

## Bolden commends Stennis employees for commitment to U.S. space program

NASA Administrator Charles Bolden visited Stennis Space Center in Mississippi Oct. 23 to welcome employees back to work after the U.S. government shutdown and thank them for their ongoing commitment to the nation's space program.

Bolden held separate meetings with Stennis and NASA Shared Services Center (NSSC) employees. At Stennis, he also toured the B-2 Test Stand, which is being prepared to test the core stage of NASA's new Space Launch System (SLS). NASA is building the SLS to carry humans deeper into space than ever before.

"Stennis continues to demonstrate that the road to space goes through Mississippi," NASA Administrator Charles Bolden said. "I applaud the center's continued work to help bring about a new era of exploration through its commercial partnerships and the ongoing essential work it does for us in testing new propulsion systems. I also salute the personnel of the NASA Shared Services Center, housed at Stennis, for the superb contingency support they provided the agency during the recent government shutdown. It's my pleasure to visit the Stennis and NSSC workforces and thank them for holding the fort during the shutdown and ensuring our forward progress."

Stennis employees returned to work Oct. 17 following a 16-day furlough. Their focus quickly returned to efforts critical to the future of American space exploration.

"It always is an honor to host the NASA administrator," Stennis Director Rick Gilbrech said. "We deeply appreciate his affirmation of our team and its support of NASA's deep-space and commercial spaceflight initiatives and pledge ourselves to ongoing excellence in all those efforts."



NASA Administrator Charles Bolden speaks to Stennis Space Center employees during an all hands session in the Bldg. 1200 auditorium Oct. 23.

*“Stennis continues to live up to its billing as the world’s largest and most robust large rocket engine test center.”*

From the desk of  
**Ken Human**

Associate Director, Stennis Space Center



**A**s we approach Thanksgiving, I think about some of the accomplishments and challenges of the last year and also look forward to some future activities just up ahead.

Stennis continues to live up to its billing as the world’s largest and most robust large rocket engine test center, as evidenced by many test accomplishments this past year. Among them is the J-2X engine gimbal series and the testing of engines in support of the Morpheus Lander Program. Orbital’s Cygnus cargo spacecraft completed its demo mission to the International Space Station in September. They joined SpaceX as NASA’s second U.S. commercial partner capable of resupplying ISS. As you know, the AJ26 engines that powered Orbital’s Antares vehicle were tested right here at Stennis.

In the area of challenges, I would be remiss if I did not mention the October furlough and the impact it has had on our workforce. It was a challenging time for all, and I speak for Stennis management when I express my appreciation for all of the teamwork and efforts above and beyond by so many. The timing of the threat of a tropical storm was an additional burden on the team that had to prepare the center for any contingencies. I want to express my appreciation to employees who were asked to come to work to take care of critical tasks to ensure our test facilities were safe and to make sure our resident organizations were provided the support they needed to continue their missions. These were trying times for all, and we are very proud of our Stennis family.

We had several events scheduled to bring the NASA family together that had to be postponed. One of

these was NASA Family Day at INFINITY Science Center. This has been rescheduled for Nov. 23, and we hope you will bring your family to enjoy the new and exciting exhibits such as the Rolls-Royce engine display, the Louisiana/Mississippi astronaut display and over three miles of nature trails that have been built. While you are there, stop by the NASA Exchange-sponsored souvenir shop to see the new gift items.

I am optimistic that we can meet the future challenges ahead and know our team will once again come together to make things happen. We have several tests on the horizon, including a new series of J-2X tests on the A-2 Test Stand. Later in 2014, we will be testing RS-25 engines on the A-1 Test Stand.

Meantime, from an agency perspective, the Lunar Atmosphere and Dust Environment Explorer (LADEE) is performing flawlessly in orbit around the moon. A recent Kepler conference highlighted the fact that Earth-like planets are in much greater abundance throughout the galaxy than previously thought. NASA also is preparing to launch the Mars Atmosphere and Volatile Evolution (MAVEN) mission from Kennedy Space Center on Nov. 18. Later this month, the ISS also will celebrate the 15th anniversary of the launch of its first element. The Orion capsule has its first experimental flight scheduled less than a year from now.

As we prepare for the holidays, I want to wish everyone a happy and safe holiday break and hope you will take time to reflect on the many things we have to be thankful for at Stennis, NASA and across our great country.

*Kenneth R. Human*

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Stennis Director Rick Gilbrech (left) talks about B Test Stand renovation work with NASA Administrator Charles Bolden (center) during an Oct. 23 tour.

## BOLDEN

### Continued from Page 1

“We have always understood the work provided by the NASA Shared Services Center is crucial to the agency’s mission,” said NSSC Executive Director Michael Smith. “However, situations like the recent furlough shed a spotlight on the hard work and dedication of NSSC employees who stop at nothing to get the job done, even under strenuous circumstances.”

Bolden’s visit came the day a new commercial engine test agreement for Stennis was announced. Mississippi Gov. Phil Bryant announced the Mississippi Development Authority has entered into agreement with Space Exploration Technologies (SpaceX) to provide initial testing

of the company’s Raptor methane rocket engines at Stennis. Testing is expected to begin in early 2014.

