National Aeronautics and Space Administration

NASA

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SPACE FLIGHT CENTER

2018 Marshall Star Year-In-Review

January 30, 2019

January

NASA Picks Up Where It Left Off in 2017, Tests RS-25 Flight Controller

NASA engineers picked up where they left off in 2017, conducting a certification test of another RS-25 engine flight controller Jan. 16 on the A-1 Test Stand at NASA's Stennis Space Center. In total, NASA successfully tested nine RS-25 engines in 2018 at Stennis. During a February test, operators powered one of the engines up to 113 percent thrust level, the highest RS-25 power level yet achieved. In August, NASA began the first in a series of nine scheduled tests on RS-25 developmental engine No. 0525. Each featured an RS-25 flight controller for use on an actual SLS mission, as well as testing engine components made with innovative manufacturing designed to reduce the cost of future engines.

Marshall Scientist Wins Astronomy Prize

NASA Marshall Space Flight Center astrophysicist Colleen Wilson-Hodge and the Fermi Gamma-ray Burst Monitor team are recipients of this year's top prize in high-energy astronomy: the 2018 Bruno Rossi Prize. The High Energy Astrophysics Division of the American Astronomical Society selected Wilson-Hodge and the Gamma-ray Burst Monitor team to receive the 2018 award for their role in the first joint detection of gravitational and light waves from the same cosmic event -- the spectacular smashup of two neutron stars in a distant galaxy.

NASA Tests 3D-Printed Rocket Part to Reduce Future SLS Engine Costs

Engineers successfully hot-fire tested an RS-25 rocket engine with a large 3D-printed part for the first time, marking a key step toward reducing costs for future engines that will power the SLS rocket. The test was part of the SLS program's RS-25 affordability initiative -- a collaborative effort between NASA and industry partner Aerojet Rocketdyne of Canoga Park, California, to reduce the engine's overall production costs while maintaining performance, reliability and safety.

The first RS-25 engine test for SLS kicked off 2018 with a 365-second, full-duration test Jan. 16 at NASA's Stennis Space Center in Mississippi.

February

NASA Acting Administrator Robert Lightfoot Delivers 'State of NASA'

NASA Acting Administrator Robert Lightfoot delivered the "State of NASA" address Feb. 12 at Marshall. Lightfoot discussed what President Donald Trump's Fiscal Year 2019 budget request meant for NASA. It "reflects the administration's confidence that America will lead the way back to the Moon and take the next giant leap," Lightfoot said. He delivered the address at Marshall's Center for Advanced Manufacturing, where engineers are pushing boundaries in the fields of additive manufacturing, 3D printing and more.

Structural Testing Complete on SLS Core Stage Powerhouse

After numerous tests using millions of pounds of force, engineers successfully completed structural qualification testing on the engine section for SLS. The hardware was installed into a unique 50-foot test stand at Marshall where electronically controlled hydraulic cylinders pushed, pulled and bent the test article with more than 3 million of pounds of force.

Marshall POIC Marks Station Crew-hours Milestone

In February, International Space Station crewmembers backed by Marshall's Payload Operations Integration Center team -- which supports International Space Station science and communications around the clock, 365 days a year -- achieved a record 100 hours of scientific research on station in a single week. To celebrate, the POIC team, along with former Marshall Associate Director Jonathan Pettus, raised a banner in their control room and made a video call to NASA astronauts Joe Acaba, Mark Vande Hei and Scott Tingle. In 2017, the space station added a fourth crew member for the first time, enabling them to nearly double the average 35 hours per week previous crews devoted to research each week.

NASA Acting Administrator Robert Lightfoot delivers the "State of NASA" Feb. 12 at Marshall.

March

NASA's Barge Pegasus Delivers SLS Hardware to Marshall for Testing

A structural test version of the intertank for SLS arrived at Marshall in March aboard the barge Pegasus. The intertank is the second piece of structural hardware for the massive SLS core stage built at NASA's Michoud Assembly Facility and delivered to Marshall for testing. The test hardware is structurally identical to the flight version of the intertank that will connect the core stage's two colossal propellant tanks, serve as the upper-connection point for the two solid rocket boosters and house critical avionics and electronics.

