



LAGNIAPPE

Volume 1 Issue 7

www.nasa.gov/centers/stennis

July 2006

'And the rockets' red glare...'

STS-121 launches on Fourth of July

On the nation's 230th birthday, Discovery rocketed into the Florida sky, returning the shuttle fleet to space after almost a year.

The first human spacecraft to launch on Independence Day, Discovery began its journey to resupply and service the International Space Station. Commander Steve Lindsey, Pilot Mark Kelly and Mission Specialists Mike Fossum, Lisa Nowak, Stephanie Wilson, Piers Sellers and Thomas Reiter, a European Space Agency astronaut, lifted off at 1:38 p.m. CDT. The launch followed a flawless countdown.

"We're absolutely thrilled to be safely back in space again and are looking forward to evaluating shuttle system ascent performance as soon as possible," said NASA Administrator Michael Griffin.

Stennis Space Center tests all space shuttle main engines, including the three that powered Discovery on its STS-121 mission.

At an evening press conference July 4 at Kennedy Space Center, Space Shuttle Program Manager Wayne Hale reported that the external tank's performance was greatly improved for this launch.

Discovery's mission, STS-121, is the second in NASA's Return to Flight sequence. For 13 days, Discovery's crewmembers continued testing new safety equipment and procedures that were introduced on the first Return to Flight mission, STS-114, last summer. They also will deliver equipment, supplies, experiments and spare parts to the station.



Space Shuttle Discovery kicks off the Fourth of July fireworks with its own fiery display as it rockets into the blue sky, spewing foam and smoke over the ground, on mission STS-121.

See more STS-121 coverage, Pages 4-5

From the desk of
Dr. Richard Gilbrech
 Director,
 Stennis Space Center



These are exciting times for NASA and Stennis Space Center. Last month NASA announced center responsibilities for the Constellation Program. This distribution of work across NASA's centers is an example of how the agency will use personnel, facilities and resources from across the agency to accomplish the Vision for Space Exploration.

Stennis will play a crucial role in this bold venture, by continuing to do what the center has done for more than 40 years – test rocket propulsion systems. I am thrilled to be a part of this endeavor. I was not a part of NASA during the Apollo era, but playing such an important role in sending humans back to the moon and eventually on to Mars and beyond is equally as exciting as the days when Stennis employees tested the first and second stages for the Saturn V.

On June 30, Scott Horowitz, associate administrator for NASA's Exploration Systems Mission Directorate, announced the names of the vehicles that will take our astronauts to the lunar surface. Horowitz, along with all of the Constellation Program managers, reviewed all of the suggested names and unanimously chose the names

Ares I for the crew launch vehicle and Ares V for the cargo launch vehicle. The names stem from NASA's long history of naming vehicles after mythological figures, and Ares, called Mars by the ancient Romans, resonates with the agency's exploration mission. The "I and V" designations are an homage to the Saturn I and Saturn V rockets.

As NASA moves forward in returning to the moon, a first step is returning the space shuttle to flight. We are well on our way with the July 4 launch of Space Shuttle Discovery on STS-121 – the first ever launch on Independence Day. When I stood in the firing room at Kennedy Space Center as Discovery and her crew of astronauts reached orbit and achieved MECO (main engine cut off), I was proud – proud knowing that the engines that powered them to orbit were tested and proven flight-worthy here at Stennis Space Center.

The workforce at Stennis has a history of excellence in rocket propulsion testing, and I look forward to many years of continuing this legacy.

At the time of printing Lagniappe, we are awaiting the safe return of STS-121. We are also turning our attention to the upcoming launch of Atlantis on STS-115, scheduled for Aug. 28. Once again, I expect the main engines for that mission to perform exceptionally, due in no small part to the hard work and dedication of the men and women of NASA Stennis Space Center. Good luck and Godspeed to Atlantis and her crew.

Richard J. Gilbrech

SSC engineer takes part in Vision for Space Exploration Day



NASA's Gary Benton, J-2X project manager at Stennis Space Center (right), speaks with a Congressional aide June 22 on Capitol Hill during the Vision for Space Exploration Day.

Approximately 700 people, including members of Congress and their staffers, industry representatives, students and the public visited during an interactive, all-day exhibit highlighting NASA, its centers and the Vision for Space Exploration – NASA's plan to return to the moon, and travel to Mars and beyond.

Models of NASA's proposed exploration vehicles, Ares I and Ares V, are visible in the background, alongside a model of the Saturn V rocket that transported Americans to the moon. Stennis Space Center was built to test the huge first and second engine stages of the Saturn V rocket in the 1960s, and will also test engines and stages for the new family of vehicles.

