

Air-breathing rocket engine tests successfully completed

Marshall-developed technologies could make space transportation affordable for ordinary folks

by Deana Nunley

NASA has successfully completed two years of testing radical, new rocket engines that could change the future of space travel. NASA and its industry partners have ground tested rocket engines that “breathe” oxygen from the air.

This unconventional approach to getting to space is one of the technologies NASA’s Advanced Space Transportation Program at the Marshall Center is developing to make space transportation affordable for everyone from business travelers to tourists. NASA’s goal is to reduce launch costs from today’s price tag of \$10,000 per pound to only hundreds of dollars per pound.

“Air-breathing rocket engine technologies have the potential of opening the space frontier to ordinary folks,” said Uwe Hueter

See Air-breathing Rocket on page 6



An artist's concept of a vehicle powered by an air-breathing rocket engine.

STS-95 crew members Mukai and Glenn performed various microgravity experiments managed by Marshall Center



NASA photo

STS-95 Payload Specialists John Glenn and Chiaki Mukai talk with reporters Sunday, Nov. 8, after Space Shuttle Discovery’s picture-perfect landing Saturday at Kennedy Space Center, Fla. Glenn and Mukai performed many of the 54 Marshall-managed microgravity experiments aboard the mission. “The STS-95 mission was able to accomplish a great deal of outstanding microgravity research for the nation,” said Joel Kearns, manager of NASA’s Microgravity Research Program at Marshall Center.

Automated Rendezvous & Docking Component completes successful test aboard STS-95

by John Bryk

The STS-95 Space Shuttle crew completed a series of successful tests on a new video guidance sensor component Tuesday, Nov. 3. The component — part of the Automated Rendezvous and Capture System — will allow spaceships to locate each other and rendezvous without human intervention. The sensor

will be used by the International Space Station to simplify routine supply dockings and separations.

The Marshall-developed video guidance sensor uses a combination of lasers, video and reflectors to measure the relative position and distance between spacecraft. For testing, reflectors were mounted on the SPARTAN solar observa-

See Automated Rendezvous on page 6

Marshall science studies are real ‘hits’ on the Web

by Tim Tyson

News media coverage of two Marshall Center science activities created an enormous increase in Internet visits to the Marshall Center in August and September.

Hundreds of thousands of “virtual visitors” logged onto Marshall’s Global Hydrology and Climate Center and Space Sciences Laboratory Web sites to follow the Convection of Moisture Experiment (CAMEX) hurricane study. CAMEX was NASA’s nearly two-month study of Atlantic hurricanes, joining with the National Oceanic and Atmospheric Administration and university researchers

See CAMEX on page 7

“Safety is an everyday effort”

Safety slogan submitted by Ann Towery, SA34

In celebration of Education Week Nov. 15-21

Workshops, open house to be held at Educator Resource Center

Marshall's Educator Resource Center, located at the U.S. Space & Rocket Center, will sponsor two workshops and an open house as part of American Education Week Nov. 15-21.

NASA workshops to be held from 9 a.m.-noon, Tuesday, Nov. 17 are:

- ✦ "Education on the Web" by Mark Fisher and Robert Champion of the Propulsion Systems Engineering Branch of Marshall's Propulsions Laboratory.; and
- ✦ "Access NASA Online Resources" by Kathy Forsythe of the Computer Science Corp.

The workshops are free and open to kindergarten through twelfth-grade teachers. In keeping with this year's American Education Week theme — "Teaching People to Think and Dream: Togetherness Through Education" — the Educator Resource Center will hold an open house from 2-5:30 p.m., Thursday, Nov. 19, offering educators the opportunity to preview science, mathematics and space technology teaching materials and resources offered through the Center. Refreshments will be served during the open house. For more information about Marshall's Educator Resource Center, call Alease Sims at 544-5812.

A variety of local educational events are scheduled to be held during Education Week, including:

Monday, Nov. 16 — A band/vocal concert at 6:30 p.m. at Bob Jones High School, Madison.

Tuesday, Nov. 17 — Parent Teacher Association-sponsored breakfasts, selected activities at local schools, and Marshall-sponsored workshops from 9 a.m.-noon at the Educator Resource Center in the U.S. Space & Rocket Center.

