MARSHALL STAR
Marshall Space Flight Center
Oct. 19, 2000
'We bring people to space — We bring space to people'

Marshall plays key role in 100th Shuttle mission

by Lynnette Madison

When the Space Shuttle Discovery lifted off Oct. 11 from Pad 39A — on the milestone 100th Shuttle mission — it was propelled to successful orbit by propulsion elements developed by scientists and engineers at Marshall. Discovery is expected to return to Kennedy Space Center at 1:10 p.m. CDT Sunday.

"This historic flight is a special milestone for Marshall's Shuttle Team," said Alex McCool, manager of the Space Shuttle Projects Office. "We take great pride in knowing our team of government and industry at Marshall developed the propulsion systems that make space transportation successful."

Marshall serves as NASA's leader in research and development of the propulsion systems that enable safe, reliable and lower-cost access to space and space exploration.

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Since 1992, enhancements in the Shuttle's propulsion elements — the External Tank, Solid Rocket Boosters and Reusable Solid Rocket Motors — have reduced estimated risks during launch by more than 80 percent. Cost of operating the Shuttle has been reduced by more than 40 percent.

The Marshall Center also played a key role in the development and upgrading of the three reusable, high performance rocket engines, known as the Space Shuttle Main Engines. Since 1981, three design modifications have more than tripled the ascent reliability projections of the engines' safety.

"The Shuttle system is a proven workhorse that will continue to support America's space flight goals," said McCool. "Redesign and testing of these systems continue to evolve to produce the safest, most reliable and reusable Space Transportation System in the world."

The improvements instrumented by the Marshall Center enable NASA to fly the Space Shuttle for at least another decade. "The Space Shuttle is definitely the most capable, reliable and versatile spacecraft in the world," said McCool.

In addition to its versatility, the Shuttle has contributed to microgravity research, world-wide mapping, ozone and environmental research, deployment of the Hubble Space Telescope and the Chandra observatory and assembly of the International Space Station.

There are also more than 1,300 documented NASA technologies related to the Space Shuttle that have improved our quality of life here on Earth, benefited

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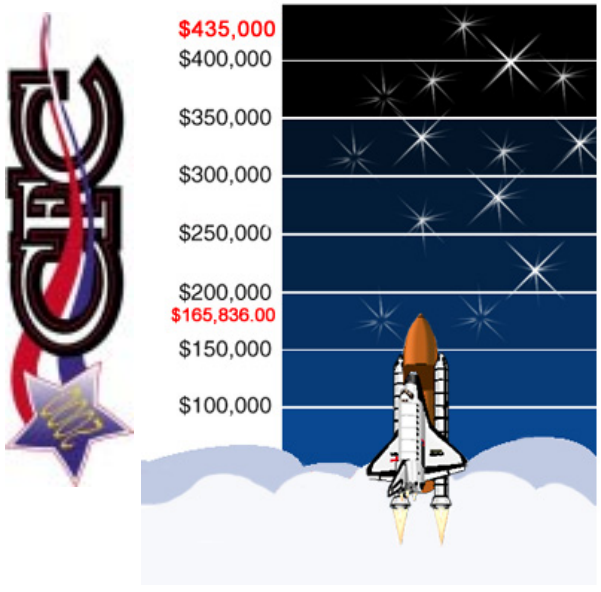

Donations top $165,000 in second week of campaign

Shuttle program results in down-to-earth technology discoveries

Discovery mission STS-92 will go down in the history books as the 100th voyage of the Space Shuttle. For nearly two decades, the Space Shuttle has been the cornerstone of the U.S. space program — the world's only reusable spacecraft.

It's the first vehicle in the history of space flight that can carry large cargoes, such as satellites and spacecraft parts, both to and from orbit.

During construction of the International Space Station, the Space Shuttle will serve as the world's largest and most sophisticated moving van, carrying astronauts, cosmonauts and literally tons of equipment and supplies to our new outpost in orbit.

The technology used to create the most versatile and most advanced spacecraft ever built also touches the lives of people here on Earth. After nearly 100 flights, the benefits to industry,

*See **Discoveries** on page 4*

Photo by Emmett Given, NASA/Marshall Space Flight Center

Space Transportation Day at Marshall

Roy Klusendorf, center, a program development manager with Oceaneering Space Systems of Houston, speaks with Rose Allen, left, of Marshall's Space Transportation Directorate, at the Space Transportation Days held Oct. 11-12 at Marshall. The event focused on new-generation technologies. Technologies discussed included intelligent vehicle health management systems, Space Shuttle upgrades, airframes, thermal protection systems, launch vehicle operations, upper stages, propulsion, in-space transportation systems and research.

Physical equipment inventory under way

Marshall's annual physical inventory of all government-owned equipment is under way through Dec. 29.

This is the first-ever agreement for collaborative inventory activities among the Marshall Property Management Group/AD41, Institutional Services Contractor — Cortez III, Program Information Systems Mission Services — CSC, Outsourcing Desktop Initiative for NASA — OAO, Consolidated Space Operations Contract — Lockheed/CSC, and Space Station — Boeing.

This collaborative inventory is designed to minimize the impact on the Marshall user community. One inventory team will visit each year instead of several visits from the various property control organizations.

Employees can help to make this 100 percent inventory of all Center assets as accurate as possible by ensuring access to all offices, locked spaces, cabinets, etc. This will minimize unnecessary return trips and help Marshall recover equipment now categorized as "lost."

The inventory schedule is provided on "Inside Marshall."

For more information, call Inge Kuberg at 544-5678.

Schools vie in robotics contest

Marshall sponsors schools in competition

by Jonathan Baggs

Three area high schools will participate in a national engineering competition to build robots with the help of the Marshall Center.

