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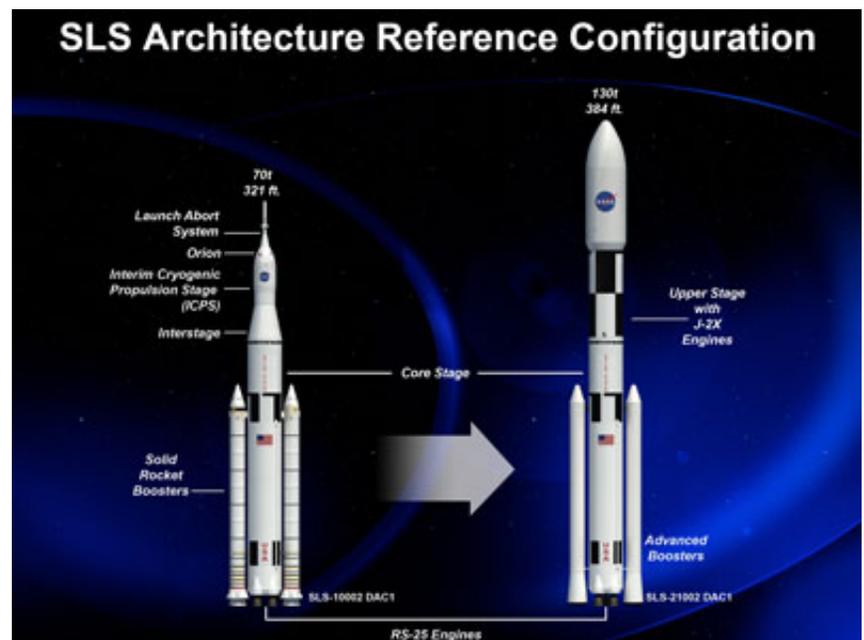
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NASA's Space Launch System Celebrates a Year of Progress

By Bill Hubscher

NASA is powering ahead with the Space Launch System, the nation's next step in human exploration efforts, with this week marking one year of progress since the formation of the Space Launch System Program, managed at the Marshall Space Flight Center.

Image right: An artist rendering of the various configurations of NASA's Space Launch System, managed by the Marshall Space Flight Center. The flexible configuration, sharing the same basic core-stage, allows for different crew and cargo flights as needed, promoting efficiency, time and cost savings. The SLS enables exploration missions beyond low-Earth orbit and support travel to asteroids, Mars and other destinations within our solar system. (NASA)



On Sept. 14, 2011, NASA announced a new capability for the space program: a heavy-lift rocket design, combined with the

Orion crew capsule, under development at the Johnson Space Center, to send astronauts farther into space than ever before. And now, one year later, NASA has made swift progress improving on existing hardware, testing and developing new components, and paving the way for a new launch vehicle to open up new possibilities for scientific study and make human exploration of the solar system a reality.

NASA's SLS team began work immediately after the announcement, finding new methods of creating designs, conducting reviews, and improving scheduling and budget planning.

"Our goal was to become a leaner and more efficient program, based on lessons learned from previous successes by the agency," said Todd May, SLS program manager. "But even more important is to build a safe vehicle for our astronauts and one that can sustain exploration for years to come. That takes time and we're off to a great start. We want to inspire the next generation of scientists, engineers and explorers."

The initial designs of the SLS are for a rocket capable of carrying 70 metric tons for human spaceflight, evolving to a larger rocket capable of launching 130 metric tons beyond low-Earth orbit. That is the equivalent of 154,000 pounds or roughly the weight of 50 sport utility vehicles and 286,000 pounds or 75 SUVs, respectively. Concept images of these configurations are posted online [here](#).

Many elements of the rocket are based on existing, proven propulsion, including more robust solid rocket booster designs and main engines from the Space Shuttle Program. While the RS-25 engines -- formerly known as the space shuttle main engines -- are proven workhorses, Pratt-Whitney Rocketdyne of Canoga Park, Calif., is working to update the flight computer hardware and software to bring the technology into the 21st century. A new five-segment booster already has been tested three times, and Alliant Techsystems Inc. in Promontory, Utah, will test a flight-qualified booster next year.

NASA is relying on the expertise at The Boeing Co. of Huntsville to build the SLS Core Stage at the Michoud Assembly Facility, where more than a hundred external tanks were built for the shuttle program. Early welding is paving the way for building the tanks and infrastructure to feed the J-2X and RS-25 engines.

