



Fond farewell

Center Director Aaron Cohen reminisces about his 31 years at JSC during a Roundup interview. Story on Page 3.



Ready to fly

The first international astronaut class includes mission specialists from Canada, Europe and Japan. Story on Page 4.

Space News Roundup

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No. 32

JSC group coordinates Perseids storm sightings

By Kari Fluegel

Scientists at JSC this past week coordinated the collection of data and information from around the world during a rare astronomical event—the Perseids meteor shower.

A more intense meteor storm did not materialize when debris from Comet Swift-Tuttle, which passes the Earth 130 years, splattered the Earth with tiny meteorites Wednesday night. Nevertheless, astronomers had a chance to study an event that is not well understood.

In preparation for the Perseids shower, a group from the Solar System Exploration Division outfitted

an observation “command center” at which they collected and analyzed information from storm watchers from around the world.

“It was a standard Perseids meteor shower,” said Faith Vilas, the project lead. “We really didn’t have a storm. We had people reporting in from Slovenia in eastern Europe to Japan. Probably the maximum count came from Slovenia, which is where we expected it to be.”

The activity was organized in concert with the International Meteor Organization, the American Association of Variable Star Observers and other space agency and astron-

omy groups. It was designed to help researchers quantify the risk such events represent to present and future spacecraft operations. The last such storm occurred in 1966 when there were relatively few spacecraft in orbit.

Don Kessler, a member of JSC’s Perseids watch group, said funding has been limited to study meteor storms in the past, and as a result, there is a lack of data. These storms also are difficult to predict. Kessler added that predicting meteor storms is analogous to predicting hurricanes. Weather forecasters can determine that a hurricane exists but

can only guess at its path.

“We know there are clouds of debris out there, but we’re not sure where they are until the Earth passes through them,” he said.

This uncertainty in predicting the storms resulted in NASA delaying the launch of the *Discovery* from Aug. 4 to Aug. 12 last week.

Vilas said amateur and professional astronomers across the United States, Europe and Japan fed information into the center regarding the time, location and frequency of sightings. This allowed the JSC group to determine when the storm started and the peak activity

period. The group received reports in the form of visual, ionization radar and telescopic sightings, Vilas said.

“Both the data and the idea that we can set up a network to gather the data are important,” Vilas said. “We haven’t studied meteor showers much and the amount of data we have now allows us to quantify what the hazard could be to something like a spacecraft.”

Each summer, during a typical Perseids shower, observers can see one or two meteorites a minute. During this storm, however, an estimated 2,500 might be seen each minute.



JSC Photo by Bob Walck

HEALTHY SNACK—Viet Nguyen takes a healthy low-fat yogurt snack from Rich Aucoin at one of the “Total Health” booths set up around JSC this past week to promote the Life Sciences Directorate’s new wellness program, which concentrates on preventive medicine. Also at the booth were Christine Jowid and Michelle Moody. Organizers of the kick-off, which included the introduction of new healthy entrees at the cafeterias and discussions of healthy living, said about 2,000 people visited the booths Tuesday.

Engine shutdown stops *Discovery* in final seconds

By Kelly Humphries

Discovery’s main engines were shut off in the last seconds of the countdown Thursday morning, halting a 21st attempt to launch the STS-51 mission.

The crew—Commander Frank Culbertson, Pilot Bill Readdy and Mission Specialists Dan Bursch, Jim Newman and Carl Walz—remained safe inside *Discovery*’s crew compartment as Kennedy Space Center launch controllers immediately began instituting procedures to ensure *Discovery* remained in a safe condition.

The primary payloads for the flight—the Advanced Communications Technology Satellite and the Orbiting and Retrievable Far and Extreme Ultraviolet Spectrometer—remained safe in the cargo bay.

“We saw the engines start up and felt the vibration, heard the rumble then all of a sudden the red lights came on and the master alarm goes off and we know we’re in a shutdown,” Culbertson said after getting out of the shuttle. “Then we’re just concentrating on making sure the vehicle is safe.”

Space Shuttle Operations Director Brewster Shaw said early reports indicated that *Discovery*’s onboard computers began the shutdown because the No. 2 main engine controller received an erroneous indication of an off-normal fuel flow. Engineers believe one of two sens-

ing systems connected to that controller may have been feeding erroneous information, he said, but more tests are need to prove that.

Once the exact cause of the shutdown is determined, shuttle managers will be able to decide what needs to be done to prepare *Discovery* for another launch attempt.

“When that happens there are certain inspections that are required in order to fly those engines again,” Shaw said.

Shaw predicted another attempt would be made within three to six weeks. There still is a good possibility that NASA will be able to launch three more missions this year.

“Operating this program is a balance between safety and being able to fly,” Shaw said. “We had independent hardware failures and we’ll have to deal with them individually and when everything comes together then we’ll fly just as we have over 50 times in the past. It’s unfortunate, especially after coming off a year like last year where we flew eight flights, seven of them on time essentially. Everybody is disappointed when their car doesn’t start in the morning.”

Otto Goetz, space shuttle main engine project manager, said there are two redundant sensors systems monitoring the fuel flow. One of the four coils that sense the fuel flow didn’t produce any electrical output

Please see **CULBERTSON**, Page 4



Magellan aerobraking success at Venus

Magellan Project officials at NASA’s Jet Propulsion Laboratory announced Tuesday the successful first-of-a-kind experiment to “aerobrake” a spacecraft by dragging it through the atmosphere of a planet.

The Magellan spacecraft’s orbit was changed from highly elliptical to nearly circular by dragging it through the top of the thick Venusian atmosphere repeatedly over a period of 70 days, ending on Aug. 3.

Magellan was the first orbiting planetary spacecraft to use atmo-

spheric drag, or aerobraking, to change its orbit. Launched in May 1989, Magellan was placed in an orbit with a closest approach, or periapsis, of 186 miles (300 kilometers), on Aug. 10, 1990. Its furthest distance from the planet, or apoapsis, was 5,270 miles (8,500 kilometers).

Starting on May 25, with carefully controlled rocket firings, project engineers were able to lower the periapsis to about 87 miles (140 kilometers) which is just skimming the thin upper atmosphere.

The purpose was to reduce the orbital high point, apoapsis, using the atmospheric drag to slow the spacecraft rather than the limited fuel available for the small rocket thrusters, which was not enough for the desired change.

Magellan’s orbit was successfully modified from a 3-hour, 15-minute elliptical orbit to a nearly circular 94-minute orbit, about the same as orbital periods of shuttle flights around Earth.

