MARSHALL STAR

Marshall Space Flight Center **Feb. 24, 2000**

"We bring people to space — We bring space to people"

Shuttle Endeavour returns safely after mapping mission

Space Shuttle Endeavour returned to Kennedy Space Center's Shuttle Landing Facility at 5:22 p.m. CST Tuesday.

After traveling 4 million miles in space, and mapping more than 47 million square miles of the Earth's surface, the orbiter and six-member flight crew made a flawless landing on Kennedy's Runway 33 on the second of two Florida landing opportunities. The first opportunity was at 3:50 p.m. CST, but cross winds at the facility violated established weather constraints.

The Marshall Center played a key role in the mission to map the Earth. Marshall provided power and coolant to the payload.

The next planned Shuttle mission is STS-101. Space Shuttle Atlantis is scheduled for launch no earlier than April 13. It will be the third International Space Station flight. The crew is preparing the Space Station for the arrival of the Zvezda service module.

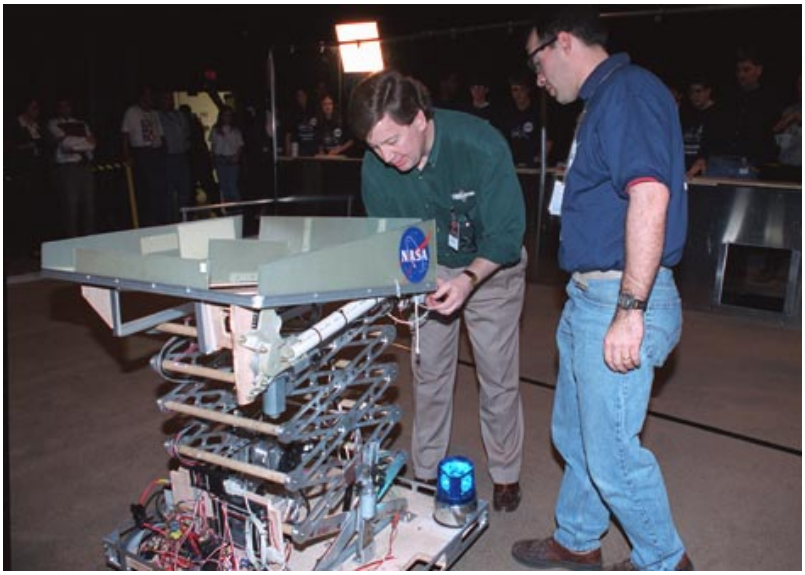


Photo by Emmett Given, NASA/Marshall Space Flight Center

Looks like a winner

X-traktor the robot — built by Lee High School students and volunteers — will compete in the FIRST (For Inspiration and Recognition of Science and Technology) regional robot competition March 16-18 in Houston. Bill Elliott, left, of Mevatec Corp. and father of Lee High School student William Elliott, and Geoffrey Beech, a Marshall engineer with the Engineering Systems Department, put the finishing touches on X-traktor. **See story on page 4.**

Chandra reads cosmic bar code around black hole

An international team of astronomers has used NASA's Chandra X-ray Observatory to make an energy bar code of hot gas in the vicinity of a giant black hole. These measurements, the most precise of their kind ever made with an X-ray telescope, demonstrate the existence of a blanket of warm gas that is expanding rapidly away from the black hole.

The Marshall Center manages Chandra.

The team consists of Jelle Kaastra, Rolf Mewe and Albert Brinkman of Space Research Organization Netherlands in Utrecht, Duane Liedahl of Lawrence Livermore National Laboratory in Livermore, Calif., and Stefanie Komossa of Max Planck Institute in Garching, Germany. A report of their findings will be published in the March issue of the European journal Astronomy & Astrophysics.

Kaastra and colleagues used the Low Energy Transmission Grating in conjunction with the High Resolution Camera to measure the number of X-rays present at each energy. With this information they constructed an X-ray spectrum of the source.

Their target was the central region, or nucleus of the galaxy NGC 5548, which they observed for 24 hours. This galaxy is one of a class of galaxies known to have unusually bright nuclei that are associated with gas flowing around and into giant black holes. This inflow produces an enormous outpouring of energy that blows some of the matter away from the black hole.