Lee High School in Huntsville, Arab High School and Lincoln County High School in Fayetteville, will vie in the annual FIRST Robotics Competition in early 2001. The Marshall Center is sponsoring the school teams by providing engineering, advisory and financial support.

This is the second year that Marshall is participating — having sponsored Lee High School in the 2000 competition. The Lee team beat more than 260 competitors to capture two of the national awards presented. The Boeing Co. will partner with Marshall to sponsor Lee High in the 2001 competition.

The FIRST Foundation (For Inspiration and Recognition of Science and Technology) conducts annual regional and national design competitions for high school students teamed with industries and universities. The overall goal is to demonstrate that engineering and science can be as interesting, captivating and entertaining as a sporting event.

The competition requires an intense six-week project in which teams design, build and control a remotely operated vehicle for a sports-based task whose objective changes each year.

"Last year's objective was to design a robot to put balls in a goal, and support its own weight by hanging from a bar," said Vicki Smith of Marshall's Education Programs Department.

Competition begins in early January when the objective — or game — for the robot is unveiled. Each year, different size, weight and material construction limitations are imposed.

"Six weeks later, you have to have your robot completed and ready for competition. It is highly intense," Smith said. "It's also a lot of fun for the engineers since they don't usually see a project go from the drawing board to construction and operation so quickly."

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

¡Hispanic Heritage Month!

Charles Scales recognized for efforts at Marshall's National Hispanic Heritage Month fiesta

by Lynnette Madison

Charles H. Scales, director of Equal Opportunity at the Marshall Center, was recognized last Thursday at National Hispanic Heritage Month festivities at the Center for his contributions to Marshall's Hispanic Employment Program.

Scales was presented the first Bonzzo award given by the Hispanic Employment Program. The award — named for a Puerto Rican cartoon character — recognizes Marshall Center managers who make significant contributions supporting equal opportunity principles.

He was recognized for his appointment of a new Hispanic Employment Program manager, for implementing "significantly improved recruitment and outreach efforts," and "increased support for local and community efforts to promote the advancement of Latinos."

Scales received a statue of Bonzzo signed by Marshall Center Director Art Stephenson, Puerto Rican Gov. Pedro Rossello and Puerto Rican cartoonist John Rivas, who donated the statue to honor the work of Hispanics at the Marshall Center.

The presentation culminates a month of activities at the Marshall Center recognizing the contributions of Hispanics.

In 1988, President Ronald Reagan established Hispanic Heritage Month, celebrated from Sept. 15 to Oct. 14. Oct. 12 is celebrated as El Dia de la Raza — The Day of the People, recognized as the day Christopher Columbus discovered the Americas.

Photos by Doug Stoffer, NASA/Marshall Space Flight Center

Scales, left, receives the first-ever Bonzzo award from Rivas, right. Stephenson, center, looks on.

"Charles is an excellent choice for this first award," said Elia Ordonez, Hispanic Employment Program manager at the Marshall Center. "He has contributed much to the quality of life in our community and, in particular, the Hispanic community at Marshall."

Scales has served as director of the Marshall Equal Opportunity office since 1997. He joined Marshall's Institutional and Program Support Directorate in 1975 and has served as Business Management Office director, Resources Management Branch chief, and Program Control Office chief.

Prior to that, Scales was a telecommunications specialist and program analyst in the Institutional and Program Support communications office.

He has a bachelor's degree in business from Alabama A&M University. Past honors include the Space Flight Leadership Award, the NASA Exceptional Service Medal, the Astronauts' Silver Snoopy Award and the Profiles in Excellence Award.

A native of Livingston, Ala., he and his wife, Vernal, have a daughter, Tiffany, and son, Chad. They reside in Huntsville.

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

Hispanic Heritage Month festivities include a dessert tasting in the Bldg. 4200 courtyard.

100th Mission

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U.S. industry and created jobs for Americans.

Technologies used in developing the Shuttle's propulsion systems alone have produced more than 100 technology spinoffs.

The Marshall Center, through its industry partnerships, has been active in developing a knee brace that provides freedom of movement, fiber optic forceps that help obstetricians reduce the risk of injury to babies and their mothers, and better dental arch wires and catheter guide wires. Other technology spinoffs related to Marshall include improved prosthetics for persons who have lost a limb, better-insulated hot and cold lunch carts for hospitals and a lunchbox that will keep food hot.

"We are fortunate at Marshall to have always been an important part of the Space Shuttle Program," said McCool. "This 100th Shuttle mission reinforces the key role Marshall plays in making space transportation safer and using technology to improve our quality of life on Earth."

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

Discoveries

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medical research and to the quality of daily life easily match the number of missions.

More than 100 documented NASA technologies from the Space Shuttle are now incorporated into the tools you use, the foods you eat, and the biotechnology and medicines used to improve your health.

"We often take for granted the returns on NASA's past investments: Everything from global satellite telecommunications to disposable diapers are the result of our investment in space technology," said NASA Administrator Dan Goldin. "The mission of the Space Shuttle is no different. The program's goal is to play a lead role in opening the space frontier, but it's also about bringing the discoveries of the Space Shuttle into your home."

For more information on NASA-developed technologies that can be used to help solve everyday problems on Earth, visit:
http://nctn.hq.nasa.gov/
http://www.sti.nasa.gov/tto/
http://inspection.jsc.nasa.gov/

3-D biotechnology

Developed for Space Shuttle medical research, a rotating cell-culture device simulates the microgravity of space. This allows researchers to grow cells in three dimensions. The device may one day help researchers find cures for dangerous infectious diseases and offer alternatives to patients who need organ transplant surgery.

Artificial heart

Technology used in Space Shuttle fuel pumps led to the development of a miniaturized ventricular-assist pump by NASA and renowned heart surgeon Dr. Michael DeBakey. The tiny pump, a mere two inches long, one inch in diameter, and weighing less than four ounces, is currently undergoing clinical trials in Europe, where it has been successfully implanted into more than 20 people.

