

DELTA IV EFT-1 MISSION

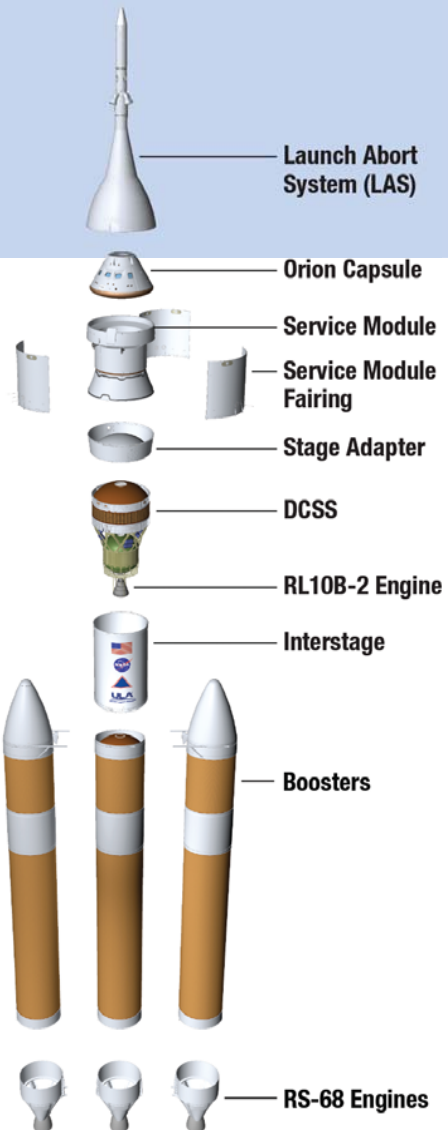
A United Launch Alliance Delta IV Heavy will take the Orion spacecraft to the highest orbit for a spacecraft designed for humans since Apollo, then deliver it to a re-entry location for splashdown and recovery. Liftoff will occur from Space Launch Complex 37 at Cape Canaveral Air Force Station, FL.

The Orion Exploration Flight Test (EFT)-1 mission is an un-crewed launch of Orion to demonstrate the Service Module (SM) fairing and Launch Abort System (LAS) jettison events, the ability to perform controlled re-entry, and the effectiveness of the heat shield. The Orion spacecraft is built by Lockheed Martin and is comprised of four major elements: the LAS, the Crew Module (CM), the SM, (together, the LAS, CM, and SM comprise the Multi-Purpose Crew Vehicle (MPCV)), and the MPCV Stage Adapter (MSA).

The EFT-1 mission will orbit the Earth twice, reaching a maximum altitude of more than 3,500 miles on the second orbit prior to a starting a steep descent that approaches a lunar mission return thermal environment. The Orion CM will achieve a maximum speed of more than 19,770 mph (29,000 ft/sec) before entering Earth's atmosphere. Following a parachute-aided descent, the Orion spacecraft will be recovered by the U.S. Navy from the Pacific Ocean off the California Baja Peninsula.



Image Courtesy of NASA



Orion Spacecraft

The spacecraft is comprised of the Launch Abort System, the Crew Module, the Service Module and fairings, and the Stage Adapter. The vehicle's height with Orion is approximately 243 ft.

Delta Cryogenic Second Stage (DCSS)

The DCSS stage propellant tanks are structurally rigid and constructed of isogrid aluminum ring forgings and spun-formed aluminum domes. It is a cryogenic liquid hydrogen/liquid oxygen-fueled vehicle, and uses a single RL10B-2 engine that produces 24,750 lb of thrust. The DCSS cryogenic tanks are insulated with a combination of spray-on and bond-on insulation, and helium-purged insulation blankets. An equipment shelf attached to the aft dome of the DCSS liquid oxygen tank provides the structural mountings for vehicle electronics.

Boosters

The Delta IV booster tanks are structurally rigid and constructed of isogrid aluminum barrels, spun-formed aluminum domes and machined aluminum tank skirts. Delta IV booster propulsion is provided by the RS-68 engine system which burns cryogenic liquid hydrogen and liquid oxygen which delivers 663,000 lb of thrust at sea level. Booster cryogenic tanks are insulated with a combination of spray-on and bond-on insulation and helium-purged insulation blankets. The boosters are controlled by the DCSS avionics system, which provides guidance, flight control.



The ULA team is proud to be the launch provider for the Lockheed Martin Orion Exploration Flight Test (EFT)-1 mission. The EFT-1 mission represents the next step U.S. crewed space exploration beyond Earth orbit, testing critical interfaces on the Orion and further refining the design that will take astronauts to the moon and beyond.