Astronomers have used optical, ultraviolet and X-ray telescopes in an effort to disentangle the complex nature of inflowing and outflowing gas at different distances from the black hole in NGC 5548. X-ray observations provide a ringside seat to the action around the black hole. By using the Low Energy Transmission Grating, the Dutch-U.S.-German team concentrated on gas that forms a warm blanket that partially covers the innermost region where the highest energy X-rays are produced.

As the high energy X-rays stream away from the vicinity of the black hole, they heat the blanketing gas to temperatures of a few million degrees, and the blanket absorbs some of the X-rays

*See **Chandra** on page 7*

"Safety Beats Regrets Every Time"
— Safety slogan submitted by
David Guy, PS10

Black History Month

Science Fair winners named

Students in grades 6-8 from area schools competed in Marshall's Black History Month Science Fair Feb. 17. Winners were named in the following categories:

Engineering

First place — Jacob Johnson, Priceville School; Second place — Andrew Gilbert, Priceville School; Third place — John Miller Jr., Priceville School

Chemistry

First place — Josh Berry, Academy of Science and Foreign Language; Second place — Hunter Teague, Priceville School; Third place — Kandice Houser, Priceville School

Biology

First place — Emily White, Priceville School; Second place — Kenny Corder, Priceville School; Third place — Anne Frances Steel, Academy of Science and Foreign Language

Physical Science

First place — Brian James Holder, Ed White Middle School; Second place — Ryan Mouser, Priceville School; Third place — Jasmine Johnson, Discovery Middle School

Photo by Doug Stoffer, NASA/Marshall Space Flight Center

Jacob Johnson, an eighth grade student from Priceville School, took first place in the engineering category of the Black History Month Science Fair held Feb. 17.

NASA contractors eligible for MWR membership

Redstone Arsenal and NASA contractors may become members in Morale, Welfare and Recreation (MWR). For $15 a month, members are entitled to services from golf to fine dining, hunting to arts and crafts, and access to Redstone's four fitness centers.

Membership includes:

• Membership in the Redstone Officers' and Civilians' Club

— Unlimited $2 haircuts year round at the club barber shop

— Access to the four Redstone Arsenal Fitness Centers

— Up to 20 percent off lunch purchases at the club (10 percent off every purchase and each 11th lunch is "on the house" when you use the frequent diner's card)

— Free birthday party for member and a guest

— Free hors d'oeuvres buffet every Friday in the Big Springs Lounge

— $5 monthly dining coupon

— Anniversary bottle of champagne

— Private party catering privileges

— Reciprocal membership privileges worldwide at any military club

Sign up before March 1 to lock in the $15 monthly rate. The monthly fee will increase to $17 after March 1.

Eligible to join are military officers (active, retired, Reserve and National Guard); Army civil service employees, grades GS-7 and above; Marshall Center personnel, grades GS-7 and above; NASA contractors; Redstone Arsenal contractors; and family members.

Also available is the Morale, Welfare and Recreation Services Discount Card for only $10 a month.

Discounts include:

• Receive $15 of "money" redeemable at Redstone activities when you sign up for the card!

• 5 percent off Child Development Center and School Ages Services Program monthly fees

• 10 percent off evening dining at the Soldatenstube German Restaurant

• $2 off regular greens fees at the Redstone Golf Course

• 10 percent off all snack bar purchases at Rocket Lanes Bowling Center

• 5 percent off all purchases over $50 when using your Morale, Welfare and Recreation First USA Card at Challenger Bingo

• 5 percent off Auto Skills Center fees

• 5 percent off all Arts and Crafts Center class fees

• 5 percent off purchases at the vet clinic for eligible users

• $3 off outdoor pool season passes. Pools are open Memorial Day through Labor Day.

For more information about either program, call Mil White at 830-9175 or Sales and Marketing at 955-7399.

Reaching toward NASA's space transportation, propulsion goals

by Debra Valine

To get beyond a low-Earth orbit — which is the beginning of space flight , future cosmic explorers will require a more efficient means of rocket propulsion. And to get there, the Marshall team will have to "think outside the box."