Engine test at SSC marks major milestone

The Integrated Powerhead Demonstration engine was fired at 100 percent power for the first time on July 12 at NASA Stennis Space Center. The IPD, which can generate about 250,000 pounds of thrust, is a reusable engine system whose technologies could one day help return Americans to the moon, and one day travel to Mars and beyond.



America's only staged combustion rocket engine now in development marked a significant achievement July 12 at NASA Stennis Space Center when it fired at 100 percent power level for the first time. The engine, dubbed the Integrated Powerhead Demonstration, or IPD, is a ground demonstrator engine combining the very latest in rocket engine propulsion technologies.

"Reaching 100 percent power level is a major milestone in testing the IPD engine," said Stennis Space Center Director Rick Gilbrech. "Technologies developed through the IPD could benefit the Vision for Space Exploration – to return humans to the moon, travel on to Mars and beyond. I congratulate the entire IPD team led by the Air Force Research Lab and NASA's Marshall Space Flight Center, and am proud of the Stennis test team for enabling this significant achievement."

Capable of generating about 250,000 pounds of thrust, the engine uses liquid oxygen and liquid hydrogen in a first U.S. demonstration of the full-flow, staged-combustion cycle. It has been designed as a reusable engine system, capable of up to 200 flights, and features high-performance and long-life technologies and materials that are cost-conscious.

This cycle uses a fuel-rich pre-burner to drive the fuel turbopump, and an oxidizer-rich pre-burner to drive the oxygen turbopump. Because all of the propellants are burned in the preburners, more mass flow is available to drive the turbines than in a conventional staged combus-

tion cycle. The additional power enables lower turbine temperatures, translating into longer turbine life, a key factor for reusable engine life. In addition, the use of oxidizer-rich gas in the oxidizer turbine and fuel-rich gas in the fuel turbine eliminates the need for a complex inter-propellant seal for the pumps, in order to prevent inadvertent propellant mixing. The elimination of propellant mixing failure mode at the seals increases engine system reliability.

"I can't tell people how excited I am about this program. Our team is incredibly talented and the best that the industry and government have to offer," said Stephen Hanna, Air Force Research Laboratory's IPD program manager. "We continue to pave new technological ground each day, and are currently developing and test-firing the first new liquid engine cycle in the last 35 years dating back to the development days of the shuttle's Staged-Combustion Main Engine."

The IPD engine has been designed, developed and tested through the combined efforts of Pratt & Whitney Rocketdyne Inc. and Aerojet, under the program direction of the Air Force Research Laboratory and technical direction of NASA's Marshall Space Flight Center. Rocketdyne is the systems integrator and provides the fuel turbopump, the oxidizer turbopump, the main injector, the main combustion chamber, engine control system and other engine systems components. Aerojet provides the fuel and oxidizer preburners, nozzle and fuel pre-mixer. Test operations and facilities are provided by Stennis Space Center.



The STS-121 crew consists of (from left) Stephanie D. Wilson and Michael E. Fossum, both mission specialists; Steven W. Lindsey, commander; Piers J. Sellers, mission specialist; Mark E. Kelly, pilot; European Space Agency astronaut Thomas Reiter of Germany and Lisa M. Nowak, both mission specialists.

The STS-121 Mission

Space Shuttle Discovery docked with the International Space Station July 6, and crew members were welcomed on to the station by Expedition 13 at 12:30 p.m. EDT.

Discovery delivered supplies and equipment to the station. Also arriving on Discovery was European Space Agency astronaut Thomas Reiter, who became Expedition 13's third crew member. This is the first three-person crew since the Expedition 6 crew returned to Earth May 4, 2003. Without the space shuttle to ferry equipment to the station after the Columbia accident, only two people could be supported onboard until the necessary provisions were in place.

The STS-121 astronauts spent the week working with the Expedition 13 crew, transferring much-needed supplies and hardware from the shuttle and the Leonardo multipurpose logistics module (MPLM) to the station. This is the fourth trip to the station for Leonardo, the first of three Italian-built MPLMs. Equipment and supplies no longer needed on the station will be moved to Leonardo before it is unberthed on Flight Day 10 and put back into Discovery's cargo bay for return to Earth.

Prior to docking, STS-121 Commander Steve Lindsey piloted Discovery through a back-flip maneuver to allow the station crew to capture imagery of the orbiter's heat shield.

