MONTHLY ACCOMPLISHMENTS
January 2014

orion

At Your Service: Orion Team Completes Exploration Flight Test-1 Service Module

The second of three major parts of the Orion spacecraft that will launch into orbit on Exploration Flight Test-1 (EFT-1), is complete. The Orion spacecraft consists of three components: crew module, service module, and launch abort system. This month's completion on the service module marks another major accomplishment as progress continues toward the EFT-1 Orion's first high-altitude orbital flight set for this fall.

Orion's service module sits between the crew module and the rocket that will launch Orion into space. The recently completed EFT-1 service module contains all the structural elements, spacecraft adapter, payload fairings and crew module separation systems. The Exploration Mission-1 (EM-1) service module will also provide power, heat rejection, and propulsion for maneuvering in space. Orion's service module is also responsible for housing water, oxygen and nitrogen for the deep-spacemissions. Since Orion's first mission will be a four-hour-long, uncrewed flight test, many of those systems aren't needed for EFT-1. Instead, this first service module will primarily be responsible for providing the structural support involved in carrying the crew module and launch abort system as they launch into space.

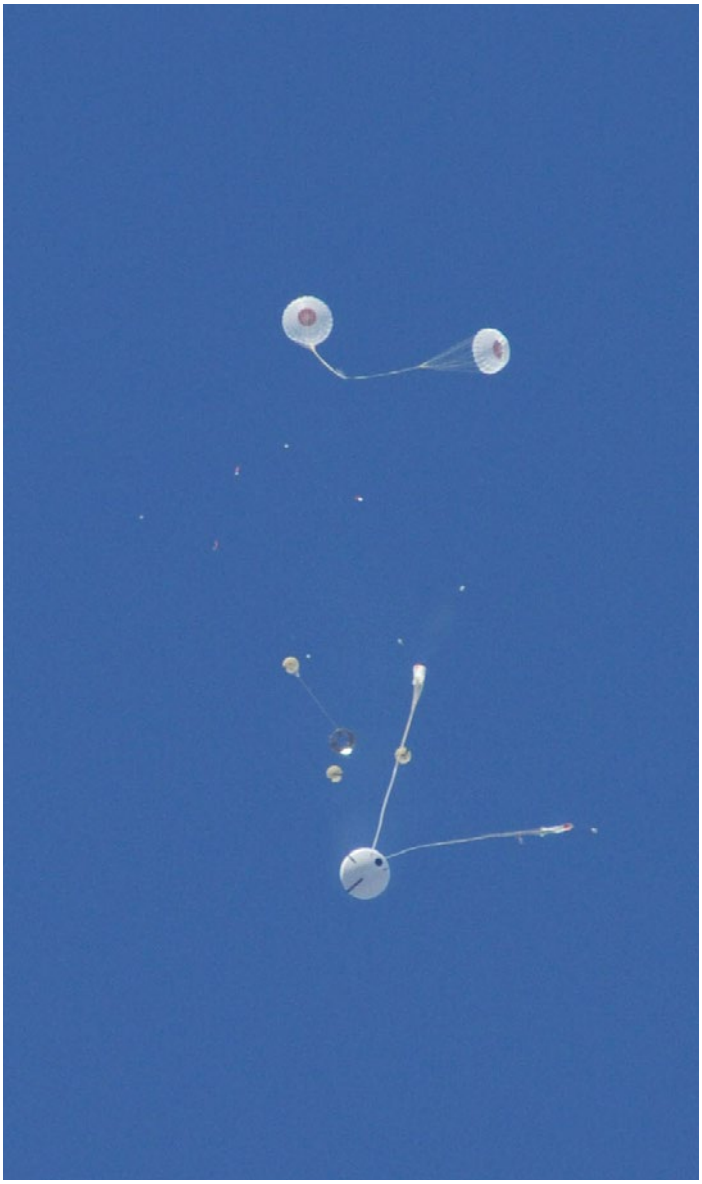
Since the crew module and launch abort system together weigh more than 37,000 pounds at liftoff, Orion's structural integrity must be put to the test prior to flight. To ensure that the service module and its protective panels, called fairings, are up to the challenge, it will spend two weeks in February undergoing tests. Engineers will carefully apply small amounts of stress to the structure to test its stiffness and verify it reacts as predicted. If it does, they'll up the ante, pushing and twisting it from multiple directions. If it can withstand the strain, the engineers will know the spacecraft is ready for flight.