Blood serum research

An astronaut's body, once free of gravity's pull, experiences a redistribution of body fluids that can lead to a decrease in the number of red blood cells and produce a form of space anemia.

Monitoring and evaluating blood serum was required to understand these phenomena. However, existing blood-analysis technology required the use of a centrifugation technology that was not practical in space. NASA developed new technologies for the collection and real-time analysis of blood as well as other bodily fluids without the need for centrifugation.

Artificial limbs

Responding to a request from the orthopedic-appliance industry, NASA recommended that the foam insulation used to protect the Shuttle's external tank replace the heavy, fragile plaster used to produce master molds for prosthetics. The new material is light, virtually indestructible, and easy to ship and store.

Lifesaving light

Special lighting technology developed for plant-growth experiments on Space Shuttle missions is now used to treat brain tumors in children. Doctors at the Medical College of Wisconsin in Milwaukee use light-emitting diodes in a treatment called photodynamic therapy, a form of chemotherapy, to kill cancerous tumors.

Taking temperatures

Infrared sensors developed to remotely measure the temperature of distant stars and planets for the Space Shuttle program led to the development of the hand-held optical sensor thermometer. Placed inside the ear canal, the thermometer provides an accurate reading in two seconds or less.

Better balance

Devices built to measure the equilibrium of Space Shuttle astronauts when they return from space are now widely used by major medical centers to diagnose and treat patients suffering head injury, stroke, chronic dizziness and disorders of the central nervous system.

Faster diagnostics

NASA technology was used to create a compact laboratory instrument for hospitals and doctor offices. This device quickly analyzes blood, accomplishing in 30 seconds what once took 20 minutes with conventional equipment.

Land mine removal

The same rocket fuel that helps launch the Space Shuttle is now being used to

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Discoveries

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save lives — by destroying land mines. A flare device, using leftover fuel donated by NASA, is placed next to the uncovered land mine and is ignited from a safe distance using a battery-triggered electric match. The explosive burns away, disabling the mine and rendering it harmless.

Tracking vehicles on Earth

Tracking information originally used for Space Shuttle missions now helps track vehicles here on the ground. This commercial spin-off allows vehicles to transmit a signal back to a home base. Many cities today use the software to track and reassign emergency and public works vehicles. The technology also is used by vehicle fleet operations, such as taxis, armored cars and vehicles carrying hazardous cargo.

Rescue 911

Rescue squads have a new extrication tool to help remove accident victims from wrecked vehicles. The hand-held device requires no auxiliary power systems or cumbersome hoses and is 70 percent cheaper than previous rescue equipment. The cutter uses a miniature version of the explosive charges that separate devices on the Space Shuttle.

Byte out of crime

Image-processing technology used to analyze Space Shuttle launch videos and to study meteorological images also helps law enforcement agencies improve crime-solving videos. The technology removes defects due to image jitter, image rotation and image zoom in video sequences. The technology also may be useful for medical imaging, scientific applications and home video.

Gas gauges

A gas leak-detection system, originally developed to monitor the Shuttle's hydrogen propulsion system, is now being used by the Ford Motor Company in the production of a natural gas-powered car.

Product labeling

NASA needs to identify, track and keep records on each of the thousands of heat-shield tiles on the Space Shuttle. This required a labeling system that could be put on ceramic material and withstand the rigors of space travel to be readable after a flight. NASA developed high data-density, two-dimensional, machine-readable symbol technology used to mark individual tiles.

This novel method of labeling products with invisible and virtually indestructible markings can be used on electronic parts, pharmaceuticals and livestock — in fact on just about anything.

Keep cool under fire

Materials from the Space Shuttle thermal protection system are used on NASCAR racing cars to protect drivers from the extreme heat generated by the engines. This same material is also used to protect firefighters.

Fire resistant foam

A unique foam developed for Space Shuttle thermal insulation and packing is now being used as thermal and acoustical insulation in aerospace, marine and industrial products. Since it's also fire resistant, it's being used as well for fire barriers, packaging and other applications requiring either high-temperature or very low-temperature insulation in critical environments. For example, use of these foam products by airframe manufacturers such as Boeing, Lockheed-Martin, and Airbus provides major weight savings, while retaining good thermal and acoustical properties in the various products.

Fire sighting

A sensitive, gas infrared camera, used

*See **Discoveries** on page 9*

File photo

STS-95 Discovery launches in October 1998 carrying International Flavors and Fragrances Inc.'s Space Flower experiment — a rose plant — onboard.

NASCAR's Bobby Allison speaks Wednesday at Marshall's Safety Awareness Day

by Lynnette Madison

What's the first step to protect NASCAR drivers?

Safety.

Retired NASCAR driver Bobby Allison will talk about how NASCAR has made safety a priority in racing at the annual Safety Awareness Day, Wednesday, at Marshall.

Allison

Debringer

According to Allison, there's nothing that carries as great a peril as NASCAR racing. Unless, of course, you're talking about human space flight.

"I see the strong parallel between racing and space flight," Allison said. "To achieve the goal — whether it's winning a race or exploring space — you have to recognize risk and accept it. But, take every precaution possible."

Allison — one of two keynote speakers for Marshall's Safety Awareness Day — was the 1983 Winston Cup Champion, a three-time winner of the prestigious Daytona 500 and won 84 NASCAR Winston Cup races. The daylong event planned for NASA employees and contractors is dedicated to safety issues — including work, home and recreational safety.

"Preserving the safety of our brave astronauts is of the utmost importance to Marshall," said Jody Singer, assistant manager of the Space Shuttle Project and co-chair of Safety Awareness Day. "Diligent attention to detail and strict process controls are critical to the Shuttle launch system's safe and reliable performance."