Wednesday, Nov. 18 — College mentoring programs at local schools.

Thursday, Nov. 19 — Marshall's Educator Resource Center open house from 2-5:30 p.m. in the U.S. Space & Rocket Center, and the Redstone Army Educational Center open house and panel discussion "Chat with a Chief" from 9:30-10:30 a.m. in the Sparkman Center.

Friday, Nov. 20 — American Education Week Luncheon and Student Contest Awards at 11:30 a.m. at the Huntsville Hilton.

Intertribal Celebration to be held Nov. 18 at Redstone

Marshall's Equal Opportunity Office, in conjunction with Redstone Arsenal's Native American Heritage Committee, will sponsor the 1998 Intertribal Celebration from 3-5 p.m. Nov. 18 at the recreation Center on Patton Road, Bldg. 3711. Food samples, displays and vendors will be featured. The event is free and open to the public.

For more information, call Willie Love at 544-0088.



NASA photo by Adeline Byford

Education Week proclamation signing

Reviewing the American Education Week Proclamation signed by Center Director Art Stephenson are, from left, Pam Heard, of Marshall's Education Office; Sid Saucier, Center associate director; and Bill Anderson, of Marshall's Education Programs Office .

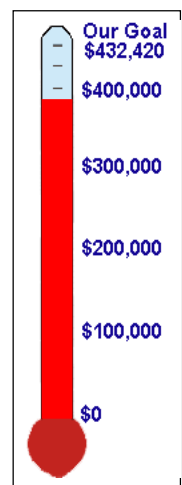
Marshall pledges \$384,918 after fifth week of CFC

The Marshall Center's Combined Federal Campaign (CFC) has passed its fifth week with employees contributing \$384,918 to charitable organizations, Center CFC officials report.

"The Tennessee Valley Combined Federal Campaign solicitation for financial contributions will end Nov. 13," said CFC chairperson Cathy Nichelson. "Our CFC Total goal is \$432,420, so if you haven't made your contribution yet, you still have time to get it in. You can make a one-time cash/check contribution or payroll deduction by using the hardcopy pledge cards" or the electronic version on the Website at: <http://inside.msfc.nasa.gov/CFC98/pledge.html>

"The CFC offers a list of more than 1,300 organizations from which to choose," added Nichelson. "I have enjoyed this year's CFC activities and meeting all the wonderful people I encountered while performing my CFC duties."

Center offices that have achieved 100 percent participation include: AB01, AI01, AI11, AL01, AM01, BC01, BF01, BF20,BF70, CC01, CE01, CO02, CO03, CO30, CO40, CO50, CO70,CR01, CR75, CR90, DA01, DE01, EB11, EB31, EE21, EE51, EH21, EJ33, EJ41, EJ43, EM41, EO46, GP01, HR10, JA01, JA02, JA10, JA21, JA41, JA51, JA52, JA63, JA81, MG01, MG10, MG30,PP01, PP04, SA01, SA24, SA34, SA45, SA52, TA01, TA11, TA21, TA31 and TA61.



Russian rocket engine successfully tested at Center

by Joy Carter

NASA engineers successfully tested a Russian-built rocket engine Nov. 4 at Marshall. The test began with engine ignition at 6:27 p.m. and lasted 56 seconds, as planned.

The Marshall Center is under a Space Act Agreement with Lockheed Martin Astronautics of Denver to provide a series of test firings of the Atlas III propulsion system configured with the Russian-designed RD-180 engine.

The tests are designed to measure the performance of the Atlas III propulsion system, which includes avionics and propellant tanks and lines, and how these components interact with the RD-180 engine.

Preliminary data indicate the test achieved good results. In Wednesday's test the engine operated at 90 percent power. About 500 special sensors are attached to the engine and Marshall's Advanced Engine Test Facility to gather information. The data provided by this instrumentation will help engineers assess the performance of the engine configuration being tested. Examination of the data will continue for several days.

The RD-180 — the most powerful rocket engine tested at Marshall since Saturn rocket tests in the 1960s — generates 860,000 pounds of thrust.