Please see **MAGELLAN**, Page 4

Mars Observer snaps first photograph

Spacecraft to enter orbit around Red Planet next week

The Mars Observer spacecraft has taken its first photograph of the Red Planet from a distance of 3.6 million miles.

The spacecraft used its high resolution narrow-angle camera to take the photograph on July 26.

The photograph, which has a resolution of about 13.4 miles per picture element, shows the northern hemisphere at the top with the southern hemisphere in shadow at the bottom of the photograph.

The sunrise line stretches across the morning hemisphere from lower right to upper left.

With Mars still 3.6 million miles away, only bright and dark marking

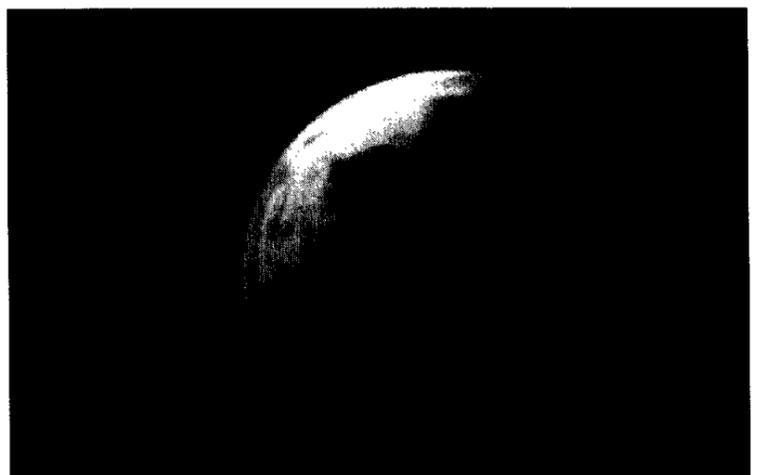
resulting from variations in the amount and thickness of dust and sand are visible. Toward the bottom of the picture is a bright, roughly circular area called Hellas, an impact basin some 1,250 miles across. A dark area in the center of the photo is Syrtis Major, a region of volcanic planes and dark sand dunes. At the top is Nilosyrtis, an area of buttes, mesas and box canyons reminiscent of the deserts of the southwestern United States.

Launched on Sept. 25, 1992, Mars Observer will enter Mars orbit on about 11:30 a.m. CDT Aug. 24. The on-orbit engineering checkout of the camera is scheduled to

begin Sept. 16. The camera and six other scientific investigations will begin mapping operations for a circular orbit of 248 miles on Dec. 16.

Mars Observer switched to an automatic contingency mode, a self-protective default mode on Aug. 1 when the spacecraft performed a larger than expected attitude correction while reorienting itself relative to the stars and the Sun. By the next day, full recover to normal cruise mode was complete.

All spacecraft subsystems and instrument payload are performing well.



NASA Photo

The first photograph of Mars taken by Mars Observer shows the northern hemisphere in light and the southern in shadow. The photo was taken at 10:52 p.m. CDT July 26.

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.

Rocking 50's Dinner Dance (7 p.m., Aug. 28, Gilruth Center): \$15 per person; tickets on sale until Aug. 25.

Astros vs. San Diego Padres (1:35 p.m. Sept. 19, Astrodome) — Discount tickets: \$9; on sale until Sept. 3.

Moody Gardens — Discount tickets to three of five attractions: \$14.

Six Flags Over Texas — Discount tickets: one-day pass, \$19.95; two-day pass, \$24.95 and children under four feet, \$18.95.

Splash Town USA — Discount tickets: \$10.50.

Astroworld — Discount tickets: adult, \$18.95; children under 41/2 feet, \$15.95.

Waterworld — Discount tickets: \$9.95.

Sea World in San Antonio — Discount tickets: adult, \$19.75; child (3-11), \$13.15.

Fiesta Texas, San Antonio — Discount tickets: adult, \$18.35; child (6-11) \$12.75.

Sea World and Fiesta Texas — Discount coupons: \$6 off discount prices if tickets purchased for both parks.

Space Center Houston — Discount tickets: adult, \$7.50; child (3-11) \$4.50; commemorative: \$9.95.

Metro tickets — Passes, books and single tickets available.

Movie discounts — General Cinema, \$4.50; AMC Theater, \$3.75; Loew's Theater, \$4.

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 two weeks in advance. For more information, call x30304.

EAA badges — Dependents and spouses may apply for photo identification badges from 6:30-9 p.m. Monday-Friday. Dependents must be between 16 and 23 years old.

Defensive driving — Course is offered from 8 a.m.-4:30 p.m. Aug. 21. Cost is \$19.

Weight Safety — Required course for employees wishing to use the weight room is offered from 8-9:30 p.m. Aug. 26. Pre-registration is required; cost is \$5.

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. Cost is \$24 for eight weeks.

Aikido — Martial arts class meets from 5-7:30 p.m. Tuesdays. Cost is \$15 per month.

Fiction workshop — Class will meet from 6:30-9 p.m. beginning Aug. 18. Cost is \$80 for five weeks.

Tennis lessons — Classes meet from 5:15-6:45 p.m. Beginners class starts Aug. 16; advanced class begins Aug. 18. Cost is \$32 for six weeks.

Sign language — Class meets from 5-6:30 p.m. beginning Aug. 16. Cost is \$55 for six weeks.

Scuba diving — Class will meet from 6:30-9 p.m. Tuesdays and Thursdays beginning Aug. 26. Cost is \$190 for four weeks.

Basketball and volleyball — Registration for the fall season will be held during the week of Aug. 16.

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

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

Lease: CLC, Oakbrook, 3-2-2, fenced, no pets, extras, \$700/mo, \$300 dep. 326-6782.

Sale: Pearland lot, medium density, concrete streets, all utilities. 482-5003.

Sale: LC/Meadowbend, 4-2-2, FPL, ceiling fans, landscaped, starter home, \$74.9k negotiable, assumable. Peter, 526-1853.

Sale: Univ Green, 2-2, garage, FPL, pool, \$72.9k. Dave, 486-5181 or Jim, 482-8800.

Rent: Southern Colorado, 2 BR house, sleeps 5, close to skiing, fishing, national forest area, no pets, no smoking, day/wk/mo or longer. Bob, x30825 or 998-7372.

Lease: Seabrook, 3-2-2, brick, 1800 sq ft, \$750/mo. 474-2857.

Rent: Galv condo, furnished, sleeps 6, Seawall Blvd & 61st St, cable, wknd/wkly/dly. Magdi Yassa, 333-4760 or 486-0788.