While swift progress is under way on the 70-metric-ton initial configuration, the program created an Advanced Development team to look for ways to enhance and upgrade future designs of the heavy-lift vehicle including more powerful advanced boosters. Proposals have been selected to promote affordability, performance and future upgrades to the various elements.

NASA continues a battery of tests on the J-2X engine at the Stennis Space Center. Some test firings this past year broke duration records at the center and pushed the new engine design to its limits. The J-2X will power the upper stage of the evolved rocket.

The program reached a critical milestone earlier this summer with agency-level approval of the System Requirements and System Definition Review. Guiding the course of the program, this key step was a pivotal moment, allowing SLS to move from concept to design and target preliminary design review next year.

As the vehicle comes together, SLS is working closely with the Orion Program at the Johnson Center and the Ground Systems Development and Operations Program at the Kennedy Space Center. The launch facilities include a mobile launcher and a new firing room for the SLS.

The Orion Program continues improvements of the spacecraft, using water landing tests and parachute drop tests to expand confidence in the design. Meanwhile, the ground crew at Kennedy is processing an Orion test module for its first flight in 2014 -- just a few years before SLS will take its place on the launch pad.

When Orion flies for the first time, SLS also will flight-test the Spacecraft Payload Integration adapter ring. Engineers and machinists at the Marshall Center are building this section of the rocket, which will mate the spacecraft to the Delta IV stand-

in for SLS during Orion's test flight in 2014 and the rest of the Space Launch System in 2017. The adapter ring is being designed once for both applications as an example of NASA's commitment to affordable solutions for the human exploration of space.

"Each decision made in support of SLS has been carefully considered," May said. "We're moving forward with our eyes on deep space, contributing critical technology and functional knowledge to meet our nation's exploration goals. At the same time, we realize how lucky we are to write the next chapter in space exploration and hopefully inspire future generations."

For a review of the first year's worth of activities, NASA has created a video called "[Space Launch System: Powering Forward.](#)"

Hubscher, an AI Signal Research Inc. employee, supports the Office of Strategic Analysis & Communications.

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Marshall Team to Honor Neil Armstrong on Sept. 14



On Sept. 14, the men and women of the Marshall Space Flight Center will honor the life and career of former astronaut and American hero Neil Armstrong, who died Aug. 25 at the age of 82.

Image left: Neil Armstrong was the first man to walk on the moon. (NASA)

Marshall team members are invited to Morris Auditorium in Building 4200 at 9 a.m. for live music, a video tribute to Armstrong and remarks by Marshall Center Acting Director Robin Henderson. She will introduce keynote speaker James R. Hansen, a professor of history at Auburn University in Auburn, Ala., and author of "First Man: The Life of Neil Armstrong."

The Marshall event will be streamed live on DesktopTV: <http://desktoptv1.ndc.nasa.gov>.

Following the tribute to Armstrong, Hansen will be available to sign copies of his book at 10:30 a.m., in the lobby of Building 4203. Employees

are encouraged to bring personal copies of the book as copies may not be available for purchase at the event.

Armstrong was born in 1930 in Wapakoneta, Ohio. He served as a U.S. Navy pilot and test pilot before joining NASA's space program. He flew to space for the first time in 1966 during the Gemini 8 mission, alongside fellow astronaut David Scott. Three years later, he commanded the Apollo 11 lunar mission, which included lunar module pilot Edwin "Buzz" Aldrin and command module pilot Michael Collins. On July 20, 1969, Armstrong became the first human being to set foot on the moon.

Marshall's Les Johnson, Author on the Side: 'I'd Like for My Readers to Come Away with the Sense of Adventure that is Space Exploration'

By Jessica Eagan

There is no doubt that science runs through his veins.

Image right: Les Johnson participates in a book signing at Barnes & Noble in Lexington, Ky., in March. Visit his website [here](#) for signing dates. (Leslie Johnson)

A physicist by day and a science author and editor by night, Les Johnson -- deputy manager of the Advanced Concepts Office in the Marshall Space Flight Center's Engineering Directorate -- shares his passion with people through the pages of his books.



Johnson has been reaching to science fiction and non-fiction enthusiasts for six years, gathering a good many of his topics by just stepping out his front door.

"Plot ideas are all around us," said Johnson. "The human element of what we do is the plot element -- nature will provide the rest, whether it be 'human versus human,' 'human versus nature' or 'human versus machine.' The classic themes will be with us wherever we go, including into space."

