

Parachutes for NASA's Orion spacecraft hit no snags in most difficult test

June 26 2014, by Rachel Kraft



A test version of NASA's Orion spacecraft descends under its three main parachutes above the U.S. Army Proving Ground in Arizona in the agency's most difficult test of the parachutes system's performance. NASA is preparing Orion for its first trip to space in December, a two-hour, four-orbit flight that will send an uncrewed spacecraft more than 3,600 miles into space before returning it to Earth to test the performance of many of the spacecraft's critical systems needed to carry crew to deep space destinations in the future. Credit: NASA/Rad Sinyak

(Phys.org) —NASA completed the most complex and flight-like test of the parachute system for the agency's Orion spacecraft on Wednesday.

A [test](#) version of Orion touched down safely in the Arizona desert after being pulled out of a C-17 aircraft, 35,000 feet above the U.S. Army's Yuma Proving Ground. It was the first time some parachutes in the system had been tested at such a high altitude. Engineers also put additional stresses on the parachutes by allowing the test version of Orion to [free fall](#) for 10 seconds, which increased the vehicle's speed and aerodynamic pressure.

"We've put the parachutes through their paces in ground and airdrop testing in just about every conceivable way before we begin sending them into space on Exploration Flight Test (EFT)-1 before the year's done," said Orion Program Manager Mark Geyer. "The series of tests has proven the system and will help ensure crew and mission safety for our astronauts in the future."

After Orion's free fall, its forward bay cover parachutes deployed, pulling away the spacecraft's forward bay cover, which is critical to the rest of the system performing as needed. The forward bay cover is a protective shell that stays on the spacecraft until it has reentered Earth's atmosphere. The parachutes that slow Orion to a safe landing speed are located under the cover, so the cover must be jettisoned before they can be unfurled.

Engineers also rigged one of the main parachutes to skip the second phase of a three-phase process of unfurling each parachute, called reefing. This tested whether one of the main parachutes could go directly from opening a little to being fully open without an intermediary step, proving the system can tolerate potential failures.

The test also marked the last time the entire parachute sequence will be tested before Orion launches into space in December on its first space flight test, EFT-1. During the flight, an uncrewed Orion will travel 3,600 miles into space, farther than any spacecraft built to carry humans has

been in more than 40 years. Orion will travel at the speed necessary to test many of the systems critical to NASA's ability to bring astronauts home safely from missions to deep space, including an asteroid and eventually Mars.

During its return to Earth, Orion will reach a speed of up to 20,000 mph and experience temperatures near 4,000 degrees Fahrenheit. Once Orion has made it through the atmosphere, the [parachute system](#), with two drogue parachutes and three massive main [parachutes](#) that together cover almost an entire football field will be responsible for slowing it down to just 20 mph for a safe splashdown in the Pacific Ocean.

Orion's next parachute test is set for August and will test the combined failure of one drogue parachute and one main parachute, as well as new parachute design features. It is one of three remaining tests needed to demonstrate the system's capability for human missions, but does not need to be completed before Orion's first flight later this year.

Provided by NASA

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