Rent: Univ Trace condo, 1-1, W/D, storage, patio, alarm, \$460/mo + \$250 dep. Cindy, 337-6270.

Sale: Friendswood, 3-2-2, FPL, spa, new roof, maintenance free, new int paint, carpet, vinyl, \$84.9k. 482-1859.

Sale: Camino South, 3-2-2, formal living rm, dining, lg den w/wetbar, FPL, 5 year cert on roof, assum at 10% w/approval, \$77.9k. 333-6246 or 480-3986.

Rent: Nassau Bay, 4-2-2, recently remodeled, \$895/mo. Minh, x30992 or 484-2456.

Lease: Baywind II condo, 1-1, FPL, W/D conn, avail Sept. 1, \$450/mo + dep. 512-869-0389.

Sale: Dickinson waterfront, 4-2-5-2, pool, FPL, wetbar, 100 yr old trees, 3/4 acre, sec sys, \$219k. x34354 or 337-1640.

Sale: Forest Bend, 3-2-2, new roof, paint, child's playhouse, lg backyard, upgrades, \$72k negotiable. Ted, x36894 or 992-4814.

Cars & Trucks

'90 Volvo 740GL, blk w/gray int, sunroof, ex cond, \$16k. Don, 488-7499 or x32309.

'71 Chevy Nova, needs windshield, motor ex cond, \$400 OBO. Jesse, 470-8502.

'92 Dodge Dakota LE, auto, air, ABS, PS, 6' bed, 16k mi, \$10.5k. 486-8260.

'90 Toyota Celica, 5 spd, 34k mi, PS/PB, AC, AM/FM/cass, alarm, new tires, ext warr, ex cond, \$9.5k. x38871 or 538-1887.

'85 Ford Escort Exp, 5 spd, good cond, 2 seater, \$1.4k negotiable; '80 Lincoln Town Car, loaded, leather, all pwr, 90k mi, ex cond, \$4k negotiable. x46260 or 286-6486.

'82 Honda Accord, AC, ex motor, good body, \$1.2k or trade for small pickup; '88 Dodge Grand Caravan, 80k mi, AT, AC, ASM/FM/cass,

sun screen windows, luggage rack, \$6.5k. Tony, x30028.

'85 Chevy PU, auto, air, AM/FM, ex cond, \$2.2k OBO. 286-6358.

'82 Cougar, auto, AC, pwr, PS needs work, 93k mi, \$750. Rafael, x38359.

'88 Sterling 825SL, pwr windows, doors, seats, sunroof, AC, cruise, leather, 43k mi, orig owner. Betsy/Hollie Hodges, 488-3468.

'84 Jeep CJ7 Wrangler, 6 cyl, 5 spd, AC, 2 tops, new tires, \$5.4k OBO. x38785 or 409-948-4887.

'82 Honda Civic, good int, AC works, runs good, \$800 OBO. x31397 or 996-1247.

'84 Toyota Corolla hatchback, AC, PS, 5 spd, 125k mi, \$1050 OBO. 286-0022.

'90 GMC Sierra 1500 step side sports truck, 1/2 ton, custom paint, 45k mi, \$11.2k. 991-0533.

'89 Olds Cutlass Supreme, red, 45k mi, new tires, V6, \$6.5k. 991-0533.

'79 Ford F150 PU, good 351 eng, rebuilt trans, new brakes, ugly, \$500. Paul, x48095 or 996-8326.

'88 Pontiac Grand AM LE, blk, 2 dr, 2.3 quad 4, 5 spd man, sunroof, AM/FM/cass, elec W/L/S, AC, 79k mi, \$3.7k. Dan, x30764 or 334-5270.

'81 Mercedes 300 SD Turbo diesel, anthracite gray, pwr roof, tint, phone hookup, Kenwood, 2nd owner, records, ex cond, 162k mi, \$9.5k. 486-0732.

Boats & Planes

'84 Monark CC, 16', 75 hp Merc, stainless prop, VHF, fish finder, rod holders, 2 live wells, bimini, all safety equipment, \$49k. 538-2022.

Trlr for catamaran or util hauling, lights work, \$50. Cliff, x47944 or 534-4145.

25' MacGregor, swing keel, 2 sails, VHF, new 4 hp O.B., clean, everything works, \$6.9k. Paul, x48095 or 996-8326.

Honda O/B, 8 hp, 2 cyl w/auto oil injector, remote tank, 30 hrs, ex cond, \$700. Paul, x48095 or 996-8326.

Santana 22, fixed keel, main, jib, spinnaker, ex cond, \$3.5k. x34063.

'83 Hobie Cat 16', Signature model w/trlr, extras, \$1499 OBO. Doug, x41081.

Cycles

Man's 10 spd bicycle, 26" frame, \$29. Lucky, x36198.

'80 Kawasaki 650 LTD, r cyl, new tires, everything works, \$850. Paul, x48095 or 996-8326.

Men's 12 spd Diamond back mountain bike, good cond, \$125 OBO. Dave, x33845 or 996-5075.

Audiovisual & Computers

Compu-Add 386 SX, 101 kybd, 3.5 and 5.25" FD, 14" CVGA, 16 bit graphic card, Panasonic KX-P1180, Windows and Works sw, \$900 OBO. 554-6317.

Nintendo game sys w/27 games, game genie, advantage joystick, wireless control pads, \$600 OBO. 338-6645.

Star Power Mate daisywheel printer, cable, good cond, \$125. Speier, 333-2263.

IBM comp PC, 386SX, 16 Mhz, 1 MB RAM, 40 MB HD, 1.44 MB 3.5 and 1.2 MB 5.25 FD, DOS 6.0, Windows 3.1, 101 kybd, 14" VGA

JSC

Dates & Data

Today

Cafeteria menu — Special: turkey and dressing. Entrees: breaded veal cutlet, beef chop suey, steamed pollock, beef cannelloni, French dip sandwich. Soup: beef and barley. Vegetables: Brussels sprouts, mixed vegetables, egg plant casserole, winter blend vegetables.

Tuesday

Blood drive — Allied Signal and Paramax will sponsor blood drive from 8-11 a.m. Aug. 17 at 595 Gemini. For more information, contact Heidi Riggs at 283-7334.

Blood drive — MITRE will host a blood drive from 12:30-3:30 p.m. Aug. 17 at 1120 NASA Road 1. For more information, call Irwin Feig at 333-0935.

Cafeteria menu — Special: pepper steak. Entrees: baked lasagna, pork chop and fried rice, turkey a la king, baked chicken, French dip sandwich. Soup: black bean and rice. Vegetables: breaded squash, steamed spinach, baby carrots, navy beans.

