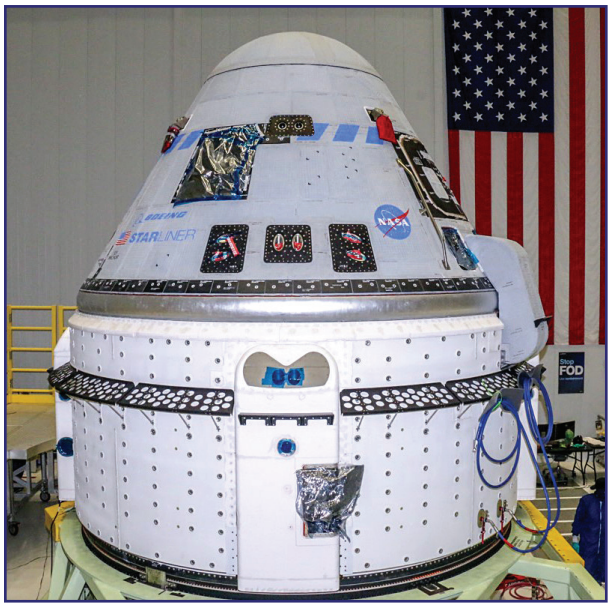
LAUNCH AMERICA

National Aeronautics and Space Administration

NASA'S COMMERCIAL CREW PROGRAM

MISSION OVERVIEW

Orbital Flight Test-2



NASA's Boeing Orbital Flight Test-2 (OFT-2) mission to the International Space Station is the second uncrewed flight test of the company's CST-100 Starliner spacecraft for the agency's Commercial Crew Program.

OFT-2 will test the end-to-end capabilities of the Starliner spacecraft from launch to docking to a return to Earth in the desert of the western United States. Launching from Space Launch Complex-41 on Cape Canaveral Space Force Station in Florida, United Launch Alliance's Atlas V rocket puts Starliner in orbit and on its way to the space station. Following a successful completion of the OFT-2 mission, NASA and Boeing will fly the agency's Boeing Crew Flight Test (CFT), Starliner's first flight with astronauts.

OFT-2 and CFT will provide valuable data toward NASA certifying Boeing's crew transportation system for regular crewed flights to and from the space station. The orbiting laboratory is critical to NASA's next great leap in space exploration, including future missions to the Moon and eventually to Mars.

For this mission, Starliner will spend about five to 10 days in space and deliver about 440 pounds of NASA cargo to the space station. This includes food and crew preference items for the current expedition crew members on station, and provisions, like clothes and sleeping bags, for CFT astronauts.

United Launch Alliance Atlas V

LAUNCH LOCATION: Cape Canaveral Space Force Station, FL

LAUNCH PAD: Space Launch Complex-41 (SLC-41)

HEIGHT: 172 ft

CONFIGURATION: Two-stage rocket with two solid rocket boosters

CENTAUR UPPER STAGE DIAMETER: 10 ft

ATLAS V COMMON CORE BOOSTER DIAMETER: 12.5 ft

PROPELLANT: Liquid hydrogen (LH2), liquid oxygen (LOX) and rocket grade kerosene (RP-1)

PROPULSION: RD-180 booster engine, 860,200 pounds of thrust, two solid rocket boosters, 348,500 pounds of thrust each, and dual RL-10 Centaur engines, 45,200 pounds of thrust

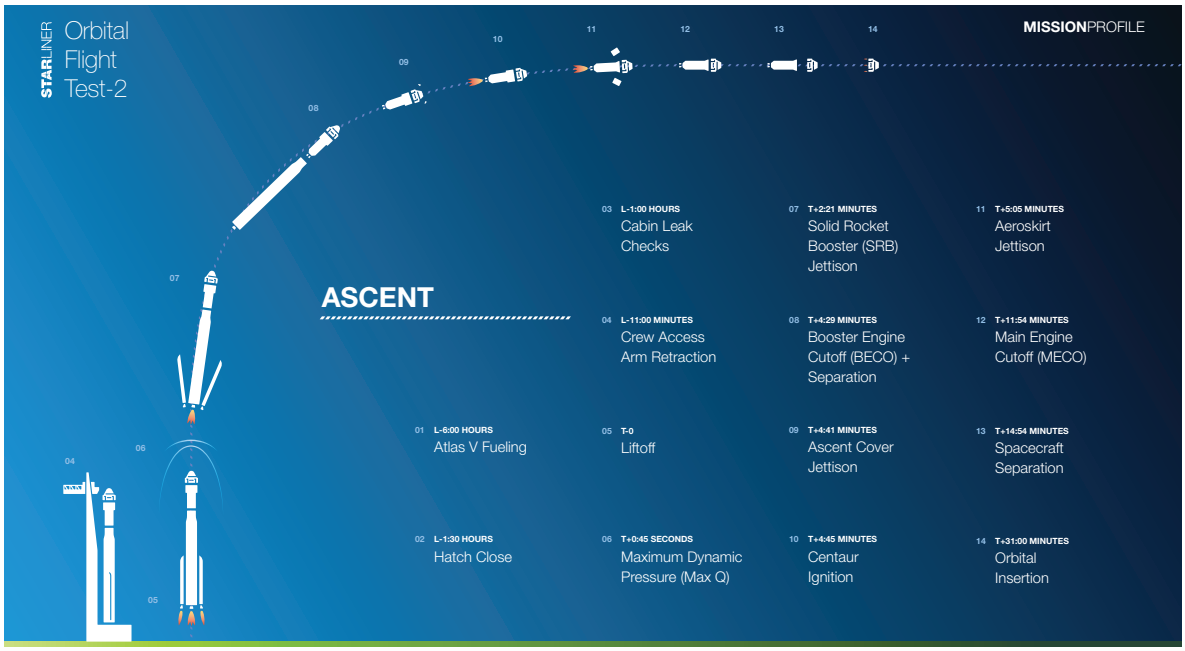
Boeing CST-100 Starliner

HEIGHT: 16.5 ft (Crew Module + Service Module)