Also on the Safety Day program is John Drebinger Jr., author of "Mastering Safety Communication." Drebinger — a member of the American Society of Safety Engineers — uses magic and group participation to give motivational safety messages. He has made presentations to such companies as United Space Alliance, Boeing, Lucent Technologies and the U.S. Postal Service.

More than 100 Marshall employees and contractors will receive Safety Excellence Awards at a special ceremony during the day. In addition, employees can participate in the Safety and Health Fair that includes more than 66 local participants – emphasizing issues such as breast cancer awareness and boating safety.

NASA astronauts Ellen Bakery, Stanley Love, Chris Ferguson and Rex Walheim plan to attend the day's activities.

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

Buses to provide transportation to Safety Day activities

Safety Day activities Wednesday will be in Bldg. 4752, north and south tents. Buses will provide transportation from the following locations beginning at 7:30 a.m. through 4 p.m.:

Stop No. 1
- Bldg. 4705, south side
- Bldg. 4708, northwest
- Bldg. 4707, north side

Stop No. 2
- Bldg. 4487, main (south side)

Stop No. 3
- Bldg. 4612, west side
- Bldg. 4610, north side

Stop No. 4
- Bldg. 4663, main

Stop No. 5
- Bldg. 4650, east side
- Bldg. 4666, main

Stop No. 6
- Bldg. 4493, main
- Bldg. 4481, west end
- Bldg. 4471, east end

Stop No. 7
- Bldg. 4200, main loop

Stop No. 8
- Bldg. 4203, north loop

Stop No. 9
- Bldg. 4250, east end
- Bldg. 4207, northeast

Stop No. 10
- Bldg. 4488, offsite parking

Ideas for safety activities

- Develop safety goals for your organizations.
- Inventory the hazardous material used in your area of responsibility.
- Have an office/shop/lab clean-up day. A clean workplace is a safer workplace.
- Have a safety presentation on some subject of interest to your organization. This can be a work or away from work related issue.
- Schedule a Safety Film via the Marshall closed circuit television system.
- Review the new Marshall Safety, Health and Environmental Program, MPG 8715.1.
- Conduct walk around to meet with employees one-on-one. Solicit ideas to improve safety.
- Have a demonstration of the proper way to perform some potentially hazardous tasks.
- Update list of all potentially hazardous procedures performed by your organization.
- Review and practice Marshall Emergency Evacuation Plans — fire and severe weather — posted in your work area.
- Check safety signs, posters, decals and tags in area of responsibility to assure they are current.

Vendors to feature Safety Day exhibits

Vendors will set up exhibits in the tents on either side of Bldg. 4752 on Wednesday. The asterisks denote Marshall exhibitors. Those participating are:

MSFC Safety*
SunCom
Coast Guard Aux.
Wellsafe
Inspector General*
CSC Prizms*
Brady
PureSafety.Com
Cook's Pest Control
Grainger.com
Grainger GSA
Grainger Products
Red Cross
Ala. Institute for the Deaf & Blind
Ala. Industries for the Blind
TASC
ADRS/CRS/EI
WHNT Vials of Life
Bobby Allison
AJT & Associates*
Environmental Engr*
ADEM Ala Dept Environ Mgt
Banks Industries
Air Quality Technology
Koorsen
Perfect Fit Glove
Miller Fall Protection
3M
Fisher Safety
Allstate
Millenium
Superior Industrial
Dalloz Safety
MSA
Master Lock
Armstrong Tools
Rustoleum
Werner Ladders
Stanley Proto
North Safety Products
Space Flight Awareness*
Atlas
Wyatt Safety Supply
Mary Kay Skin Care
Total Wellness
Hernandez Engineering*
Pace & Waite*
ASRI*
FD Directorate*
MADD
Madison Research
Contractor Safety Forum*
Mafeco*
TD Directorate*
RSA Fire Department
Boeing*
STAR program Breast Cancer Awareness
MSAT MSFC Safety Action Team*
Shuttle Project Office*
Lockheed*
Lowes
Mobility Plus Van
No Zone Truck
HFD Smoke House
FD Car show*
WHNT Satelite Truck
WAAY Storm Van

Courtesy photo

Giving away prizes

An array of prizes will be given away during Safety Day activities. In addition to those shown above, other prizes include Igloo coolers, gift certificates — Wal-Mart, Copeland's Restaurant, Outback Steakhouse, Home Depot, Best Buy and Applebee's — caps, T-shirts and mugs.

Safety Bowl semi-finals, finals continue Wednesday

The semi-finals and final competitions in Marshall's Safety Bowl will be held on Safety Day, Wednesday. Here are more questions to help prepare for the finale.

1. Name two examples of employee participation in safety at Marshall.
2. List three symptoms that indicate someone may be choking.
3. When using a stepladder, you should never go higher than what?
4. Hypothermia can kill. If you fall into water that is 32.5 to 40 degrees F, exhaustion or unconsciousness occurs within what range of time?
5. At Marshall, where should cloth rags or paper towel saturated with combustible or flammable liquids be stored?

*See **Answers** on page 11*

Fire Safety Month winners

In recognition of Fire Safety Month, the Marshall Safety Office had displays in Bldgs. 4203 and 4610 on Oct. 11. Employees registered for fire extinguishers, carbon monoxide alarms and fire escape ladders. The winners were: Rodney Gilbert, TBE; Walter Templeton, LMC; Jenny Holmes, QS10; Eddie Griffin, DIS; Samantha Estes, ED42; Earl Pendley, PS52; Shade Murray, TD02; Deborah Gigandet, ASRI; David Harris, TD03; and Pat Crabtree, ED42.

The Space Shuttle — still young at 100

by USA Update

The Space Shuttle has amassed an amazing array of accomplishments in the past 20 years.

• It has launched 3 million pounds of cargo and more than 600 passengers and pilots.

• The Shuttle fleet has cumulatively spent almost 2 1/2 years in orbit.