"Space is becoming a much more important place to be for a wide variety of reasons," said Bob Sackheim, Marshall's associate director for space propulsion. "Anything that goes farther than a low-Earth orbit has to have more efficient rocket propulsion."

Sackheim, who joined the Marshall team in September 1999, oversees all advanced space propulsion activities at Marshall. He provides technical leadership for all of Marshall's propulsion flight projects including Space Shuttle, Space Station, Pathfinder and Trailblazer projects and other various spacecraft projects. His technical leadership is focused on the exploration of space — existing flight programs and new, innovative propulsion system development at Marshall.

Sackheim's vision for future space propulsion embraces balance between both near- and long-term space transportation programs. This includes Earth-to-orbit and in-space propulsion technologies.

The technology being developed for the X-vehicles is important, he said, because each of the X programs is testing a different phase of the technology required to send spacecraft and

*See **Space Propulsion** on page 6*

Key Personnel Announcements

Ann McNair has been appointed manager of the Ground Systems Department in Marshall's Flight Projects Directorate. She previously served as the department's assistant director.

McNair began her federal career with Marshall in 1958 after receiving a degree in mathematics and physics from the University of Alabama in Tuscaloosa. Her initial appointment as a mathematician in Marshall's Aeroballistics Laboratory marked the beginning of a long and challenging career.

Ann McNair

She advanced rapidly, holding positions of increasing technical and managerial responsibility, including chief of the Requirements Analysis Group in the Mission Operations Office; deputy manager of the Mission Operations Office; chief of Flight Operations Branch; deputy chief of Operations Development Division; chief and acting chief of Mission Systems Division; and assistant director of Mission Operations Laboratory.

McNair played a prominent role in developing innovative, new and advanced technologies and processes in the areas of information systems, payload operations and ground control systems that are still in use today.

Photo by Doug Stoffer, NASA/Marshall Space Flight Center

All that jazz

Marshall's Kim Jones of the Engineering Directorate plays the piano during the Jazz Cafe held Feb. 18 in the Bldg. 4203 cafeteria as part of Black History Month festivities. Professional saxophonist Kelley O'Neal will be the featured performer at the Jazz Cafe from 11:30 a.m.-12:30 p.m. Friday.

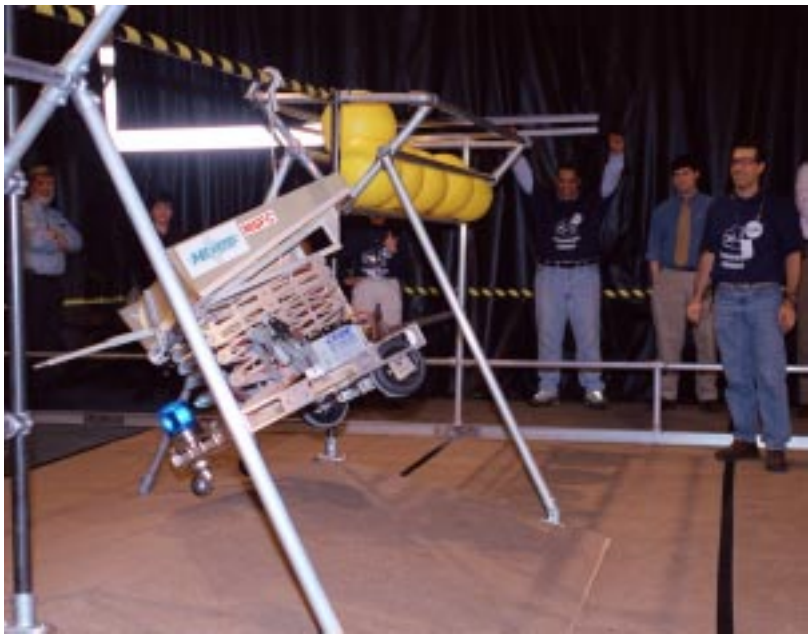
Engineers, students ship FIRST robot to Houston

For the past several weeks, 15 students from Lee High School in Huntsville have been immersed in a project — but not your ordinary school assignment. They've been hard at work planning, designing and building ... a robot.

