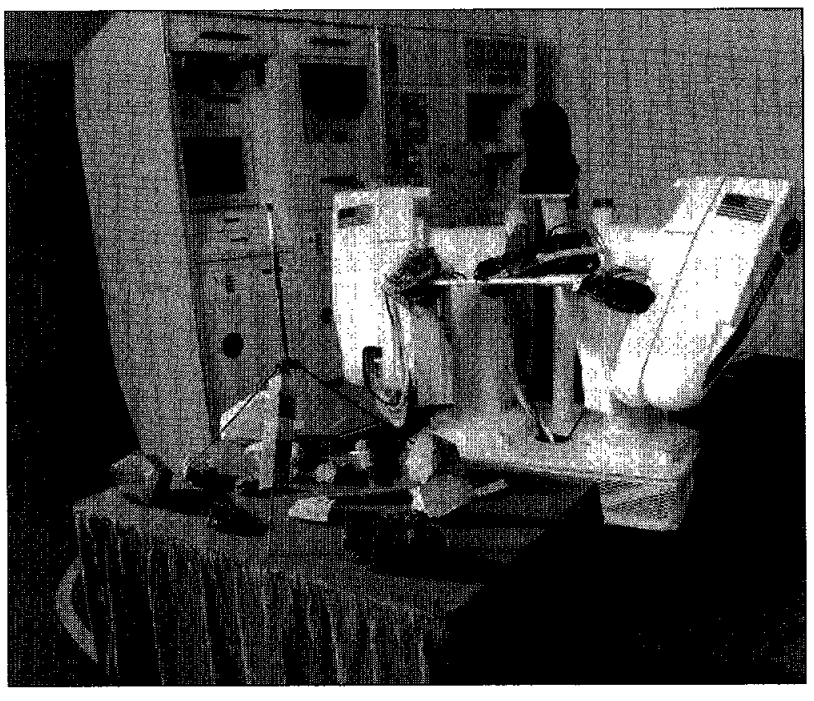
DART's final task was a "rock identification test" to determine its resolution and imaging. Equally important were the capabilities of specialized eye-hand coordination required in a true field setting to observe and differentiate color, size, and subtle textural and crystalline features. To assess how user-friendly the robot's exoskeleton and helmet would be to someone new to the system, a professional geologist—Dean Eppler of SAIC—was put through a rock and mineralogy "test."

Preliminary results favor the use of robots as telepresent explorers, under the direct control of humans. DART proved to be highly dexterous, capable of performing even the slightest movements with amazing accuracy and control. The robot was able to use a variety of tools with very little time required to train the operators. With a few minor modifications to the tools themselves, DART would be able to use them even more efficiently. Dean was able to learn to operate DART with a minimal amount of training.

The one area where DART needs improvement is in its optical system. The current camera system lacks sufficient resolution for distinguishing the very fine rock textures and features.

Future studies will compare DART's capabilities to a human confined by an EVA suit and gloves and explore possibilities for equipping DART with special sensors to analyze rocks in the field, or specialized cameras that can zoom and focus only inches away or miles from DART.

The cross-cultural team will continue the quest to explore where no human has gone before. For some of the more dangerous areas, using intelligent capable robots, perhaps no human will have to go at all. ❑



Top: Larry Li, developer of the Dexterous Anthropomorphic Robotic Testbed, commands the robot to strike a rock with an Apollo-style geology hammer by miming the action. Center: Artist Pat Rawlings' 1989 a rendition of what a prototype robot field geologist would look like bears an uncanny resemblance to DART. Left: Space and Life Sciences' Nancy Ann Budden, left, and Engineering's Joyce Carpenter discuss a simulated lunar geology test for DART. Far left: DART poses with the Apollo-style hand tools and rocks used in the test.

Computer users should restrict connectivity to official business

Many JSC employees are seeing a new window to the world opening as individual workstations gain worldwide connectivity through the Internet, but JSC's Chief Information Officer says users must remember who is providing the connection and why.

CIO Jack Garman recently issued a JSC Announcement reiterating the center's policy that automated information systems furnished by the government, regardless of their location, are to be used for official business only.

"With this ready access to essentially unlimited information on practically any subject, it is easy to forget that the computer equipment in your office belongs to the government and may only be used to help you do the job NASA is paying you for," Garman said.

Official business broadly includes all job-related work, he said, but some activities clearly are outside the boundaries of official business.