Johnson's on-the-job experiences at NASA have not only provided story themes, but they also have helped him translate highly technical information into intelligent prose and creative novels.

The start of his writing career

Johnson's first book, "Living Off the Land in Space," was published in 2007. Teamed with Gregory Matloff, a physics professor at New York City College of Technology, and C Bangs, an artist and former Marshall Center summer faculty fellow, the non-fiction work explains how space travelers can use the resources of the solar system and beyond to support sustainable exploration for long missions.

In 2008, Johnson, along with Matloff and Giovanni Vulpetti, a Rome, Italy, physicist, published "Solar Sails: A Novel Approach to Interplanetary Travel." This non-fiction book highlights solar sail technology that can harness the sun's power to fuel spacecraft.

"Solar sails will allow for exploration to be more affordable and will offer access to destinations that are out of our reach," said Johnson. "It's an easy read and does not require one to know anything about physics or solar sailing."

"Paradise Regained," a non-fiction work published in 2009 by Johnson, Matloff and Bangs, shows how space resources and technologies can be used to help solve environmental and energy problems here on Earth. The authors write that it is important for people recognize that the answer to these kinds of problems lies in the development of space. They believe that not only will extraterrestrial resources prevent a crisis, but they will provide a foundation for continued technological and societal progress.

Paradise Regained also shares how resources of the solar system will assist in meeting projected industrial needs. The authors demonstrate how space-based power generation systems work synergistically with Earth-based conservation.

"This is my favorite book," said Johnson. "When I began my career at NASA, I was all about 'going there.' Now I'm more of a 'what-can-space-do-to-help-improve-life-here-on-Earth' person, and that's what prompted me to write the book.

"Space exploration seems to have become mundane," he added. "The public isn't as engaged as they used to be. The possibilities of which so many of us dreamed have been slow in coming, and I'm afraid that the general public might be losing interest. I want my books, both fiction and non-fiction, to be entertaining, informative and connecting. I'd like for my readers to come away with the sense of adventure that is space exploration."

First fiction in 2010: 'Back to the Moon'

Johnson's first science fiction novel, "Back to the Moon," was released in 2010, co-authored with Travis Taylor, a rocket scientist who is a principal on "[Rocket City Rednecks](#)," the Huntsville-based program on the National Geographic Channel.

The book transports the reader to a time in the future many decades after the last footprints were engraved on the moon. America is preparing for another trip to the lunar surface when an urgent mission pops up -- and lives depend on it.

"In the early to mid-2020s, China secretly launched a manned expedition to the moon and crashed on its surface. Now it's up to the United States to come to their rescue -- that is, if the Chinese accept the U.S. mission," said Johnson.

Johnson and Travis have recently signed a contract for a sequel to this book, which will be available in late 2013.

Most recent work

Johnson joined several authors and co-edited "Going Interstellar," released this year. The book is a collection of original science fiction stories by multiple authors on the general theme of how a realistic voyage to another star might actually happen. Readers will find a short story and non-fiction essay by Johnson.

"The science fiction books are targeted at a broad audience," said Johnson. "They are safe for all ages. As a parent, that was important to me. I remember reading the classics by Isaac Asimov, Robert Anson Heinlein and Sir Arthur Charles Clarke at a young age, and I want to make my books equally accessible -- though I am not comparing my writing with 'the greats' by any means!"

Advice for aspiring writers

And what advice would Johnson give to those who'd like to see their works on the shelves of a bookstore?

"Write! And don't doubt yourself," he said. "Since I've started, I've met several people who tell me about their novels that are sitting -- unread by anyone. The only way to see if you can get your book published is to write it and then try."

Johnson said it takes him and his partners a year to write and that requires dedication with a little bit of challenge.

"Finding two to three hours of uninterrupted time is the hardest part," Johnson said. "It takes me at least 20 minutes to get my thoughts together. With each interruption, I have to go back to the beginning and start over. I don't even try unless I think I will have at least two hours available, but the results are rewarding!"

What inspired him to become an author? His answer is simple: "Do you know any avid readers that don't dream of having a book published?"

To read more about Johnson and his works, and to read the reviews he's received from magazines such as Nature and

Analog Science Fiction and Fact, visit [here](#). His books are available in the Marshall Space Shop.