The ULA team is focused on attaining Perfect Product Delivery for the EFT-1 mission, which includes a relentless focus on mission success (the perfect product) and also excellence and continuous improvement in meeting all of the needs of our customers (the perfect delivery).

My thanks to the entire ULA team and our mission partner, Lockheed Martin, as well as major suppliers of ULA for their hard work and commitment to mission success.

Go Delta, Go EFT-1!

Jim Spornick
Vice President, Atlas and Delta Programs



With more than a century of combined heritage, United Launch Alliance is the nation's most experienced and reliable launch service provider. ULA has successfully delivered more than 80 satellites to orbit that provide critical capabilities for troops in the field, aid meteorologists in tracking severe weather, enable personal device-based GPS navigation and unlock the mysteries of our solar system.

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MISSION OVERVIEW

- 90th ULA Launch
- 8th Delta IV Heavy Launch
- 1st Commercial Delta IV Heavy Launch

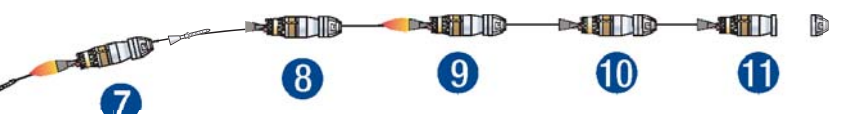


DELTA IV PRODUCTION AND LAUNCH

- 1 De Soto, CA**
— RS-68 Engine Fabrication at Aerojet Rocketdyne
- 2 Denver, CO**
— ULA Headquarters & Design Center Engineering
- 3 Decatur, AL**
— Boosters, & Second Stage Fabrication
- 4 West Palm Beach, FL**
— RL10 Engine Fabrication at Aerojet Rocketdyne



MISSION PROFILE AND GROUND TRACE

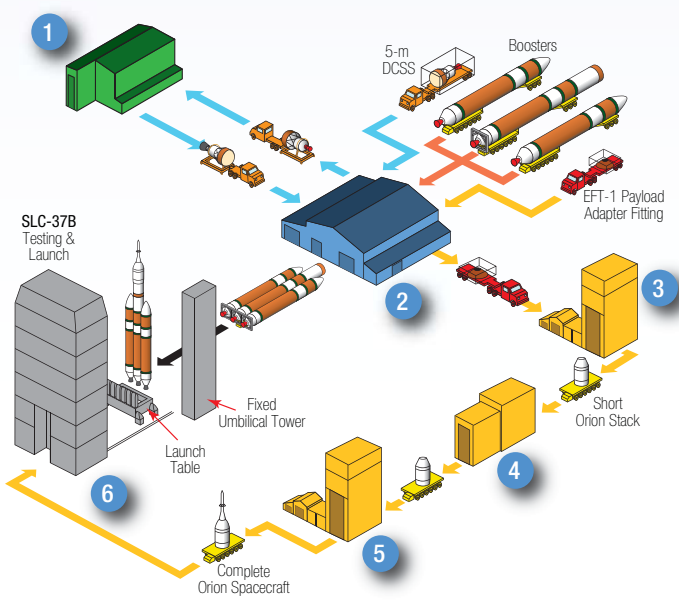


Event	Time (seconds)	Time (hr:min:sec)
1 RS-68 Engine Ignition	-5.0	-00:00:05.0
Liftoff (Thrust to Weight > 1)	0.0	00:00:00.0
Begin Pitch/Yaw Maneuver	13.0	00:00:13.0
Mach 1	82.2	00:01:22.2
Maximum Dynamic Pressure	82.2	00:00:82.2
2 Port and Starboard Booster Jettison	238.3	00:03:58.3
3 Main Engine Cutoff (MECO)	330.9	00:05:30.9
4 First-Stage Separation	338.0	00:05:38.0
5 Second-Stage Ignition	351.0	00:05:51.0
6 Service Module (SM) Fairing Jettison	376.0	00:06:16.0
7 Launch Abort System (LAS) Jettison	381.0	00:06:21.0
8 First Cutoff—Second Stage (SECO-1)	1,037.1	00:17:17.1
9 First Restart—Second Stage	6,920.5	01:55:20.5
10 Second Cutoff—Second Stage (SECO-2)	7,202.5	02:00:02.5
11 Orion Separation	12,216.0	03:23:36.0