• The fleet has amassed more than 15 years of passenger-hours in space.

• More than 850 payloads have flown, including hundreds of individual experiments.

• The Shuttle has deployed more than 60 payloads and retrieved more than two dozen.

NASA Photo

STS-101 touches down at Kennedy Space Center.

The Shuttle has enabled unprecedented discoveries about humankind, the planet and the universe.

• The Shuttle has supported two space stations, made three maintenance flights to the Hubble Space Telescope and launched planetary missions to study Jupiter, Venus and the Sun. All of NASA's "Great Observatories" — the Gamma Ray Observatory, Hubble and the Chandra X-ray Observatory — were put in space by the Shuttle, and through dozens of discoveries among them, they have fundamentally changed the way we perceive the universe.

• Studies of the Earth from the Shuttle have mapped 90 percent of the surface with greater precision than ever before. Observations by astronauts from the Shuttle have discovered and confirmed ancient impact craters on Earth; tracked deforestation; monitored coral reefs; studied air and water pollution; and documented the effects of droughts, floods, volcanoes and hurricanes.

• Imaging radar missions flown aboard the Shuttle have even located an ancient "lost" city — called Ubar — in Oman; revealed the course of the Nile River through the ages; and found riverbeds beneath the sands of the Sahara Desert.

• Atmospheric studies aboard the Shuttle have fine-tuned the satellites that track the Earth's ozone layer and researched the destruction of ozone and chemistry of the upper atmosphere.

• Hundreds of investigations have studied the effects of weightlessness on plants, animals and materials aboard the Shuttle, contributing to our understanding of their basic nature. For example, a tissue-growth device called the bioreactor that has been perfected during Shuttle flight experiments is now in use in labs around the world contributing to research to combat AIDS, Hepatitis C, Lyme disease and other illnesses, as well as being studied as a potential device for growing tissues that can be transplanted.

• In terms of its unique capability, the Space Shuttle is at its peak now — assembly of the International Space Station simply would not be possible without the Shuttle to support large, heavy payloads; perform intricate robotic arm operations; support extensive extra-vehicular activities; and allow crew rotation.

Because of continuous improvements throughout the program's history, today's Shuttle is safer, more capable and more reliable than when it was new.

• The Shuttle main engines have had three major redesigns since their first flight. The redesigns increased estimates of their safety threefold. During the last 20 years, the safety of every major component of the Shuttle has been increased.

• Primarily due to weight reductions in the external tank, but also because of performance enhancements and weight reductions in other areas, the Shuttle today can lift almost 12 tons more cargo to orbit than when it first flew.

• Since 1992 alone, the cargo capacity of the Shuttle has increased by eight tons; the annual cost of operating the Shuttle has decreased by 40 percent; the engine improvements and other upgrades have reduced the estimated risks during launch by 80 percent; and the number of all problems experienced in flight has dropped by 70 percent.

• More Shuttle upgrades are now in development for some of the highest risk systems: a fourth overhaul of the engines; safer electric auxiliary power units; better cockpit displays to reduce pilot workload at critical times; and safer solid rocket hydraulics.

• The Space Shuttle fleet still has more than three-quarters of its design lifetime ahead of it, and will fly for at least another decade — and probably much longer. Each Shuttle structure was designed for 100 flights. Discovery is the most-flown so far with 28 flights. STS-92 is number 28.

USA Update is published by United Space Alliance of Houston.

Discoveries

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by NASA observers to monitor the blazing plumes from the Space Shuttle's solid rocket boosters is also capable of scanning for fires. Firefighters use this hand-held camera to pinpoint the hotspots of wildfires that rage out of control.

Jeweler's gem

Jewelers no longer have to worry about inhaling dangerous asbestos fibers from the blocks they use as soldering bases. Space Shuttle heat-shield tiles offer jewelers a safer soldering base with temperature resistance far beyond the 1,400 degrees Fahrenheit generated by the jeweler's torch.

Jet stripping

NASA developed a tool that uses powerful jet streams of water to strip paint and primer from the Space Shuttle's solid rocket boosters. A commercial version of this water jet is now used to treat turbine-engine components, airframe components, large aerospace hardware, ships and other mechanical devices, using only pure water. No hazardous chemicals are needed.

Quick fit fasteners

Fastening items in space is a difficult task. A Virginia company developed a fastener that can be pushed on, rather than turned. These quick-connect fasteners are flexible and strong, and have been used by NASA astronauts since 1989. The product is now in use by firefighters and nuclear power-plant repair technicians, and has other commercial applications.

Computer joysticks

Computer games can now be played with all the precision and sensitivity needed for a safe and soft Space Shuttle touchdown. A game-controlling joystick for personal computer-based entertainment systems was modeled after controls used in shuttle simulators. Astronauts used the joystick to practice runway landings and orbit maneuvering.

Toys for tots

Already successful with its Nerf toy products, Hasbro, Inc. wanted to design a toy glider that a child could fly. Benefiting from NASA wind-tunnel and aerodynamic expertise used in the Space Shuttle program, Hasbro improved the flying distances and loop-to-loop stunts of its toy gliders.

Slick products

A lubricant used on the transporter that carries a Space Shuttle to the launch pad has resulted in a commercial penetrating-spray lube, which is used for rust prevention and loosening corroded nuts. It's also a cleaner and lubricant for guns and fishing reels, and can be used to reduce engine friction.

★ ★ ★ Marshall Stars ★ ★ ★

Marshall Center Deputy Director ***Carolyn Griner*** was one of three Florida State University (FSU) alumni honored by their alma mater at the annual Homecoming Breakfast Oct. 14.

Griner

Recognized by Omicron Delta Kappa as one of this year's "Grads Made Good," Griner received a bachelor's degree in astronautical engineering from Florida State in 1967. Her first experience at the Marshall Center came when she was a co-op student with FSU, and she went on to build a 34-year career with NASA.