Some of the sources that may be used to determine whether work is job-related include employee position descriptions, contracts, grants, international agreements, job assignments and discussions with supervisors. Official business also may include less formal activity, at the option of the NASA manager or supervisor.

For example, electronic mail messages involving a work-related event such as a technical symposium, class, or presentation are permitted as official business. Electronic mail messages involving activities with center sponsorship, such as the Child Care Center or Gilruth Center, also are permitted. And, staff organizations may use electronic mail to distribute information on events or activities specific to that organization.

On the other hand, Garman said, some activities are outside the boundaries of official business. Use of government computers and networks to maintain or conduct a personal business, to perform personal work, to send chain letters, to access electronic bulletin boards or servers to obtain non-job-related information, and to download non-job-related files or documents are prohibited.

"With the extraordinary growth of home computer systems and modems, folks must excercise the same caution even when using their own equipment but are "dialed-in' to a government network using their NASA or government account or ID," Garman said. "With the increasing availability and decreasing costs of public access to the Internet, there's really no reason for NASA to be embarassed or our employees affected adversely by such misuse."

Every user of a government-furnished computer system should understand that both the systems and the information they contain are subject to occasional audits. All users should be aware that files and electronic mail may be preserved, for example, during back-ups and that deleting files or electronic mail in a user's account may not necessarily remove all copies.

"Although it is not JSC's policy to conduct routine personal data audits on any of its computer systems," he explained, "all users should understand that, under appropriate circumstances, any information in a user's mainframe account, server, or personal workstation, may be examined by supervisors, managers, and even by outside parties such as law enforcement officials."

Garman said any user who has a question about the business relevance of any proposed use of a government computer should ask their NASA supervisor or appropriate NASA official for guidance. Supervisors at all levels are responsible for ensuring that government information systems are used for official business only. The JSC Legal Office at x33021 and the Chief Information Officer at x32700 can provide more information.

Safety center offers slate of 20 training classes

JSC's Safety Learning Center is offering 20 different safety training classes to ensure the center becomes a Center of Excellence for Occupational Safety and Health.

The classes, held in the Learning Center, range from mandatory hazard communication to crime prevention.

Safety Representative Certification: four hours, for safety representatives.

Bloodborne Pathogens: one hour, for employees with potential exposure to bloodborne infectious agents.

Risk Management and System Safety Practice I: 20 hours, for those whose work involves recognizing and managing system risks.

Confined Space Entry: three hours, for those serving as confined space entry supervisors or who are required to enter confined spaces.

Life Safety Code Seminar: 24 hours, for facility planning, layout and design personnel, safety representatives, and fire wardens.

Crime Prevention: three hours, for all employees.

Implementation of Safety, Health and Environmental Protection Requirements in JSC Contracts: two and a half hours, for NASA contracting officers and technical representatives.

Hazard Communication: two hours, mandatory class for all employees with an annual refresher.

Occupational Ergonomics: 16 hours, for all professionals, engineers, and managers.

Level 1 Asbestos: two hours, for employees with potential exposure to asbestos while performing job duties.

Lockout/Tagout: three hours, for employees who service and maintain equipment where the unexpected startup of the equipment or release of stored energy could cause injury. First line supervisors and safety representatives should also take this course.

Protect your Back: four hours, for anyone who wants to learn to prevent back injuries.

Community CPR Refresher: four hours, for anyone who wants to update CPR training.

Computer Ergonomics: two and a half hours, for employees with exposure to ergonomic risk factors.

Payload Safety Review and Analysis: 32 hours, for employees involved in shuttle payloads.

Community First Aid and Safety: nine hours, for emergency response personnel, selected electricians, child care workers and other interested employees.