Along with this new commercial testing, Stennis is continuing to test Aerojet Rocketdyne AJ26 rocket engines for Orbital Sciences Corporation of Dulles, Va., which has partnered with NASA to provide commercial cargo flights to the International Space Station. Orbital’s maiden flight to the space station launched from NASA’s Wallops Flight Facility in Virginia on Sept. 18. Orbital’s Antares rocket was powered by a pair of AJ26 engines – E9 and E12 – tested at Stennis May 3, 2012, and Jan. 18, respectively.

Orbital’s Cygnus capsule connected to the ISS on Sept. 29. It detached from the space station successfully Oct. 22 after completing delivery

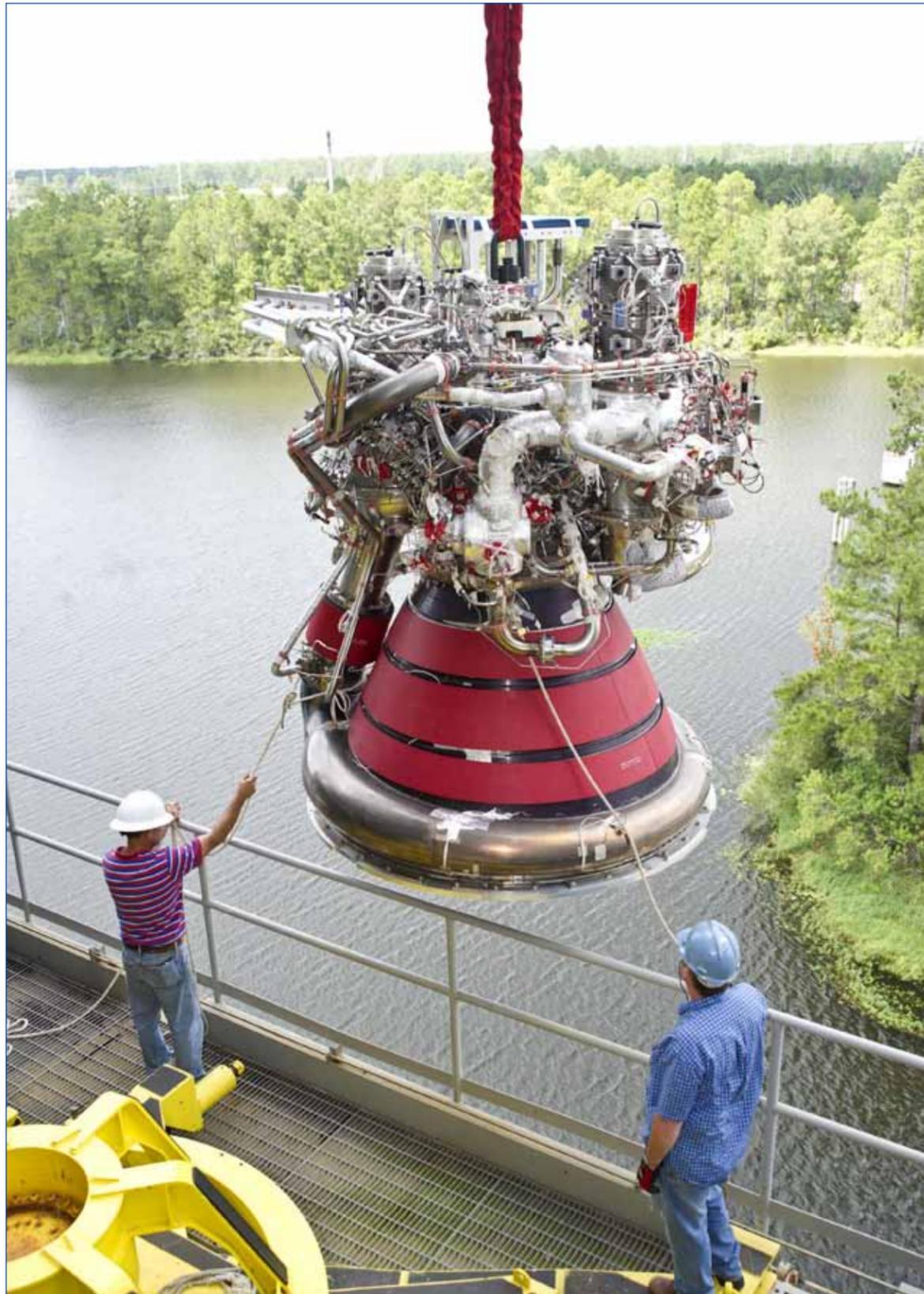
of its cargo. Orbital has a contract through NASA’s Commercial Resupply Services initiative to launch eight cargo missions to the space station.

Other companies also have tested their propulsion systems at Stennis. Blue Origin has conducted testing at the center’s E-1 Test Stand. Stennis also has leased the B-1 Test Stand to Aerojet Rocketdyne for testing of its RS-68 engine. The RS-68 in a Delta IV heavy-lift rocket will power the first flight test of NASA’s Orion multipurpose crew vehicle in 2014.

In addition to this commercial testing, the A-1 Test Stand at Stennis is being readied to test the RS-25 engine that will power the SLS. The B-2 Test Stand also is being modified to test the SLS core stage, which will involve firing four RS-25 engines simultaneously.

