Associate Administrator Rothenberg outlines FY 2000, 2001 hiring plan — See story on page 2

MARSHALL STAR

Marshall Space Flight Center **Jan. 6, 2000**

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

Successful Chandra, Space Station, X-Vehicle milestones highlight rewarding 1999 for Marshall

From the launch of the Chandra X-ray Observatory to the first test flight of the X-34 rocket plane, from delivery of key elements of the International Space Station to Space Shuttle safety upgrades, Marshall has played a key role in NASA's many memorable successes in 1999.

One of NASA's most notable achievements in the past year was the successful launch in July of Chandra aboard the flight of STS-93. The Marshall-managed space observatory will spend five or more years in high Earth orbit, documenting the history of the cosmos through study of X-ray emissions.

"It's literally a dream come true," said Marshall Center Director Art Stephenson, following Chandra's successful delivery to orbit aboard Space Shuttle Columbia. "There are people here at Marshall, and elsewhere, who have devoted more than 20 years of their lives to the Chandra program. Now they have seen their dreams become reality."

The earliest captured images from the Chandra Observatory — named for the late Nobel Laureate Dr. Subrahmanyan Chandrasekhar — are already benefiting

*See **Milestones** on page 6*

Chandra X-ray Observatory

Biology course set Jan. 12-13

"Essentials of Biology" is being taught in two parts Jan. 12-13 in Morris Auditorium. Part I will be taught twice on Jan. 12; Part II will be taught twice on Jan. 13. Class times both days are 8:30 a.m.-noon and 1-4:30 p.m.

The course provides an increased understanding of biology's role in tomorrow's world. The intent is to review and renew appreciation of biology — the evolving science of life.

All employees are encouraged to attend. Attendance will be on a first-come, first-serve basis until all seats are filled. Participants will sign in.

The course, offered to the staff at NASA Headquarters, was highly rated by attendees. It is offered at the request of NASA Administrator Dan Goldin.

For more information, call Ela Washington at 544-1164.

"Observing safety each day keeps the doctor away"
— Safety slogan submitted by
Greg Caldwell, TD73

Second X-34 rocket plane reaches assembly milestone

by Martin Burkey

Assembly of the second of NASA's three X-34 rocket research planes reached a major milestone in late December with the attachment of its composite wing to its fuselage at Orbital Sciences Corp. facilities in Dulles, Va.

Orbital is building and will operate the three experimental robot planes under contract to Marshall. The X-34 is part of a family of experimental vehicles designed to demonstrate technologies that will increase the safety and reliability of future launch vehicles and reduce launch costs from $10,000 per pound to $1,000.

A-2, as the second vehicle is designated, will make the X-34's first powered flights scheduled to occur from Dryden Flight Research Center at Edwards Air Force Base, Calif., next year. After the A-2 vehicle is assembled and tested at Orbital, the wing — manufactured by R-Cubed of West Jordon, Utah — will be removed and shipped to Dryden.

The fuselage will be shipped to Holloman Air Force Base, N.M. There, integrated with its Fastrac rocket engine, it will

*See **X-34** on page 11*

Good news for Marshall Center

Downsizing discontinued; new hires authorized

In his Dec. 15, 1999, memorandum, Associate Administrator for Space Flight Joseph Rothenberg gave the Marshall Center the authority to begin immediate hiring of more than 40 positions to meet near-term workforce requirements.

He also thanked the Marshall Center staff for the support, long hours and extra effort given to providing the data necessary to understand and advocate the Office of Space Flight workforce needs.

Rothenberg provided guidance on Center workforce staffing and emphasized that downsizing at the Office of Space Flight Centers is discontinued.

Joseph Rothenberg

"Based on the decisions resulting from the Office of Space Flight workforce reviews, hiring in FY 2000 is authorized," Rothenberg said. "That hiring will be followed by one-for-one replacement until reaching steady state in FY 2001.

Rothenberg authorized supplementing Marshall's current staffing by a total of approximately 190 hires and managing the Center to a ceiling of more than 2,600 full-time equivalents for FY 2000, an increase in the FY2001 ceiling to over 2,700.

"In concert with the Office of Management and Budget and the budget process, we will conduct follow-up reviews to assure the health and vitality of the workforce," he said. "We also will guide outyear hiring to ensure workforce balance between operations and development needs."

The new guidelines provide staffing to meet Office of Space Flight programmatic and institutional needs. Shuttle safety of flight operations remains the highest priority for Marshall, followed by International Space Station and Advanced Space Transportation activities.

It provides support for Shuttle upgrades, the Space Station, Expendable Launch Vehicle, Advanced Space Transportation and specific administrative areas. It also provides staffing levels for Next Generation Launch Services and payload operations management.

The plan addresses Center aging issues by recommending the hiring of approximately 50 percent freshouts. It also provides staffing for a viable Co-op program to serve as a feeder for future skills needs, as well as supporting a rotating career development (detailee) program among the Office of Space Flight Centers and Headquarters.

Galileo sees dazzling lava fountain on Jupiter's Io

During a recent close flyby of Jupiter's moon Io, NASA's Galileo spacecraft observed a fiery lava fountain shooting more than a mile above the moon's surface.

Galileo took the pictures on Nov. 25.

"We've finally caught a close-up of a massive volcanic eruption in action on Io," said Galileo project scientist Dr. Torrence Johnson of NASA's Jet Propulsion Laboratory in Pasadena, Calif. "The erupting lava was so hot and bright, it over-exposed part of the camera picture and left a bright blur in the middle."

These lava fountains were hot enough and tall enough to be observed by the NASA Infrared Telescope atop Mauna Kea, Hawaii. By combining data from this telescope and Galileo observations, scientists have their best chance ever to pin down temperatures of the extremely hot lava on Io.