Now, along with space program engineers who are serving as their mentors, the students have results to show for their efforts. On Tuesday, Marshall engineers, Lee High School students and other volunteers packed up their robot and shipped it to Houston.

X-traktor, the robot, is the result of a six-week endeavor to build a robot for a regional FIRST (For Inspiration and Recognition of Science and Technology) competition being held in Houston March 16-18. From Houston, the robot will head to national competition in April in Orlando where more than 300 teams will compete.

Lee High School is participating through a grant from Marshall's Education Programs Department. NASA, a major supporter of FIRST, is sponsoring more than 100 nationwide teams and hosting four regional competitions.



Photos by Emmett Given, NASA/Marshall Space Flight Center

The robot receives 10 extra points for being able to hang on a bar and pull itself up.

The students have been working with engineers from Marshall, parents, faculty from the University of Alabama in Huntsville, Weddendorf Design, Mevatec Corp., Redstone Arsenal's Aviation and Missile Command and Lee High School teachers to brainstorm, design, construct and test their "champion robot."

"X-traktor plays a game," said Vicki Smith of Marshall's Education Programs Department. "The goal is in the center of the playing field. Human participants line one side. From the side, black and yellow balls are loaded into the robot's basket. The robot then has to score the goal. Points are awarded for goals scored and maneuvering such as the robot hooking itself up to a bar and pulling itself up off the ground — which X-traktor can do."

Shanika Sanders from Lee High School in Huntsville, and a member of the FIRST robot team, puts a ball in play during testing at the Marshall Center.

FIRST team members include:

Students: **Acacia Lamb, Laura Hall, William Elliott, Ron Spindelilus, Newton Banks, Jeffrey Hansen, Aaron Anderson, Joel Gabre, Alfonza Darnell, Annalisa Schneider, Meagan Lykins, Leann Carter, Poscha Stiger, Matthew Smith and Shanika Sanders.**
Teachers: **Clarissa Daniels and Jim Miller**
Marshall Volunteers: **Geoffrey Beech, Arthur Henderson, Brent Hipp, Barbara Long and Vicki Smith.**
Additional Volunteers: **Bruce Weddendorf, William Elliott, Lynn Anderson, Kevin Peterson, Scott Savage, Charles Cowen and Darvin Smith.**
Sponsors: **Marshall Center, Mevatec Corp., U.S. Army Aviation and Missile Command, Tri-State Expedited Service Inc., University of Alabama in Huntsville, Cortez III and Scientific and Commercial Systems Corp.**

National Engineer's Week is Feb. 20-26

In 1951, the National Society of Professional Engineers established National Engineers Week. The week coincides each year with George Washington's birthday.

To mark the week, Marshall engineers will make classroom presentations.

Also, the Black History Month Committee sponsored a Science Fair in which 36 middle school students participated.

Washington, the nation's first president, a military engineer and land surveyor, established the first call for an engineering school. That led to the founding of the West Point Military Academy in New York.

National Engineer's Week helps increase public understanding of the profession, encourages students to pursue technical degrees and to answers the questions: What do engineers do? Why? And for whom?

Engineers across the country sponsor activities that involve hands-on-activities designed to teach practical uses for science and math for students.

In addition, competitions are sponsored to motivate students to put into practice theories learned in the classroom. One such competition is the Future City Competition in which 7th and 8th grade students design and build their concept of what a city would look like in the 21st century.

Sonya Hutchinson, a Marshall engineer, through her affiliation with the National Society of Black Engineers, collaborated with Ed White students in Huntsville and submitted a design for the regional competition. The design placed sixth and won the "Most Innovative" design award.

For engineering excellence

Four Marshall engineers recognized by Engineer's Council

Four Marshall engineers will receive awards from the Engineer's Council Saturday in Studio City, Calif., as part of National Engineers Week observances. National Engineers Week is Feb. 20-26.

Dr. Michael E. Polites, deputy manager of the Avionics Department, will receive the Engineer's Council Engineer of the Year Award for his outstanding technical contributions, leadership and service to the engineering profession in the areas of planning, conducting and directing the research, development, design and analysis of space-related electrical power systems.