NASA photo by Dennis Olive

The Atlas II RD-180 Russian rocket engine was successfully tested Nov. 4 at Marshall.

Asteroid named for CNN journalist John Holliman

NASA's Jet Propulsion Laboratory in Pasadena, Calif., has named an asteroid in memory of CNN space correspondent John Holliman who was killed in a car accident on Sept. 12.

The asteroid, discovered by JPL astronomer Eleanor F. Helin on April 30, 1989, at the Palomar Observatory, will now be called 6711 Holliman. It has a diameter of about 10 kilometers (6 miles). The asteroid's orbit is inclined 15 degrees to the ecliptic plane — the plane on which the planets orbit the Sun — and moves in an orbit between Mars and Jupiter.

Holliman reported extensively on the role JPL played in space exploration. He was the network's lead anchor for the Pathfinder mission to Mars in July 1997, reporting on the landing and the subsequent mission as the spacecraft sent back video from the planet's surface.



NASA photo by Adeline Byford

NASA senior management team visits Center

A senior management team, led by NASA Acting Deputy Administrator Gen. John Dailey, second from right, meets with fellow team members before briefing Marshall employees during a town hall meeting Monday. Speakers at the official rollout of NASA policy and guidelines on program and project management include, from left, Marshall Center Director Art Stephenson; Alison McNally, executive officer, Office of the Administrator; Dr. Daniel Mulville, NASA chief engineer, Office of the Administrator; and Center Deputy Director Carolyn Griner.

Marshall Exchange Council seeks nominees; deadline is Nov. 17

A special nominating committee is accepting names of nominees from employees for an election to fill two positions on the Marshall Exchange Council.

Names of nominees will be accepted by the committee when accompanied by a petition signed by 20 or more employees. Nominations may be made by employees at large and there is no requirement that nominees and petitioners be from the same organization. Petitions must bear the signature of the nominee indicating a willingness to serve, if elected, and social security number, considered privacy act information, or Marshall badge number. No Marshall employee may serve concurrently as a member of the Council and as an officer of any Exchange-sponsored club or activity. Each candidate must have been a Marshall employee for not less than one year. The term of office is two years.

Deadline for submitting nominations is 4:30 p.m., Nov. 17. Petitions should be mailed to: Exchange Council Election, CO10X, Bldg. 4752.

The new Council members will take office in the new year and join one other elected member, Larry Gagliano. Four members of the seven-person Council are appointed by the Center director, chairman, operations manager, treasurer and secretary. A list of nominees and voting instructions will be

printed in the Dec. 2 Marshall Star and concurrently, ballots will be mailed to employees.



NASA photo by Danny Reeves

Media Day at Marshall

Regional media representatives turnout Thursday for the U.S. Laboratory media day at Marshall. Astronaut Ken Cockrell — commander of the International Space Station assembly flight slated to deliver the laboratory module to orbit in early 2000 — is interviewed at the Space Station Manufacturing Facility by reporter Andy Cordan, of WKRN-ABC in Nashville, Tenn.

Marshall Center's Safety Goal: Be Number One in Safety within NASA!



NASA photo by Adeline Byford

The Redstone Fire Department provided fire extinguisher training for Marshall employees last week in front of Bldg. 4200. Redstone firefighters explained the different types of extinguishers and demonstrated their use. Trainees were given hands-on

fire-fighting practice. For more information about scheduling similar training in your organization, contact Marshall's Industrial Safety Office at 544-0046.

NASA Day set for Saturday at Alabama A&M University football game

The Equal Opportunity Office at Marshall is coordinating High School Senior Day/NASA Day at Alabama A&M University in Huntsville. The event will be held in conjunction with the Alabama A&M vs. Alcorn State football game scheduled for 1:30 p.m., Saturday, Nov. 14 at the Alabama A&M Stadium.

General admission tickets are \$12 each, students ages 6-12 years are \$5 each, and children under 6 years old will be admitted free. Tickets may be purchased from 8 a.m.-4:30 p.m. Monday-Friday at the NASA Exchange in Bldg. 4752. For more information, call Willie Love at 544-0088.