Lava fountains provide the most spectacular volcanic show on Earth, although the fountains found in Hawaii and elsewhere on Earth rarely exceed a few hundred yards in height. Because their appearances are infrequent and brief, it is very difficult to target these events. "Catching these fountains was a one-in-500-chance observation," said Galileo scientist Dr. Alfred McEwen from the University of Arizona in Tucson.

The new Io images are available at:
http://www.jpl.nasa.gov/pictures/io

Additional information and pictures taken by Galileo are available at:
http://galileo.jpl.nasa.gov

Y2K

NASA reports no problems with Year 2000 transition

The first business day of the Year 2000 turned up no significant problems in NASA information technology systems.

"The NASA Y2K team should take pride in what has been a truly extraordinary accomplishment," said NASA Chief Information Officer Lee Holcomb, who oversaw the Agency's Y2K effort. "NASA has transitioned successfully to the Year 2000 with no significant problems. The few minor anomalies that arose were easily fixed and we have closed them all out."

Only two space-related systems suffered problems that appeared to be Y2K-related, but neither problem directly affected real-time mission-critical systems.

One problem occurred in software used to plan communications opportunities between the Upper Atmosphere Research Satellite and the Tracking and Data Relay Satellite System.

The other occurred in orbital-prediction software used by NASA's Deep Space Network. Workarounds for both problems were developed over the New Year's weekend.

Smooth transition to new year at Marshall Center

Following the transition to the Year 2000, computer and communication systems managed at Marshall continued in a "green" status, meaning the systems were not significantly affected by the transition from 1999 to 2000.

During the primary monitoring period from 6 a.m. Dec. 31 through 2 p.m. Jan. 3, the Center experienced only a few minor anomalies that were easily fixed.

Marshall officials attributed the trouble-free transition to thorough preparation. "As part of a federal agency, we had to develop and implement a plan by March 1999 to have the 'Y2K problem' fixed. And we did that," said Sheila Fogle, Y2K project manager for Marshall's Information Services Department.

Fogle led the Information Services Department Y2K Team established in 1996 — the same year the federal government ordered all agencies to begin steps toward Y2K compliance. To be compliant, computers had to be upgraded or replaced, to ensure they correctly read a two-digit year code "00" as the Year 2000.

"We viewed the Y2K issue as a business problem, not a computer problem," Fogle said. "If computers and communications equipment don't work, we can't do business, whether it is a NASA or contractor system, whether it is space-related software or a payroll system."

Committee sponsors Black History Month competitions

The Marshall Black History Month Committee is sponsoring poster and essay contests and a science fair. The competitions are open to children of Marshall civil servants and contractors. Winners will be recognized for each competition.

The poster contest is for students in grades 3-5. A half-sized poster should relate to "African-American Contributions of the 20th Century." Attach a cover sheet that includes the student's name, grade level, school, school system, teacher and topic. Posters must be received at the Marshall Library in the basement of Bldg. 4200 or the Huntsville-Madison County Public Library at 915 Monroe St. in Huntsville by Jan. 26.

Students in grades 6-8 are invited to participate in a science fair. A three-panel display should highlight a project that falls within chemistry, physics/optics, engineering or biology. Call Johnnie Clark at 544-2799 to obtain an application and additional details. Applications are due by Jan. 28.

There will be an essay contest for students in grades 9-12. The essay must contain between 200 and 250 words and address "The African-American Legacy and the Challenges of the 21st Century." Essays must be submitted to Johnnie Clark, ED34, no later than Jan. 26.

New Year brings payroll issues, changes for civil service employees

With the New Year, civil service employees are reminded of several payroll-related issues and changes. For instance:

— Salaries earned through the pay period ending Dec. 18, 1999, will be reflected on the 1999 W-2s. The W-2s will be mailed to home addresses no later than Jan. 31.

— New tax withholding changes will be reflected in the Leave and Earning Statement received on Jan. 11. These are the results of increases in the allowances for personal exemptions for 2000. This generally increases net pay.

— The FICA rate for 2000 will be the same as last year, 7.65 percent. This rate is composed of Hospital Insurance Tax (HIT) at 1.45 percent and Old-Age, Survivors, and Disability Insurance (OASDI) at 6.20 percent. Maximum earning subject to OASDI will increase to $76,200 and HIT will be unlimited. These changes will be effective for the pay period ending Jan. 1.

— The locality pay increase and cost of living increase will be effective Jan. 2.

— New group health rate changes, as well as 2000 CFC pledge deductions, will be reflected in the salary received on Jan. 25.

— The 1999 leave year ends on Jan. 1.

— The Thrift Savings Plan maximum contribution for 2000 increased to $10,500.

— The employee retirement deduction rates will increase by .15 percent for 2000.

For more information, call Michael Clemons at 544-7345.

Marshall completes study for removing paint from aircraft

by Marceia Clark-Ingram and Miria Finckenor

The Marshall Center has completed an effort with the Environmental Protection Agency and the U.S. Air Force to study environmentally friendly technologies for removing paint from aircraft.

Methylene chloride, a popular paint-stripper, is being eliminated from industrial use due to its possible carcinogenic effects on humans and its effect on the environment. The Occupational Safety and Health Administration recently imposed strict limits on exposure levels of methylene chloride for workers.

Marshall's Materials, Processes and Manufacturing Department led the depainting effort. Representatives from numerous aerospace companies, including Boeing, Lockheed-Martin, Northrup Grumman, Sikorsky and United Space Boosters Inc., served on a technical advisory committee to ensure that no useful technology was overlooked and the evaluations were fair.

Eight environmentally friendly methods of stripping paint with products from 34 companies were studied:

- methylene chloride-free chemicals
- carbon dioxide (CO_2) blasting
- CO_2 laser stripping
- xenon flashlamp and CO_2 coating removal (FLASHJET®)
- high-pressure water blasting (WaterJet)
- wheat starch blasting (EnviroStrip®)
- plastic media blasting
- sodium bicarbonate wet stripping.

Courtesy photos

Sandwich corrosion samples are shown inside a high humidity cabinet.