The crew of Space Shuttle Discovery will continue to test new equipment and procedures that increase the safety of space shuttles. They also will perform maintenance on the space station and deliver more supplies and cargo for future station expansion.

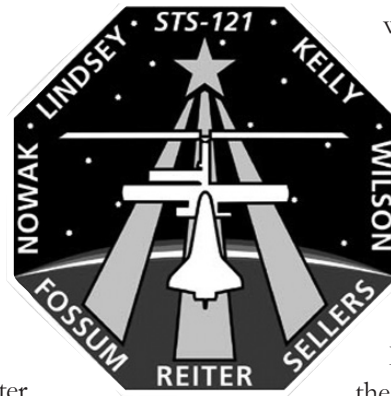
Reiter will remain on the station, working with the station crew under a contract between ESA and the Russian Federal Space Agency.

Two 6.5-hour spacewalks were completed by Sellers and Fossum on the fifth and seventh days of the mission.

The first spacewalk tested the 50-foot robotic arm boom extension as a work platform.

During the second spacewalk the crew replaced the detached cable on the mobile transporter, which was inadvertently cut, and its reel assembly. They also installed a replacement part for the station's thermal control system.

During STS-121, mission managers determined shuttle consumables supported adding an extra day for the mission. Mis-



The nozzles for Discovery's three main engines, each tested at Stennis Space Center, are visible in this close-up image photographed by one of the Expedition 13 crewmembers onboard the International Space Station prior to docking of the two spacecraft.



At left, Astronauts Piers J. Sellers and Michael E. Fossum, STS-121 mission specialists, work in tandem on the shuttle's remote manipulator system/orbiter booster sensor system during the mission's first scheduled session of extravehicular activity.

outside the shuttle/station complex to perform a get-ahead task. The spacewalkers relocated a grapple fixture from a cargo carrier to an ammonia tank on the S1 truss. This sets the stage for the tank's removal during a future spacewalk.

Before returning to the airlock, the duo demonstrate an infrared camera by performing a 60-second recording of two sample damaged

tiles. The camera is designed to capture temperature gradients that will indicate invisible damage.

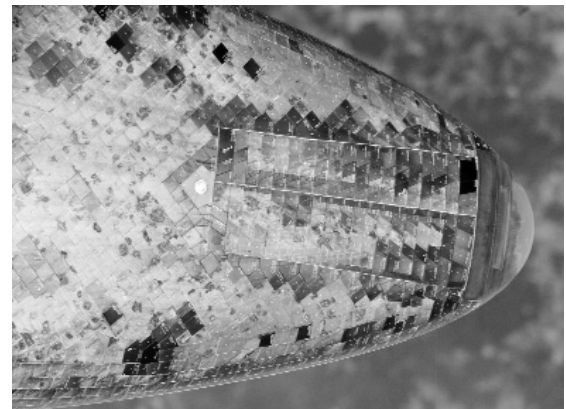
Inspections of the orbiter's heat shield with a 50-foot-long Orbiter Boom Sensor System were performed before Discovery arrived at the station, and will be conducted again the day the shuttle undocks from the space station.

At the time of printing, undocking was set for July 15. Discovery's crew was scheduled to make final preparations for the return home July 16, with landing at the Kennedy Space Center's Shuttle Landing Facility on July 17.

sion Specialists Mike Fossum and Piers Sellers demonstrated on-orbit heat shield repair techniques as they conducted STS-121's third spacewalk at the station during the extra day. The spacewalkers demonstrated repair work on pre-positioned heat shield materials in the payload bay. Among the tools they used are a space-certified caulk gun and a variety of spatulas to manipulate the test materials.

Near the end of the spacewalk, Mission Control notified Sellers and Fossum that they would get extra time

At right, part of the bottom of Discovery's crew cabin and a number of its thermal tiles are visible in this image captured during the shuttle's back-flip maneuver that allowed the station crew to photograph the orbiter's heat shield.



SSC employees honored for space shuttle work

Eleven employees at NASA Stennis Space Center recently received the Honoree Award, the highest form of recognition bestowed upon an employee by NASA's Space Flight Awareness Program. The NASA civil servants and contractors were honored June 27 for their significant contributions to the nation's space program. The honorees were selected to view the July 4 launch of the current mission, STS-121. They attended a special reception in their honor, and received commendations and models of the space shuttle. The honorees are (from left): front row, Cathy Dean, Applied Geo Technologies; John Bridges, Computer Sciences Corp.; Dinna Cottrell, NASA; second row, Don Caudill, Mississippi Space Services; Duane O'Neal, Science Systems and Applications Inc.; Scott Gipson, Jacobs Sverdrup; Charles Coogan, Jacobs Sverdrup; Rob Moeller, Pratt & Whitney Rocketdyne; SSC Director Dr. Richard Gilbrech; back row, Todd Mannion, Mississippi Space Services; Maury Vander, NASA; and Reggie Ladner, Pratt & Whitney Rocketdyne.