Annual Christmas Dance planned for Dec. 5

Marshall's annual Christmas Dance will be held Dec. 5 in the Von Braun Center Exhibit Hall.

Doors will open for the semi-formal event at 6 p.m. and two bands will play continuous music from 7-11 p.m. The "Little Big Band" will play the sounds of oldies and smoothies, and the "Nite Owls" will feature rock and disco music. The bands will alternate every half hour.

Non-alcoholic punch and a variety of hors d'oeuvres will be served. Cash bars also will be available.

Ticket cost for NASA employees, retirees and on-site contractors is \$6 and guest tickets are \$8. Tickets will be sold Nov. 16-Dec. 4 and may be purchased from 11:30 a.m.-12:30 p.m. Monday-Friday at Marshall's Activity Bldg. 4752. Groups desiring to sit together should purchase tickets at the same time. A layout will be provided showing available seats. Seating is limited and no seats will be reserved without the purchase of a ticket.

Marshall to co-sponsor Children's Health Fair

The F.A.S.T. Program at Marshall is co-sponsoring a Children's Ability and Health Fair from 4-7 p.m., Wednesday, Nov. 18 at Alabama A&M University in Huntsville in the School of Business multi-purpose room.

The Health Fair is designed to bring together some of Alabama's most respected service organizations that benefit children with disabilities, learning disorders and childhood diseases. The fair — which is free and open to the public — will offer parents, educators and counselors the opportunity to obtain information and speak with experts.

Organizations attending the fair include NASA, the American Red Cross, Epilepsy Foundation, Alabama Department of Rehabilitation Services and Juvenile Arthritis Foundation.

For more information about the fair, contact Chanel Vaughan at 544-6727 or Shelve Miller 544-0090.



NASA photo

'Capitol Steps' perform during Von Braun Forum

Marshall's Equal Opportunity Director Charles Scales, second from left, and University Affairs Officer Jim Dowdy, second from right, join the "Capitol Steps" in their rendition of "Miss Applied Technology" during the Von Braun Forum held recently at the Von Braun Center.

U.S. Space & Rocket Center offers free weekend for area citizens

The U.S. Space & Rocket Center is saying thanks to the citizens of Huntsville and Madison County the weekend of Nov. 14-15 by offering free admission to all area residents. Guests are encouraged to bring a canned food item that will be donated to local charities to help citizens during the upcoming holidays.

"We want to convey an attitude of gratitude to the surrounding area," said Mike Wang, the U.S. Space & Rocket Center's chief executive officer. "We greatly appreciate the support of the community and want to give citizens an opportunity to come see what many from around the country consider a national treasure."

During the free-admission weekend, guests can view new additions to the Space & Rocket Center — including the meteorite, Mars and Mir space station exhibits.

"TOPS," the 10-foot-tall inflatable astronaut, will be on hand to greet children. Video presentations on Space Camp are scheduled for 10 a.m., noon, 2 and 4 p.m. in Challenger Auditorium.

Bus transportation from the twin red towers near the Space habitat will take visitors to Aviation Challenge for presentations and demonstrations scheduled for 11 a.m., 1 and 3 p.m. Two visitors selected during each Aviation Challenge presentation will be offered the opportunity to ride the two-passenger centrifuge.

The Space & Rocket Center will be open from 9 a.m.-5 p.m. Nov. 14-15. The free admission includes the Spacedome IMAX Theater and a tour of the Marshall Center, but due to space limitations, both will be available on a first-come, first-served basis. For more information, call the U.S. Space & Rocket Center at 837-3400.

Air-breathing rocket could make future space travel affordable

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of the Marshall Center. "We've proven the technologies on the ground with extensive testing of complex and technically challenging system components. Now, I believe we're ready to demonstrate the technologies in flight."

Air-breathing rocket engines could make future space travel like today's air travel, said Hueter, manager of NASA's Advanced Reusable Technologies project. The spacecraft would be completely reusable, take off and land at airport runways, and be ready to fly again within days.