## FULFILLING NASA'S EXPLORATION MISSION

# NASA begins new round of J-2X engine developmental testing at Stennis



NASA began a new round of J-2X engine testing on the A-2 Test Stand at Stennis Space Center with a 50-second hotfire test Nov. 6 (bottom right photo). The new test series follows completion of a round of gimbal, or pivot, tests on the engine on the A-1 Test Stand. J-2X engine No. 10002 was removed from the A-1 stand Sept. 20 and returned to the Aerojet Rocketdyne engine assembly facility for inspection and storage (left photo). Engine No. 10003 was delivered and installed on the A-2 Test Stand on Oct. 21 (right photo). NASA plans to conduct a series of tests on the engine, concluding next spring. Meanwhile, the A-1 stand is being prepared to test RS-25 engines that will power NASA's new Space Launch System, being built to carry humans deeper into space than ever. Testing of RS-25 engines is scheduled to begin next spring.



## FULFILLING NASA'S EXPLORATION MISSION

# Antares completes ISS mission, powered by Stennis-tested engines



(Right photo) An Orbital Sciences Corporation Antares rocket, with the Cygnus cargo spacecraft aboard, is seen in this false color infrared image, as it launches from Pad-0A of the Mid-Atlantic Regional Spaceport at NASA's Wallops Flight Facility in Virginia, on Sept. 18. The rocket was powered by a pair of Aerojet Rocketdyne AJ26 engines tested and proven flightworthy at Stennis Space Center. During the test flight mission, the spacecraft delivered about 1,300 pounds of cargo, including food and clothing, to the Expedition 37 crew on the International Space Station (ISS). The false color infrared image was taken by NASA photographer Bill Ingalls. Ingalls used a modified digital SLR camera to photograph the morning launch (9:58 a.m. CDT) in infrared light. The image was then processed to present a false-color view. The Orbital Sciences test flight was conducted to show the Cygnus spacecraft is ready to begin a series of eight cargo delivery missions for NASA under a \$1.9 billion contract between the company and federal agency. Cygnus docked with the orbiting space station on Sept. 29, spending almost a month at the station before concluding its successful mission Oct. 22. Orbital Sciences now plans a full mission

to the space station next month. Set for liftoff in a window from Dec. 15 to Dec. 21, the next Cygnus flight will be Orbital's first operational cargo mission under its NASA contract.

(Top photo) Former NASA Deputy Administrator Lori Garver (right) and U.S. Rep. Steven Palazzo, R-Miss., view a May 3, 2012, test of AJ26 engine No. 9 on the E-1 Test Stand at Stennis Space Center. The engine was one of two that powered the successful test flight mission of an Orbital Sciences Corporation Antares rocket and Cygnus spacecraft earlier this fall.

(Bottom photo) Engineers at Stennis Space Center conduct a successful test of AJ26 engine No. 12 on the E-1 Test Stand on Jan. 18, 2013. The engine was one of two used to power Orbital Sciences' successful test flight mission to the ISS last month. NASA has partnered with Orbital Sciences to provide a series of cargo supply missions to the space station. All of the AJ26 engines that will power those missions will be tested at Stennis.



# NASA testing the future at Stennis with Project Morpheus effort

NASA tested the future – in more ways than one – during a recent hotfire series on a fourth-generation Project Morpheus engine at the agency's Stennis Space Center facility. Morpheus is a prototype vertical takeoff and landing vehicle designed to advance innovative technologies into flight-proven systems that may be incorporated into future human exploration missions.

Engineers conducted three days of tests on the liquid oxygen/liquid methane Morpheus engine HD4B on the E-3 Test Stand at Stennis, including seven tests featuring a 3-D printed nozzle. The engine is designed to power a prototype planetary lander that could evolve to carry cargo and technologies safely to space destinations such as asteroids or Mars.

"We're pushing the bounds of technology with this project," said Rob Morehead, main engine designer for Project Morpheus. "Advancing these lander technologies could open doors for all kinds of planetary missions at lower cost, while 3-D printing, if successfully implemented, could revolutionize numerous aspects of space exploration."

Several NASA centers are on the front lines of the cutting-edge effort. Johnson Space Center in Texas is developing and operating the Morpheus lander. Stennis Space Center in Mississippi is testing the engines to power the lander. Kennedy Space Center in Florida will host the free-flight tests of the lander at a specially landscaped runway area, and Marshall Space Flight Center in Alabama manufactured the engine's nozzle using an innovative 3-D printing process known as selective laser melting.

"The Morpheus tests will provide us with another valuable piece of data from a rocket part exposed to the extreme conditions of a hotfire testing," said Ken Cooper, whose team at Marshall manufactured the 3-D printed nozzle. "These tests are helping us qualify a new manufacturing process that could lead to more affordable space missions."

During the week of Sept. 9, Stennis tested the HD4B engine and the pair of nozzles, one made by standard machining and one by the 3-D printing process. A third nozzle is being built at Langley Research Center in Virginia, using a 3-D printing method known as EBF3 (Electron-Beam Free Form Fabrication). It may be tested at Stennis later this year.

3-D printing could revolutionize development of space technology by providing a faster, less-expensive means of building components, as well as a way to create more complicated components that cannot be easily machined. However, prototypes must be tested to ensure they hold up as well as components fabricated by standard means. The recent HD4B series offered a chance to test the 3-D printing process.

Engineers used the standard nozzle to set a baseline, then ran the 3-D printed nozzle through the same test conditions. During the week, engineers conducted 10 tests on the standard nozzle and seven on the 3-D printed version. The 3-D tests totaled 130 seconds, with the final hotfire reaching 60 seconds and peak nozzle temperatures around 1,800 degrees Fahrenheit.

