

Forward Bay Cover Jettison Test Successful



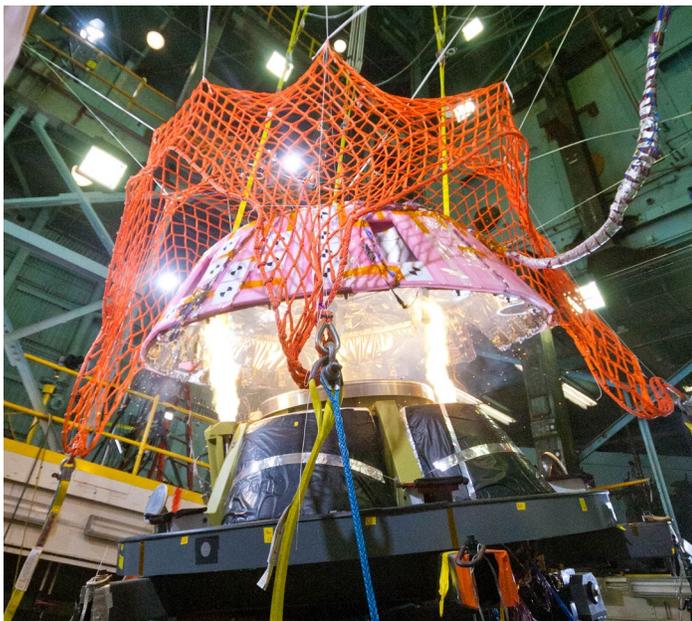
The series of ground development jettison tests of the Orion crew module forward bay cover (FBC) retention and release mechanism was successfully completed on March 6. The final two tests simulated taxing flight conditions, which proved out design robustness moving into the Exploration Flight Test-1 (EFT-1) and Exploration Mission-1 (EM-1) missions.

The first test in the series, successfully completed on Dec. 19, represented an EFT-1 flight-like condition. That test included a nominal jettison with three simulated FBC parachutes, and functional avionics and ordnance devices. The subsequent cases represented more

challenging jettison conditions including off-nominal cases. The first, completed in January, represented a FBC parachute failure condition. The final case included a firing system time delay, which creates asymmetric system loading and simulated several off-nominal ordnance issues.

Astronauts Rex Walheim, Shannon Walker, Scott Tingle and Jack Fischer personally visited the Waterton campus the day after the test to congratulate the Lockheed Martin team. Since jettison of the cover is a complex event required for subsequent deployment of the main parachutes, deceleration of the vehicle and landing the crew safely,

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it is considered one of the top risk drivers. This testing provided critical verification data and represents a significant risk reduction for the program.

The FBC and its jettison system will undergo minor design evolvments and enhancements between the EFT-1 and EM-1 missions, primarily centered on mass reduction. This testing directly influences those decisions and refinements.

The FBC protects the top portion of the crew module during launch, orbital flight, and re-entry. It is jettisoned at an altitude of approximately 23,000 feet to allow for deployment of the parachute system.

Orion Makes Testing, Integration Strides Ahead of First Launch to Space

Orion is marching ever closer to its first trip to space on a flight that will set the stage for human exploration and new discoveries throughout the solar system.



The Orion team continues to work toward completing the spacecraft to be ready for a launch later this year. The initial timeframe for the Exploration Flight Test-1 (EFT-1) launch has shifted from September-October to early December to better accommodate a full slate of launches from Cape Canaveral Air Force Station this year. Completing the Orion spacecraft according to the original schedule will allow more engineers and technicians to transition to work on the Orion Exploration Mission-1 spacecraft that will fly atop the agency's Space Launch System. It will also ensure that NASA's partners are ready for the launch of EFT-1 at the earliest opportunity in the event launch manifest changes.

The EFT-1 core and starboard boosters for the United Launch Alliance Delta IV Heavy rocket that will launch Orion into space for the first time arrived at Cape Canaveral Air Force Station this month. The port booster is still in production at the company's Decatur, Ala., facility and is scheduled to arrive at KSC in April along with the rocket's upper stage. All the rocket segments will undergo additional processing and testing inside ULA's Horizontal Integration Facility prior to rollout to Launch Complex 37B.

NASA Orion Spacecraft Mock-up Arrives at Langley

A full-sized test version of the Orion crew module arrived at NASA's Langley Research Center in Hampton, Va., for testing that will examine how it performs under a variety of ocean landing conditions.

In the coming months, NASA researchers will conduct static and water impact loads evaluations on it at Langley's Landing and Impact Research Facility. The tests will simulate water landing scenarios for different velocities, parachute deployments, wave heights and wind conditions the spacecraft may encounter when it lands in the Pacific Ocean.