An air-breathing rocket engine inhales oxygen from the air for about half the flight, so it doesn't have to store the gas onboard. So at take-off, an air-breathing rocket weighs much less than a conventional rocket, which carries all of its fuel and oxygen onboard. Getting off the ground is the most expensive part of any mission to low-Earth orbit, and reducing a vehicle's weight decreases cost significantly.

An air-breathing engine (called a rocket-based, combined cycle engine) gets its initial take-off power from specially designed rockets, called air-augmented rockets, that boost performance about 15 percent over conventional rockets. When



NASA photo

Marshall engineer Jim Turner inspects an air-breathing rocket engine in a test bay at GASL in Ronkonkoma, N.Y.

the vehicle's velocity reaches twice the speed of sound, the rockets are turned off and the engine relies totally on oxygen in the atmosphere to burn the hydrogen fuel. Once the vehicle's speed increases to about 10 times the speed of sound, the engine converts to a conventional rocket-powered system to propel the vehicle into orbit.

GASL, a small aerospace company in Ronkonkoma, N.Y., has conducted most of the air-breathing rocket engine testing at its facilities on Long Island. GASL's unique facility is capable of testing across a wide range of speeds and modes the

rocket engine must achieve in flight.

NASA's industry partners in developing air-breathing rocket technologies are: Aerojet Corp. of Sacramento, Calif.; Rocketdyne of Canoga Park, Calif.; Astrox Corp. of Rockville, Md.; Pennsylvania State University of University Park; and the University of Alabama in Huntsville.

More information about the Advanced Space Transportation Program at Marshall may be found at the following Web site: <http://stp.msfc.nasa.gov>

Automated Rendezvous

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tory satellite that was carried into orbit by Discovery Oct. 29. During the STS-95 mission, the Shuttle-mounted video guidance sensor measured reflected laser light from SPARTAN to gather rendezvous data.

The satellite was deployed from the Shuttle's payload bay on Sunday, Nov. 1. The STS-95 crew used the Shuttle's robot arm to position SPARTAN 33 feet, or 10 meters, in front of the video guidance sensor mounted in the payload bay. The Shuttle's robot arm moved SPARTAN as close as 13 feet, or 4 meters, to the sensor to gather detailed tracking information prior to releasing SPARTAN into space for a two-day solar science mission.

On Nov. 3, after a successful SPARTAN science mission, the STS-95 crew began long-range testing of the Video Guidance Sensor during manual rendezvous and retrieval operations.

The video guidance sensor was activated and made contact when the Shuttle moved to within 480 feet, or 146 meters, of the satellite. During approach, at 360 feet, or 110 meters, the crew performed attitude maneuvers — changing the position of the Shuttle to determine the width of the sensor's field of view. "The video guidance sensor locked-on at 480 feet. That's 120 feet

better than we designed the system to achieve," said Gene Beam, project manager for the video guidance sensor at Marshall.

The crew stopped attitude maneuvers at 246 feet, or 75 meters, from SPARTAN during the brief orbital nighttime to maintain observation of the nearby satellite. The Shuttle then moved away to a distance of 600 feet, or 82 meters, to gather more information on the maximum limits of long-range tracking. Completing the maneuver, the crew moved back into robot arm range of SPARTAN and successfully captured and re-stowed it in the Shuttle payload bay for return to Earth.

During long-range testing, data from the Shuttle's hand-held laser range finder was compared to information from the video guidance sensor. "The difference in readings between the hand-held laser and the sensor was well within acceptable levels," said an STS-95 crew member. "The data we collected looks comparable to the data from the earlier STS-87 mission where we first tested this sensor." The Space Shuttle Columbia carried the first test into orbit in November 1997.

The operational version of the Automated Rendezvous and Capture System is expected to be accurate within one-tenth of an inch.

CAMEX

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across the nation. Robbie Hood of the Global Hydrology and Climate Center was lead mission scientist for the program.

Statistics show that both Center organizations experienced phenomenal growth in Web site visits. The Web "hits" reached all-time high levels with the combined total visits to the sites approaching nearly one million when media exposure was at its height. Particularly popular was

Global Hydrology's capability to allow the user to view hurricane images from geostationary satellites, "zoom in" on those images and animate them. Science articles posted on the Space Sciences Lab Web page describing the activities of the CAMEX participants were also well received.