Eagan, an AI Signal Research Inc. employee and the Marshall Star editor, supports the Office of Strategic Analysis & Communications.

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NASA Center Chief Technologists' Council Meets at Marshall, Tours Center



Marshall Space Flight Center's Chief Technologist Andrew Keys hosted a NASA Center Chief Technologists' Council tour at Marshall on Aug. 29. The council is comprised of chief technologists from the 10 NASA field centers. From left are Martin Waszak, deputy center chief technologist at Langley Research Center; Peter Hughes, center chief technologist at Goddard Space Flight Center; James Zakrajsek, acting deputy center chief technologist at Glenn Research Center; David Moyer, executive secretary for the Chief Technologists' Council at Johnson Space Center; Fred Hadaegh, associate center chief technologist at the Jet Propulsion Laboratory;

Keys; Ingrid Desilvestre, program executive at Ames Research Center; Karen Thompson, center chief technologist at Kennedy Space Center; John Saiz, center chief technologist at Johnson; Donald Frazier, deputy center chief technologist at Marshall; and David Voracek, center chief technologist at Dryden Flight Research Center. During the center visits, the council conducts its business and works actions from the Office of the Chief Technologist, based at NASA Headquarters. The group meets every four to six weeks, and rotates meeting venues among the NASA centers so its members can tour local facilities and learn more about each center's technical capabilities. The Office of the Chief Technologist coordinates and tracks all technology investments across the agency. It also serves as the NASA technology point of entry and contact with other government agencies, academia and the commercial aerospace community. The office is responsible for developing and executing innovative technology partnerships, technology transfer and commercial activities and the development of collaboration models for NASA. For more information, visit [here](#). (NASA/MSFC/Ray Downward)

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NASA's 'Mighty Eagle' Robotic Prototype Lander Aces Major Exam

By Megan Davidson

Completing the latest round of flight-test objectives, the "Mighty Eagle," a NASA robotic prototype lander, flew to an altitude of 100 feet and descended gently to a controlled landing during a successful free flight Sept. 5 at the Marshall Space Flight Center.

Image right: An excited crowd claps and cheers as the "Mighty Eagle" lands after a successful, 100-foot test Sept. 5. Among those watching the test are, Denise Smithers, in foreground, an executive intern supporting the Marshall Center's acting director and administrative team; second row, from left, Chris Cianciola, manager of Marshall's Human Exploration Development Office; Daniel Schumacher, manager of Marshall's Science & Technology Office; and Johnny Stephenson, deputy director of Marshall's Office of Strategic Analysis & Communications. On the third row, above Schumacher, are from left, Dale Thomas, associate director (technical) in Marshall's Office of the Director; Ellen Ochoa, deputy director of Johnson Space Center in Houston, and a former astronaut; and Jonathan Pettus, acting associate director of Marshall. (NASA/MSFC/Emmett Given)



Guided by autonomous rendezvous and capture software, the vehicle located an on-the-ground target using its onboard camera and flew to it. A flight on Aug. 28 followed a preprogrammed flight profile, but the latest run operated "closed loop," with the vehicle seeking and finding its target using the onboard software to guide the flight.

"The 'Mighty Eagle' had a great flight, fulfilling the objectives we had for this test -- finding and landing on its target using a closed-loop system," said Greg Chavers, test lead for the project. "Given this is one of our last tests in this series, it is a worthy finale of a lot of people's hard work -- including our young engineers. They did a remarkable job running [this] flight."

The "Mighty Eagle" project managers turned over the vehicle's keys to three young Marshall engineers, new for this test: Adam Lacock, flight manager; Jake Parton, test conductor; and Logan Kennedy, systems engineer.

Nicknamed the "Mighty Eagle" after a character in the popular "Angry Birds" game, the vehicle is a three-legged prototype that resembles an actual flight lander design. It is 4 feet tall, 8 feet in diameter and, when fueled, weighs 700 pounds. It is a "green" vehicle, fueled by 90 percent pure hydrogen peroxide, and is guided by an onboard computer that activates the thrusters to power the craft's movements.



"We've surpassed our expectations and flew the most challenging run to date," said Mike Hannan, a controls engineer in Marshall's Engineering Directorate. "It was an overcast, extremely humid day, and we were concerned steam might block the vehicle's camera. We didn't see that, and the lander sought and found its target successfully."

