

ATLAS V OA-4 MISSION

A ULA Atlas V 401 rocket will launch the Cygnus™ spacecraft on the initial leg of its cargo resupply mission to the International Space Station. Liftoff will occur from Space Launch Complex 41 at Cape Canaveral Air Force Station, FL.

Orbital ATK developed the Cygnus advanced maneuvering spacecraft to perform ISS cargo delivery missions under the Commercial Resupply Service (CRS) contract with NASA. Orbital ATK is under contract to deliver 28,600 kg of cargo over the life of the CRS-1 contract. The OA-4 Cygnus spacecraft will carry 3,513 kg of that cargo.

Cygnus is a low-risk design incorporating elements drawn from Orbital ATK and its partners' existing, flight-proven spacecraft technologies. Cygnus consists of a common Service Module (SM) and a Pressurized Cargo Module (PCM). The SM is assembled and tested at Orbital ATK's Dulles, VA, satellite manufacturing facility and incorporates systems from Orbital ATK's flight-proven LEOStar™ and GEOStar™ satellite product lines. The PCM is based on the Multi-Purpose Logistics Module (MPLM), developed and built by Thales Alenia Space of Italy.

The Cygnus spacecraft for the OA-4 mission is the first to employ the longer, "enhanced," PCM which can carry a greater volume of cargo than the PCM flown on previous missions, and lightweight UltraFlex arrays developed and built by Orbital ATK's Goleta, CA, facility.



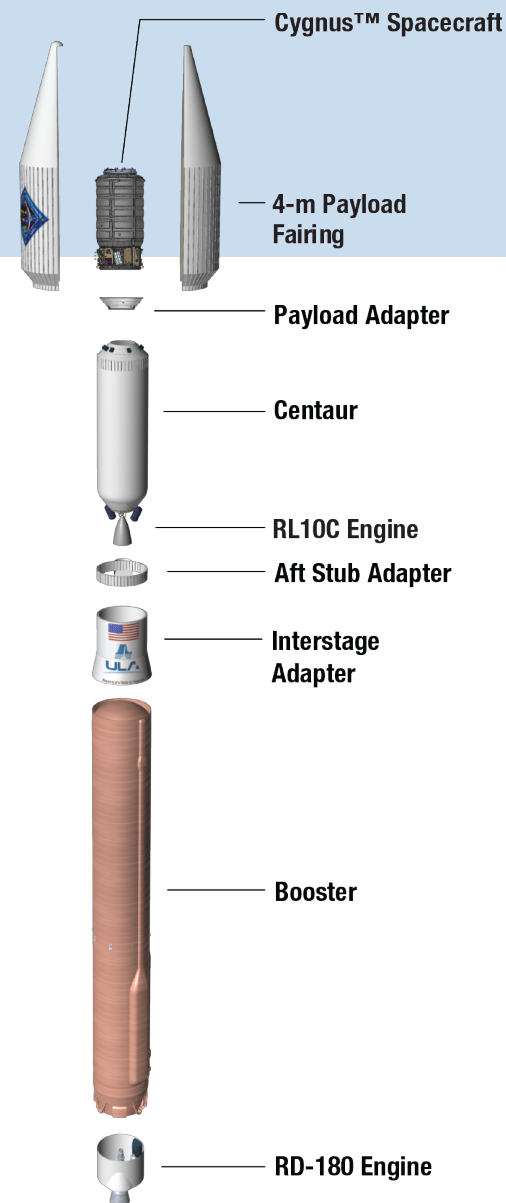
The OA-4 mission represents ULA's first ISS Cargo Resupply mission. ULA recognizes the criticality of this mission in providing much-needed replenishment of supplies to the ISS crew, scientific equipment to further the ISS mission of discovery and logistical hardware to help maintain a healthy ISS.

The ULA team is focused on attaining Perfect Product Delivery for the OA-4 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, Orbital ATK, as well as our many suppliers and other teammates for their hard work and commitment to mission success.