The Center's Media Relations Office — responsible for the overall Agency media outreach CAMEX campaign — collaborated with Global Hydrology and Space Sciences to disseminate information to the public. The Media Relations Office had chosen the CAMEX field study to inaugurate its new online "News Center" and provided daily status updates during the mission.

CAMEX campaign kicks off

The CAMEX effort began Aug. 12 with a live news conference broadcast on NASA television and included an announcement about the Internet sites. The news conference also was carried live on C-SPAN and National Public Radio. USA Today and Florida Today prominently carried the three Web site listings, and

CNN online carried a link to Marshall's News Center site. Hundreds of media requests — handled at Marshall and at the CAMEX staging area at Patrick Air Force Base, Fla. — referred reporters to the science Web sites for additional informa-



Images on the Web of Hurricanes Bonnie and Danielle.

tion. Days of the highest Web interest coincided with national network television, radio and newspaper media reports of NASA airplane flights carrying researchers into the eye of Hurricanes Bonnie and Georges.

The Global Hydrology and Climate Center's Web site, averaging 50,000 "hits" each day prior to the CAMEX hurricane study, experienced peaks of more than 720,000 during Hurricane Bonnie and 550,000 during Hurricane Georges. The site now receives more than 100,000 daily visits.

The Space Sciences Laboratory site, which had experienced peaks as high as 100,000 on previous events, saw two peaks of about 300,000. Not only did visitors come to Marshall for information on the two events, but they also searched the three Web sites for information on other programs and activities.

Magnetar burst sparks additional interest

The tremendous response to the hurricane study was duplicated a few days after Hurricane Georges when NASA

Headquarters' Public Affairs Office sponsored a live news briefing on NASA TV about the impact on the Earth from a huge burst of gamma rays from a Magnetar 20,000 light years away. The Space Sciences Laboratory Web site received nearly 300,000 visits in one day— totalling nearly one-million visits to the site during the following week. Dr. Chryssa Kouveliotou of the Space Sciences Laboratory was NASA's spokeswoman for the announcement.

U.S. Internet users search Marshall sites for science-related information

The unprecedented Web response mirrors a recent study by an independent media research firm indicating that 64 percent of Internet users in the United States search the Web for information on science topics.

"The recent success of Internet interest in our science product is a clear indication that Marshall science sells, and it sells because it's world class both in the advancement of knowledge and in the

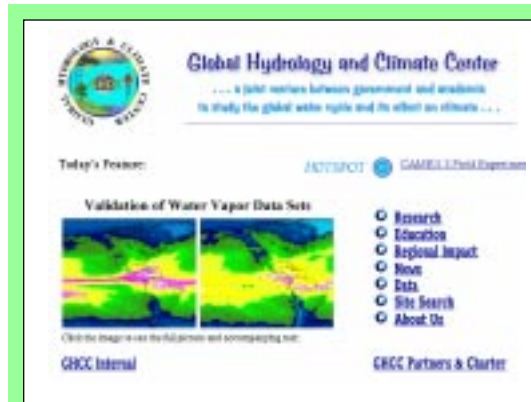
communication of knowledge: NASA's primary mission in the strategic plan," said Dr. John Horack, Space Sciences Laboratory's science communications officer.

Web site addresses

The Web site for Marshall's Global Hydrology and Climate Center is:
<http://www.ghcc.msfc.nasa.gov/>

The Web site for Marshall's Space Science Laboratory is:
<http://www.science.nasa.gov/>

The latest, up-to-date information on NASA programs at the Marshall Center may be found by visiting Marshall's "News Center" Web site at:
<http://www.msfc.nasa.gov/news>



The Global Hydrology and Climate Center's Web site experienced peaks of more than 720,000 hits during Hurricane Bonnie.