DIAMETER: 15 ft

CREW CAPACITY: Up to four people for NASA missions to the space station

RETURN: Land-based return in the western United States

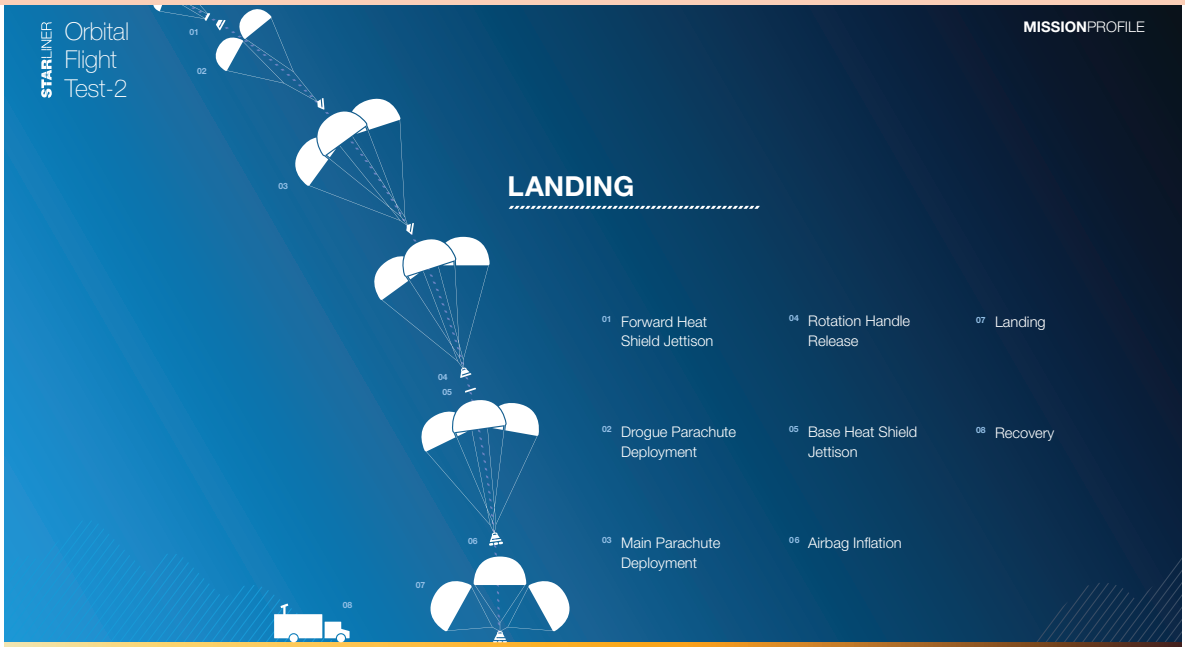


MISSION PROFILE

Launch and Ascent: The ascent phase of the mission starts after ignition of the Atlas V's RD-180 main engine and two solid rocket boosters. As the Atlas V continues to climb, it will work its way through various launch milestones, including Max Q, solid booster jettison, booster stage separation, and Centaur ignition. Following orbital insertion, Starliner will separate from the Centaur upper stage, followed several minutes later by an adjust maneuver setting it on its path to rendezvous and dock with the station.

Rendezvous and Docking: Once in a stable orbit on course for the space station, Starliner continues its rendezvous maneuvers designed to mirror the same orbit as station. After it gets closer to the station, it will pause before entering the 656-foot (200-meter) "keep out sphere" while flight controllers evaluate the alignment and readiness to proceed with docking. Starliner then begins the docking process, pausing once more at about 33 feet (10 meters) away, before final approach and autonomously docking to an International Docking Adapter.

Undocking, Reentry, and Landing: Starliner is designed to land at one of five landing sites in the western United States—two on the White Sands Missile Range in New Mexico, one on the Dugway Proving Ground in Utah, one on the Willcox Playa in Arizona, and one on Edwards Air Force Base in California. When cleared to leave the space station, Starliner undocks, performs a flyaround maneuver, and positions itself for the deorbit burn to slow from orbital velocity in preparation for atmospheric reentry, where it is met with reentry heating of 3,000 degrees Fahrenheit (1,650 degrees Celsius). Starliner will jettison the forward heat shield around 30,000 feet (9 km) above the ground, followed by deployment of a series of parachutes. First, two drogue parachutes continue to slow Starliner, followed by extraction of the three main parachutes. At 3,000 feet (.9 km) from the ground, airbags inflate to further absorb the initial forces of landing, cushioning the crew for a soft, safe return to Earth.



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