"It appears the 3-D nozzle material performed the same as the standard nozzle, but the next step is a more detailed metallurgical analysis of the

3-D nozzle."

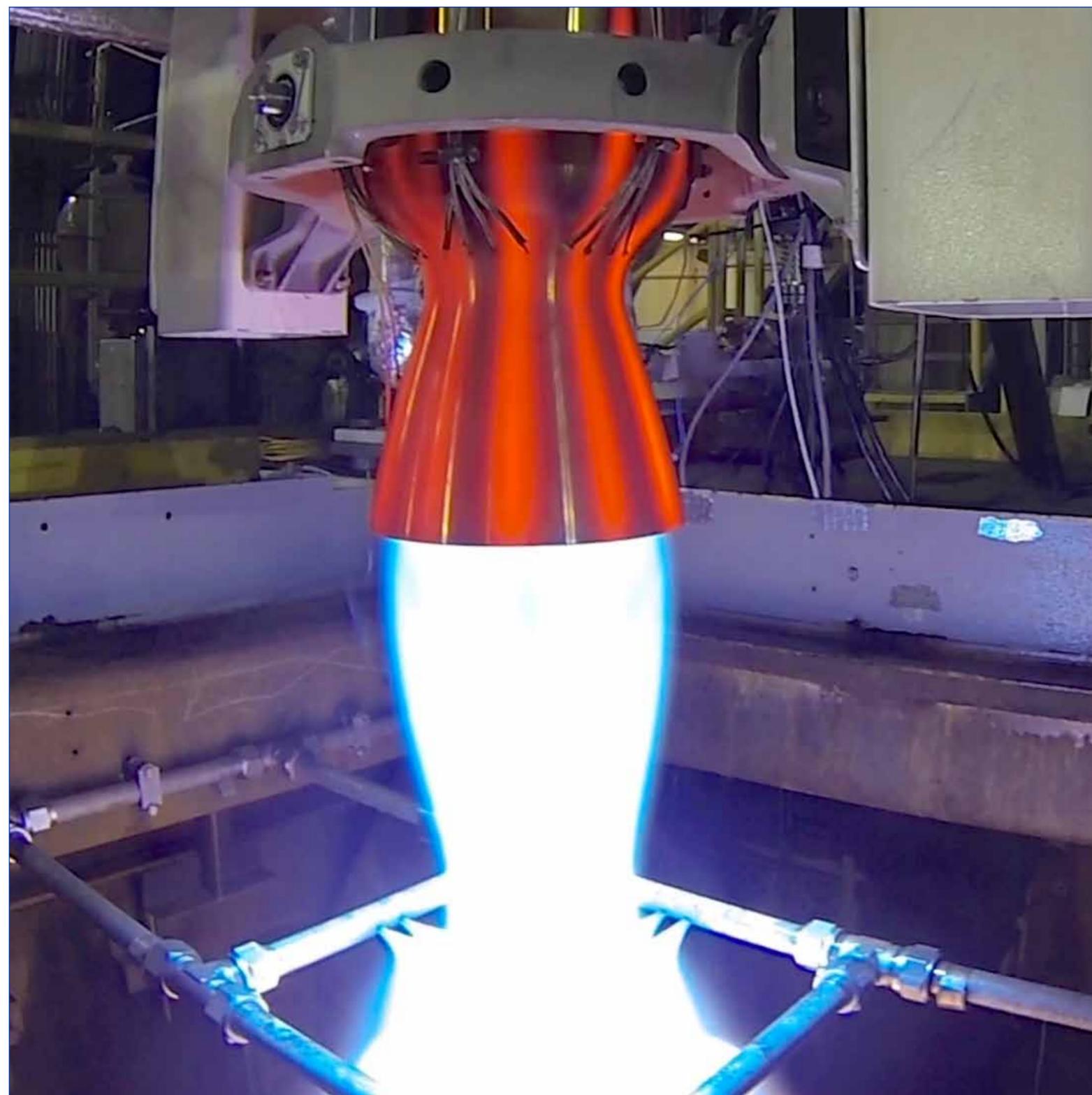
The HD4B engine now will serve as a backup for the Morpheus 1.5B lander that will undergo free-flight testing at Kennedy in upcoming months. That lander is powered by engine HD4A, which was tested at Stennis earlier this year.

Meanwhile, Morpheus engineers plan to return to Stennis later this fall with engine HD5. Testing of 3-D printed nozzles is expected to continue at that time. "It is exciting to be such a central part of front-line space exploration work," E-3 Test Director Craig Chandler said. "It also demonstrates the unique capability of Stennis facilities and test teams to support a variety of projects."

Project Morpheus is a primarily civil service effort to develop and test a prototype planetary craft capable of vertical takeoff and landing. The craft is envisioned as a "generic" lander capable of carrying a variety of technological payloads, including robots and science labs, on exploration missions, thus reducing costs. The liquid oxygen/liquid methane-propelled test vehicle is sized to simulate carrying 1,100 pounds of cargo on a prototypical lunar mission. The current primary payload experiment is the Autonomous Landing and Hazard Avoidance Technology (ALHAT), a risk reduction capability for future spacecraft landers.

The Morpheus project is supported by the Advanced Exploration Systems Division within the Human Exploration and Operations Mission Directorate.