NASA names new rockets:

‘Ares’ salutes the future, honors the past



Artist's concept of the Ares V

NASA recently announced the names of the next generation of launch vehicles that will return humans to the moon and later take them to Mars and other destinations. The crew launch vehicle will be called Ares I, and the cargo launch vehicle will be known as Ares V.

“It’s appropriate that we named these vehicles Ares, which is a pseudonym for Mars,” said Scott Horowitz, associate administrator for NASA’s Exploration Systems Mission Directorate, Washington. “We honor the past with the number designations and salute the future with a name that resonates with NASA’s exploration mission.”

The “I” and “V” designations pay homage to the Apollo program’s Saturn I and Saturn V rockets, the first large U.S. space vehicles conceived and developed specifically for

human spaceflight. The crew exploration vehicle, which will succeed the space shuttle as NASA’s spacecraft for human space exploration, will be named later.

This vehicle will be carried into space by Ares I, which uses a single five-segment solid rocket booster, a derivative of the space shuttle’s solid rocket booster, for the first stage. A liquid

oxygen/liquid hydrogen J-2X engine derived from the J-2 engine used on Apollo’s second stage will power the crew exploration vehicle’s second stage. The Ares I can lift more than 55,000 pounds to low Earth orbit.

Ares V, a heavy lift launch vehicle, will use five RS-68 liquid oxygen/liquid hydrogen engines mounted below a larger version of the space shuttle’s external tank, and two five-segment solid propellant rocket boosters for the first stage. The upper stage will use the same J-2X engine as the Ares I. The Ares V can lift more than 286,000 pounds to low-Earth orbit and stands approximately 360 feet tall.

This versatile system will be used to carry cargo and the components into orbit needed to go to the moon and later to Mars.

Teach children importance of understanding diversity

It is important for children to understand that all people are different, and that these differences should be understood and valued. Talking to children about diversity can be tough. Young people ask questions that can make adults squirm, but it is a conversation that adults can’t afford to ignore.

Pay attention to your own conscious and unconscious stereotypes. We all have attitudes and beliefs learned from our families and the background that we grew up in. Children model their behavior after the adults they are around, especially when it comes to treating others with respect and dignity. Exemplify the positive attitudes about diversity that you want to see in your children. Show respect for your child’s curiosity. Create an open atmosphere where tough issues can be addressed; this is an important gift that parents give their children.

Children will encounter various aspects of diversity in

From the
**Office of Diversity
and Equal Opportunity**

their surroundings, including children with special needs, like learning disabilities and physical disabilities. Children need to be able to understand the difficulties that

these children may have, and to help make all children feel comfortable.

Another aspect of diversity comes from the many cultures that are a part of the United States. Be honest about differences between people; explain that we all experience the world in different ways and that all experiences are important.

Embracing diversity is an ongoing endeavor that cannot be covered in one conversation. Agree with your children that no subject is taboo. This provides authority for your children to feel free to talk to you about anything. This will help children to learn more about themselves and the people around them and will help to foster respect and appreciation for others.

Stennis technology licensed by Mississippi corporation

An award-winning technology conceived at NASA Stennis Space Center and developed under its Dual Use Technology Development Program is now licensed for production in Mississippi. The Institute for Technology Development at SSC recently signed an exclusive license agreement for Lextel Corp. of Jackson to manufacture portable hyperspectral sensors.

The sensors are handheld devices that use special cameras to split a snapshot into 120 color-specific images, allowing identification of unique characteristics of crops, skin disorders, eye diseases, counterfeit documents or airborne pathogens.

With the exclusive licensing agreement, Lextel will produce four sensor product lines under the name Photon Intelligence Systems: Visible/Near Infrared, Fluorescence Visible/Near Infrared, Ultraviolet and Short-Wave Infrared.

"This Dual Use Technology Development project is an excellent example of how NASA and industry can partner to develop a technology that meets both a NASA and a commercial marketplace need," said John Bailey, deputy chief of NASA's Science and Technology Division at SSC.

Lextel Chief Executive Officer Charles Doty called the agreement "a win-win for the nation and Mississippi, as the hyperspectral sensors support NASA's mission and Mississippi's economy."