Go Atlas, Go Centaur, Go OA-4!

Jim Spornick
Vice President, Atlas and Delta Programs



Payload Fairing (PLF)

The Cygnus spacecraft is encapsulated in the 4-m (14-ft) diameter extra extended payload fairing (XEPF). The XEPF is a bisector (two-piece shell) fairing consisting of aluminum skin/stringer construction with vertical split-line longerons. The vehicle's height with the PLF is approximately 194 ft.

Centaur

The Centaur second stage is 10 ft in diameter and 41.5 ft in length. Its propellant tanks are constructed of pressure-stabilized, corrosion resistant stainless steel. Centaur is a liquid hydrogen/liquid oxygen- (cryogenic-) fueled vehicle. It uses a single RL10C engine producing 22,900 lbf of thrust. The cryogenic tanks are insulated with a combination of helium-purged insulation blankets, radiation shields, and spray-on foam insulation (SOFI). The Centaur forward adapter (CFA) provides the structural mountings for the fault-tolerant avionics system and the structural and electrical interfaces with the spacecraft.

Booster

The Atlas V booster is 12.5 ft in diameter and 106.5 ft in length. The booster's tanks are structurally rigid and constructed of isogrid aluminum barrels, spun-formed aluminum domes, and intertank skirts. Atlas booster propulsion is provided by the RD-180 engine system (a single engine with two thrust chambers). The RD-180 burns RP-1 (Rocket Propellant-1 or highly purified kerosene) and liquid oxygen, and delivers 860,200 lb of thrust at sea level. The Atlas V booster is controlled by the Centaur avionics system, which provides guidance, flight control, and vehicle sequencing functions during the booster and Centaur phases of flight.



America's Ride to Space

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 100 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.

Join the conversation:



ULALaunch.com



MISSION OVERVIEW

- 60th Atlas V Launch
- 30th Atlas V 401 Configuration Launch
- First ULA Mission Supporting ISS Cargo Resupply



America's Ride to Space

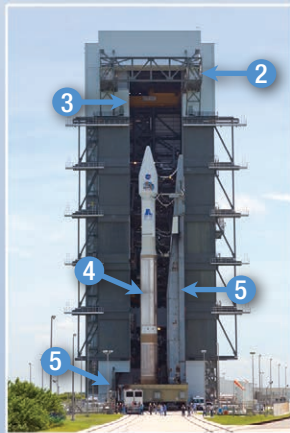
ATLAS V PRODUCTION AND LAUNCH

- 1 Denver, CO**
— ULA Headquarters & Design Center Engineering
- 2 Harlingen, TX**
— Payload Fairing, Boattail, Centaur Forward Adapter, Aft Stub Adapter & Launch Vehicle Adapter Fabrication
- 3 Decatur, AL**
— Booster Fabrication & Final Assembly, Centaur Tank Fabrication & Centaur Final Assembly
- 4 West Palm Beach, FL**
— RL10C Engine Fabrication at Aerojet Rocketdyne
- 5 Khimki, Russia**
— RD-180 Engine Fabrication at NPO Energomash