Wednesday

TQM luncheon — The Center Operations Directorate is sponsoring a brown bag luncheon from 12-1 p.m. Aug. 18 in Bldg. 12, Rm. 254. Nancy Aldrich, senior staff scientist at Futron, will discuss team building. For more information, call Joe Olivarez Jr. at x34022.

Cafeteria menu — Special: Mexican dinner. Entrees: broccoli cheese quiche, catfish and hush puppies, spare ribs and sauerkraut, steamed fish, Reuben sandwich. Soup: seafood gumbo. Vegetables:

Spanish rice, pinto beans, peas, broccoli.

Thursday

IEEE luncheon — The Institute of Electrical and Electronics Engineers Galveston Bay Section and the Instrument Society of America Clear Lake Section will sponsor a luncheon at 11:30 a.m. Aug. 19 at the Gilruth Center. Kenneth Goodwin Jr., JSC site manager for the Charles Stark Draper Laboratory Inc., will discuss "Technology Reinvestment: The New Cold War." Cost is \$6 for members and \$8 for non-members. Reservations are due by 11 a.m. Aug. 16. For more information, call Barbara Nepveux at x30194.

Cafeteria menu — Special: hamburger steak with onion gravy. Entrees: corned beef, cabbage and new potatoes, chicken and dumplings, meat ravioli, French dip sandwich. Soup: broccoli cheese and rice. Vegetables: navy beans, cabbage, cauliflower, green beans.

Friday

Cafeteria menu — Special: tuna noodle casserole. Entrees: deviled crabs, broiled pollock, liver and onions, broiled chicken with peach half, Reuben sandwich. Soup: seafood gumbo. Vegetables: Italian green beans, cauliflower au gratin, steamed rice, vegetable sticks.

Monday

Cafeteria menu — Special: Italian cutlet. Entrees: barbecue beef, spare ribs with kraut, steamed pollock, French dip sandwich. Soup: black bean and rice. Vegetables: California mix, okra and tomatoes, vegetable

sticks, ranch style beans.

Professional development — A half-day workshop on "The Power of Professional Presence" will be held from 8:30-a.m.-noon and again at 1-4:30 p.m. Aug. 23 at the Gilruth Center. Author and consultant Debra Benton will speak. For more information, call Federal Women's Program Manager Pam Adams at x33761.

Aug. 24

Professional development — A half-day workshop on "Budgeting and Planning Your Financial Future" will be held from 8:30-a.m.-noon Aug. 24 at the Gilruth Center. Certified financial planner and registered investment adviser Beth Hearn will speak. A separate workshop on "Excellence in Effective Listening" will be presented from 1 p.m.-4:30 p.m. Aug. 24. Author and communication specialist Madelyn Burley-Allen will speak. For more information, call Federal Women's Program Manager Pam Adams at x33761.

Aug. 26

TQ round table — MOD's Q+ Committee will host an American Quality Coaches Round Table discussion from 2:30-3:30 p.m. Aug. 26 in the Bldg. 30 auditorium. The discussion will focus on the philosophies of Dr. Juran, Dr. Deming and Philip Crosby. For more information, contact Dave Miller at x37073 or Emmerson Edwards at x34228.

Aug. 31

Blood drive — The next JSC on-site blood drive will be from 8-11:30 a.m. and 1-3:30 p.m. Aug. 31 at the Gilruth Center. For more information, contact Susan Anderson at x33073.

monitor, tracball mouse, misc sw, manuals \$675. 335-1607 or 326-3294.

IBM PC/XT, 640k, 2-360k drives, 10 MB HD, P/S ports, mono monitor, \$175. x35549 or 554-4257.

PC XT clone, mono monitor, Herc graphics, 20 MG HD, 5.25 FD, Okidata 92 printer, Dos 3.3, some software, \$295. 488-4412.

Working Fisher VCR, includes manuals, was \$190, now \$60. 331-0164.

Sega gamegear, AC adapter, master sys converter, games, \$100 OBO. Jason, 333-7623 or 326-6104.

Commodore 64, two sys, 2 kybds, 2 prts, 2 dskdrs, 1 monitor, 1 modem, sw. Jason, 333-7623 or 326-6104.

Azuresoft Elite Personal Flight Simulator for IBM comp or MAC, simulates a Cessna or Moody, incl universal controls interface w/builtin microprocessor, navigation sw for 3 cities, \$600. 482-9084.

Photographic

GE VHS home movie camera, 5 yrs old, was \$1.3k, now \$300 OBO. Jim, 991-0533.

Pets & Livestock

Cockateils, m & f, w/cage sizing 17x16x29, \$99 OBO. Lucky, x36198.

Boa constrictor, 6' long, healthy, \$125. Terry, 474-5639 or 282-2520.

Thoroughbred mares, ages 7 and 12, no papers, \$1.5k/pr or \$850/ea. Jim, 991-0533.

AKC yellow labrador retriever pups, field champion bloodlines, ready 8-29-93, \$350. Mary Anne, x47701 or 280-8125.

Musical Instruments

L-22 Lowery upright organ, good cond, beginner music mtrl, inc, \$400. x31426.

Upright vertical grand piano, ex for beginners, \$400 OBO. Donna, x30261 or 334-5082.

Household

Kg sw waterbed, dk wood, mirrored hdbd, 12 drawer pedestal, \$100. 482-9084.

Two pc L-shaped blue Scandinavian sofa w/wood frame, \$175. 333-7010 or 482-5393.

Lg dormitory refrig, \$125. Shirley, x34179 or 482-0899.

Sofa, loveseat, chair, blue/wht velour, new cond, \$400. x59021 or 482-7019.

Dinette tbl, 6 chairs, 8' couch, \$50/ea. Dennis, x31409.

Folding lawn chairs w/lounge, \$20; pair cane sides chairs, barrel back light chairs, \$40/both, long solid wood shelf w/decorative braces, \$20; heavy glass top dinette set, tbl w/chrome legs, \$150; modern chair, Leopard cov uphol, \$25; round 32" formica tbl w/bamboo legs, \$45; tv tbl on rollers, \$12. 488-5564.

Kg sw waterbed, semi motionless, solid oak hdbd/ftbd, liner, heater, matt, make offer. Lance, 280-4524 or 326-1526.

5 pc girls bdrm set w/box spring, brwn, \$500 OBO. 282-6255 or 480-3986.

Electrolux canister vacuum cleaner, \$35; 1200 baud ext modem, \$20; 1/3 sheet sander, \$18; ASCII terminal, \$15; hiking boots, \$8. 538-2022.