Aluminum panels were painted with a commonly used epoxy primer and polyurethane topcoat, artificially aged through thermal cycling, then stripped.

The paint system was the aircraft paint stripping industry standard. The thermal cycling times and temperatures were selected to best simulate ground-to-cruise altitude cycles.

The panels were evaluated for any remaining paint or primer and any substrate damage due to the strip method, then refurbished for another cycle of painting, aging and stripping. Some methods were eliminated after one cycle for poor performance; others were evaluated for as many as five cycles.

The NASA Operational Environments Team provided the overall technical guidance and coordination for the entire depainting effort.

The Manufacturing Services Group prepared the test panels, including alodining and painting. The Nonmetallic Materials and Processes Group stripped many of the panels using the facilities at Marshall's Productivity Enhancement Center.

The Environmental Effects Group and the Non-destructive Evaluation and Tribology Group evaluated the panels for substrate damage and changes in surface roughness. The Chemistry Group investigated materials compatibility issues. The Metallic Materials and Processes Group evaluated the panels for changes in fatigue and tensile properties and crack detectability. The Thermal and Fluid Systems Group, Environmental Test Facility Team of the Structures, Mechanics and Thermal Department performed the thermal cycling for artificial aging.

The final report contains strip rate data from all of the methods, lessons learned during processing, metallurgical evaluations of the panels and summaries of corrosion and hydrogen embrittlement studies. No process was singled out above the others, as companies should consider equipment and operational costs when complying with the new OSHA regulations.

For a copy of the depainting final report, call Marceia Clark-Ingram at 544-6229.

The authors are materials engineers in the Engineering Directorate.

Johnnie Clark of Marshall's Materials Processes and Manufacturing Department in the Engineering Directorate, removes paint using the plastic media blast method.

Three million census takers needed for Census 2000

The Department of Commerce has requested help from several federal agencies in recruiting employees for temporary, intermittent appointments for the upcoming Census 2000 initiative.

"Census 2000" refers specifically to the decennial census which will take place this year. A decennial census is a complete count of the U.S. population conducted every 10 years.

NASA has agreed to publicize Census 2000 positions to employees through its Human Resources Offices. Employees accepting these positions must sign an agreement of understanding as to conditions of dual employment. Approval for outside employment should be obtained from one's immediate supervisor prior to accepting a position with the Census Bureau. Recruitment targets include current federal (including military) employees, spouses and retirees.

Applicants must be 18 years old or older and U.S. citizens, have had no convictions other than minor traffic violations since age 18, and not be currently employed as a tax collector/ assessor or law enforcement official.

Men born after Dec. 31, 1959, must be registered with the Selective Service. Applicants must complete an application, take a 30-minute basic skills test and pass a security check. Persons hired as managers will be subject to an employment reference check.

Dual-pay restrictions that normally apply to federal workers who hold more than one federal job are waived for the census. Appointments will be short-term and allow flexible working hours while conducting door-to-door interviews to update addresses and to follow-up on households that did not return their census questionnaire.

Positions available include:
FIELD POSITIONS:
• Census taker (enumerator);
• crew leader
OFFICE POSITIONS:
• 520 local Census offices throughout the country will remain open through August; staffed between 10 and 30 people or about 60 at peak from March through June;
• local Census Office manager;
• assistant managers for Field Operations, Administration, Recruiting Office and Field Operations supervisors;
• administrative assistant; and
• clerk.

These positions are referred to as enumerators. Individuals hired will represent their own communities and provide evening and weekend services for a three-to-10 week period for work beginning in the spring.

Limited recruiting and testing has begun. There will be intensive recruiting and testing through March. Selections will begin in February. Pay will vary based on local prevailing rates and varies nationally from $8.25 to $18.50 per hour. Earnings are subject to federal and state taxes.

Census workers are paid weekly and paid to attend training. They are reimbursed for mileage costs for field jobs. Census takers are not eligible for health benefits, life insurance or retirement benefits in this employment. Leave is not earned.

As a temporary, intermittent employee, benefits for health and life insurance, retirement coverage and entitlement to earn annual and sick leave is retained from the full-time federal appointment only. Census takers are eligible for benefits under the Federal Employees Compensation Act for disability due to injury sustained while performing census duties.

Some waivers or administrative exemptions will help recipients of government benefits to work on Census 2000 without reducing their benefits. Employees who take a buyout from federal employment are not eligible for work on the census without repayment of full buyout incentive.

Hiring preference is given by law to veterans with proof of eligibility for preference required. The Bureau of the Census is an Equal Opportunity Employer. Interested candidates should contact the U.S. Census Bureau, toll free 1-888-325-7733, to find out how and where to apply, contact the Census Web site at:

www.Census.Gov/Jobs2000

or call the Regional Census Center in Atlanta, Ga., at (404) 331-0000.

Course set on effective written, oral communications

Two workshops on the "Simple Strategies for Effective Written and Oral Communications" will be from 8 a.m.-4 p.m. Jan. 10-11 and Jan. 12-13 in Bldg. 4200, room P106.

The workshops will meet the requirements of the government's directive on Plain Language in Government Writing and will follow the "Plain Language Guidelines" provided by the National Partnership for Reinventing Government.

Part I of the workshop, "Using Plain Language in Government Writing," will teach how to create a simple, effective writing style; organize writing projects clearly and logically; use proper spelling and grammar; and write memos, letters and reports that get desired results.

Part II, "Effective Oral Communication in Business," teaches how to listen effectively and hear what others are actually saying; master the keys to empathetic listening; use skillful communication to improve your work performance; and help other people communicate effectively.

Civil service employees may enroll via AdminSTAR by close of business Friday.

For more information, call Chrissa Hall at 544-5468 or Sherry McKellar at 961-0012.

Milestones

Continued from page 1

research into the mysteries of exploding stars, black holes and other celestial phenomena.