For additional information about Project Morpheus, visit online: <http://morpheuslander.jsc.nasa.gov/>



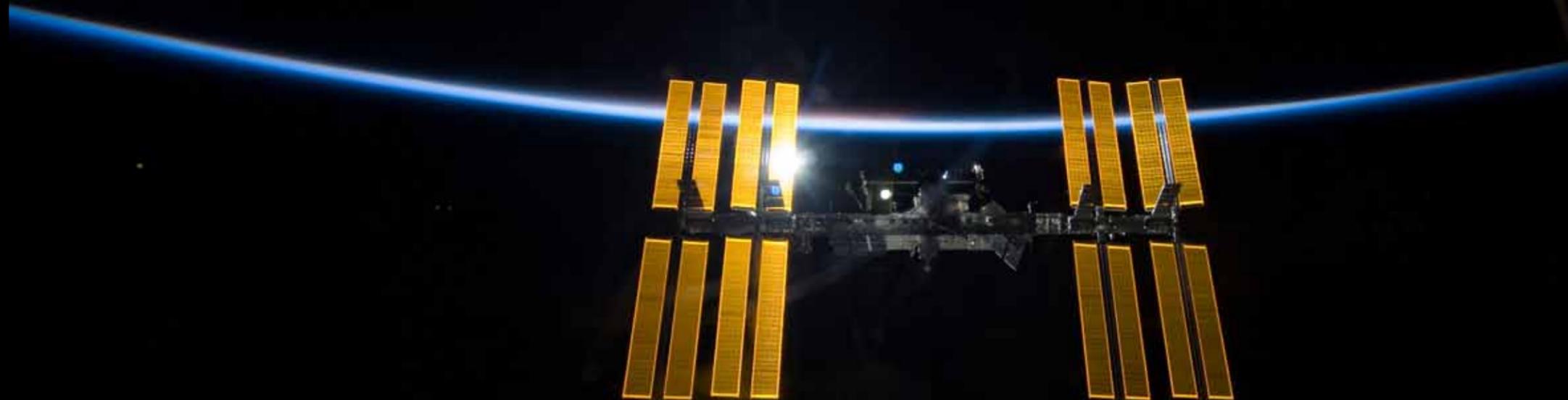
NASA engineers conduct a test of the liquid oxygen/liquid methane Morpheus lander engine HD4B on the E-3 Test Stand at Stennis Space Center during the week of Sept. 9.

# International Space Station 15th anniversary

“This year, we are celebrating the 15th anniversary of the International Space Station.

The ISS is the greatest engineering achievement ever completed by humans, and Stennis Space Center played a role in accomplishing this. The main engines that launched the space shuttles to help build the station were tested and proven flightworthy here. Today, we are continuing to play a role by testing the engines that are propelling the vehicles that transport cargo to the ISS. Important research is being conducted on the ISS, and we can be proud to say that we helped make this possible.”

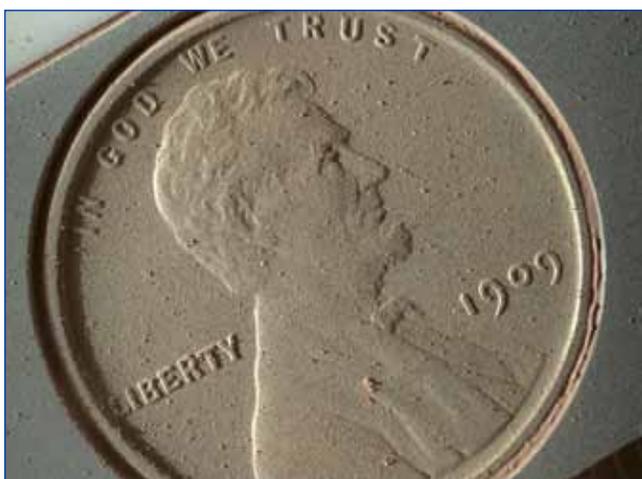
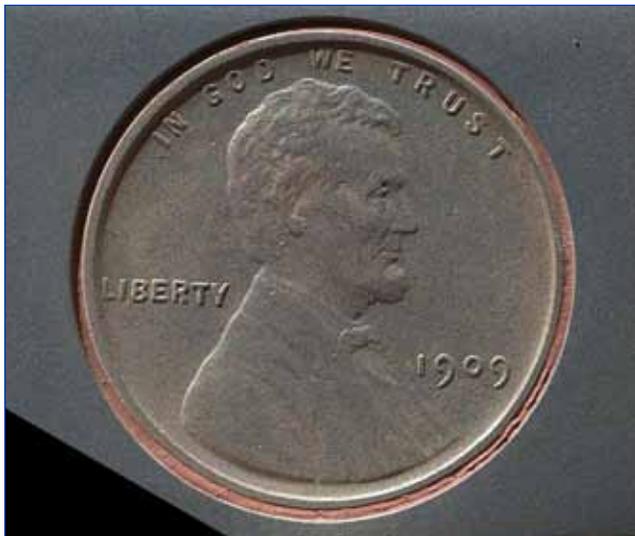
Dr. Richard J. Gilbrech  
Stennis Space Center Director



## International Space Station facts

- First segment launched Nov. 20, 1998
- 13 years of continuous human presence onboard
- Spans (with solar arrays) the area of a football field, including end zones
- Weighs 924,739 pounds
- More livable space than a five-bedroom house, with two bathrooms, a gym and a 360-degree bay window
- Solar array surface area covers an area the size of the U.S. Senate Chamber three times over
- More than 115 space flights conducted on five launch vehicles during ISS construction
- Fifty-two computers control onboard systems
- 100 telephone-booth-sized rack facilities can be installed in the ISS for operating the spacecraft systems and research experiments
- 3.3 million lines of software code on the ground support 1.8 million lines of flight software code
- Eight miles of wire connects electrical power system
- In the U.S. segment alone, 1.5 million lines of flight software code run on 44 computers, communicating via 100 data networks, transferring 400,000 signals (e.g., pressure or temperature measurements, valve positions, etc.)