French Provincial sofa, beige, fruitwood; modern loveseat, brwn print velour, 4 lots at

Rosewood Cemetery. 941-3262.

Dining rm tbl, glass top, brass/wood legs, 4 matching chairs, \$75. Paul, x48095 or 996-8326.

6 pc living room set, \$600 OBO. x39080.

4 pc wood frame furniture, \$60; oval shape dining rm tbl, 3.5' wide, 4' long w/4 solid oak wood chairs, veneer surface, good cond, \$150. 283-1239 or 538-4393.

G.E. 0.8 cu ft microwave, 18 mths old, turntable, temp probe, multifeature, ex cond, \$100. x48554 or 486-5546.

Wanted

Want NASA or NASA contractor engineer as a mentor for career advice, like to correspond w/an in the trenches veteran, if you are willing to share your years of exp to help student with career towards NASA, please call Andrew, 280-0647.

Want locking file cabinets. 992-5535.

Miscellaneous

Commercial 8' doors for work benches, \$3; other \$5; beauty products, .50-\$1; toys, trains, crafts, small appl, school supplies, diapers, \$5; signed numbered prints w/frames, \$10-14. Diane, 283-1858 or 538-2914.

Wedding gown w/pearls, sequins, v-neck, chapel length train, sz 6-8, veil, petticoat, \$400. x36696 or 332-9102.

8' Weedeater elec trimmer, was \$35, now \$20; upright vacuum, good cond, \$85 OBO; Sears exercycle, \$55. Ed, x41125 or 481-4889.

14k ring w/three sapphires, 3 dia chips, was \$250, now \$75. Kate, 471-3119.

Wooden child guidance slide, Graco premier stroller, hobby horse, girls cloths, newborn thru 3T, boys clothes, 8-10, toddler toys. 286-8457.

2c antique dia ring, round, European cut, platinum band w/36 dia, \$7.5k OBO. 336-6752.

Welsh stroller, top of the line, in orig box, \$70. Joel, x49885.

Monkey grass in 1 gal containers, \$2.50 or 10 for \$20. x30974 or 554-7083.

Exec desk, computer storage, chair, refinished walnut, \$995. Dale, x48179 or 481-0046.

Dan Wesson revolver, stainless, 8" heavy barrel, 44 mag, \$300. Steve, x49625 or 486-8047.

Elec typewriter, portable, Cannon Typetar 6, LED readout, memory w/case, extras, \$80. 282-6432 or 796-1833.

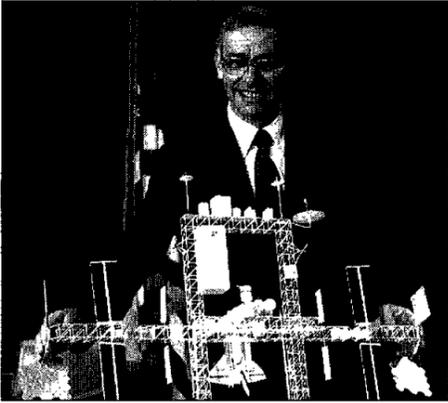
His/hers HJC motorcycle helmets, blk w/visors, faces shields, NADY PMC3 intercom and FM radio, \$100; Hamilton wood drafting tbl 31" x 42" top, \$50; Mucci 19 oz. pool cue w/hard case, \$50. 486-8813.

His/her wedding ring set, 1.37c solitaire dia w/dia ring guard, soldered, his, plain gold band, med sz, \$1.2k. Diana, 282-4104 or 484-4304.

Walter Hagen Ultradyne II proline golf clubs, 2-9 & PW irons, driver, 3-wood, 4-wood, ex cond, \$150; PGA



Then NASA Administrator Richard Truly congratulates Cohen on receiving the National Space Trophy in 1991.



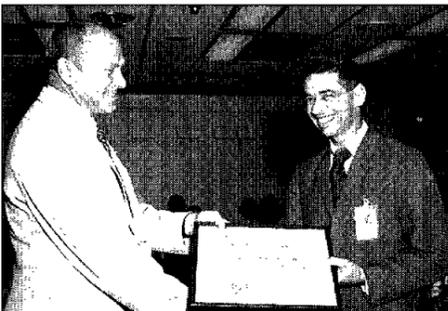
After being named JSC director in 1986, Cohen stands with an early space station concept model.



As manager of the Space Shuttle Orbiter Project Office in 1982, Cohen sits in the Mission Control Center on landing day for one of four orbiter flight tests with Thomas Moser, center, and Glynn Lunney, Space Shuttle Program Office deputy and manager, respectively.



In 1972, Cohen, STS-1 Commander-to-be John Young and Space Shuttle Program Office Manager Robert L. Thompson brief the press three years before shuttle approach and landing tests begin.



Also in 1972, Cohen represents his Apollo 16 engineering support team, receiving a Group Achievement Award from Thompson. He was manager for the Apollo Command and Service Modules.



This official NASA portrait was taken in 1969, when Cohen was manager of the Apollo Command and Service Modules.

Working with Giants

Outgoing JSC Director Aaron Cohen looks back on his NASA career and ahead to the future of the center

[Editor's note: JSC Director Aaron Cohen will retire Aug. 20 to become the Zachry Professor of Engineering at Texas A&M. The following is the text of an interview conducted Aug. 6.]

By Kelly Humphries

Roundup: You have been at this center for a little over 31 years, and you've watched it grow and prosper as our country has. What has been JSC's greatest contribution to the advancement of America? Do you expect that to change, and if so, how?

Cohen: Advancing human space flight is the greatest thing we've done. The great adventure, of course, was the Apollo program. But we did wonderful things with the shuttle program and the orbiter. Of course, that's what our job has been. Getting more specific, the most significant event in my career was Apollo 8, the first time that human beings left the gravitational influence of the Earth and went to another body in our solar system. The space program started because of the Cold War. Today the Cold War is over, so it's a tougher job to defend the space program. But I think if you go back and really look at President Kennedy's speech at Rice Stadium and some of the statements that James Michener made about space travel, you'll find exploration is the dominant theme. It's human destiny to explore, and we carried on the impetus of exploration. Today, that is not sufficient to keep the space program going. Because of the end of the Cold War, because of the economic situation in the country and the world today, you have to show how the space program benefits humankind on Earth. The agency will change because we have to stop just telling people how we are going to do something, which we are very good at, we have to tell people why we are going to do something and be convincing. That's not easy to do. The space program has to be relevant to current society.

Roundup: Do you expect to have any input into who your successor is? Any idea how soon one will be named?