X-Series Vehicles

1999 was a year of accomplishment for the "X" programs, next-generation launch vehicle demonstrators managed by the Marshall Center and aimed at making the future of flight — both in space and in Earth atmosphere — more reliable and affordable.

The workhorse in NASA's line of reusable rocket planes, the X-34, made remarkable progress in 1999. Unveiled in April at the Dryden Flight Research Center in Calif., the X-34 made its maiden flight in June, attached to the underbelly of its L-1011 carrier aircraft. The X-34 is expected to begin a series of 27 solo test flights in spring of 2000.

In February, the X-33 rocket plane's rugged thermal-protection system panels passed an intensive series of tests. Three months later, Marshall completed testing of the vehicle's aluminum liquid oxygen tank. Testing also began at Marshall on one of the X-33's two composite liquid hydrogen tanks. Damage to the skin of the tank, discovered following a successful pressure and structural test, is now being investigated.

File photo

News media representatives and a crowd of on-lookers watch the rollout of the X-34 vehicle at Dryden Flight Research Center in California.

In July, NASA and the Boeing Co. of Seal Beach, Calif., entered into a $173 million cooperative agreement to develop the X-37, an experimental space plane designed to test new technologies for reusable launch vehicles. Its first test flight — an unpowered drop from an aircraft — is scheduled for 2001, followed by orbital and atmosphere re-entry testing in 2002.

The International Space Station

The Marshall Center continues to play a vital role in building and managing the International Space Station, now being assembled in orbit by the United States and 15 partner nations. The 470-ton Space Station will be wholly devoted to scientific research conducted in microgravity — one of Marshall's primary NASA missions.

The Space Station's Airlock Module and two of the Station's primary truss segments — the starboard-side S1 truss and the

Photo by Danny Reeves/ NASA/Marshall Space Flight Center

A section of the International Space Station truss assembly arrives at Marshall on NASA's Super Guppy aircraft.

port-side P3/P4 truss — were delivered to Marshall in 1999 for structural and design testing as well as installation of critical flight hardware.

In October, outfitting and testing of the Boeing-built S1 truss was completed. The spine-like truss segment was flown from Marshall to Kennedy Space Center, Fla., where it will be taken to orbit aboard the Space Shuttle in 2001. Testing of the airlock is due to conclude in January of 2000 for delivery to Kennedy. The airlock also will be carried to orbit by the Shuttle in 2001.

Marshall also manages several international partnership Station components. In July, Italian Space Agency contractor Alenia delivered the second of three Multi-Purpose Logistics Modules — or Station supply transports — to Kennedy. Managed by Marshall, the first of the modules will be flown to orbit in late 2000.

Marshall continues to oversee testing of two Italian-built connecting nodes — pressurized modules that will link living and working quarters aboard the Station. The nodes will be sent aloft separately; the first is scheduled for delivery in 2002.

Development of water recycling and oxygen generating systems for the Space Station's Environmental Control and Life Support System also is proceeding at Marshall. In May, the Station's Water Processor was successfully flight-tested aboard Space Shuttle during the STS-96 mission. The Shuttle crew tested the processor's Volatile Removal Assembly to ensure proper function of the Station's water reclamation system.

Space Shuttle

The Space Shuttle's role in delivering Space Station elements, Chandra and other NASA mission objectives to space spurred

*See **Milestones** on page 7*

Chandra maps vital elements from supernova

A team of astronomers led by Dr. John Hughes of Rutgers University in Piscataway, N.J., has used observations from the Marshall-managed Chandra X-ray Observatory to make an important new discovery that sheds light on how silicon, iron and other elements were produced in supernova explosions. An X-ray image of Cassiopeia A (Cas A), the remnant of an exploded star, reveals gaseous clumps of silicon, sulfur, and iron expelled from deep in the interior of the star.

The findings — slated for print publication on Monday — appear online in the Astrophysical Journal Letters at:

http://www.journals.uchicago.edu/ApJ/journal/issues/ApJL/v528n2

Authors of the paper "Nucleosynthesis and Mixing in Cassiopeia A" are Hughes, Rutgers graduate student Cara Rakowski, Dr. David Burrows of Pennsylvania State University, University Park, Penn., and Dr. Patrick Slane of the Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.

According to Hughes, one of the most profound accomplishments of twentieth century astronomy is the realization that nearly all of the elements other than hydrogen and helium were created in the interiors of stars. "During their lives, stars are factories that take the simplest element, hydrogen, and convert it into heavier ones," he said. "After consuming all the hydrogen in their cores, stars begin to evolve rapidly, until they finally run out of fuel and begin to collapse. In stars 10 times or so more massive than our sun, the central parts of the collapsing star may form a neutron star or a black hole, while the rest of the star is blown apart in a tremendous supernova explosion." Supernovae are rare, occurring only once every 50 years or so in a galaxy like our own.

Equal in significance to the image clarity is the potential the Chandra data held for measuring the composition of the various knots and filaments of stellar material visible in Cas A. Not only could the astronomers determine the composition of many knots in the remnant from the Chandra data, they were also able to infer where in the exploding star the knots had originated.

To follow Chandra's progress, visit the Chandra sites at:

http://chandra.harvard.edu

and

http://chandra.nasa.gov

Milestones

Continued from page 6

Photo by Terry Leibold, NASA/Marshall Space Flight Center

Don Holder of Marshall's Environmental Control and Life Support Branch performs final checkout of the Volatile Removal Assembly Flight Experiment.

NASA and Marshall in 1999 to rededicate their efforts toward the safety and reliability of the Shuttle.

From the Solid Rocket Boosters to the Main Engines and the External Fuel Tank, all Shuttle propulsion elements managed at Marshall continue to be upgraded. In 1999, Marshall initiated development of Main Engine enhancements that include a more reliable high-pressure fuel turbo pump — scheduled for flight in late 2000 — and the Advanced Health Monitoring System, which measures vibration and tracks proper engine function during takeoff and flight.