## FULFILLING NASA'S EXPLORATION MISSION



## High-res photo from Mars

The lower image of a U.S. penny on a calibration target was taken by the Mars Hand Lens Imager (MAHLI) aboard NASA's Curiosity rover in Gale Crater on Mars. At 14 micrometers per pixel, it is the highest-resolution image that MAHLI can acquire. The image was obtained as part of a test on the 411th Martian day, or sol, of the mission (Oct. 2, 2013), the first time the rover's robotic arm placed MAHLI close enough to a target to obtain the camera's highest-possible resolution. Compared to the upper image taken last September, the new photo shows that during the penny's 14 months (so far) on Mars, it has accumulated Martian dust and clumps of dust, despite its vertical mounting position on the calibration target for MAHLI. The previous highest-resolution MAHLI images, which were pictures of Martian rocks, were at 16 to 17 micrometers per pixel. A micrometer, also known as a micron, is about 0.000039 inch. The penny is a 1909 VDB penny (bearing the initials of designer Victor David Brenner) minted in Philadelphia during the first year that Lincoln cents became available. More information about its inclusion on Curiosity is available at [www.jpl.nasa.gov/news/news.php?release=2012-033](http://www.jpl.nasa.gov/news/news.php?release=2012-033). The gold medal for highest resolution photographs on Mars goes to NASA's Phoenix Mars Lander's optical microscope. As a microscope, though, fine-grained samples had to be delivered to it, whereas MAHLI can be deployed to look at geologic materials in their natural setting. Image credit: NASA/JPL-Caltech/MSSS

## NASA in the News

### Image offers new view of Saturn, Earth

NASA has released a natural color image of Saturn from space, the first in which Saturn, its moons and rings, and Earth, Venus and Mars, all are visible. The new panoramic mosaic of the majestic Saturn system was taken by NASA's Cassini spacecraft. Cassini's imaging team processed 141 wide-angle images to create the panorama. The image sweeps 404,880 miles (651,591 kilometers) across Saturn and its inner ring system, including all of Saturn's rings out to the E ring, which is Saturn's second outermost ring. For perspective, the distance between Earth and our moon would fit comfortably inside the span of the E ring. "In this one magnificent view, Cassini has delivered to us a universe of marvels," said Carolyn Porco, Cassini's imaging team lead at the Space Science Institute in Boulder, Colo. Launched in 1997, Cassini has explored the Saturn system for more than nine years. NASA plans to continue the mission through 2017. To view the image, visit: <http://photojournal.jpl.nasa.gov/catalog/pia17172>.

### NASA data available via Amazon

NASA and Amazon Web Services Inc. (AWS) of Seattle, Wash., are making a large collection of NASA climate and Earth science satellite data available to research and educational users through the AWS cloud. The system enhances research and educational opportunities by promoting community-driven research, innovation and collaboration. "NASA continues to support and provide open public access to research data, and this collaboration is entirely consistent with that objective," said NASA Chief Scientist Ellen Stofan at the agency's headquarters in Washington, D.C. The agreement allows NASA and AWS to experiment with a new way to provide data services. By using the cloud, research and application users worldwide gain access to an integrated Earth science computational and data management system. The service encompasses selected NASA satellite and global change datasets and data processing tools from the NASA Earth Exchange (NEX), a research platform of the NASA Advanced Supercomputer Facility at the agency's Ames Research Center in Moffett Field, Calif. The NASA datasets will be available through the Amazon Public Data Sets program at: <http://aws.amazon.com/datasets>. To learn more about the NASA NEX Public Data Sets on AWS, visit: <http://aws.amazon.com/nasa/nex>.

For NASA news releases, visit: [www.nasa.gov/news/releases/latest/index.html](http://www.nasa.gov/news/releases/latest/index.html).

## Stennis annual CFC effort under way

A Stennis Space Center employee collects information about an area service organization during the kickoff of the 2013 Combined Federal Campaign effort at the center earlier this fall. A variety of area organizations supported by CFC gifts provided informational displays during the Sept. 18 event. The CFC is the largest annual workplace charity effort in the nation. Each year, its gifts support organizations providing health and human services benefits throughout the world. In 2012, Stennis employees gave \$215,386 through the campaign, the second consecutive year that site gifts totaled more than \$210,000. The total exceeded the 2012 giving goal by 9.7 percent. For 2013, Stennis has set a goal of giving \$182,750.