A structural test version of the intertank for SLS arrives at Marshall March 4, aboard the barge Pegasus.

NASA Acting Administrator Robert Lightfoot Announces Retirement

Robert Lightfoot, NASA's acting administrator since Jan. 20, 2017, announced his retirement from the agency on March 12, 2018, in a message to the NASA workforce. Lightfoot served as director of Marshall from 2009 to 2012. In a statement that followed the announcement, then-Marshall Center Director Todd May said, "Robert is a tireless public servant who has kept a steady hand on the helm over the last year. He holds a very special place in our hearts at Marshall Space Flight Center and we wish him all the best in his retirement."

April

NASA's Super Guppy Transports SLS Flight Hardware to Kennedy

The second piece of flight hardware for NASA's Space Launch System was delivered to Kennedy Space Center in April. Built at Marshall, the Orion Stage Adapter traveled to Kennedy aboard NASA's Super Guppy aircraft. The adapter will connect NASA's Orion spacecraft to the top part of the massive SLS rocket.

Marshall Engineer Takes Safety to Another Level on Commercial Flight

Shortly after take-off from a commercial flight in January, Rumaasha Maasha, an aerospace engineer in Marshall's Spacecraft & Vehicle Systems Department, spotted a fuel leak during his morning flight on a work trip to Denver. Seeing the spewing white fuel outside his window near the wing, Maasha identified the problem as a malfunctioning vent valve. He also knew that as the plane increased velocity at higher altitudes, the Venturi effect allowed by the faulty vent valve would increase suction on the fuel tank, accelerating the leak. Thanks to Maasha's quick thinking and decisive action in alerting the crew, the plane was immediately rerouted to return to Huntsville International Airport.

Jim Bridenstine Takes Office as 13th Administrator of NASA

Jim Bridenstine officially took office as the 13th administrator of NASA April 23 after he was given the oath of office by Vice President Mike Pence at NASA Headquarters. "I want to thank the President and Vice President for the confidence they have placed in me and the entire NASA family as we continue NASA's critical missions," said Bridenstine in an email to NASA team members. "I also want to thank Robert Lightfoot for his strong leadership as the Acting Administrator during a time of transition and for his decades of service to NASA and our nation. His legacy is one of commitment to our mission and leadership in all capacities."

NASA's Super Guppy aircraft prepares to depart the U.S. Army's Redstone Airfield April 3, with flight hardware for SLS.

May

NASA Advances Additive Manufacturing for Rocket Propulsion

NASA broke ground in the world of additive manufacturing with the Low Cost Upper Stage-Class Propulsion project. The agency successfully hot-fire tested a combustion chamber jacket made using a new combination of 3D printing techniques. This additive manufacturing process eliminates traditional techniques including brazing which enabled the jacket to be made in hours, rather than days or weeks. Additionally, this process produces a single article with increased durability.

NASA's Planetary Doctor Prepares to Make Its House Call on Mars

On May 5, NASA's planetary doctor, the InSight -- Interior Exploration Using Seismic Investigations, Geodesy and Heat Transport -- left Earth and began its six-month journey to make a house call on Mars, arriving Nov. 26. The mission's goal is to study the internal geologic dynamics of Mars, which will enable scientists to discern how the planet cooled and evolved over time. To accomplish its goals, InSight will use a suite of instruments that includes a seismometer, temperature probe and radio device to monitor the planet's wobble.

"After all we have learned about Earth and the Moon from studying their seismicity, we have so many questions about Mars, which InSight will help us address," said Renee Weber, a co-investigator on InSight and planetary scientist in Marshall's Science and Technology Office.

NASA successfully hot-fire tests a 3D printed copper combustion tank liner with an E-Beam Free Form Fabrication manufactured nickel-alloy jacket.

June

NASA in the Park Celebrates Agency's Past, Present and Future

More than 9,000 people attended "NASA in the Park" in Huntsville's Big Spring Park June 16 to learn about NASA's past, present and future. This year's event coincided with the agency's 60th anniversary and included more than 60 exhibits and demonstrations by NASA experts. Marshall and Downtown Huntsville Inc. partnered to put on the annual event.