Upgrades are also being made to the Solid Rocket Booster and Solid Rocket Motor elements — to improve response to flight commands and protect against excess wear, respectively. A 1999 redesign of the External Tank's fuel port will eliminate the potential for fuel leaks that could delay or scrub a launch.

Advanced Space Transportation and Propulsion

Marshall's Advanced Space Transportation Program continues to pave the "highway" to space. "Safe, reliable, affordable transportation has been the key to exploration and development of frontiers that emerged throughout history," said Dr. Row Rogacki, director of Marshall's Space Transportation Directorate. "And transportation is again the driver as we boldly prepare to explore and develop the largest frontier of all — the space frontier."

*See **Milestones** on page 8*

Photo by Emmett Given, NASA/Marshall Space Flight Center

From left, Bill Jacobs of Marshall's Avionics Department; Bill Dawson and Denis Edwards of Sussex University in Brighton, England; and George Scelzo of PRT Advanced Maglev Systems Inc. in Park Forest, Ill., install the maglev track demonstrator at Marshall.

Milestones

Continued from page 7

Among the technologies Marshall is developing that will dramatically increase safety and reduce the cost of space travel:

• Marshall received funding this year for Spaceliner 100, a technology initiative intended to reduce space launch costs to mere hundreds of dollars per pound and to meet NASA's ambitious goals of making space transportation 10,000 times safer and 100 times cheaper by 2025.

• In October, Marshall and industry partner PRT Advanced Maglev Systems Inc. of Park Forest, Ill., celebrated the successful test of a 50-foot magnetic levitation or "maglev" track at Marshall. Launch vehicles utilizing maglev technology use electricity and magnetism to achieve liftoff, reducing fuel load and launch costs.

• The Fastrac rocket engine underwent component testing at Marshall to prepare for the first powered test flight of the X-34 technology demonstrator, scheduled for 2000. In May, the engine system was successfully tested at NASA's Stennis Space Center, Miss., for the first time at full power, for 155 seconds — its planned operational time during an X-34 flight.

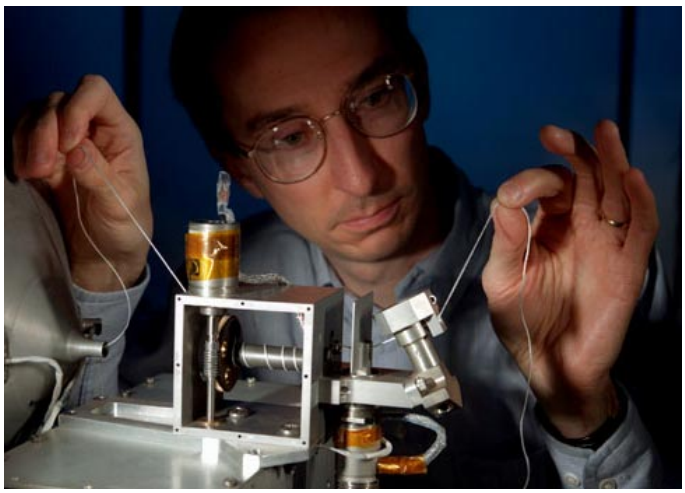

Photo by Doug Stoffer, NASA/Marshall Space Flight Center

Les Johnson, principal investigator for ProSEDS in Marshall's International Space Station Propulsion Module Project Office, inspects a flight demonstrator tether.

• In October, Marshall successfully test-deployed an electrodynamic tether, ending the first stage of preparations for testing of the Propulsive Small Expendable Deployer System, or ProSEDS — a propellant-free propulsion system targeted for launch in August of 2000. The tether, which uses low-cost magnetic thrust to propel its load, will initially be used to lower the orbit of a spent rocket stage.

• Marshall and NASA's Glenn Research Center in Cleveland, Ohio, teamed to design an air-breathing rocket engine for flight demonstration in 2005. This unique engine "inhales" oxygen from the air for about half its flight — eliminating on-board storage of liquid oxygen and significantly cutting launch costs.

• In mid-1999, Marshall engineers built a High Performance Antimatter Trap to store antiprotons for a 10-day lifetime. The trap will be used in future antimatter experiments for space propulsion.

• Marshall also took the lead on NASA's propulsion research for interstellar "precursor" missions — unmanned probes that will journey billions of miles into space to explore the edge of our solar system and study its interaction with the rest of the Milky Way galaxy. NASA may launch such a mission by 2010.

Microgravity and Space Science Research

NASA's reach for the stars not only advances humanity's exploration of the cosmos, but new technologies derived from space research continue to improve the lives of people all over the world. The Marshall Center made some noteworthy scientific advances in 1999.

In January, Marshall opened its Microgravity Development Laboratory, which helps researchers develop Space Station experiments and perform other groundbreaking investigations conducted in the microgravity environment. The Microgravity Research Program Office at Marshall also continues to work with investigators nationwide, helping to plan and prepare the first Space Station experiments.

In October, Marshall opened NASA's Space Optics Manufacturing Center. The large-scale space optics facility unites into one organization groups working to expand our view of the universe via sophisticated new telescopes. The optics center's capabilities include optical fabrication, accurate surface measurements, optics testing and diamond turning, a high-precision process using diamond-tipped tools to cut metal. The Space Optics Manufacturing Center is working to create governmental, industrial and educational partnerships to share technology, facilities and ideas.

Tasked by NASA with overseeing all science operations aboard the Space Station, Marshall has designed, equipped and will staff the Payload Operations Center, a 24-hour-a-day control facility at Marshall coordinating all Space Station science operations. The first online tests of the facility — which will communicate with Station crew, on-board experiments and researchers around the world — now are being conducted. The center is to become fully functional in early 2000.

The latest milestone for the Payload Center was the delivery of the Telescience Resource Kit, or TReK. Developed by Marshall engineers, TReK is a software system enabling scientists teaming with Marshall to remotely operate Station experiments from their own laboratories on Earth. Software validation testing is in progress.