Cohen: I'm not sure that it's fair or proper that I have any input by name, but I do think some of the characteristics should include what I've learned from previous leaders. From Bob Gilruth, I learned that there is a need for compassion. You do have to have compassion for the people you deal with because of the life that's involved. George Low showed me you have to have the ability to pay attention to detail and be bold, yet sensitive to making the correct and conservative decisions. That sounds paradoxical, but you have to know when to be bold yet when to be conservative. The Chris Kraft era was one of knowing how to make a strong, firm decision with the information you have at the time. I tried to put those attributes together. What I brought to the director's office was the ability to communicate with the people who worked with me, who worked below me and the people up above. Those characteristics, to me, should be the characteristics of the director of the Johnson Space Center. I don't think Dan Goldin is going to be in any tremendous hurry, I think he wants to pick the right person. It is a very key selection. P.J. Weitz can certainly do a good job, and everybody has a lot of confidence in P.J. as the acting director.

Roundup: The Clinton administration has given NASA Administrator Daniel Goldin the job of "reinventing" NASA as part of an overall effort to reinvent government. How do you expect this will be manifested in a broad sense?

Cohen: Just as large corporations are going through change and other government agencies are going through change, I think we're going to have to go through change. There is no room today for a program that slips its schedule and has cost growth. Because the country is demanding it, we are going to have to be more efficient in the way we do business, both our civil servants and our contractors. We are going to have to develop a culture that promotes efficiency among civil servants and our contractor community. That's going to take some time.

Roundup: How do you think it will affect individual employees and the way they do their work?

Cohen: It can have some very positive effects. It is very important that we get our decision-making process back to a lower level. When an organization gets old and starts to grow, you do start to make decisions at a higher level. You need to force the decisions back to a lower level. You become efficient that way, you put the onus on the people, you give them the authority and the responsibility. That will be a very positive thing for the civil servants. We may need to do a little bit of streamlining in our organization in terms of reducing the overlap and duplication we have here at JSC and within the agency. We may have to give up some work between our directorates and in our center to be sure that we minimize the overlap and duplication. One way of reducing the probability of cost increases and growth could be positive for the people at JSC, and that is doing more in-house work — prototyping a piece of hardware and building the hardware in house, being sure you have the right requirements to manufacture it and then writing a good spec before going to a contractor to build your flight hardware. There's a dichotomy between off-the-shelf equipment and pressing the cutting edge of the state of the art. That's always a very tough decision to make. One of the things I am going to be teaching at Texas A&M is a true systems engineering fashion of picking the right technologies. That's a case study in itself in terms of being a good systems engineer. It's a function of how long your program's going to last, what particular area you're working in, where the off-the-shelf technology stands, what advances in technology are coming around the corner. That is one of the most complicated things to do for long-duration programs like the space station or shuttle orbiter. You have to take each one on an individual basis.

Roundup: Are these changes good for JSC and the agency?

Cohen: They are because the external environment has changed, and you have to change with it. If you try to fight the change in the external environment, you're not going to win. For JSC and NASA to stay strong, they've got to change.

Roundup: NASA is about to name a new host center for the redesigned space station. Employees will understand if you aren't in a position to say which way the decision-makers are leaning, but can you provide any insight into the criteria that are being used?

Cohen: Some of the criteria certainly have to be a good work force, good working conditions, good facilities and good access to various communication routes, including travel. One of the things I think is extremely important is that space station, whatever version it is going to be, has a close tie-in with the space shuttle, mission operations and the astronauts. The synergism of operations, the shuttle and the flight crew, along with the space station hardware, says that JSC would be a very good place for the host center.

Roundup: There also is a lot of work under way to increase international involvement in the project, including that of Russia. What is NASA's biggest challenge as it moves more deeply into the international arena?

Cohen: People all over the world are going to go into space eventually. You have the European Space Agency, Canada, Japan, China and Russia. The more you can cooperate in a very effective manner the better off you're going to be. The key driver in how efficient this program is going to be is another course in systems engineering — how well you can define the interfaces and make those interfaces well-understood so that you can define what each person has to do. That eliminates overlap, duplication and ambiguity. If you can do that, I think you can be successful.

Roundup: In the current deficit-cutting climate, NASA must clearly continue to work to do more with less. Are we succeeding in our efforts?

Cohen: We have to do more with less, but it's even bigger than that. Once we say we're going to do something, we have to produce. We have to produce it for what we say we're going to produce it for and on a schedule. We have to come up with a good set of requirements, stabilize those within our program, have clear interfaces, pick the right technologies and be committed. We're going to have to better understand how to design to cost. It's almost like being in business for yourself. You can't afford to deliver a bad product or have a failure, on the other hand you have to make a profit. In some way, we're going to have to motivate both our contractors and our civil servants so that when we commit to do something, we're going to do it and if we have a problem we may have to reduce our requirements. And that's probably harder to do in the human element of space flight than any other because you still have to maintain safety and quality. If you were to give us a grade from F to A, we're probably somewhere around a C. We've got some way to go yet before we achieve the A region.

Roundup: The Total Quality management philosophy and tools seem to have taken on a lower profile in light of the upheaval the agency has been dealing with because of the space station debate. Is Total Quality dead at JSC?

Cohen: I don't think so. Everything we've been talking about is Total Quality. We have to improve the way we do business. I don't think you have to be a fanatic about Total Quality to ensure that you're doing the right thing. I think doing things more efficiently, doing things on cost and on schedule are Total Quality. That's making decisions at the right level, reducing your potential for cost growth and schedule slips, picking a set of requirements and not letting them change, picking the right interfaces, picking the right technologies, minimizing the number of people you have on the program. Total Quality is just a rigorous mechanism for making those things happen. Today what you're probably seeing is that people are trying to practice it and you don't have to have big exercises to get it done. For Total Quality to have to be in your everyday work. You shouldn't have to go to a meeting to learn Total Quality, you should practice it every day and every hour of the day.

Roundup: Do our senior managers really believe it can help us do what we have to do, and are they willing to commit the time and energy necessary to make it work?

Cohen: I think our managers today know the words I'm saying are real. They know we're going to have to do everything better and more economically. What you may have some disagreement on is the means to get there. People have their own ideas about how to do that. There is no solution that says one path is perfect and another is not. It depends on your management style, the external environment and your particular problems. But everybody agrees what the end product has to be.

Roundup: The center's strategic planning efforts have been folded in with its Total Quality efforts, and have been stalled somewhat by the uncertainty over the space station. Some people even say that the key word in our existing strategic plan — exploration — is now "politically incorrect." Is our strategic plan still viable?