Gravitational Wave Event Likely Signaled Creation of a Black Hole

In late 2017, sensors on NASA's Fermi spacecraft first detected gravitational waves originating from a source deep in the cosmos. The source: the collision of two neutron stars. While it is possible that the collision formed a single, massive neutron star, the more likely scenario is the colliding stars formed the lowest mass black hole ever detected. Had a more massive neutron star formed, the X-ray levels detected by the Chandra X-ray Observatory would have been tens to hundreds of orders of magnitude higher.

Marshall Center Director Todd May Announces Retirement

June began with the news that Marshall Center Director Todd May would retire in July 2018. May informed Marshall team members of his decision in an email June 11. "This was a difficult and emotional decision, primarily because of the amazing experience that a career at NASA affords, and the truly exceptional people you get to work with in this Agency every day," wrote May. "NASA really is the best place to work in federal government, and not just because a survey says so: it's because we get to make the impossible possible and do so with people like you, drawn to take on such challenges."

Big Spring Park in downtown Huntsville was filled June 16 with more than 9,000 visitors eager to learn about NASA's past, present and future as Marshall celebrated the agency's 60th anniversary at this year's NASA in the Park event.

July

Top Teams Win Share of $100,000 in Virtual Modeling Stage of 3D-Printed Habitat Competition

In 2018, NASA's Centennial Challenges Program awarded the most prize money to date in its 3D-Printed Habitat Challenge competition. NASA and partner Bradley University of Peoria, Illinois, selected the top five teams to share a $100,000 prize in the latest stage of the competition. Winning teams successfully created digital representations of the physical and functional characteristics of a house on Mars using specialized software tools. The teams earned prize money based on scores assigned by a panel of subject matter experts from NASA, academia and industry. In August, the Centennial Challenges Program launched a new competition — the CO2 Conversion Challenge — a public competition seeking novel ways to convert carbon dioxide into useful compounds that could benefit a future mission.

NASA Tests Solar Sail for CubeSat that Will Study Near-Earth Asteroids

NASA's Near-Earth Asteroid Scout, a small satellite the size of a shoebox designed to study asteroids close to Earth, performed a successful deployment test June 28 of the solar sail that will launch on Exploration Mission-1. NEA Scout is a six-unit CubeSat that relies on an innovative solar sail for propulsion. When deployed, the sail, which is square in shape, with each side about the length of a school bus, will harness the light of the Sun to use as propulsion to move through space.

Space Launch System Intertank Readied for Structural Testing

In July, engineers installed the intertank structural test article for SLS into a test stand at Marshall. The intertank is the second of four core stage structural test articles scheduled for testing at Marshall. The test facility for NASA's new exploration rocket was originally used for Saturn V rocket testing that enabled the Apollo Moon missions. The facility's special cranes and design features make it ideal for exposing large rockets and spacecraft to the extreme forces of spaceflight.

Team Zopherus of Rogers, Arkansas, is the first-place winner in NASA's 3D-Printed Habitat Challenge, Phase 3: Level 1 competition.

August

Historic Solar Probe Carries Instrument Developed, Tested at Marshall

The man for whom NASA's Parker Solar Probe is named -- University of Chicago physicist Eugene Parker -- helped NASA celebrate the science probe's launch in August. Over the next seven years, the probe will undertake a landmark journey to penetrate the outer atmosphere of the Sun, pursuing age-old mysteries about its turbulent corona and even help to improve forecasts of space weather events. Marshall helped develop and test the probe's Solar Probe Cup. The probe, managed by NASA's Goddard Space Flight Center, is part of NASA's Living With a Star program.

NASA Administrator Views Progress Building SLS and Orion Hardware

NASA Administrator Jim Bridenstine made his first official visit Aug. 13 to NASA's rocket factory, the Michoud Assembly Facility, for tours and briefings on progress building the Space Launch System rocket and Orion spacecraft. Bridenstine, joined by then Acting Marshall Center Director Jody Singer and Keith Hefner, director of Michoud, toured the massive facility where manufacturing and assembly of the largest and most complex parts of SLS and Orion are underway. The following day, Bridenstine visited Marshall, where he was briefed on the progress of SLS, critical human spaceflight technology development and space station science operations.