Dr. Raymond G. Clinton Jr., a materials engineer in the Materials, Processes and Manufacturing Department, will receive the Engineer's Council Distinguished Engineering Achievement Award for his outstanding contributions in the characterization of nonmetallic materials in support of the Shuttle Systems and Advanced Transportation Programs.

Carlton L. Foster, an aerospace engineer in the Structures, Mechanics and Thermal Department, will receive the Engineer's Council Distinguished Engineering Achievement Award for contributions made to the aerospace community in the development of rocket engine control hardware, and management of hardware development for Space Station-related projects.

Russell M. Mattox, a Marshall retiree who worked as a computer engineer in the Structures, Mechanics and Thermal Department, will receive the Engineer's Council Outstanding Engineering Achievement Merit Award for distinguished leadership and expert engineering accomplishments in the field of mechanisms, not only at Marshall, but also at the NASA and industry levels.

Dr. Michael Polites

Dr. Raymond Clinton Jr.

Carlton Foster

Russ Mattox

Lonely mascot seeks help from Marshall employees

Hi! My name is Safety Sam and I am a new employee at Marshall. I started my new job just last week and oh-my… what a job it is!

My first task was to train another new employee, Hazardous Harry. I thought this would be an easy task. I would simply introduce myself, explain to Harry that he should work safely, and get on to my next task.

That was before I met Harry! He's a real mess! It took me three days to track him down. I caught up with him only because he got hurt again and was back at the Medical Center getting patched up.

Thank goodness he didn't break any bones this time. I tried my best to get him on track with our safety program, but I'm afraid he's more than I can handle.

I need your help. I'm the only safety mascot at Marshall. I need several mascots to help me with Harry and others like him.

Help me by visiting this Web site: http://msfcsma3.msfc.nasa.gov/she/mascot.taf

If you don't have access to the Web, please submit a paper with your name, address, organization code and phone number along with mascot name and a brief description of what he/she/it would look like, to Judy Milburn/QS10.

Entries must be received by March 10. Employees will select the winning mascots March 15-22 by voting on entries submitted. Winners will be announced March 24. Prizes for winners will be a safety-related item valued up to $25.

Multiple entries must be submitted on separate sheets of paper. Be sure to indicate whether you are willing to participate in safety skits or appear as a mascot throughout the year.

Space Propulsion

Continued from page 3

eventually humans beyond the low-Earth orbit. The X-programs are looking at what it will take to lower the cost of space flight.

Reducing that cost is important to NASA and the burgeoning space business industry. The United States is not yet in a strong position in that business arena, Sackheim said. "I want to do whatever I can to help American industry get where it needs to be as a leader in space transportation and space propulsion."

"We are poised at a threshold where space has the potential for a major business explosion. Telecommunications alone is expected to generate $32 billion in revenues, worldwide, by the year 2008. The launch vehicle business worldwide is $8 billion a year — probably on the way to $20 billion a year. We only get $2-3 billion of that now. We need to recover market share by providing safe, extremely reliable and low-cost American launch services.

"I have been a champion of low-cost access to space for a lot of years," Sackheim said. "Everyone in the business of space transportation agrees we need low-cost access to space, and we have great difficulties in achieving concensus to chart the 'right' course to achieve this major goal."

The Integrated Space Transportation Program is a good start, he said, and he wants to be sure NASA achieves a balanced program of benefit to America and to NASA.

Space transportation is more important than just reaching low-Earth orbit. Everything that goes into space, goes to a low-Earth orbit and then on to a higher operational orbit.

"Marshall needs a balanced program that deals with both Earth-to-orbit and in-space propulsion," Sackheim said. "When you launch something off the ground, you are mostly carrying propellant. It takes a lot of propellant to get the ultimate payload to the higher orbit."

To do the Integrated Space Transportation Program process in a fair and balanced way NASA has to make sure all of the options get considered so that we come up with the best solutions, he said. That involves a lot of "out-of-the-box" thinking by the entire Marshall team. "I look forward to a partnership with all the Marshall directorates, other NASA Centers such as Stennis, Glenn, Ames and Langley; industry; federal institutions such as the Air Force, the Army and the Department of Energy; and academia.