**Goal – \$180,000**

**To-date – \$101,100.58**

**(55.3% of goal)**

## NASA exploration systems group visits Stennis

NASA personnel from agency centers around the country visited Stennis Space Center on Nov. 6 for the NASA Exploration Systems Development Division's comprehensive monthly program status review. During the visit, group members toured the Aerojet Rocketdyne engine assembly facility, which will prepare RS-25 engines for testing at Stennis next spring. They also toured the B Test Stand, which is being modified to test the core stage of the new NASA Space Launch System, which is being built to carry humans deeper into space than ever. The core stage will be powered by four RS-25 engines, firing simultaneously. Stennis is preparing its A-1 Test Stand to test all of the RS-25 engines that will be used on the SLS vehicle.



## Oral histories recount early days of Stennis

*Note: For more than 50 years, NASA's John C. Stennis Space Center has played a pivotal role in the success of the nation's space program. This month's Lagniappe provides a glimpse into the history of the south Mississippi rocket engine test center.*

Ever wonder how times were before the existence of the John C. Stennis Space Center? What was the quality of life like for people who once lived in the towns of Gainesville, Logtown, Napoleon, Santa Rosa and Westonia? What were some of the real-life events surrounding NASA's announcement to build an engine test facility in Hancock County, Miss.? Who were the key figures in the political arena, and how did strategists make adversities work to their advantage?

Many questions have been asked, but the whole story had never been told until the

University of Southern Mississippi partnered with the Stennis History Office for the Mississippi Oral History Program project. A diverse group – former center directors and employees, former business and community leaders, and former residents – shared their memories of actual events during the creation of what was known then as the Mississippi Test Operations (MTO).

Conducted by Southern Miss faculty and staff members, 29 individuals participated in the oral history project. Most interviews were recorded during the 1990s in different locations. At age 96, Mrs. J.W. Hover was interviewed with her 73-year-old daughter, Mrs. J.R. Boutwell, at their home in Pearlington in 1993. They were both former residents of Napoleon. MTO's first manager, Capt. William C. "Bill" Fortune, recorded his oral history via telephone from his home in California. He was 82 years old in 1993 when he discussed with interviewer Charles Bolton the first time he met his boss, Wernher von Braun.

Sen. John Stennis' pointman, William "Bill" Spell, described how the senator told him what happened the day he spoke at Logtown on Nov. 1, 1961. He continued to talk about his role in assisting Stennis and Center Director Jackson Balch to develop the then-named Mississippi Test Facility from a single-mission rocket engine testing site to a fully utilized operation.

Spell told interviewer Steven Patterson it did not take long talking to Balch to realize he had a great deal of knowledge. "He had a rather engaging personality if one understood what his objectives were and how dedicated he was to obtaining them," he said. "Over the years, we developed a very close working relationship. As a result of our relationship and as a result of (Sen.) Stennis' position, ... he was in a very key position to deal with NASA in many areas. So, he was in a rather influential and critical position and could influence a lot of things that NASA was interested in and that were really essential to NASA.



"So, Jack Balch became a source of information not only on the problems that were regional or local interest but to some of the national philosophies of NASA. And it became apparent to me rather quickly that Balch's

ideas were pretty much parallel to those of Stennis, in that he didn't have any use for the bureaucracy."

Balch passed away in 1980, prior to the creation of the Stennis Space Center History Office 10 years later. As stated in "Way Station to Space: A History of the John C. Stennis Space Center," Balch describes Spell as "Stennis' Machiavellian aide."

Although there is no oral history from Balch, former Center Director Roy Estess elaborated about his relationship with Balch in all three of his oral histories, recorded in 1991, 1995 and 2002.

Businessman Leo W. Seal Jr. also was among the 29 individuals interviewed for the project. He told of his conversation with Capt. Fortune to bring a Hancock Bank branch onsite; it still operates today. "You are out here in the middle of nowhere," he told Fortune. "The closest bank is about 13 miles away in Picayune, and we're about 19 miles away in Bay St. Louis. We think we need to put a bank out here for you."

Twelve oral histories of the Mississippi Oral History Program collection will eventually be featured on the Oral History webpage. Please check periodically at: [www.nasa.gov/centers/stennis/about/history/oral-history.html](http://www.nasa.gov/centers/stennis/about/history/oral-history.html).

## Office of Diversity and Equal Opportunity

# Pioneer astronauts changed face of space program

In many ways, the astronaut corps serves as the public face of the National Aeronautics and Space Agency. Thirty-five years ago, NASA introduced a class of 35 new astronauts to the American public that would break barriers and come to inspire the next generation of explorers.

Selected in 1978, NASA astronaut Group 8 was the first new class of astronaut candidates since 1969 and would include NASA's first female astronauts (Shannon W. Lucid, Margaret Rhea Seddon, Kathryn D. Sullivan, Judith A. Resnik, Anna L. Fisher and Dr. Sally Ride) and the first three African-Americans to fly in space (Dr. Guion "Guy" Bluford, former NASA Deputy Administrator Fred Gregory and Ron McNair). These astronauts helped to "change the face of the space program."

Ride (May 26, 1951 – July 23, 2012) was born in Los Angeles, Calif. In 1973, she received a Bachelor of Science degree in physics and a Bachelor of Arts degree in English from Stanford University. She received her Master of Science and doctoral degrees in physics from Stanford in 1975 and 1978, respectively.

Ride served as a mission specialist on STS-7, launched June 18, 1982, becoming the first American woman in space. She returned to space on Oct. 5, 1984, as a member of STS-41-G. Following the Challenger explosion, Ride served on the presidential commission investigating the accident. Upon completion of the investigation, she was assigned to NASA Headquarters as special assistant to the administrator.