Prior to its arrival at Langley, the Orion test capsule was used for pathfinding operations, including simulated manufacturing, assembling and stacking procedures at NASA's Kennedy Space Center in Florida. Lockheed Martin, which built the Orion mockup, collaborated with NASA to complete a series of acoustic, modal and vibration tests on the test capsule that simulated launch and spaceflight conditions.



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Meanwhile, in the spacecraft factory at Kennedy Space Center – the Operations and Checkout Facility – Orion undergoes additional testing as it nears completion.

After completing construction on the service module in January, engineers at Kennedy tested whether Orion could withstand the stresses it will endure during launch and in space. Despite being pushed and pulled in multiple directions, the service module came through the tests not only unscathed, but earlier than planned.

Once the service module testing was completed, it was the crew module's turn.

Almost all of the spacecraft's avionics components have been installed, and system by system, the engineers are powering them up. It's a methodical, deliberate process, in which each connector is checked individually before they're hooked up and the system turned on to make sure each battery, heater, camera and processor – to name a few – works on its own, before the entire system is turned on together. Otherwise, one faulty cable could damage an entire, one-of-a-kind system.

The process is called functional testing, and once it's complete and all 59 systems have been verified, the engineers will graduate to performance testing, in which all of the systems work together to operate the crew module as a whole. Ultimately, they'll be able to turn on all of the flight computers, radios and other systems at once and simulate the vehicle's sensors so that the spacecraft thinks it's flying in space.

The crew module testing will wrap up in April, and then Orion's heat shield – the largest of its kind ever built – will be installed. With that in place, the crew module, service module and launch abort system will be ready to mate this spring. Its launch later this year will send Orion 3,600 miles above the Earth for a two-orbit flight that will give engineers the chance to verify its design and test some of the systems most critical for the safety of the astronauts who will fly on it in the future. After traveling 15 times farther into space than the International Space Station, Orion will return to Earth at speeds near 20,000 mph, generating temperatures of up to 4,000 degrees Fahrenheit, before splashing down in the Pacific Ocean.



The Exploration Flight Test-1 (EFT-1) launch abort system fillets, which were shipped from Michoud Assembly Facility in New Orleans, arrived at Kennedy Space Center on March 13.



The Exploration Flight Test-1 (EFT-1) launch abort system (LAS) was relocated from the Launch Abort System Facility mid-bay to the high bay after completion of high bay modifications to accommodate the EFT-1 LAS to crew module/service module stacking operations.

Facility at Kennedy Prepped for Stacking Operations

NASA's Johnson Space Center Flight Test Management Office took possession of the Payload Hazardous Servicing Facility (PHSF) at Kennedy Space Center this month. This is the facility where the fuel, ammonia and high pressure gas will be loaded on the vehicle for the Exploration Flight Test-1 mission. The Layher stair towers, shown here, were moved from the Vehicle Assembly Building high bay to the PHSF airlock in preparation for the stacking operations. The scaffolding stairs will allow technicians to access the spacecraft to perform hazardous servicing operations.



AAS Honors Cleon Lacefield with Industrial Leadership Award



Cleon Lacefield, Lockheed Martin Orion program manager, was awarded the American Astronautical Society's (AAS) 2013 Industrial Leadership Award in recognition of his professional accomplishments leading a multi-corporation, nation-wide team through the Orion Program Design Review. His selection was endorsed by the AAS awards committee and approved by the society's officers and directors.

This award was first presented in 1992 and recognizes an individual in the space industry who has made an outstanding contribution through leadership in the development and acquisition of space systems.

The award was presented at an honors and awards luncheon on March 5 in conjunction with the 52nd Robert H. Goddard Memorial Symposium.

Suppliers Conference Features NASA Leadership



On March 11, Mark Kirasich, Orion deputy program manager (far right) participated in a panel discussion about NASA's program status at the Space Launch System/Orion Supplier's Conference in Washington, D.C. Joining him were (left photo: from left to right) Patrick Scheuermann, Marshall Space Flight Center director; Michael Bolger, Ground System Development and Operations program manager; Ellen Ochoa, Johnson Space Center director; Todd May, Space Launch System program manager; and Dan Dumbacher, NASA Headquarters deputy associate administrator for Exploration Systems Development.



More than 100 small businesses and suppliers participated in the event, which included industry team briefings with Congressional leadership.

The Industry Team member panel consisted of (right photo: from left to right) Jim Crocker, vice president and general manager, Civil Space, Lockheed Martin Space Systems Company, John Elbon, vice president and general manager, Boeing Space Exploration, Julie Van Kleeck, vice president, Space Programs, Aerojet Rocketdyne and Charlie Precourt, vice president and general manager, Alliant Tech Systems Space Launch Division.