Cohen: I think you're going to see them pick up again very shortly. Mark Craig happens to be doing the strategic planning for Headquarters, working directly with Gen. Daily. Once that is finished, we're going to start resuming strategic planning at the centers. Each time we launch a shuttle, it's exploration. Each time you fly a payload on the space station to be, it's going to be exploration. If you're really talking about the exploration of sending humans back to the Moon and Mars, I think that is going to be delayed a while. We have to prove to the American public and Congress that we can build a productive space station on schedule and on cost. We have to continue to fly shuttles safely and more economically. We have to build the Earth Observing System on schedule and on cost. If we do those things and the economy gets better — and I think it will in two to three years — you'll see people willing to talk about the exploration program as we understand it in our strategic plan. We need to reestablish our credibility and do the things we have on our plate right now.

Roundup: As you prepare to leave, what are your fondest memories of JSC from a professional standpoint? From a personal standpoint?

Cohen: I've had a very fortunate career at JSC. I've been able to work with the giants of academia, industry and government. I've been able to work on programs that I feel have made significant accomplishments for humankind. When I look back I'm really amazed at how great it's been. I would say the high point of my career was Apollo 8. The next was STS-1, because it was the first shuttle flight, and then STS-2, because it was reusable, and then Apollo 11. That's how I rate them. The people at JSC have been very good to me in every role I've taken, whether it was head of systems engineering during the Apollo program, or Apollo command and service manager, orbiter project manager, director of research and engineering or the center director. I didn't feel like they were working for me, I felt like I was working for them. I guess I'd have to say the day I was named the orbiter project manager was my fondest personal memory. I felt I was really given total responsibility to develop a reusable vehicle, which nobody else had done before. Being able to take that from a set of requirements to view graphs and then turn the view graphs into hardware and turn the hardware into operations gave me a fantastic feeling of accomplishment. There have been a lot of people who have influenced me through the years — Chris Kraft, George Low, Bob Gilruth and my wife, Ruth.

Roundup: What advice would you give to young, ambitious employees who want to make the kind of contributions to America's space program that you have?

Cohen: There are opportunities for almost every element of expertise, whether it be technical, public affairs, human resources, budgeting or project control. In whatever discipline you're in, the first thing you need to do is become very proficient in a specific area. Then, you need to be able to communicate with people both verbally and in writing. You need to have integrity in your dealings. Then, you need to look at a bigger view of things, more of a systems approach. With that, you need to know when it's time to compromise and when it's time to take a hard stand. You can't always have everything exactly how you think it ought to be. But many times if you can work a compromise, you're better off. If you have those attributes, I think you can make a success out of it. □



Cohen and his wife, Ruth, at the Space Center Houston grand opening gala in 1992.

Unique chemical process could improve ceramic materials

A new group of ceramic processing chemicals, that may revolutionize the ceramic industry, has been developed by researchers at Lewis Research Center.

"These chemicals have direct use in the aerospace industry. We can use them to form lightweight, corrosion-resistant ceramic parts leading to more efficient aircraft engines and rocket motors," according to Dr. Warren H. Philipp, inventor and senior research chemist in Lewis'

Materials Division. "There's also a real need for pure ceramics in such items as electric capacitors, superconductors, semiconductors and thermal barrier coatings."

The new processing chemicals, derived from the base organic compound guanidine, may lead to high purity ceramic products which can better withstand temperatures over 2192 degrees Fahrenheit (1200 degrees Celsius).

Ceramic components generally

are fabricated from powders using a variety of techniques. Normally, after processing, a residue containing sodium or potassium remains and weakens the ceramic material at high temperatures."

However, with the guanidine-based processing chemicals, there is no sodium or potassium residue. The ceramics produced using this method have reduced corrosion problems and improved high-temperature strength.

"Ceramic composites consist of a ceramic matrix reinforced by ceramic fibers. The fibers in the matrix usually are coated to inhibit cracks from occurring or spreading. Guanidine soaps are used to coat the ceramic fibers." Philip added.

The guanidine compound was synthesized when scientists were searching for a sodium-free compound for use in producing pure superconductors.

The use of guanidine in commer-

cial ceramics is an example of technology utilization—technology developed for aerospace applications that can be applied to non-aerospace uses.

NASA's Technology Utilization Program was established in 1962 to encourage greater use of space agency knowledge by providing a link between the NASA research community and those who might use the research for commercial or industrial products.

JSC retiree's daughter needs medical care

The daughter of Alyce Jernigan, a 27-year JSC employee who retired in 1988, is recovering from a serious traffic accident and needs help to meet medical expenses.

Twelve-year-old Nicole Jernigan suffered a traumatic head injury in a car-pedestrian accident in April. Nicole is recuperating from a coma and participating in a rehabilitation program at the Texas Medical Center.

Jernigan's insurance is limited and financial assistance is needed to help cover Nicole's long-term care. A special account for contributions has been established at the Guaranty Federal Bank, 102 W. Parkwood, Friendswood, TX 77546. Donations should be marked "for the benefit of Nicole Jernigan."

For more information, contact the Guaranty Federal Bank at 482-3364.

MOD to host quality coaches round table

The Mission Operations Directorate's Q+ Committee will host an American Quality Coaches Round Table discussion from 2:30-3:30 p.m. Aug. 26 in the Bldg. 30 auditorium.

The discussion will focus on the philosophies of Dr. Juran, Dr. Deming and Philip Crosby. For more information, contact Dave Miller at x37073 or Emmerson Edwards at x34228.



Front row, from left, Wendy B. Lawrence, Koichi Wakata, Jean-Francois Clervoy, John M. Grunsfeld, Andrew S.W. Thomas, Maurizio Cheli, Catherine G. Coleman, and Mary Ellen Weber. Second row, Scott E. Parazynski, Richard M. Linnehan, Brent W. Jett Jr., Daniel T. Barry, Steven L. Smith, Michael L. Gernhardt, Joseph R. Tanner, and Winston E. Scott. Back row, Charles E. Brady Jr., Jerry M. Linenger, Marc Garneau, Kent V. Rominger, Kevin R. Kregel, Chris A. Hadfield, Michael Lopez-Alegria and Scott J. Horowitz.

First international astronaut class holds graduation

By Barbara Schwartz

The Aug. 3 graduation ceremony for the 13th group of astronaut candidates was the first time an official ceremony has been held to commemorate a group's conversion to astronaut status and mark availability for space flight assignments.