Ride later said, "The fact that I was going to be the first American woman to go into space carried huge expectations along with it. (On launch day) there was so much excitement and so much happening around us in crew quarters, even on the way to the launch pad. I didn't really think about it that much at the time, ... but I came to appreciate what an honor it was to be selected to be the first to get a chance to go into space."

Bluford was born in Philadelphia, Penn., on Nov. 22, 1942. He graduated from Pennsylvania State University in

1964 with a Bachelor of Science degree in aerospace engineering. In 1974, Bluford received a Master of Science degree with distinction in aerospace engineering from the Air Force Institute of Technology. He received a Doctor of Philosophy in aerospace engineering with a minor in laser physics from the Air Force Institute in 1978. In 1987, he attended the University of Houston-Clear Lake, where he received his master's in business administration.

Bluford received his pilot wings in January 1966 and flew 144 combat missions, 65 over North Vietnam. In July 1967, he was assigned to the 3630th Flying Training Wing at Sheppard Air Force Base, Texas, as a T-38A instructor pilot and then entered the Air Force Institute of Technology residency school at Wright-Patterson Air Force Base in Ohio. In 1979, he entered the astronaut corps.

Bluford became the first African-American in space as a mission specialist on STS-8, launched from Kennedy Space Center on Aug. 30, 1983. STS-8 was the third flight of the space shuttle Challenger and included the first night launch and the first night landing of the Space Shuttle Program. He also flew on a Spacelab mission, STS-61-A, in 1985, and again in 1991 as a member of STS-39. Bluford's last flight, STS-53, was in 1992 and included deployment of a classified Department of Defense payload. He logged over 688 hours in space.

Bluford stated that his goal was "to do the best job possible so that other people would be comfortable with African-Americans flying in space and African-Americans would be proud of being participants in the space program and ... encourage others to do the same."

In addition to the first American woman in space and the first African-American in space, astronaut Group 8 also included the first Jewish-American in space (Resnik, STS-41-D) and the first American woman to perform a "spacewalk" (Sullivan, STS-41-G). With such amazing role models leading the way into space, it comes as no surprise that NASA continues to assemble diverse and accomplished astronauts to carry on the proud legacy of Ride and Bluford.

*(All biographical data and quotes from NASA documents and sources)*

## Hail & Farewell

### NASA bids farewell the following:

Linda McCain

Management Support Assistant

Center Operations Directorate

Kirk Sharp

AST, Engineer Program Management

Rocket Propulsion Test Program Office

# Stennis hosts 8th-grade career expo activities



Eighth-grade students from lower Mississippi counties enjoyed several NASA-related activities during a two-day Pathways2Possibilities career expo event sponsored by area businesses on Nov. 13-14. An estimated 6,500 students visited the Mississippi Gulf Coast Coliseum to participate in the interactive expo involving schools in six coastal counties. Among other featured activities, Stennis Space Center hosted



displays to help students learn about rocket engine test activities at Stennis and career opportunities in science, technology, engineering and mathematics. They also learned about robotics and airplane design and participated in a competition to build a model rocket engine test stand using spaghetti and marshmallows. Participating students also were able to collect NASA memorabilia and information.

## Stennis DEVELOP students deliver research results

NASA DEVELOP students at Stennis Space Center had an active October, presenting Earth science research results to a pair of area conferences.

The presentations not only allowed students to extend research results to relevant science communities who could benefit from the work, but also provided valuable professional development experience.

On Oct. 17, Stennis DEVELOP lead Ross Reahard and

Stennis DEVELOP project lead Shelby Barrett attended the Mississippi Geospatial Conference held at the University of Southern Mississippi in Long Beach.

Reahard's presentation highlighted DEVELOP's work with the National Wildlife Federation to evaluate the effectiveness of key wetland restoration sites in southeast Louisiana. Barrett's presentation focused on DEVELOP's efforts to test an experimental method for measuring nearshore salinity in the Northern Gulf of Mexico using NASA satellite products.

On Oct. 18, Stennis DEVELOP project lead Jamie Thompson attended the Society of Wetland Scientists South-Central Fall Meeting held at Mississippi State University in Starkville. At the meeting, she presented research findings from DEVELOP's Louisiana wetlands monitoring project and networked with other conference attendees.

For more information about the DEVELOP Program, including how to apply for an internship, please visit: <http://develop.larc.nasa.gov>.

### New exhibit engine arrives at INFINITY

A retired Trent 1000 test engine donated by Rolls-Royce North America arrives at the INFINITY Science Center at Mississippi Exit 2 on Interstate 10 East on Oct. 11 to become a new exhibit on display at the museum. The engine, which is designated ESN 10017, amassed more than 467 hours and 988 cycles during testing at Stennis Space Center and played a key part in the Trent 1000 engine development program. The Trent engine, certified up to 76,000 lbs. of thrust, is used on Boeing's 787 aircraft.



### Stennis hosts 2013 Energy Awareness Day

Stennis Space Center employee John Boffenmyer (left) demonstrates to Bruce Spiering of NASA that one must crank out much more power to illuminate a standard light bulb than is needed for the energy-efficient variety. The exhibit was one of several visited by Stennis employees during 2013 Energy Awareness Day activities onsite Oct. 23. Information at the exhibits focused on helping Stennis employees learn about steps they can take to help conserve energy in their daily lives.