"We need a dedicated activity in research and developing new technology, and we need to have that technology in place so that we can get to the operational orbits faster, better, cheaper — and most importantly, smarter," Sackheim said.

"Technology needs to be developed off-line, and in-house. We have a lot of new young people who can do that — Fastrac was a good example and learning opportunity for these people. We need to develop the program to achieve a technology readiness level of four to six, and then have industry take it from there. We must include propulsion-related technologies in our development plans and roadmaps. We have to recognize important technologies such as nuclear and thermal propulsion. Achieving higher technology readiness levels is important in reducing the risks. I think Marshall should develop some of these enabling technologies and make them available for industry."

Programs such as Pathfinder — X-34 and X-37 — are the testbeds to develop technology in the real operating environments, he said. Testing under simulated conditions is always difficult and expensive; however, the Pathfinder programs are "well conceived to solve these complex problems," Sackheim said.

In terms of Earth to orbit, Sackheim explained the only way to get a thrust to weight that is greater than one — the thrust needed to launch a vehicle out of Earth's atmosphere — is to use a thermal rocket. There are only two kinds of thermal rockets available today. "Nuclear is perceived as a long way off environmentally for Earth-to-orbit; therefore, vehicles must be powered by chemical combustion sources for a long time to come.

*See **Space Propulsion** on page 7*

Next space station component to launch between July 8-14

Launch of the International Space Station's next component — the Zvezda service module — is scheduled between July 8 and 14 from the Baikonur Cosmodrome in Kazakhstan.

The Zvezda launch window will be proposed for approval to the International Space Station Partners in accordance with the Space Station Control Board process within the next several weeks.

Following joint meetings in Moscow, including a General Designer's Review and a Joint Program Review, Rosaviakosmos has proposed that Zvezda (Russian for "Star") — the early living quarters for crews aboard the Station — be launched on a Proton rocket with second and third stage engines modified to increase reliability.

The 42,000-pound Zvezda provides the early living quarters for astronauts and cosmonauts, and the life support system, electrical power distribution, data processing system, flight control system and propulsion.

Chandra

Continued from page 1

from the central source. This produces dark stripes, or absorption lines in the X-ray spectrum. Bright stripes or emission lines due to emission from the blanketing gas are also present. Since each element has its own unique structure, these lines can be read like a cosmic bar code to take inventory of the gas. The team was able to determine what atoms the gas contains and how many, the number of electrons each atom has retained in the hostile environment of the black hole and how the gas is moving there. They found lines from eight different elements including carbon, nitrogen, oxygen and iron. The amount of this gas was found to be about 100 times greater than that found with optical and ultraviolet observations.

Space Research Institute of Netherlands and the Max Planck Institute built the Low Energy Transmission Grating under the direction of Albert Brinkman. The Smithsonian Astrophysical Observatory in Cambridge, Mass., built the High Resolution Camera, under the direction of Stephen Murray.

Space Propulsion

Continued from page 6

"Rocket-based combined cycle is more efficient, if we can solve the very difficult and stressing technology issues," Sackheim said. "A combined cycle propulsion system gulping air and then switching to rockets offers great potential performance benefits.

"I am looking forward to the research and development that will make that happen."

The writer, employed by ASRI, is the Marshall Star editor.

Mathcounts 2000

Area students compete in local competition

Thirty-five seventh and eighth grade students from six schools in Madison Madison, Marshall and Morgan counties participated in the Mathcounts 2000 competition Feb. 5 at Arab Junior High School.

NASA is a corporate sponsor for the program.

The top three schools and four individuals will compete at the state contest March 17 in Mobile, and those winners will go to the national competition in Washington D.C., May 12.

Mathcounts fosters mathematics education through competition.

The Marshall Engineers and Scientists Association presented top individual finisher Kevin Bombino of Arab Junior High School with "The Art of Problem Solving" volumes 1 and 2 and two volumes of with solutions manuals.

Bombino, Peng Wang and Steve Reeves were among the top 10 individuals competing last year, and Bombino went to the national competition to represent Alabama.

The Alabama Society for Professional Engineers will re-present Bombino with his first-place trophy at the Engineer's Week luncheon Friday at the Huntsville Hilton.