Griner worked with astronaut Norm Thagard, M.D., now FAMU-FSU College of Engineering Bernard F. Sliger Eminent Scholar, as the payload manager for his 1985 Space Lab 3 flight. Griner also is identified as an authority on NASA's project management and program processes that enable the agency to deliver its products to the American people. She has received the NASA Exceptional Service, Leadership and Distinguished Service medals.

Love

Willie Love, assistant director of Marshall's Equal Opportunity Office, recently received the Buford L. Crutcher Service Award from Alabama A&M University. The award is presented to an alumnus who is most effective in establishing partnerships between the university and business or industry. The award is named for Buford L. Crutcher, an Alabama A&M University alumnus, who served as director of the Business/Industry Cluster Program from 1971 to 1981. Crutcher graduated from the university in 1970.

Marshall Center employees featured in "Marshall Stars" have made significant contributions to NASA and the Marshall Center by taking significant strides in leadership and dedication to their professional and/or educational development. Marshall Center employees may nominate themselves or another employee. Submit your nominations for consideration to Debra Valine, CD40, or call 544-3749.

Marshall-developed Dynamically Controlled Protein Crystal Growth Experiment to fly on Space Station

by Debra Valine

Marshall's Biotechnology Program Office has been testing flight hardware designed to facilitate research — the Dynamically Controlled Protein Crystal Growth (DCPCG) experiment — onboard the International Space Station.

The hardware — being developed under contract by the University of Alabama at Birmingham —will be integrated into the EXPRESS RACK on the Space Station.

The Dynamically Controlled Protein Crystal Growth Experiment seeks to understand the relationship of humidity and temperature to protein crystal growth. The flight hardware will house three lockers for the experiment: one controls vapor, one controls temperature and the third locker is the computer control center for the other two lockers. The vapor and control lockers are ready to go to the Space Station next year in June 2001. The temperature locker will fly in February 2002.

Researchers — under the lead of Dr. Larry DeLucas at the University of Alabama in Birmingham — hope to gain information that will lead to development of enhanced pharmaceuticals and drugs, with fewer side effects. "The ability to develop better pharmaceuticals is greatly increased by our understanding of the macromolecular protein structures," said Tim Owen, Marshall's project manager for the Dynamically Controlled Protein Crystal Growth Experiment. "This experiment seeks to understand the relationship of humidity and temperature play in size and quantity of the crystals produced."

Photos by Terry Leibold, NASA/Marshall Space Flight Center

The Dynamically Controlled Protein Crystal Growth Team includes, front row from left, Tim Owen and Mike Kim; back row from left: Sharon Manley, Liz Kitchen, Pam White, Vladimer Belotserkovshiy, Steve Greenleaf, David Ray, Al White, Mike Moroon, and Nancy Ellis.

The vapor locker, top, and the command and control locker, are elements of the Dynamically Controlled Protein Crystal Growth Experiment.

Flying the experiment on the Space Station allows for longer duration experiments. "On the Space Shuttle, you have maybe 15 days to conduct an experiment," Owen said. "The Space Station will give us two to three months of uninterrupted microgravity conditions. This extended duration is necessary to slowly draw out the growth process while manipulating the humidity or temperature inside the growth chambers."

The flight hardware has undergone acoustics level testing to determine how much noise it makes when it is operated. Results of the testing in July indicated the experiment was too noisy for the crew-tended environment. Modifications to the experiment have been made by UAB to reduce the noise levels. The Engineering Directorate's Acoustics Lab will perform testing again the week of Oct. 23. Following successful testing and lower level acoustic emissions, the hardware will then be readied for integration testing at the Kennedy Space Center.

The EXPRESS RACK was developed at Marshall in the Flight Projects Directorate and built by the Huntsville Division of the Boeing Co.

"The flight hardware has been developed concurrently with the Space Station's EXPRESS RACK," Owen said. "A tremendous amount of coordination has been needed to ensure compatibility. We did not know how the experiment

*See **DCPCG** on page 11*

Traveling Vietnam Wall coming to Huntsville

If you've never seen the Vietnam Memorial in Washington, D.C., your chance is coming, and you won't even have to leave Huntsville. The "Wall" is coming here.

In an effort to celebrate veterans, the Association of the U.S. Army, Redstone Arsenal Chapter, and the city of Huntsville are bringing a half-size replica of the Vietnam Memorial Wall to be displayed in Big Spring Park Oct. 26-29.

The "Wall that Heals" exhibition features a half-size replica of the Vietnam Veterans Memorial in Washington, D.C. The replica is complete with the 58,219 names of those killed or mission in action from the conflict. The display comes with an Information Center to assist visitors in finding names and a traveling museum that tells the story of the Vietnam War.

Opening ceremonies for the event include a free breakfast for Vietnam veterans at the Von Braun Center at 8 a.m. Oct. 26. To reserve seats for the breakfast, call (256) 518-6152 by Thursday.

Following breakfast at 10 a.m. will be opening ceremonies in Big Spring Park East. This ceremony will conclude with a fly-by of Vietnam War-era aircraft.

The wall will be open for visitors 24 hours daily for the four-day period. Closing ceremonies will be 5 p.m. Oct. 29.

DCPCG

Continued from page 10

hardware would interface with the EXPRESS RACK. To ensure we had a proper fit and function, good communication between the Dynamically Controlled Protein Crystal Growth engineering team and the EXPRESS RACK Office was critical."

Liz Kitchen, the Systems Engineer for the Dynamically Controlled Protein Growth team, coordinated the communication effort. "The hardware will not be integrated into the flight rack until it is actually on the Space Station," Owen said. "That's why the work Liz does is so important."

Marshall is NASA's Lead Center for Microgravity Research. The experiment is being developed by the Biotechnology Program Office of the Marshall Microgravity Science and Applications Department for the Science Directorate.