Image left: Overcast skies didn't deter the "Mighty Eagle," flying high above the historic F-1 test stand – formerly used to test turbopumps for Saturn first stage engines. (NASA/MSFC/Dennis Olive)

"It was an invaluable experience managing [this] test," added Lacock. "This is the kind of experience young engineers, like myself, need to learn more about flight mechanics, vehicle hardware and project management. It was a good day for our team."

NASA will use the "Mighty Eagle" to mature the technology needed to develop a new generation of small, smart, versatile robotic landers capable of achieving scientific and exploration goals on the surface of the moon, asteroids or other airless bodies.

The "Mighty Eagle" was developed by the Marshall Center and Johns Hopkins University Applied Physics Laboratory in Laurel, Md., for NASA's Planetary Sciences Division, Headquarters Science Mission Directorate. Key

partners in this project include the Von Braun Center for Science and Innovation, which includes the Science Applications International Corp., Dynetics Corp. and Teledyne Brown Engineering Inc., all of Huntsville.

More information on NASA's robotic landers is available [here](#).

Davidson, an AI Signal Research Inc. employee, supports the Office of Strategic Analysis & Communications.

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Space Station Associate Program Scientist Tara Ruttley to Speak at Marshall Association Meeting Sept. 20

Dr. Tara Ruttle, associate program scientist for the International Space Station Program Science Office at Johnson Space Center, will speak at the Marshall Association meeting Sept. 20.

Ruttle will discuss science that is currently being researched on the space station and why.

The event will be held from 11:05 a.m. to 1 p.m in conference room A164 in Building 4663. Lunch will be ordered from Newk's. A sandwich lunch is \$10 for association members and \$12 for nonmembers; salad lunch is \$8 for members and \$10 for nonmembers.



Tara Ruttle (Photo courtesy)

Following lunch, there will be a tour of the Payload Operations Center.

Please RSVP [here](#) for the meeting and the tour by Sept. 18. Parking is available on the west side of 4663 at the Huntsville Operations Support Center entrance. Those who do not cancel their reservations by Sept. 18 will be asked to pay for their meal.

For more information, team members can visit ExplorNet. For more information about the Marshall Association and how to join, visit [here](#).

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First-Ever Racin' the Station Duathlon to be Held Sept. 29

By Jessica Eagan



Ever wanted to race the International Space Station? You can Sept. 29!

The first-ever Racin' the Station Duathlon -- sponsored by the Marshall Association -- will begin at the Marshall Space Flight Center's Building 4316 at 8:30 a.m., where participants will run, bike and run again to race the space station as it completes one Earth orbit.

The station circles the Earth every 91 minutes, 12 seconds. The duathlon committee will track the starting location of the station at the race start time and those who "beat" the laboratory before it orbits the world will be given a small prize.

The event is open to the public. The cost is \$35 for one person; \$60 for a two-person relay team. Registration is available [online](#) until Sept. 28 and will be capped at 300 racers.

"If you have three people interested in participating as individual racers and they all work for the same organization/agency/company, then form a team!" said Kent Criswell, the event's organizer. "The fastest aggregate times for

the team division also will receive prizes."

The current space station expedition crew will provide pre-recorded statements from the station to be played at the opening ceremony.

Anyone wishing to participate who does not have Redstone Arsenal access will be permitted to register but must be a U.S. citizen. Additional information will be needed to access the arsenal. More details can be found [here](#). Those without access will not be permitted to register after Sept. 14.

The first 175 racers will receive a free T-shirt. Bring family and friends, and they can cheer you on at 4316 while tracking the station as it orbits high above.

Criswell expressed "thanks to the center's Mission Operations Laboratory for their assistance in preparing for this race. They've helped out tremendously and we look forward to this new and fun event!"

Participants must be 16 years or older.

For more information and details about the course, visit [here](#). To review results following the duathlon, visit [here](#). The race will support the Marshall Association Scholarship Fund.

For questions, contact Criswell at 544-6421.

Eagan, an AI Signal Research Inc. employee and the Marshall Star editor, supports the Office of Strategic Analysis & Communications.

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Obituaries

William Fred Medlen, 89, of Huntsville died Sept. 7. He retired from the Marshall Center in 1982 as a production controller. He is survived by his wife, Inez Medlen.

Reba McAlexander Franklin, 86, of Huntsville died Sept. 8. She retired from the Marshall Center in 1980 as a clerical assistant.

Find this article at:

<http://www.nasa.gov/centers/marshall/about/star/index.html>