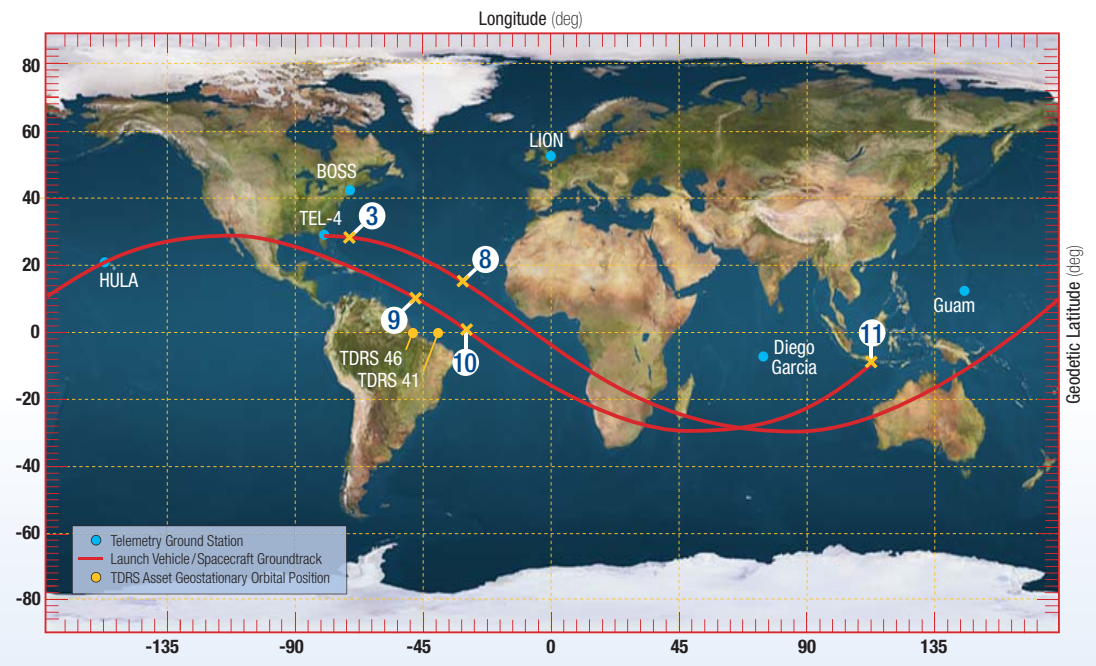
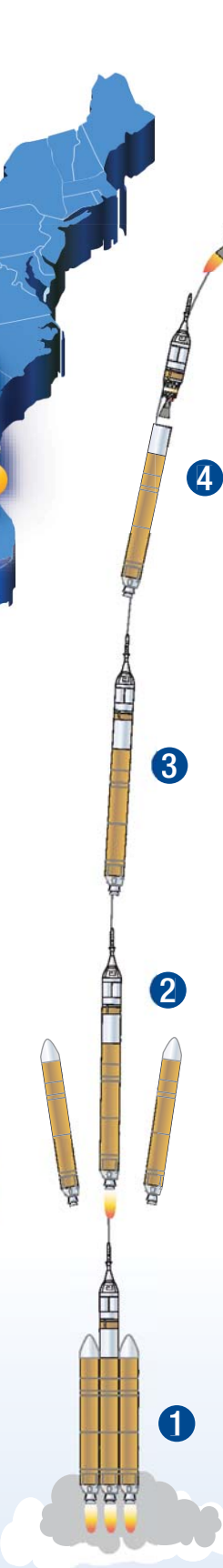
Perigee Altitude: -16.1 nmi | Apogee Altitude: 3,126.4 nmi | Inclination: 28.8 deg | Flight Azimuth: 95.0 deg

- 1 Delta Operations Center (DOC)** | Launch Control Center and Mission Director's Center
- 2 Horizontal Integration Facility** | Receiving, inspection and integration
- 3 Neil Armstrong O&C Building** | Orion spacecraft assembly and testing
- 4 Payload Hazardous Servicing Facility (PHSF)** | Orion spacecraft fueling
- 5 Launch Abort System Facility (LASF)** | Launch abort system installation on Orion spacecraft
- 6 Mobile Service Tower** | Launch vehicle integration and testing, spacecraft mate and integrated operations

- 1 Mobile Service Tower (MST)**
- 2 Launch Vehicle**
- 3 Launch Table**
- 4 Fixed Umbilical Tower (FUT)**
- 5 Lightning Protection Towers**
- 6 LH2 Storage Tank**
- 7 LO2 Storage Tank**



Space Launch Complex 37



All Values Approximate