Under the Dual Use program, administered by SSC's Innovative Partnership Program, SSC and ITD shared the cost and risk of developing the technology to meet the needs of both organizations. ITD originally developed the imaging systems to support NASA's Earth science research and space exploration programs, garnering three patents and one trademark along the way.

ITD President and CEO George May said the sensors' medical imaging applications hold the most promise for NASA's space flight program. In addition to giving accurate, noninvasive pictures on astronauts' health, the sensors can provide early detection of molds and toxins growing aboard space vehicles.

For information on the Web about the Innovative Partnership and Dual Use Technology Development programs at NASA Stennis Space Center, visit: <http://technology.ssc.nasa.gov>.

Hail & Farewell

NASA welcomes the following to SSC:

James Jacobs – Contract specialist

Marleen Phillips – Attorney

Scott Chavez – Legal trainee

Richard Kirkpatrick – Student trainee engineer

Andrew Bracey – Student trainee engineer

AROUND NASA

■ **NASA announces next shuttle crew:** NASA has assigned crew members to the next space shuttle flight. Air Force Col. Pamela A. Melroy will command the STS-120 mission to take the Node 2 connecting module to the station. Melroy, a veteran shuttle pilot, is the second woman to command a shuttle. Marine Corps Col. George D. Zamka will serve as pilot. The flight's mission specialists will be Scott E. Parazynski, Army Col. Douglas H. Wheelock, Navy Capt. Michael J. Foreman and Paolo A. Nespoli, a European Space Agency astronaut.

■ **NASA names Shared Services Center deputy executive director:** NASA Shared Services Center Executive Director Richard E. Arbuthnot announced the selection of Joyce M. Short as the organization's deputy executive director. Short is currently the director of the Service Delivery Directorate and will continue managing in this capacity in addition to handling her new responsibilities.

Short will assist Arbuthnot in managing the roles and responsibilities and the integration of the three components of the shared services center: Service Delivery, Business and Administration and Customer Satisfaction and Communication. Short will continue managing Service Delivery Operations, where she is responsible for the leadership, oversight and integration of the financial management, human resources, information technology and procurement services.

■ **NASA launches education initiative for minority institutions:** NASA kicked off a new initiative with the United Negro College Fund Special Programs Corporation on June 28, to give researchers and students from minority institutions direct access to NASA facilities, scientists and capabilities.

Focused on science, technology, engineering and mathematics, the institute will bring together the talent and expertise of historically black colleges and universities; Hispanic-serving institutions; tribal colleges and universities; and other minority institutions through research-based fellowships, internships, co-ops and grants. Funded by a \$3.5 million grant from NASA, the corporation will establish the NASA Science and Technology Institute for Minority Institutions in the NASA Research Park at Ames Research Center, Moffett Field, Calif.

■ **Micro-satellites complete mission:** NASA's three orbiting micro-satellites known as Space Technology 5 have completed their planned 90-day mission. The mission team shut down the spacecraft to conclude operations on June 30. The mission, launched March 22, primarily focused on flight-testing miniaturized satellites in the harsh environment of space and evaluating their ability to make research-quality scientific measurements. The mission demonstrated the benefits of using a constellation of spacecraft to perform scientific studies. The spacecraft simultaneously traversed electric current sheets and measured the magnetic field using miniature magnetometers.

Interns, summer faculty working on programs at SSC



NASA summer faculty and student interns are working on their 10-week programs at NASA Stennis Space Center. The students are participants of the Undergraduate Student Research Program and the DEVELOP Program. The faculty participants are part of the NASA Summer Faculty Program. During their final week at Stennis, each participant will give a presentation regarding research findings. Pictured are (from left): front row, Cara Waite, Robert Goggins, Steven Rawls, Jacob Christensen, Keith Silvio, Dane Freeman; back row, NASA Education Director Dewey Herring, Satyajit Verma, James Elbers, Felicia Harry, InDyne Education Coordinator Nancy Bordelon, Tara Dunn, Ratessiea Lett and NASA Student Program Manager Joy Smith.

Astro Camp Plus takes closer look at science, technology

Stennis Space Center's new Astro Camp Plus camp kicked off June 19 for teens ages 13-15. The new camp delves more deeply into the science, math and technology concepts introduced in the center's popular Astro Camp series.

At right, campers including Jasmyne White (left) and Dana Yingst, both of Slidell, La., learn how NASA uses 'podcasting' to broadcast video, and made their own podcasts.



LAGNIAPPE

is published monthly by the Office of External Affairs – Public Affairs at NASA's John C. Stennis Space Center.

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