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

Answers

Continued from page 7

1. Any 2: safety committee activities, safety walk-through participation, safety meeting attendance, safety training/certification records

2. Any 3: clutching their throat; trouble speaking or breathing; skin turns pale or bluish; loss of consciousness

3. Second step from the top

4. 15-30 minutes. Use caution, wear life jacket and follow a buddy plan when on frigid lakes or waterways

5. In steel cans with self-closing lids and ventilated bottoms

Center Announcements

- ***ASEM Meets —*** The American Society of Engineering Management (ASEM) will meet at noon Nov. 7 at the Holiday Inn by Madison Square Mall in the 5th Avenue Banquet Room. ASEM exists to promote engineering management and can be reached through the national Web site at: www.engineering-management.org. For local questions and reservations, please call: Pamela Wallace Takada at 544-3645. James Kennedy, director of Marshall's Engineering Directorate, will be the featured speaker. The cost is $10 per person and will be collected at the door. This meeting is open to current and aspiring managers.
- ***Black History Month Volunteers —*** Volunteers are being accepted to chair or serve on various committees for the Year 2001 Black History Month activities. To volunteer, send an e-mail to james.bailey@msfc.nasa.gov or jackie.pates@msfc.nasa.gov Volunteers will receive notification of meeting dates and times.
- ***MARS Harvest Ball Dinner Dance —*** Tickets for the Oct. 21 Harvest Ball dance are now available from the MARS Ballroom Dance Club. The formal event will be held at the Von Braun Center West Exhibit Hall and will feature ballroom music by the Paul Chambers Combo. Socializing will begin at 6:30 p.m. A sit-down dinner will be served at 7 p.m. followed by dancing from 8-11 p.m. Tickets are $19 per person with a $3 discount for members. They can be purchased from Linda Kinney at 544-0563, Tamara Landers at 544-6818, Pat Sage at 544-5427, Ed Ogozalek at 837-1486, Bob Williams at 544-3998, Hugo Berry at 544-3525, Woody Bombara at 650-0200, and Earl Herndon at 534-7408. To reserve a table for eight, call Bombara.
- ***Great Paper Airplane Contest —*** The American Institute of Aeronautics and Astronautics will hold its 7th Annual Great Paper Airplane Contest at 3:30 p.m. Nov. 3 in the Highbay area of Bldg. 4752, the NASA Exchange. The event is free to everyone. The contest is open to all ages in the categories of aerobatics, time of flight, distance, accuracy and artistic. An awards ceremony will be at 5:30 p.m. For more information, call Tom Hancock at 961-4002 or send e-mail to: tom.hancock@msfc.nasa.gov
- ***MOO Meets —*** The Management Operations Office (MOO) retirees will meet for breakfast/lunch at 10 a.m. Oct. 26 at the Cracker Barrel Restaurant in Madison. For more information, call 539-0042.
- ***Shuttle Buddies —*** The Shuttle Buddies will meet for breakfast at 9 a.m. Oct. 23 at Mullins Restaurant on Andrew Jackson Way. For more information, call Deemer Self at 881-7757 or Gail Wynn at 852-8189.
- ***Disney Vacation Package —*** Executive Tour and Travel Services Inc. is offering a discount hotel package to Marshall employees, retirees, families and friends. The package includes a 4-day/3-night Disney/Epcot Area Hotel package for two adults and two children up to 12 years of age for $139. Room tax is not included. Hotels included in this package are: Red Roof Inns, Wynfield Inn, Ramada Inn, Quality Inn, Holiday Inn, Summer Bay*, and Island One*. (*Tour Required. Travel to Florida not included.) A deposit of $65 plus $5 for shipping and handling must be made by Oct. 31. Although a 60-day advanced notice is required, travel dates are good through October 2001. For more information, call (800) 272-4707, Monday through Friday 9 a.m.-8 p.m. EDT, Saturday 9 a.m.-noon EDT. Flyers are available at the Marshall Space Shop in Bldg. 4752.
- ***A&M Memorial Lecture —*** Alabama A&M is hosting the third annual Putcha Venkateswarlu Memorial Lecture at 3 p.m. Oct. 31 in the Dawson Building Auditorium. Dr. Horst L. Stoermer, the 1998 Nobel Laureate in Physics, will speak. A reception will be at 5 p.m. at the West Campus Knight Center. To attend, call 858-8148 or 858-8138.