Other highlights of Marshall's 1999 space science programs included accomplishments in the microgravity and astrophysics fields:

• The first successful brain cancer surgeries were conducted using special lighting technology developed for space-based

*See **Milestones** on page 9*

Upcoming Events

New employee orientation — Marshall's new employee orientation will be from 8 a.m.-4:30 p.m. Jan. 12-14 at the Huntsville Marriott. Bus service will begin at 7:45 a.m. at Bldg. 4203.

Volunteers Needed for Youth Task Force — Marshall's Equal Opportunity Office is looking for volunteers for a youth motivational task force at Alabama A&M University. Volunteers will spend two days on campus speaking to students and classes emphasizing skills necessary for making realistic career decisions. For more information, call Willie Love at 544-0088.

'Write in Plain English' — The "Write in Plain English" course will be offered from 8:30 a.m.-4:30 p.m. Jan. 18-19 in Bldg. 4200, room G-21. The course focuses on enhancing your ability to produce effective documents. Civil service employees should register via AdminSTAR. For more information, call Vanessa Suggs at 544-7527 or Stephanie Elliott at 544-7553.

Gagliano re-elected to NASA Exchange Council

Larry Gagliano

Larry S. Gagliano of the Technology Transfer Department has been re-elected to a two-year term on the NASA Exchange Council at Marshall.

He joins two other elected members: May Wales of the Center Operations Directorate's Management Support Office and Bennie Jacks of the Facilities Engineering Department of the Center Operations Directorate.

The board also has four appointed members: Council Chairman Axel Roth, director of the Flight Projects Directorate; Charles Sullins of the Systems and Processes Office in the Office of the Chief Financial Officer; and George Myers in the Vehicle and Systems Development Department of the Space Transportation Directorate. The fourth appointed position is vacant due to the recent retirement of Victoria Crawford of the Human Resources Department.

Milestones

Continued from page 8

commercial plant growth research aboard the Space Shuttle.

• On Jan. 23, 1999, Marshall scientists captured the first-ever optical image of one of the most powerful explosions in the universe: a gamma ray burst. The Burst and Transient Source Experiment (BATSE) — a Marshall-managed instrument orbiting on the Compton Gamma Ray Observatory — made the achievement possible.

File photo

Paul Meyer, left, of Marshall's Global Hydrology and Climate Center and David Hathaway, center, of the Space Science Department, developed VISAR. Sammy Nabors, right, of the Technology Transfer Department, assisted with the commercialization of the technology.

Earth Sciences and Planetside Research

The Global Hydrology and Climate Center in Huntsville, managed by the Marshall Center, made significant progress in a number of research areas this year. Satellite tracking of hurricanes promises to improve global severe-weather forecasting capabilities — saving lives and mitigating property damage. Likewise, NASA research into lightning activity is providing new insight on the formation of tornadoes. Thermal studies of metropolitan areas are helping Marshall "heat hunters" alert citizens and urban planners to the detrimental effects of the urban heat island. NASA remote sensing technologies are even exploring new ways to aid farm productivity and identify outbreaks of disease.

NASA announced in 1999 that Marshall and the State of Alabama would form the National Space Science and Technology Center. The center will offer unique opportunities for NASA scientists to collaborate with industry, academia and other federal agencies for research in materials sciences, Earth sciences, biotechnology, propulsion, optics and other disciplines that support NASA's mission.

In the past year, Marshall helped translate a number of NASA's scientific achievements into commercial successes through the Technology Transfer process. The program seeks commercial applications of NASA technology, resulting in marketable products for industry or the public. For example:

• Video Image Stabilization and Registration (VISAR)

*See **Milestones** on page 10*

Firearms require special safety precautions

Did you know that, according to the International Hunter Education Association, approximately 1,000 mishaps involving firearms occur every year in the United States, with 100 of those involving death?

The following "commandments" of firearm safety can help ensure a safe hunting season:

- Always keep the muzzle pointed in a safe direction.
- Treat every firearm as though it were loaded.
- Always make sure the firearm is unloaded and keep the action open except when actually hunting or preparing to shoot.
- Be sure the barrel and action are clear of obstruction and that you have the proper ammunition for the firearm you are carrying.
- Be sure of your target before you pull the trigger.
- Never point a firearm at anything you do not want to shoot. Avoid all horseplay with any firearm.
- Never climb a fence, tree or jump a ditch with a loaded firearm.
- Never shoot at a flat, hard surface or water.
- Store firearms and ammunition separately.
- Avoid alcohol and other drugs before or during shooting.

Alabama Law requires all first-time hunting license buyers born on or after Aug. 1, 1977, to complete a hunter education course prior to purchasing their first hunting license. For more information about hunting safety and scheduled hunter education classes, visit the Alabama Department of Conservation and Natural Resources at:

http://www.dcnr.state.al.us/agfdl

Job Opportunities

Reassignment Bulletin: 00-04-CL, AST, Technical Management, GS-801-13, in the Engineering Directorate, Engineering Systems Department, Engineering Services Office. Closes Jan. 18.

Reassignment Bulletin: 00-05-CV, AST, Flight Activity Planning, GS-801-13, in the Flight Projects Directorate, Payload Operations and Integration Department, Operations Development Group. Closes Jan. 18.

Reassignment Bulletin: 00-06-CV, AST, Manned Systems, GS-801-12/13, in the Flight Projects Directorate, Payload Operations and Integration Department, Operations Training Group. Closes Jan. 18.

Reassignment Bulletin: 00-07-CV, AST, Aerospace Vehicle Design and Mission Analysis, GS-861-13, in the Flight Projects Directorate, Payload Operations and Integration Department, Mission Design Group. Closes Jan. 18.

Reassignment Bulletin: 00-08-CV, AST, Mission Operations Integration, GS-801-13, in the Flight Projects Directorate, Payload Operations and Integration Department, Multi-Use Payload Group. Closes Jan. 18.