Orion Small Business Wins Big with Rigel Award

Tim Wong, CEO of Arcata Associates, poses with the 2014 Rigel Award, alongside Glenn Delgado, NASA associate administrator for Small Business.

The Rigel Award is Lockheed Martin's Small Business of the Year Award that is given to a small business subcontractor who performs above and beyond its contractual commitments.

Arcata won the award this year for their continued support in supply chain management for Orion and the build of the Exploration Flight Test-1 vehicle. Plaques with each year's winners resides at the Lockheed Martin program offices in Houston and Denver.

Key Staff Members Hear About Orion

John Casper gave an Orion overview to Jerr Rosenbaum, legislative director, and Jay Guerrero, Southeast Texas regional director for Senator John Cornyn, on March 20.

Paul Marshall, Orion assistant program manager, strategy integration, discussed the latest progress on Orion with Robert

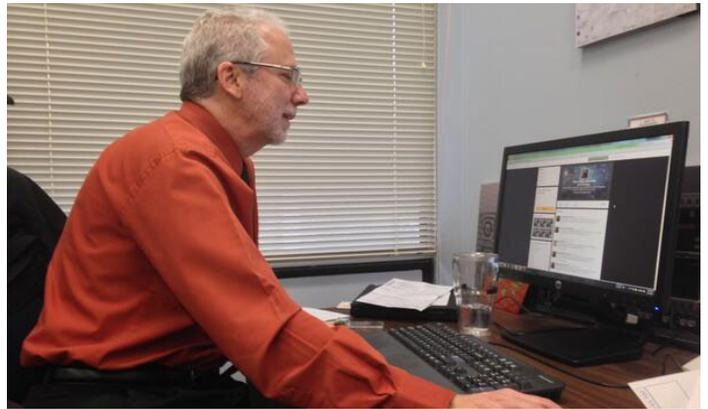
La Branche, space legislative aide; Catherine Knowles, chief of staff; and Brittany Seabury, district director, for Congressman John Culberson on March 20. Congressman Culberson is a member of the Commerce, Justice and Science Subcommittee of the House Appropriations Committee.

Orion Gets Social



Scott Wilson, Orion production operations manager at Kennedy Space Center in Florida, spoke to a room full of social media attendees at a Social Media Day hosted at NASA's Kennedy Space Center on March 14. Those in attendance were able to tour the Exploration Flight Test-1 launch abort system in the Launch Abort System Facility at Kennedy.

Tweet That Chit Chat



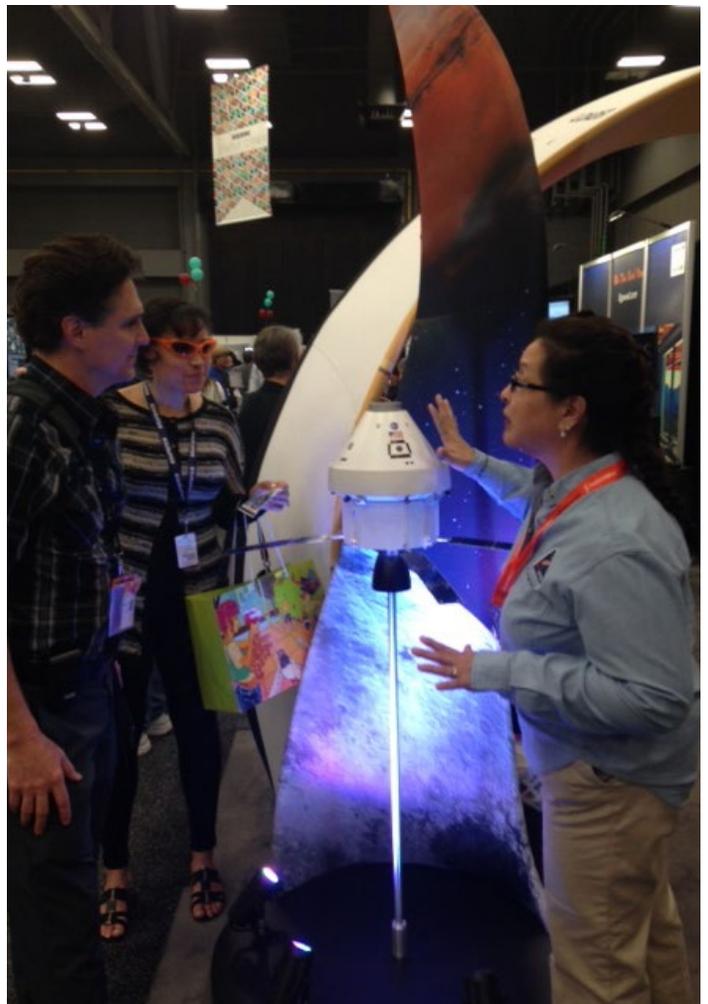
Orion Program Manager Mark Geyer participated in a Space Chat on Twitter on March 24. Twitter users submitted their questions using the **#SpaceChat** hashtag, and they were answered by Geyer, who tweeted from **@NASA_Orion**. Questions can be answered any time by submitting them to Orion's social media accounts at **@NASA_Orion** on Twitter or via Facebook at: **www.facebook.com/NASAOrion**