Employee Ads

Miscellaneous

★ Chrome roll bar and light bar for full-size pickup truck, any reasonable offer. 534-8186
★ Sears compressor w/paint gun, hoses, containers; transient w/tripod and range pole, router, leather craft tools. 881-9421
★ Pfaltzgraff stoneware, Folkart pattern, various pieces, 8 of many. 233-5607
★ Smith-Corona notebook word processor w/ spreadsheet, Daisy wheel printer, $80. 895-6722
★ Pool table w/accessories, 8', 2 yrs. Old, $650. 882-3222
★ Sears Kenmore refrigerator, side-by-side, water/ ice in door, 22 cu. Ft., 2 yrs. old, tan, make offer. 682-5181
★ Mah-Jong game set in leather case, used once, $50. 232-1171
★ Apple computer system, 6100 66/DOS, 2 monitors, printer, software, manuals, optical drive, make offer. 828-6213
★ Norman Rockwell figurines, Mint condition, 14 each, w/boxes & papers, including the large "Triple Self Portrait." 539-8401
★ Sony car stereo/cassette/equalizer w/CD connection, installation instructions, $175 obo. 864-0465
★ Auburn vs. Louisiana Tech tickets, $15 ea. 350-6477
★ Fireplace insert, "Ambassador" w/thermostat & variable speed blower, $250 obo. 830-6584
★ Kenmore microwave, 1400W, 1.4 cu. ft., temperature probe, removable shelf, $80. 895-6722
★ Black & Decker circular saw, 2.5HP, 7-l/4", $40; Black & Decker electric air pump, $40. 895-6722
★ Plexiglas panels for Kenmore refrigerator doors, black, 63.25"x17.75", 13"x28.375", 13"x20.125" $20. 895-6722
★ Chinese rug, 5x9, $350. 721-0709
★ Washer & dryer, $175; King mattress & frame, $75; sofa, $50, Nordic exerciser, $20. 881-6388
★ "Man of LaMancha" Broadway Theater League tickets, Sunday, Oct. 22, two tickets, Loge Row 2, VBCC, $27.50 ea. 881-0278
★ Ladies golf clubs: 10 MacGregor irons, $25; 4 Hagen woods, $25; leather bag, $50. 533-4824
★ 1997 Coleman pop-up camper, sleeps 8, a/c, two stoves, storage, water heater, toilet, $6,500. 852-0142
★ Sofa, green & white striped, 86" long, approximately 10 yrs. old, $150 obo. 883-5104
★ Kenmore continuous cleaning 30" range, $75; Kenmore portable trash compactor, $50. 771-1500
★ Sportster XLH 883, 14,300 miles, many extras, $8,000. 882-9053
★ MacQuadra 605, monitor & Laserwriter, $300; Ruger M96/44 Mag rifle, $300; Sega Dreamcast & 4 games, $275. 851-8085
★ Bobby Allison racing collectibles, 3 different die casts and 1 comic book. 230-6382
★ Kawasaki JS550 jet ski, starter needs brushes, $450. 230-6382
★ Tires and wheels, 8-lug saw blade wheels w/ trailblazer Regal AT, 33x12.50R16.5LT tires, $250. 464-0667
★ Liriope (monkey grass), solid green, 50 cents each plant. 539-8976
★ Barbie quilt and sheets, full size, $12. 882-6100

Vehicles

★ 1993 Nissan King-cab, maroon w/gray camper shell, automatic, am./fm/cassette, 110K miles, chrome wheels, $5,000. 880-9025
★ 1988 Honda CRX, 5-speed, new battery, $1,850. 551-0041
★ 1995 Nissan King-cab pickup, 92K miles, $6,400. 881-9084 or http://qtvrbob.home.mindspring.com/truck
★ 1993 Grand Caravan SE, one-owner, many new parts, service records available, $5,500. 895-9520
★ 1999 Dodge SE Sports Grand Caravan, white, 6 cyl, 28K miles, keyless entry, rear air, $16,999 obo. 351-0126
★ 1992 Buick Regal Custom, one-owner, maroon w/ maroon interior, am/fm cassette, a/c, pw/pl, 25/30 mpg, 102K miles, $3,950 obo. 534-4785
★ 1994 Chevy Prizm, 91K miles, 5-speed, radio w/ cassette, one-owner. 895-0955 after 6 p.m.
★ 1992 300ZX Turbo coupe, 78,800 miles, chrome wheels, 5-speed, $15,800. 851-9159
★ 1997 Ford F-250, 4x4, XLT, pickup truck, alloy wheels, 40K miles, w/gooseneck ball, automatic, camper shell, $16,800. 931-732-4742
★ 1994 Toyota Cressida S/W, white, original owner, 96K miles, $2,000. 881-4229
★ 1992 Dodge Caravan SE van, 96K miles, a/c, tape, cruise, pdl, new tires, $5,950. 461-8182/ 461-4908
★ 1985 Nissan Sentra, 4-door, auto, $950; 1995 Dodge Neon, 4-door, auto, a/c, $4,500. 851-1854
★ 1996 Dodge Intrepid ES, V-6, 3.5L, black w/gray interior, all-power, CD, premium sound, integrated childseat, 64K miles, $7,500. 882-7350
★ 1999 Chevy Z71, extended cab, charcoal gray, 4WD, CD player, keyless entry, $23,500. 883-6724
★ 1989 Camaro convertible RS, red, V-8, air, cruise, power windows, $3,600. 880-9487
★ 2000 Toyota Tundra, 4x4, 13K miles, leather, all-power, 8 yr./80K warranty, $29,000. 658-7679
★ 1972 GMC pickup truck, 350, V-8, PB/PS, air, $1,500 obo. 881-9421
★ 1997 Mercury Tracer LS, 4-door wagon, <26k miles, automatic, pw/pd, a/c, ABS, am/fm/tape, cruise, keyless entry, $11,000. 883-9875
★ 1991 Ford Ranger XLT, supercab, 3.0 V^, 5-speed, 124K miles, new battery, $3,700. 729-8089
★ 1999 Geo Tracker, approx. 16 K miles, $18,600. 355-6116/301-9072
★ 1997 Mustang, 6 cyl., auto, black/tan, a/c, pdl/pw, anti-lock brakes, new tires, $7,650 firm. 256-753-2278
★ 1990 Plymouth Grand Voyager LE, V-6, cruise, tilt, all power, am/fm/CS, 112K miles, $3,800. 451-4280

Found

★ Watch in Bldg. 4202. Call 544-2280 to identify
★ Key in Parking Lot. Call 544-4758 to claim/ identify

Lost

★ Case pocketknife in Bldg. 4610 or 4487. Call 544-4214 if found

Free

★ Firewood, oak, ash, hickory, you pick up. 881-4601
★ Tomato cages. 881-6595

Wanted

★ Ride needed from Shelton Road (Forest Park Apartments) to Bldg. 4200 area. 461-6800 or 544-7142
★ The person who advertised the 100-lb. propane tanks w/regulator, please call 773-1828

Job Opportunity

CPP 01-004-EB, AST, Data Systems, GS-854-15, Engineering Directorate, Avionics Department, Flight Software Group. Closes Oct. 27.

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