Reassignment Bulletin: 00-09-KP, AST, Flight Systems Design, GS-861-11/12/13, in the Engineering Directorate, Structures, Mechanics & Thermal Department, GSE & Mechanisms Design Group. Closes Jan. 18.

CCP-00-26-KP: Supervisory AST, Structural Dynamics, GS-861-15, in the Engineering Directorate, Structures, Mechanics & Thermal Department, Structural Dynamics & Loads Group. Closes Jan. 10.

CCP-00-27-CL: Materials Support Specialist, GS-301-5, in the Materials, Processes and Manufacturing Department, Nonmetallic Materials and Processes Group. Closes Jan. 14.

Milestones

Continued from page 9

software technology — developed by Marshall researchers to improve imagery beamed from space — reduces blurs and other flaws in video and stabilizes shaky video pictures. The technology promises to be a boon to law enforcement officers, helping to better identify details of video taken during crimes.

- With the assistance of Marshall's Tech Transfer program, a pediatric doctor in Milwaukee has successfully used light emitting diode (LED) technology — developed for use on Space Shuttle experiments — as a tool for use in fighting brain cancer. Two surgeries performed by Dr. Harry Whelan on patients in May and August 1999 have shown no signs of tumors reoccurring.

Quick-connect nut

- In October, Marshall announced a licensing agreement with M&A Screw and Machine Works of Philadelphia, permitting the company to commercially produce the "quick-connect fastener," a nut that attaches more easily onto bolts than conventional nuts. Applications for the nut — originally designed by Marshall engineers for use in space — may include work in mines or under water, where speed of construction can reduce safety risks.

Obituary

Davis, Paul R., 84, of Huntsville, died Dec. 24, 1999. He retired from Marshall in February 1980 where he worked in Reliability and Quality Assurance, in the Science and Engineering Directorate. He is survived by his wife, Saranel B. Davis.

★ ★ ★
Marshall Stars
★ ★ ★

Counts Wins National Space Award — A NASA team led by Parker Counts, a senior engineer at Marshall, has won the Dr. Wernher von Braun Space Flight Award for its work on the Space Shuttle's external fuel tank. Counts is manager of the Space Shuttle External Tank Project.

The 2,600-person, nationwide team of civil servants and contractor employees was lauded for its work to develop the super-lightweight fuel tank, an improved version of the large, orange tank the Shuttle "rides" into orbit.

The team developed an aluminum lithium tank that weighs 7,500 pounds less than older tanks.

Thomas named to Space Systems Committee — Dr. Lawrence "Dale" Thomas of Marshall's Systems Management Office recently was named a member of the Space Systems Committee of the International Astronautical Federation. Thomas is the only NASA member of the international committee.

File photo

New program lets students talk to astronauts

Astronaut Jan Davis, deputy director of the Flight Projects Directorate, chats online with students from 22 schools nationwide during a network test of Marshall Center's Payload Operations Center internet communications system. The system will support actual science operations for principal investigators around the United States via the Payload Operations Center to the International Space Station. The "online" voice chat gave students the opportunity to ask Davis about space travel and the Space Station. "The kids had great questions and were very professional," Davis said. "It was exciting for me to be a part of this new technology that will allow scientists to operate their experiments on the Space Station."

At Stennis Space Center

X-33 Linear Aerospike Engine undergoes first full-power test

A new type of rocket engine that will propel the X-33 experimental launch vehicle was tested to full power for the first time Dec. 18.

Marshall manages the X-33 program for NASA.

The 18-second test of the XRS-2200 Linear Aerospike Engine was conducted on the A-1 test facility at NASA's John C. Stennis Space Center in south Mississippi.

Initial test data indicates satisfactory engine performance throughout the test. After the test, visual inspection showed some minor pinhole-sized erosion isolated to the interior wall of one of the engine's 20 thrust cells. The erosion was within the normal range for development testing and will not preclude further testing.

The XRS-2200 Linear Aerospike Engine was developed and assembled by Boeing Rocketdyne Propulsion & Power in Canoga Park, Calif.

The engine will power the X-33, a half-scale, sub-orbital technology demonstrator of a proposed, commercially-developed, reusable launch vehicle called VenturStar. The X-33 is being developed under a cooperative agreement between NASA and Lockheed Martin Skunk Works in Palmdale, Calif.

X-34

Continued from page 1

undergo propulsion system testing before being shipped to Dryden where the wing will be reattached for powered flights. The Fastrac engine was designed and developed by the Marshall Center. Marshall is NASA's Lead Center for Space Transportation System Development.

The first X-34 is now at Dryden being modified for unpowered flight testing at White Sands Missile Range, N.M. in the spring. The third X-34, still in early stages of production, will be used to flight test additional technologies late in the series of 27 planned X-34 missions.

The X-34 is approximately 58 feet (17.7 meters) long with a wingspan of about 27 feet (8.4 meters).

The writer, a contractor employed by ASRI, supports the Media Relations Department.