First SLS Core Stage Flight Hardware Complete

The first major piece of core stage hardware for NASA's Space Launch System rocket completed assembly in August and is now ready to be joined with other hardware for Exploration Mission-1, the first integrated flight of SLS and the Orion spacecraft. The forward skirt, the smallest part of the core stage, will serve two critical roles — It will connect the upper part of the rocket to the core stage and house many of the flight computers, or avionics.

NASA Administrator Jim Bridenstine addresses members of the media in front of a structural test version of the intertank at Marshall.

September

Jody Singer Named Director of Marshall Space Flight Center

History was made in September when NASA Administrator Jim Bridenstine named Jody Singer Marshall's first female center director. Singer, appointed Marshall deputy director in February 2016, had served as acting director since the July 27, 2018, following the retirement of then-center director Todd May. "Jody's deep management experience over three decades at the project, program and center levels will be a huge asset to Marshall's critical work supporting NASA's goals of returning to the Moon to stay," said Bridenstine. "Her proven leadership abilities and close connections to Marshall's work and the human spaceflight community made her the right choice to lead Marshall at this pivotal time."

At a Sept. 24 All-hands meeting, Marshall Director Jody Singer addresses team members for the first time as center director.

New Satellite Antenna Receiving Station Unveiled at Marshall

On Sept. 21, Marshall held a ribbon-cutting ceremony to unveil a weather satellite receiving station installed in front of Activities Building 4316. The new station helps Marshall scientists and the weather forecasting community tap into the revolutionary data provided by the National Oceanic and Atmospheric Administration's most advanced series of geostationary weather satellites.

Marshall, Partners Send New EXPRESS Racks to Space Station

Properly known as the "EXpedite the PRocessing of Experiments to Space Station" Racks, the new experiment storage and science units are streamlined versions of cargo racks developed at Marshall and built by Boeing. They were flown to the station in September on the Japan Aerospace Exploration Agency's HTV7 launch vehicle. The two new Basic EXPRESS Racks brought the full complement aboard the station to 10 racks.

October

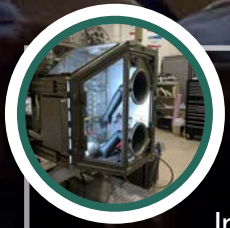
NASA Marshall Panel Discusses '60 Years of Smoke and Fire'

To commemorate the 60th anniversary of NASA on Oct. 1, Marshall hosted a panel discussion, "60 Years of Smoke and Fire: Igniting Human Space Exploration through Engine Testing at Marshall and Stennis." Former Marshall Center Director Gene Goldman moderated the panel, which included Garry Lyles, NASA Space Launch System program chief engineer; Robert Lightfoot, former NASA acting administrator; and Patrick Scheuermann, former Marshall Center director.

Kin of Gravitational-Wave Source Discovered

In late 2017, astronomers excitedly reported the first detection of electromagnetic waves, or light, from a gravitational wave source. Now, a year later, researchers are announcing the existence of a cosmic relative to that historic event. The discovery was made using data from telescopes including NASA's Chandra X-ray Observatory, Fermi Gamma-ray Space Telescope, Neil Gehrels Swift Observatory, the NASA/ESA Hubble Space Telescope and the Discovery Channel Telescope.

During an event commemorating NASA's 60th Anniversary, Marshall Space Flight Center team members listened to a panel discussion themed, "Sixty Years of Smoke and Fire: Igniting Human Space Exploration through Engine Testing at Marshall and Stennis."



Marshall Delivers Life Sciences Glovebox to ISS

The successful launch of the International Space Station's new Life Sciences Glovebox brought to a satisfying conclusion its journey of development, modification and testing. The largest flight hardware ever launched in a "soft-stowed" configuration, in which the equipment is packed securely in protective foam, the glovebox offers 15 cubic feet of available workspace and unique, safe crew access to experiments. Marshall manages the hardware for NASA, partnered with Boeing to modify and test the glovebox hardware originally built by the Japan Aerospace Exploration Agency and the Dutch firm Bradford Engineering, and will help guide its use on station for a variety of automated and crew-assisted biological and physiological experiments.