Challenger Middle School, Arab Junior High School and Randolph School teams finished in the top three in this year's competition. Last year the three schools finished in the top four.

Results from Mathcounts 2000 are as follows:

Individuals:

- Kevin Bombino, Arab
- Shiva Daran, Challenger
- Peng Wang, Challenger
- John Gipson, Randolph
- Tom Burwell, Randolph
- Jeng Feng, Challenger
- Andrew Atkinson, Challenger
- Nicholas Sorrels, Covenant Christian
- Steve Reeves, Arab
- Daniel Meinart, Arab

Schools:

- Challenger Middle School
- Arab Junior High School
- Randolph School
- Covenant Christian Academy

Employee Ads

Miscellaneous

★ Firewood, oak and hickory, needs splitting, you haul, $10 per pickup load. 880-2290
★ Drake Hf Rig, R4A receiver, T4X transmitter and power supply, $350. 498-3194
★ Murray riding mower, 11HP, 36" cut, $200; 1987 Stratos boat, 19'3" w/200 Mercury motor, 12/24 omc, T/M. 233-5032
★ King-size waterbed w/bookcase headboard, 2 lights, oval mirror, $300. 882-0567
★ Dog kennel, 4'x4'x4', and large igloo dog house, $150 for all. 498-3229/Jim
★ Alfred Angelo white wedding dress, chapel train, size 10/12. 881-9879
★ 1990 Mastercraft TriStar 190 w/trailer, open bow, 351 engine, custom cover, barefoot boom included, $13,900 negotible. 757-0320
★ Lane reclining sofa, Keats multi-fabric, burgundy matching recliner, both for $800. 230-2586
★ Kenmore heavy duty washer and electric dryer, white, matching set w/lighted panel, $200. 830-4477
★ Four slide rules, $40. 772-9483
★ Kawasaki Concours sport touring motorcycle, adult ridden, many extras. $5,500. 882-9807

Vehicles

★ 1991 Geo/Prizm, silver, automatic, 72K miles, 4-door, a/c, am/fm stereo, $3,300 obo. 430-6829
★ 1999 Grand Marquis GS, 5,049 miles, must sell due to family illness, $18,200. 883-2757
★ 1992 Isuzu Trooper LS, 4WD, 5-speed, $7,500. 722-8583
★ 1993 Acura Legend, leather, sunroof, loaded, cashmere color, $12,500. 880-8008/797-6173
★ 1978 Datsun 810 station wagon, needs work, $600 obo. 851-0737
★ 1994 Camry XLE, V-6, sun roof, all power, leather seats, wood grain dash, 71K miles, $11,900. 551-0550
★ 1993 E150 conversion van, all power, TV, VCR, Nintendo, CD changer, dual air/sound, 39.5K miles, $9,850. 881-1090
★ 1987 Cadillac Cimarron, 130K miles, auto, a/c, 4-door, leather, garage kept, one-owner. 883-7144 after 5 p.m.

Wanted

★ Roommate for 2-bedroom apartment in Madison. Full- or queen-size mattress. 971-0048.
★ Telescope for beginner astronomer. 534-8186
★ Go-cart in good condition. 533-5942
★ Today's Kids Infant/Toddler Playland or equivalent. 882-9042/Todd
★ Pop-up camper in good condition. 461-9662

Lost

★ Truck ignition key, in Bldg. 4200, 4610 or 4487 area. 544-1923 if found

Found

★ Bracelet in Bldg. 4610. 544-5564
★ Scarf in the North parking lot, Bldg. 4200 on 2/14/00. 544-4758 to identify
★ Pocket knife in Bldg. 4619 parking lot. Call 544-7191 to identify

Carpool

★ Would like to form carpool from Albertville-Guntersville area, 7 to 3:30 p.m. 544-8010/544-2908

Center Announcements

☛ ***MARS Ballroom Dance Club —*** West coast swing lessons will be offered at 7 p.m. March 6, 13, 20 and 27 in the Parish Hall of St. Stephen's Episcopal Church at 8020 Whitesburg Drive. The lessons will be taught by Bonnie Henley and will cost $6 per person per night. For more information, call Linda Kinney at 544-0563.