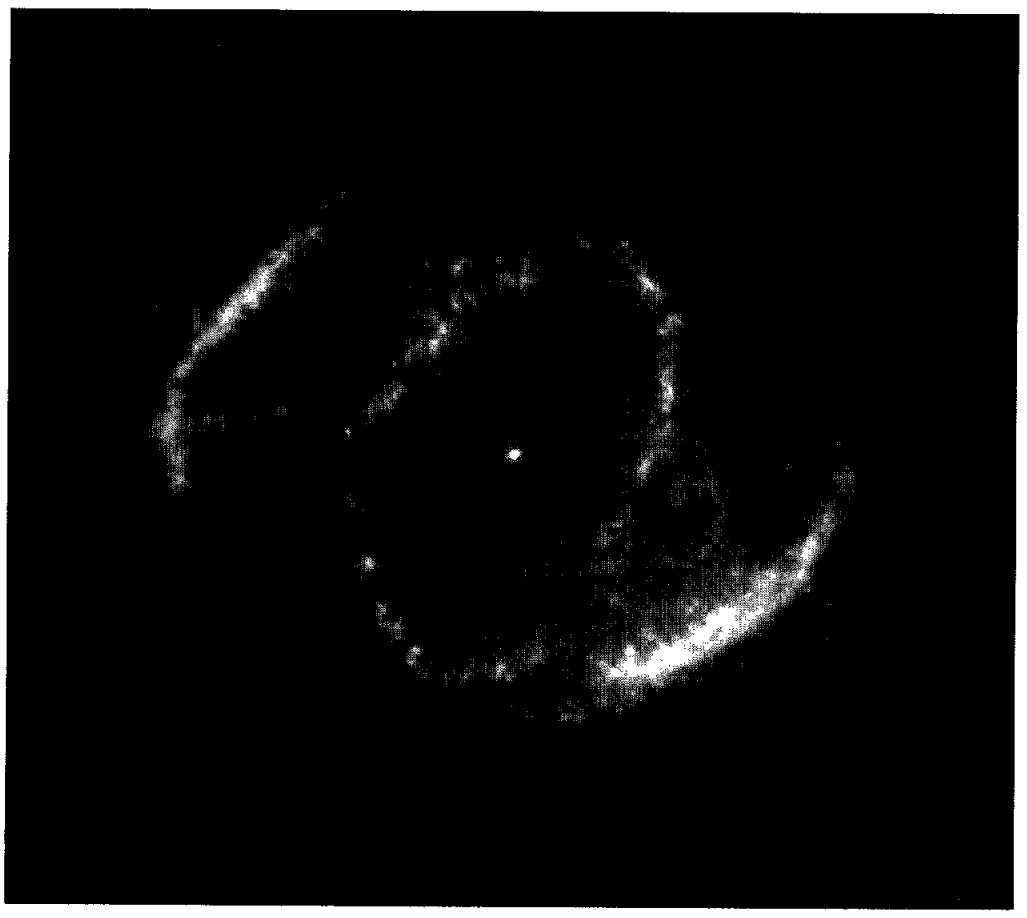
Manager's Safety Course: four hours, for civil service and contractor managers at all levels.

Fire Warden Certification: four hours, for all fire wardens and assistant fire wardens.

Mobile Crane Safety Course: 28 hours, for riggers, operators, signalmen, supervisors and safety personnel.

Facility Manager's Training Course: eight hours, for all facility managers.

A complete list and description is available in the learning center. To register, contact the Safety Learning Center at x36369 or x33801.



NASA Photo

DYING STAR—The "Cat's Eye Nebula" created a cocoon when it began to lose its outer layer of gas. A fast stellar wind has blown off gas concentration from the central star to create the elongated shell of dense, glowing gas. This Hubble Space Telescope image is a visual fossil record of the dynamics and late evolution of a dying star.

Angleton honors JSC

The Angleton Chamber of Commerce recently honored JSC with the Texas Heritage Award.

JSC Director Dr. Carolyn Huntoon accepted the award Thursday on behalf of the men and women of JSC at the Angleton Chamber of Commerce's Heritage Banquet.

"JSC was honored for bringing this area of Texas into the limelight. We are fortunate to have JSC in the Tri-tech region," said Chamber Executive Vice President Dottie Duby.

"The Tri-tech region consists of JSC, the petrochemical industry and the medical center. JSC contributes to the technical and economical viability of our area," Duby said.

JSC joins an elite group of individuals recognized for imagination, courage, determination, wisdom and faith in accomplishing bold and visionary deeds, including Lloyd Bentsen and Dr. Denton Cooley.

International candidates join 1995 astronaut class

Japan's Takao Doi and Canada's David Williams will join the newest group of astronaut candidates as mission specialists.

Their selection brings to 21 the number of candidates selected for training as part of the astronaut class of 1995. The candidates will report to JSC in March to begin a year of training and evaluation.

Doi, representing the National Space Development Agency of Japan, is from Tokyo and has a master's degree in engineering and a doctorate in aerospace engineering.