Employee Ads

Miscellaneous

- ★ Oak mahogany-stained entertainment center, stereo compartment w/glass door, \$300. 858-9682
- ★ Hay, mixed grasses, baled in October 1998, \$2.50 per bale in barn. 837-2461
- ★ Purebred Australian Shepherd puppies, 3 males/4 females, 4 red-tris, 3 merels, \$50 each. 561-2287
- ★ Full-size pine futon frame, folds upright for a loveseat, lays flat for a bedframe, \$45. 881-3527
- ★ King-size mattress, box springs, \$345. 880-6335
- ★ Magnavox television, 27", surround-sound capable, Smartsound, \$225. 882-6449
- ★ AM/FM stereo for 1997 Ford F-150; 1997 Teenie Beanies set; 1998 Teenie Beanies set. 837-8003
- ★ Lady's 3-piece Samsonite luggage, \$100; man's 3-suitcase Samsonite suitcase, \$25; small aluminum drill press, \$15. 881-8648
- ★ Firewood, oak, hickory, you carry away, \$20 per pickup-load. 880-2290
- ★ Britannica encyclopedias, \$250; two 18"x36"x76" bookcases, \$175; TV/VCR cart, \$20; rocking chair, \$40. 895-9248
- ★ Sectional sofa, blue, \$695; Lane recliner, \$359. 721-1950 after 5:30 p.m.
- ★ 83" Gold sofa; chair, green/cream; chair, tweed, gold/brown/cream. 534-4450
- ★ Kenmore large-capacity, heavy-duty washer and dryer, \$95 ea.; girl's 20" bicycle, \$45. 880-2218
- ★ Electric stove-top/ventilator, \$10; decorative curtain rods, hardware included, \$10; miniblinds, green, \$3 each. 881-1249
- ★ Eight-piece living room furniture: 4 tables, oak w/glass entertainment unit, gray sofa/loveseat/ chair, \$800. 882-9591
- ★ Hedstrom spring horse, \$45. 721-9005
- ★ Phone answering machine, \$25; Tom Clark wedding figurine, \$25; Reco collector plate, mother/son. 851-6661

Vehicles

- ★ 1987 Dodge Shelby Daytona, 129K miles, 4-cyl., 5-spd., AM/FM cassette, alloy wheels, \$1,675 firm. 753-2278
- ★ 1991 Jeep Cherokee Laredo, 4-dr., 2-wheel drive, 112K miles, \$5,800. 922-5727
- ★ 1996 Saturn SC2 coupe, 5-spd., 28K miles, \$12,000. 722-0872
- ★ 1993 Chevrolet Lumina, burgundy, 6-cyl., 4-dr., child-proof door locks, \$4,800. 859-9229 after 6 p.m.
- ★ 1993 Mitsubishi 3000 GTSL, green, 42K miles, automatic, leather, sunroof, CD security system, \$14,750. 461-7429

- ★ 1992 Cadillac DeVille sedan, 4-dr., silver, leather interior, 106K miles, \$7,850. 864-0442
- ★ 1996 Saturn SC2 coupe, 5-spd., 28K miles, \$12,000. 722-0872
- ★ 1987 Jeep Comanche pickup w/camper shell, 4.0-liter, automatic, 2-wheel drive, AC/PS/PB, 109K miles, \$3,500. 722-0076
- ★ 1992 Ford Explorer XLT, 4-dr., 5-spd., 138K miles, \$6,150. (931) 732-4742
- ★ 1991 Honda Accord LX, 5-spd., 120K miles, \$3,995 obo. 837-0846
- ★ 1990 Ford F-150 XLT-Lariat, 5-spd., bedliner, 78K miles, \$7,800. 883-6416
- ★ 1988 Toyota Camry LE wagon, automatic, V-6, 118K miles, \$4,250. 882-1448
- ★ Kawasaki KE100B dirt bike, needs work, does not run, \$400. 837-2223

Wanted

- ★ Used 35mm SLR camera, screw lens mount preferred but will consider others. 837-2386
- ★ Ride to work, 7 or 7:30 a.m. shift, Governors Drive/Huntsville Hospital area, will pay \$6 a day. 534-5398

Lost

- ★ Car keys at Bldg. 4200 or 4201. 544-4758
- ★ Microgravity lapel pin in Bldg. 4610 or BAC-49. 544-4758.