☛ ***Softball players —*** A kickoff meeting for softball coaches and players — male and female — will be held from 11 a.m.-noon, March 1 in the Bldg. 4752 All Purpose Room.

☛ ***MARS 2000 Soccer —*** MARS soccer will start this year in early March. Participation in the club is open to all NASA personnel and contractors. Pickup games are being held Sundays at 1 p.m. at the southwest corner of Martin and Rideout roads. For more information, call Bob Linner at 544-3833.

☛ ***Florida Tech Information Session —*** Florida Institute of Technology Graduate Center at Redstone Arsenal will host information sessions on its master of science in computer information systems from noon-1 p.m. on March 9 and from noon-1 p.m. and 5-6 p.m. April 6 in Bldg. 5304. To attend, call 881-7878.

☛ ***Shuttle Buddies —*** The Shuttle Buddies will meet for breakfast at 9 a.m. Feb. 28 at Mullins Restaurant on Andrew Jackson Way. For more information, call Deemer Self at 881-7757 or Gail Wynn at 852-8189.

☛ ***MARS Ballroom Dance Club —*** The MARS Ballroom Dance Club will offer waltz and cha-cha lessons on Feb. 28 in the Parish Hall of St. Stephen's Episcopal Church at 8020 Whitesburg Dr. Intermediate classes will start at 7 and beginner classes at 8. The lessons will be taught by Don Worrell and cost $6 per person per night. For more information, call Linda Kinney at 544-0563.

☛ ***Redstone Toastmasters —*** Do you want to improve your speech? Visit and join Redstone Toastmasters, which meets weekly at 6 p.m. on Tuesday at Piccadilly Cafeteria in Madison Square Mall. For more information, call Sylvia Battle at 890-0547.

☛ ***Lunar Nooners Toastmasters —*** The NASA Lunar Nooners Toastmasters Club meets Tuesday at 11:30 a.m. in Bldg. 4610 cafeteria conference room. All Marshall employees, contractors and friends are invited to attend. For more information, call Lee Johns at 544-5142.

☛ ***Sealed Bid Sale —*** The Defense Reutilization and Marketing Office in Huntsville will hold a sealed bid sale in March. Property inspection and bid submission will be from 8 a.m.-3 p.m. March 1-3 at Bldg. 7414 Red Stone Rd. on Redstone Arsenal. Bid receipt deadline is March 6. For more information, call 842-2570 or 842-9474.

☛ ***Redstone Supply Center Grand Opening —*** The Supply Center operated by Alabama Industries for the Blind will have a grand opening at 10:30 a.m. Monday at the new facility in Bldg. 3775 on Maintenance Row, just off Patton Road on Redstone Arsenal. The Supply Center sells a full line of the mandatory purchase, blind-made office supplies that military and federal civilians buy supporting blind employment with their government IMPAC credit card. Commercial products also are available.

☛ ***NASA Scholarships —*** NASA employees who wish to apply for one of six college scholarships available to their dependents for the 2000-2001 school year are reminded that completed paperwork must reach Johnson Space Center by March 31. The six $2,000 scholarships will be awarded to full-time students seeking under graduate degrees in science or engineering. Forms are available in Bldg. 4200, room 101, Janie Crawford, or at the NASA Exchange Office, Bldg. 4752, Monica Hill.

Marshall Center Open House
9 a.m.-6 p.m. May 20

MARSHALL STAR
Vol. 40/No. 24

Marshall Space Flight Center, Alabama 35812
(256) 544-0030
http://www1.msfc.nasa.gov

The Marshall Star is published every Thursday by the Internal Relations and Communications Department at the George C. Marshall Space Flight Center, National Aeronautics and Space Administration. Contributions should be submitted no later than Monday noon to the Marshall Internal Relations and Communications Department (CD40), Bldg. 4200, room 101. Submissions should be written legibly and include the originator's name. Send electronic mail submissions to: intercom@msfc.nasa.gov The Marshall Star does not publish commercial advertising of any kind.

Manager of Internal Relations
and Communications — Norman Brown
Editor — Debra Valine

U.S. Government Printing Office 1999-533-127-80099

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Permit No. G-27