



Orion

Exploration Flight Test-1



Artist's rendering of Orion during Exploration Flight Test-1, the first spaceflight of America's next generation spacecraft.

NASAfacts

NASA is committed to human spaceflight beyond low-Earth orbit and the continued development of its next generation spacecraft—Orion. The Orion spacecraft will take astronauts beyond low Earth orbit (LEO) to deep space. It will provide emergency abort capability, sustain the crew during space travel and provide safe re-entry from deep space. The spacecraft will launch on Exploration Flight Test-1, an uncrewed mission planned for 2014. This test will see Orion travel farther into space than any human spacecraft has gone in more than 40 years. EFT-1 data will influence design decisions, validate existing computer models and innovative new approaches to space systems development, as well as reduce overall mission risks and costs. Lockheed Martin is the prime contractor for the EFT-1 flight.

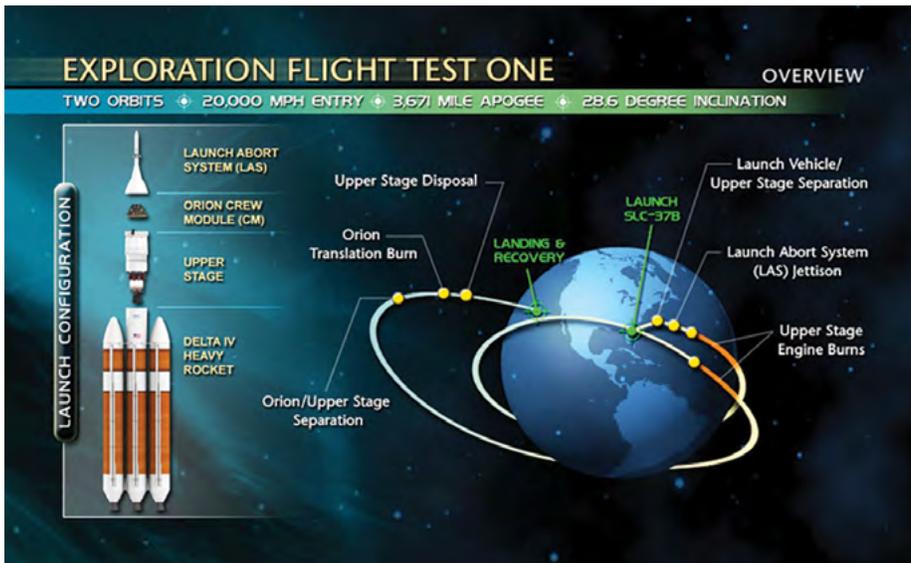
The Orion flight test vehicle is comprised of five primary elements which will be operated and evaluated during the test flight:

- **The Launch Abort System (LAS)** – Propels the Orion Crew Module to safety in an emergency during launch or ascent

- **The Orion Crew Module (CM)** – Houses and transports NASA's astronauts during spaceflight missions
- **The Service Module (SM)** – Contains Orion's propulsion, power and life support systems
- **The Spacecraft Adaptor and Fairings** – Connects Orion to the launch vehicle
- **The Multi-Purpose Crew Vehicle to Stage Adaptor (MSA)** – Connects the entire vehicle structure to the kick stage of the rocket

The uncrewed EFT-1 flight will take Orion to an altitude of approximately 3,600 miles above the Earth's surface, more than 15 times farther than the International Space Station's orbital position. By flying Orion out to those distances, NASA will be able to see how Orion performs in and returns from deep space journeys.

The first Orion spaceflight vehicle will be integrated with the Delta IV Heavy, a rocket built and operated by United Launch Alliance. While this launch vehicle will provide sufficient lift for the EFT-1 flight plan, a much larger, human-rated rocket will be needed for the vast distances of



Orion will launch atop a Delta IV Heavy rocket for the test flight, as shown in this configuration. The planned two orbit flight will send Orion out farther into space than any human spacecraft since the Apollo 17 mission in 1972.

The first space-bound Orion was constructed at the Michoud Assembly Facility, the same factory that built the space shuttle external fuel tanks. Orion's heat shield installation, final assembly and checkout operations will be completed at NASA's Kennedy Space Center in Florida.

future exploration missions. NASA is currently developing the Space Launch System (SLS), which will provide Orion the capability to carry astronauts to destinations beyond LEO, like an asteroid, Mars and other deep space destinations.

After the test flight, Orion will reenter the atmosphere at a speed of over 20,000 miles per hour, returning to Earth faster than any current human spacecraft. As Orion reenters the atmosphere, it will endure temperatures up to 4,000° F—higher than any human spacecraft since astronauts returned from the Moon. Orion will land in the water and be recovered.

This early orbital test flight will play an important role in the finalization of Orion's design and will increase efficiencies and reduce risk.

- **Programmatic Risk Reduction** – Critical flight data collected from EFT-1 will validate Orion's ability to withstand re-entry speeds greater than 20,000 miles per hour and safely return the astronauts to Earth
- **Technical Risk Reduction** – Valuable data about key systems functions and capabilities such as kick stage processing on the launch pad, vehicle fueling and stacking, and crew module recovery will ensure these systems are designed and built correctly
- **Demonstrates Efficiencies** – Gives NASA the chance to continue to refine its production and coordination processes, aligning with the agency's commitment to build the world's most cutting edge spacecraft in the most cost efficient manner
- **Enhances and Sustains Industry Partnerships** – Orion's design teams will gain important experience and training to ensure the industry is prepared for a launch of Orion in 2017 aboard the SLS



- **Skill Sustainment** – Focusing on mission flight test objectives, helps to reduce or eliminate risks to crew, and refines Orion core systems development

NASA is making significant progress in developing the deep space exploration system that will enable the nation's human spaceflight objectives. EFT-1 will provide NASA teams with invaluable experience to prepare Orion for future missions and the discoveries that await us as humans explore farther into the cosmos.

For more information about EFT-1, please visit www.nasa.gov/orion.

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