Employee Ads

Miscellaneous

★ New Dooney & Bourke billfold/bag to match, hunter green, $125; navy/tan purse, $100. 381-1613
★ Sony Trinitron 20" color TV, stereo w/remote control, A/V jacks, fully Y2K compliant, $200 obo. 895-6640
★ Aluminum full-size Chevrolet truck tool box, almost new, $150 obo. 682-7622 after 5 p.m.
★ Yazoo 5HP 22" Yard Master mower w/ commercial/industrial engine, needs work, $25. 881-8580
★ Changing table, $20; stroller, $15; wind-up baby swing, $10. 971-0518
★ Bassett infant changing table w/built-in diaper storage, one-owner, $100 obo; battery-powered baby swing, $40 obo. 881-8674
★ Kenmore refrigerator, 21 cu. ft., almond w/ice maker, $300; Nordic-Track Pro ski machine, oak, $150. 544-1451
★ Amana refrigerator, bottom freezer, black, 22 cu. ft., icemaker, 3 yrs. old, $500. 355-2161
★ Century toddler car seat; Gerry toddler booster seat; $20 each. 533-5942
★ Ember Hearth woodstove, 24" firebox, automatic blower, controls, mesh door & other accessories, $295. 880-3851
★ Longaberger baskets, call for more details. 353-5106
★ Two Soundtech LT5EC speakers, $500; Peavey 8.5C stereo amp 550x2, $250. 586-8433
★ Antique oak washstand, two doors, drawer, large mirror, $200 firm. 922-5720/Brenda
★ Three Christmas DVDs, Rudolph, St. Mary's, Wonderful Life, never opened, $15 ea. 721-4534/4-8 p.m.
★ Pentium II Celeron 400 mhz complete system, $750; A quantium fireball 3.2GB hard drive, $60. 851-0704
★ Sony boombox, model CFD-8, CD, radio, cassette, recorder, portable, $40. 883-2757
★ Firewood, dry hickory and oak, you haul, $25 per pick-up load. 880-2290
★ Black walnuts, $2 per 50 lb. bag. 880-2290
★ White toddler bed w/mattress, $25. 464-5394
★ Apple 6100 computer and older PC system, will sell separately, free table and chair w/system. 828-6213

Vehicles

★ 1992 Buick Century, white, am/fm stereo, 106K miles, $4,200. 773-7730
★ 1978 Datsun 810 station wagon, 173K miles, needs work. $600 obo. 851-0737
★ 1996 Mazda 626 LX, V6, 58K miles, white, moon roof, spoiler, $10,400 obo. 574-5098 after 5:30 p.m.
★ 1996 Chevrolet Cavalier, white, automatic, a/c, 78K miles, $6,500. 828-6545
★ 1998 Toyota Camry LE, PL/PW, alarm, keyless entry, CD, 35K miles, $15,000. 351-8221 after 6 p.m.
★ 1994 Buick LeSabre custom, 4-door, automatic, all power, tune-up at 76K miles, $7,900 obo. 828-0801 after 5 p.m./leave message

Wanted

★ Boy's solid wood bedroom set, good shape, full/ twin bed w/mattress & box springs; boy's race car bed. 533-5942

Found

★ Books & movie left in Regions Bank, Bldg. 4200. Call 544-4758 to identify
★ Silver bracelet found in south parking lot of Bldg. 4200. Call 544-4758 to identify

Free

★ Puppies, 8 golden retrievers, 4 mixed breed, ready to go. 586-7130
★ Puppies, Husky mix, ready Jan. 18. 883-5396

Lost

★ Casserole dish w/blue thermal cover, Bldg. 4200. 881-8953

Center Announcements

☞ ***NASA Ski Week* —** There are a few openings on the 9th Annual NASA Ski Week at Big Sky, Mont., Jan. 22-29. Three hundred skiers from eight NASA Centers will gather at this snowy, 3,500-acre resort for camaraderie and winter sports. All Marshall employees, on-site contractors, retirees and dependents are eligible to participate. For information, call 544-6568 or e-mail Thomas.S.Dollman@msfc.nasa.gov

☞ ***Engineering Systems Department Retirement Party* —** The Engineering Systems Department is hosting a retirement party at 9:30 a.m. Jan. 12 in Bldg. 4203, room 1201. Honorees include Gabriel R. Wallace, Glen D. Ritter, Robert G. Zagrodzky, James R. Bishop, and Sandra G. Henderson.

☞ ***NARFE Meets* —** The National Association of Retired Federal Employees (NARFE) will meet Saturday at the Senior Center on Drake Avenue. Chapter member Carl Huggins will perform a magic show. Refreshments at 9:30 a.m.; program starts at 10. For more information, call 837-0382 or 881-3168.

☞ ***Huntsville Genealogical Computing Society Meets* —** The Huntsville Genealogical Computing Society will hold its monthly meeting at 7 p.m. Jan. 17 in the auditorium of the Huntsville-Madison County Main Library. Visitors are encouraged to attend. For more information, call Bob Pace at 881-6670.

☞ ***Working with Marshall* —** The Technology Transfer Department's handbook, "Working with NASA Marshall Space Flight Center" is available online at: www.nasasolutions.com

☞ ***Smoke Stoppers* —** The next Smoke Stoppers class will begin Jan. 11. Orientation will be from 1-2 p.m. in Bldg. 4752. Administrative time has been approved for this course. To register for class or for more information, e-mail Patricia.Mirandy@msfc.nasa.gov or call 544-7570.

☞ ***Weight Control* —** A weight control program focusing on lifestyle, exercise, attitude, relationships and nutrition. Classes are from noon-1 p.m. beginning Jan. 25 for 10 consecutive weeks. Administrative time has been approved for this program. For more information, call 544-7570 or e-mail Patricia.Mirandy@msfc.nasa.gov.

☞ Fitness Classes Resume — Exercise classes at the Fitness Center, Bldg. 4752, resumed Jan. 3. The New Year schedule is as follows: Tuesday and Thursday — ll:15 a.m.-noon — TNT with Pat Mirandy; Monday and Wednesday — 5-5:50 p.m. — Strength training with Susan Caldwell; Tuesday and Thursday — 5-5:50 p.m. — Kickboxing with Emily Pauli; and Thursday — 4-5 p.m. — Circuit training. For more information, visit the NASA Exchange Web site on "Inside Marshall" or call 544-7570.

☞ ***MARS Ballroom Dance Club* —** The MARS Ballroom Dance Club will offer single swing and bolero lessons on Jan. 10, 17, 24 and 31 in the Parish Hall of St. Stephen's Episcopal Church at 8020 Whitesburg Drive. Intermediate classes start at 7 p.m. and beginner classes at 8. The lessons will be taught by Joe Whorley and cost $4 per person per night. For more information, call Linda Kinney at 544-0563.

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