Orion in the News



Mark Geyer was interviewed on March 27 by Eric Berger, a reporter with the Houston Chronicle, on Exploration Flight Test-1. The interview will be included in a multi-part series that will run later in the year on the state of human spaceflight.

Orion goes to SXSW



Lockheed Martin's Gina Gills represented Orion at the South by Southwest Tradeshow in Austin, Texas, on March 9-12. She participated in an Exploration Systems Development exhibit and spoke to interested people about Orion.



Joe Mayer, director, Government Relations with Lockheed Martin, was interviewed by The SpaceFlight Group during Florida Space Day. Watch the interview at: **bit.ly/1i8BAhH**

High School 'Final Five' Compete for Out-of-This World Test on Orion



Five teams of high school student engineers have made it to the final round in a competition to build and test designs for radiation shields for NASA's new Orion spacecraft. The competition is part of the Exploration Design Challenge (EDC), developed by NASA and Lockheed Martin, with support from the National Institute of Aerospace (NIA).

The five finalist teams were announced during a live webcast on March 26, hosted by Lockheed Martin Orion Engineer Heather McKay and NASA Orion Program Astronaut Rex Walheim. The teams represent the following high schools:

- Team Titan Shielding Systems of Illinois Math and Science Academy, Aurora, Ill.
- Team ARES of Governor's School for Science and Technology, Hampton, Va.
- Team Aegis of Herriman High School, Herriman, Utah
- Team Erion of Erie High School, Erie, Kan.
- Team LORE of Summit View High School, North Hollywood, Calif.

Forty-six teams initially submitted engineering notebooks with proposed radiation shield designs. After review by Orion engineers, as well as NASA and NIA educators, five final teams were selected. For the next phase of the competition, the final teams will build

prototypes of their designs, which will be tested by engineers at NASA's Langley Research Center in Hampton, Va., before the winning design is chosen.

The winning team will be announced in April at the United States Science and Engineering Festival in Washington, D.C., and will have their radiation experiment flown on Orion's first test flight, Exploration Flight Test-1. They also will be invited to Kennedy Space Center in Florida to watch their payload launch into orbit.

More than 125,000 students of all ages, from 81 countries around the world, have taken part in the challenge so far. Although the deadline has passed to take part in the high school competition, students in grades K-12 still have until June 30 to participate in other Exploration Design Challenge activities to have their name flown on board Orion.

To watch the announcement of the EDC high school finalists, visit: new.livestream.com/viewnow/NASAEDC

For more information about the Exploration Design Challenge, and to complete the online activity, visit:

www.nasa.gov/education/edc

To see the latest about the challenges of space radiation, visit:

1.usa.gov/1hKqXBj

Are You On Board?



Channel your inner astronaut and artist and unleash your creativity on this new "I'm on Board" Orion coloring sheet, then show the world by sharing a photo of you with your masterpiece on social media with the hashtag **#ImOnBoard**. It's as easy as 1-2-3.

1. Watch a video about the coloring sheet:
bit.ly/1efUA94
2. Download the "I'm on Board" coloring sheet:
www.nasa.gov/imonboard
3. Share at...
www.facebook.com/NASAO Orion
www.twitter.com/NASA_Orion
www.instagram.com/ExploreNASA

Spot the Orion



Christian P. Lupo was the first person to spot the Orion fact posted on site at NASA's Johnson Space Center.

A different fact is being posted each month at a different building around the campus at Johnson to increase awareness about the upcoming Exploration Flight Test-1 mission. Keep your eyes open during your walks across campus and maybe you could be the next winner.



Read about Eric Hogan, Orion engineer at Lockheed Martin Space Systems in Littleton, Colo.

on.fb.me/1IGmqmw

Coming up in April:

- Exploration Flight Test simulations with Mission Operations
- Ogives on dock at Kennedy Space Center
- Shipment of second Delta IV Heavy booster to Kennedy