Marshall Team Celebrates Work on Orion's First Mission

From left, John Casper, Orion special assistant for program integration and a former astronaut; Larry Gagliano, Marshall Center deputy project manager for the Orion Launch Abort System (LAS); and Brent Gaddes, Spacecraft and Payload Integration Adapter Subsystem manager at Marshall, take a look at the completed adapter for Orion's first mission scheduled for this fall. This spacecraft adapter will be the first of the Space Launch System (SLS) hardware tested in flight. At an event at Marshall on Jan. 30, more than 150 Marshall and Orion team members, industry partners and other special guests celebrated the contributions the center has made toward the mission. Along with the adapter work, the Flight Programs and Partnerships Office at Marshall provided support to the mission and the Orion program by fabricating more than 300 pieces flight hardware and conducting testing of the LAS thermal production material.

On Jan 22, producers from the PBS Series "MAKERS: Women Who Make America" were at the Operations & Checkout facility interviewing Orion's very own Marleen Martinez, a Lockheed Martin test engineer for the program. Along with special episodes about comedy, politics, war, business and Hollywood, the show will feature a one-hour documentary on America's Space Program — most likely to air in July.
http://www.pbs.org/makers/home/

Read about Julie Kramer White, Orion's Chief Engineer:
http://on.fb.me/1cZHnUL



Orion Parachute System Passes Complex Test

This month saw the successful completion of the most complicated parachute system test to date for NASA's Orion spacecraft. This time, in addition to parachute deployment, the system responsible for jettisoning Orion's forward bay cover was included in the test.

Engineers collected in-air data on the performance of the forward bay cover, which is a shell that fits over Orion's crew module to protect the spacecraft during launch, orbital flight and reentry into Earth's atmosphere. A successful jettison of the forward bay cover is a mission-critical event because the cover must come off before the spacecraft's parachutes can deploy. A thruster separation system built by Systima Technologies of Bothell, Wash., helps to discard the cover. "This was a tough one," said Mark Geyer, NASA Orion program manager.

"We'd done our homework, of course, but there were elements here that could only be tested in the air, with the entire system working together. It's one of the most complicated tests that we'll do, so we were all excited to see it work just as it was meant to."

Previous parachute system tests at the U.S. Army's Yuma Proving Grounds in Arizona were conducted without a forward bay cover. Since this test included the cover and its jettison, along with the deployment of three additional parachutes to pull the cover away from the crew module and lower it to the ground, this run-through was much more complex.

"The parachute deployment and forward bay cover jettisons are two of the most difficult things for us to model on computers," said Chris Johnson, NASA project manager for the parachutes. "That's why we test them so extensively ... And every bit of data we can gather in tests like these helps us improve our models."

Video of drop test: **http://bit.ly/1l05tAt**

Orion's propulsion system, Environmental Control & Life Support System (ECLSS), wiring and avionics have been successfully installed on the crew module, and the team recently began proof pressure and leak testing to qualify those systems for flight. As part of the process to qualify the spacecraft for flight, and to verify workmanship, these systems are pressurized, and the welds are checked for leaks (image on right). Once proof testing is complete, the crew module avionics system will undergo functional testing. During these tests, every piece of the avionics system will be powered on and sent commands. This functional testing expands on the initial power on test, by activating the entire avionics system.

California Small Businesses Make Big Contributions To Space

The NASA Orion and Space Launch System (SLS) team conducted supplier and outreach events in the greater Los Angeles area the week of Jan. 27, to say thanks to the workforce helping to build America's next generation spacecraft.

Representatives from Lockheed Martin, NASA, Boeing, and Alliant Techsystems participated collaboratively in the events, which included visits to a handful of the more than 200 California suppliers who have contributed to the Orion and SLS spacecraft production to date. They provided the companies with an update on program progress toward Orion's first mission this fall and the follow-on Exploration Mission-1 in 2017.

The program teams met with employees at Aero-Pacific Corp., Southern California Braiding, Coast Aerospace, Hurlen Corporation, GlenAir, Hi-Rel, and the California Science Center. In addition, program managers provided Orion/SLS briefings to more than 100 members of the AIAA student chapter at California State Polytechnic University, and participated in an event at AMRO Fabricating Corp., celebrating a protégé-mentorship announcement for the family-owned business.

"Cooperation among companies, agencies and nations is required to make Deep Space exploration possible," said Paul Anderson, Lockheed Martin Orion Avionics Integrated Product Team director. "Orion and SLS are being built by virtual teams with members all across the country to ensure we have the right skilled technicians with the level of expertise we need to accomplish that goal. It's been a great honor and privilege to meet some of these people in person and thank them for their hard work and commitment to the future of human space exploration."

Coast Aerospace Team

Lockheed Martin's Jon TenEyck and Paul Anderson, and NASA Sharon Cobb and Paul Marshall tour the Southern California Braiding facility with President Craig Phefferman.

Coming up in February

- Underway recovery test in San Diego
- Service module structural loads testing
- First Delta IV heavy booster ships to Kennedy Space Center
- Crew module multi point random vibration test