Found

- ★ Gym bag in south parking lot of Bldg. 4610. 544-4758
- ★ Computer mouse in Bldg. 4200. Call 544-4758.

Center Announcements

- ☛ **Surplus Auction** — A local Defense Reutilization and Marketing Office sealed bid sale of property will be held Nov. 16 at 7405 Warehouse Road, Redstone Arsenal. Property may be inspected and bids submitted from 8 a.m.-3 p.m. Nov. 10, 12 and 13 in Bldg. 7415, Red Oak Road. **Contact:** Donna Davis at 842-2570 or Elizabeth Couch at 842-9474.
- ☛ **NARFE** — The National Association of Retired Federal Employees (NARFE), Chapter 443, will meet Saturday, Nov. 21, at the Senior Center on Drake Avenue. Chapter 433 Insurance Counselor Pete Maiker will provide updates on changes to the Federal Employee Health Benefits Program and Medicare. **Contact:** 837-0382 or 881-3168
- ☛ **Shuttle Buddies** — The Shuttle Buddies will meet for breakfast at 9:15 a.m. Nov. 23 at Shoney's on University Drive West. **Contact:** Deemer Self, 881-7757
- ☛ **MOO** — Due to the Thanksgiving Day holiday,

- the Management Operations Office (MOO) retirees will meet for breakfast/lunch at 10 a.m. Nov. 19 (3rd Thursday) at the Cracker Barrel in Madison. All present or former MOO employees and retirees are invited. **Contact:** 539-0042
- ☛ **Annual Nut Sale** — Marshall is offering Center employees, on-site contractors and retirees the opportunity to purchase a variety of nuts during the annual Nut Sale from 8 a.m.-4 p.m. beginning Nov. 20 in the Activities Bldg. 4752. Available on a first-come-first-serve basis will be pecans (fancy, mammoth halves) for \$5.25 per pound; chocolate-covered pecans for \$6.75 per pound; English walnuts for \$3.25 per pound; jumbo raw peanuts for \$1.75 per pound; roasted, salted (in shell) natural pistachios for \$3.25 per pound; dry-roasted cashews at \$5.25 per pound; hickory-smoked almonds at \$3 per 12 ounces; natural, whole almonds for \$3.25 per 12 ounces; and honey-roasted almonds at \$3 per 12 ounces.
- ☛ **MARS Ballroom Dance Club** — The MARS Ballroom Dance Club will offer polka and tango lesson from 7-8 p.m. Nov. 16 and 23 in Parish Hall of St. Stephen's Episcopal Church, 8020 Whitesburg Drive. Lesson cost is \$8 per person and available to MARS Ballroom Dance Club members, partners and guests. **Contact:** Pat Sage, 544-5427
- ☛ **Quality Lab** — The second reunion luncheon of the Quality Laboratory will be held at 11 a.m. Nov. 12 at the Redstone Officers Club. Reservations are required. **Contact:** Frank Batty, 536-9187, Art Carr, 881-8432, Dick Henritze, 534-8312 or P.M. Hughes, 881-1937
- ☛ **MARS Fishing Club** — The next MARS Fishing Club tournament "Live Bait" is scheduled for Saturday, Nov. 14 at Safety Harbor on Wilson Lake. **Contact:** John Pea at 544-8437, Don McQueen at 544-9073 or Charlie Nola at 544-6367
- ☛ **40th Anniversary T-shirts** — The second order of T-shirts commemorating NASA's 40th anniversary has been received. T-shirts are available from 8 a.m.-4:30 p.m. Monday-Friday at the Marshall Center Activities Bldg. 4752.
- ☛ **American Express Vacation Office** — The American Express Vacation Office at Marshall is closed Nov. 2-19. For vacation travel arrangements or concerns during these dates, **contact** the American Express Travel Office at the following NASA Centers: Kennedy Space Center, (407) 867-3927; Lewis Research Center, (216) 433-6342; or Dryden Flight Research Center, (805) 258-2375.

Job Opportunity

CPP 99-4-RE, AST, Technical Management, GS-801-13/14, Program Development, Program Planning Office, Engineering Cost Office. Closes Nov. 12.

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