November

NASA InSight Lander Arrives on Martian Surface to Learn What Lies Beneath

After an almost seven-month, 300-million-mile journey from Earth, NASA's Interior Exploration using Seismic Investigations, Geodesy and Heat Transport InSight lander successfully touched down on Mars. Insight landed near the planet's equator on a flat, smooth expanse of lava called Elysium Planitia on Nov. 26. InSight's surface-operations phase began one minute after touchdown. One of its first tasks was to deploy its two decagonal solar arrays, which will provide power. InSight will operate on the surface for one Martian year, plus 40 Martian days, or sols, until Nov. 24, 2020. InSight is part of NASA's Discovery Program, managed by Marshall.

Intertank for SLS Readied for Final Assembly

In November, technicians lifted the intertank flight hardware for SLS into a vertical stacking area at NASA's Michoud Assembly Facility. Here, engineers will join it with two other large structures to form the top half of the 212-foot-tall core stage that will be flown on Exploration Mission-1, the first flight of SLS and the Orion spacecraft. The intertank, which holds some of the avionics that help control the rocket, will be bolted to the propellant tank that will hold 196,000 pounds of liquid oxygen.

Marshall Helps Deliver Space Station's First Integrated 3D Printer/Recycler

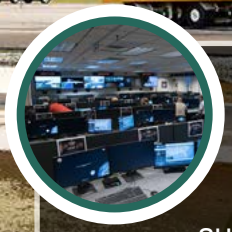
NASA's "Refabricator," the first integrated 3D printer and recycler in space, was delivered in November via Cygnus commercial resupply flight to the International Space Station -- where Marshall personnel will assist station crew in turning waste plastic and previously 3D printed parts into high-quality printer filament, or 3D printing "ink" used to create new tools and materials. Marshall team members conducted final flight certification testing of the hardware prior to its launch and will, in tandem with Tethers Unlimited Inc., of Seattle, remotely control nearly all Refabricator operations from the Payload Operations Integration Center. NASA anticipates the technology will prove invaluable for future exploration missions to the Moon and Mars.

One of InSight's 7-foot-wide solar panels was imaged by the lander's Instrument Deployment Camera, which is fixed to the elbow of its robotic arm.

December

Largest Piece of SLS Rocket Test Hardware Moved for Testing

Technicians at NASA's Michoud Assembly Facility moved the largest piece of structural test hardware for SLS from the factory to the dock where it was loaded onto NASA's barge Pegasus Dec. 14. The liquid hydrogen tank test article made its way up the Mississippi River to Marshall, where dozens of hydraulic cylinders in Test Stand 4693 will push and pull on the giant tank, subjecting it to the same stresses and loads it will endure during liftoff and flight. The test hardware is structurally identical to the flight version of the liquid hydrogen tank that will comprise two-thirds of the core stage and hold 537,000 gallons of liquid hydrogen cooled to minus 423 degrees Fahrenheit.



SLS Engineering Support Center Unveiled

The room that once offered support for missions for the Saturn V rocket and space shuttle is set to provide support to the agency's Space Launch System. The SLS Engineering Support Center, unveiled in early December, will provide critical support from the ground to monitor data and help solve challenges during the launch countdown and flight. Teams supporting different parts of the rocket and the spacecraft will rotate in and out of the support room during phases of Exploration Mission-1, the first flight of the SLS rocket and Orion spacecraft.

OSIRIS-REx Arrives at Bennu

December began with the arrival of NASA's OSIRIS-REx spacecraft at the asteroid Bennu, finding water locked inside the clays that make up its scientific target. On Dec. 31, OSIRIS-REx entered into orbit around the asteroid, making Bennu the smallest object ever to be orbited by a spacecraft. The primary science goals of this survey are to refine estimates of Bennu's mass and spin rate, and to generate a more precise model of its shape. The data will help determine potential sites for later sample collection.

Technicians at NASA's Michoud Assembly Facility moved the largest piece of structural test hardware for SLS from the factory to the dock where it was loaded onto NASA's barge Pegasus Dec. 14.