Williams, of the Canadian Space Agency, is from Saskatoon, Saskatchewan, and has a master's degree in surgery and a doctorate of medicine.

Automated information system security classes offered

JSC will continue its automated information system security classes in 1995 with a variety of classes designed to help many levels of employees who must deal with secure applications and information.

According to Frank Martin, JSC deputy center computer security manager, the classes are scheduled for NASA employees and contractors when enrollment is sufficient for a meaningful session.

The risk management classes have been approved by Human Resources for training credit. The JSC AIS Security for Line Managers course is being finalized and will soon be submitted to Human Resources for approval.

The classes, their duration and their intended audiences are:

Sensitive Application Risk Management:16 hours, for those who have been appointed sensitive application computer security officials and for those who plan, design, develop, and maintain sensitive applications. The class teaches how to conduct tests and risk analyses necessary to ensure that a given sensitive computer application meets applicable federal policies and JSC standards, and how to prepare an end-user contingency plan for use in the event that the primary data processing installation becomes unable to support that application. The class provides tools, methodologies and classroom exercises to permit the student to develop the entire end-to-end application certification and the end-user contingency plan.

Data Processing Installation Risk Management: 16 hours, for those who have been appointed data processing risk managers and for those who conduct risk analyses or prepare and maintain risk management and continuity of operations documentation. The class teaches how to assure users that the processing environment meets appropriate levels of security for the information being processed and prepare a plan for the continuity of operations in the event of a disaster. The class provides the tools, methodologies, and classroom exercises to permit the student to conduct an end-to-end risk analysis of a data processing installation, including the disaster recovery and continuity of operations plan.

Risk Management for Line Managers: two hours, for middle-to-senior NASA and contractor line managers and computer security officers who are responsible for activities supporting automated information security of federal systems. This class acquaints the manager with the federal and agency directives pertaining to automated information security and provides the manager with an overview of the methodologies used to manage risk. The class covers the kinds of products a manager should expect to see as a result of proper security management.

JSC AIS Security for Line Managers: one hour, for middle-to-senior NASA and contractor line managers and computer security officers. The class provides a general overview of security requirements at JSC and acquaints the manager or security officer with the JSC Automated Information Systems Security Manual.

For further information or to register to attend, please call Mara Umpierre at 280-3846.

Goldin says streamlining gives chance to reinvent

(Continued from Page 1)

And more cuts in government are coming, he cautioned. Both the President and Congress want an even smaller government. In December, the President announced he wants to find an additional $76 billion in savings over the next five years as part of his tax-cutting plan.

"We don't know yet if this will affect NASA," he said. "We may know more after the President's State of the Union speech later this month. We'll certainly know more when his budget plan comes out in early February."

NASA is taking a close look at itself now through a number of reviews. Chief among those are the Civil Service and Support Contractor Zero Base Review, and two independent reviews of the space shuttle program. For the Zero Base Review, everything is on the table. The major result of the shuttle studies will be to pare back civil service involvement without compromising safety, he said.

"This is the exciting part of streamlining," Goldin said. "We can totally reinvent ourselves. We can do whatever works. Nothing is sacred. We can change the way people are grouped. We can change the way they're managed. We can focus on what we do best and cut back on the rest."

Hundreds of people are involved in the reviews. Cross-cutting teams of experts from each center are looking at large areas that cross center lines, such as science or engineering or information systems. The end results will be targets and guidelines for centers and Headquarters, due by the end of May.

"We don't know what all of this means," he said. "We can't. The reviews I talked about aren't finished yet. And we don't have the last word on what the President and Congress will do. But here's what we do know. NASA will be smaller, and NASA will be different. We will have fewer people doing more complex work. We won't do some of the things we do now. We can't afford them. But the things we do will be outstanding."

Another given is that cultural diversity will be maintained.

"We are becoming more inclusive, not less," he said. "We're opening the doors of NASA at all levels to the best person for the job. That doesn't mean that suddenly, we value one group and not another. Diversity is including everybody. Each person gets to go as far as their talents can take them."

Another thing that is not expendable in the streamlining effort is the respect and human dignity with which NASA treats its employees," he said.

"You matter," Goldin said. "Whether you've been here one year or 30, many of you have left your mark on NASA. You've done more than that. you've left your mark on this country. We're going to reach our targets with as little disruption as possible. Management and unions will be working together to help us do this. But we will reach our targets."

NASA-JSC