This also is the first international class of astronauts, having 15 mission specialists and four pilots from the United States, two mission specialists from Canada, two from Europe, and one from Japan.

Astronaut Jim Voss, who has been astronaut candidate supervisor, said this class has spent 100 hours individually—about 2,500 hours total—in single systems trainers; about 40 hours each in the Shuttle Mission Simulator, making a total of 1,000 hours; about 2,500 hours flying; and about 20,000 hours, 750 hours each, in a classroom environment learning about space shuttle systems, NASA and astronaut duties in general.

"They will be ready for space flights quicker than any other class who has joined us—they've done a remarkable job. I hope some of them will be assigned to my next space flight, and we get to fly in space together," said Voss, who was recently named payload commander for STS-69.

Also on hand to congratulate the graduating class and to welcome visiting dignitaries were Chief Astronaut Robert "Hoot" Gibson, Flight Crew Operations Director David Leestma, and JSC Director Aaron Cohen. JSC Deputy Director Paul J. Weitz, astronaut selection board members, the families of the Astronaut Class of 1992, and well-wishers from the astronaut office also attended the ceremony.

Dignitaries from NASA's international partner agencies came from all corners of the globe to attend the ceremony, including Frank Vigneron, director general of the Canadian Astronaut Program; Andres Ripoll, chief, Astronaut Centre, European Space Agency; Franco Rositto, chief, ESA Astronaut Division; Kazuhiko Yoneyama, assistant executive director, Space Utilization Systems, National Space Development Agency of Japan; and Hideo Hasegawa, director, NASDA Houston Office.

Leestma congratulated the group on its "significant accomplishments." He said their contributions to refining their syllabus will make the training process more streamlined and efficient for the classes to follow.

"There are a lot of people who depend on you. You are the part of our space program that is going to be our future. You are going to fly many missions and be the start of the next step in our exploration of space," Cohen said.

JSC men's, mixed leagues seek bowlers

Two JSC bowling leagues are seeking teams to compete in the 1993-1994 season beginning this month.

The JSC Men's Bowling League will hold an organizational meeting on at 7 p.m. Thursday at the Alpha Bowl, 318 W. Bay Area Blvd. The Men's League plans to expand to at least 14 teams for the 36-week season beginning Aug. 26. Teams of five full-time bowlers or individuals

wishing to join a men's team, should contact Roy Hatch at x32158.

The NASA Mixed Bowling League begins season competition at 6 p.m. Tuesday, Aug. 31 at the Alpha Bowl. Teams consist of five men and women with at least two women in each lineup. The majority of a team's members must be NASA employees, contractors, retirees or their immediate family mem-

bers. The handicap league awards prizes for high series and high game scratch and handicap scores as well as point money to each team based on total season points.

This year the Mixed League season will run from late August to mid-May. For more information, contact Mixed League President Earl Harrison at x37935 or Secretary Leona Kain at 282-2544.

Magellan aerobraking insights may improve designs for future missions

(Continued from Page 1)

In addition, the project was able to gather significant new information about the planet's atmosphere.

In its new orbit, Magellan is positioned to profile the planet's gravity at the mid and higher latitudes and at the poles to give scientists a better picture of Venus' interior.

"A historic first for planetary spacecraft has been achieved by demonstrating the innovative aerobraking technique to change orbits," said Project Manager Doug Griffith. "The Magellan flight team has done

this on a shoestring budget in the best spirit of cheaper-better-faster."

Project Scientist Steve Saunders said that with the circular orbit, "We will begin collecting valuable gravity data around the poles for the first time."

By mapping key areas at the higher latitudes, he said, scientists will be able to compare gravity anomalies of surface features to understand how those features are caused by interior processes.

"We will see global patterns that will help us understand the origin of

major surface features such as mountains and plateaus," he said.

Aerobraking in the atmosphere of Venus also provided a better understanding of planetary atmospheric response to the 11-year sun spot cycle, said Dr. Gerald Keating, Senior Research Scientist from NASA's Langley Research Center.

"We are learning from Venus about greenhouse heating near the surface and exceptionally strong cooling of the upper atmosphere, processes which may affect Earth in the future," Keating said.

During the aerobraking, he said, it was found that aerodynamic heating of the spacecraft was much less than expected. The Venus atmosphere also was less disturbed than expected.

"These findings indicate that future spacecraft may be able to safely fly lower in carbon dioxide atmospheres than previously believed, making aerobraking a more effective technique and thus, improving the designs of future Mars and Venus missions," Keating said.

Magellan finished its radar mapping of the surface of Venus on Sept. 14, 1992, returning images of 98 percent of the planet. It subsequently mapped the gravity of Venus with high resolution in the equatorial band for a full cycle, which is one Venus day or 243 Earth days.

The aerobraking experiment began on May 25. High resolution gravity mapping of the mid and high latitude regions and the poles will begin Aug. 16 from the near-circular orbit.

Culbertson says crew will be ready when Discovery is ready

(Continued from Page 1)

while the other three show clearly that there was fuel flow.

Thursday's shutdown was the fourth time in the history of the shuttle program that a main engine cut-off had been ordered by automatic systems. The most recent occurred at the T-3 second mark on March 22 of this year as *Columbia* was preparing to lift off for the STS-55 mission. Other shutdowns were on STS-51F in 1985, and STS-41D in 1984.

Culbertson said the crew was disappointed by the delay, which fol-

lowed scrubs on July 17 and 24, but ready to try again.

The first scrub came about one hour before launch when a switch that triggers one of two sets of launch pad electronics that fire explosive devices at liftoff to free the shuttle from the pad failed. The second scrub came 19 seconds before launch when *Discovery's* computers saw that the solid rocket booster's auxiliary power unit appeared not to be operating at the proper speed.

Launch Director Bob Sieck said the STS-51 hardware failures have occurred in entirely separate sys-

tems and do not follow any pattern.

"Whenever we have a shutdown like this it is a big disappointment, but they were three separate independent events and any one of them could have happened to three separate missions," Culbertson agreed. "It happened to happen to this mission three times and we just have to deal with it."

"I don't look at it as a failure, it's just another delay," he added, "we didn't lose anything, we didn't hurt anybody, we're still next in line, we're still on the pad and we're going to launch when they're ready

for us."

Culbertson said the crew members were not worried when the engines shut down because it knew the ground support team was well trained and doing everything it could to keep them and the vehicle safe.

"We have a lot of confidence in the people that prepare the vehicles and design our missions. We work with them on a daily, weekly basis and we know that they ride with us and we know they wouldn't do something they didn't believe, so we believe in what they're doing," he said.

Space News Roundup

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