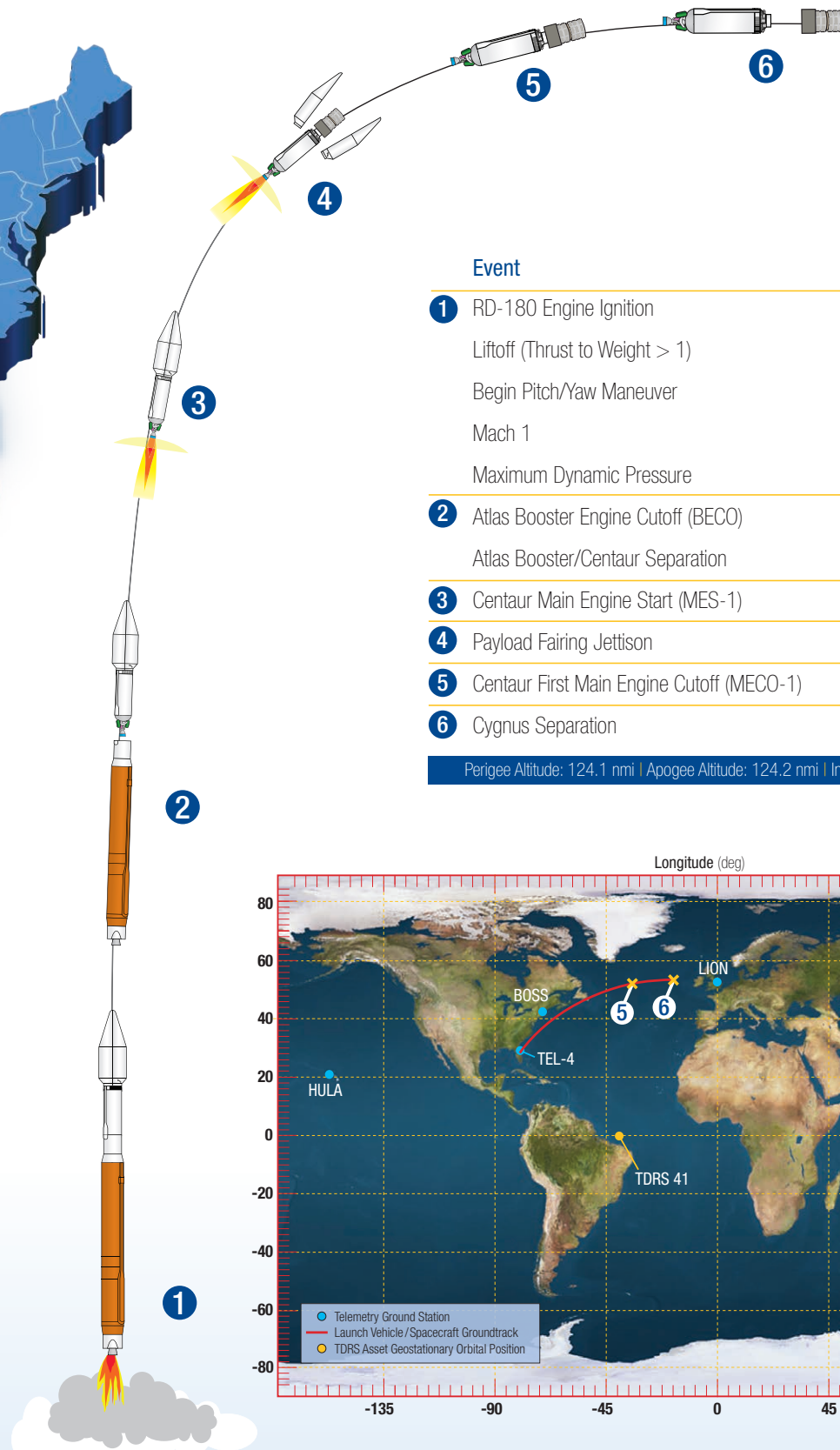


- 1 Atlas Spaceflight Operations Center (ASOC)** | Launch Control Center and Mission Director's Center
- 2 Delta Operations Center** | ISA, Centaur, Boattail Vertical Integration
- 3 Spacecraft Processing Facility** | Spacecraft processing, testing and encapsulation
- 4 Vertical Integration Facility** | Launch vehicle integration and testing, spacecraft mate and integrated operations

- 1 Vertical Integration Facility (VIF)** (See inset)
- 2 Bridge Crane Hammerhead**
- 3 Bridge Crane**
- 4 Launch Vehicle**
- 5 Mobile Launch Platform (MLP)**
- 6 Centaur LO₂ Storage**
- 7 High Pressure Gas Storage**
- 8 Booster LO₂ Storage**
- 9 Pad Equipment Building (PEB)**
- 10 Pad ECS Shelter**

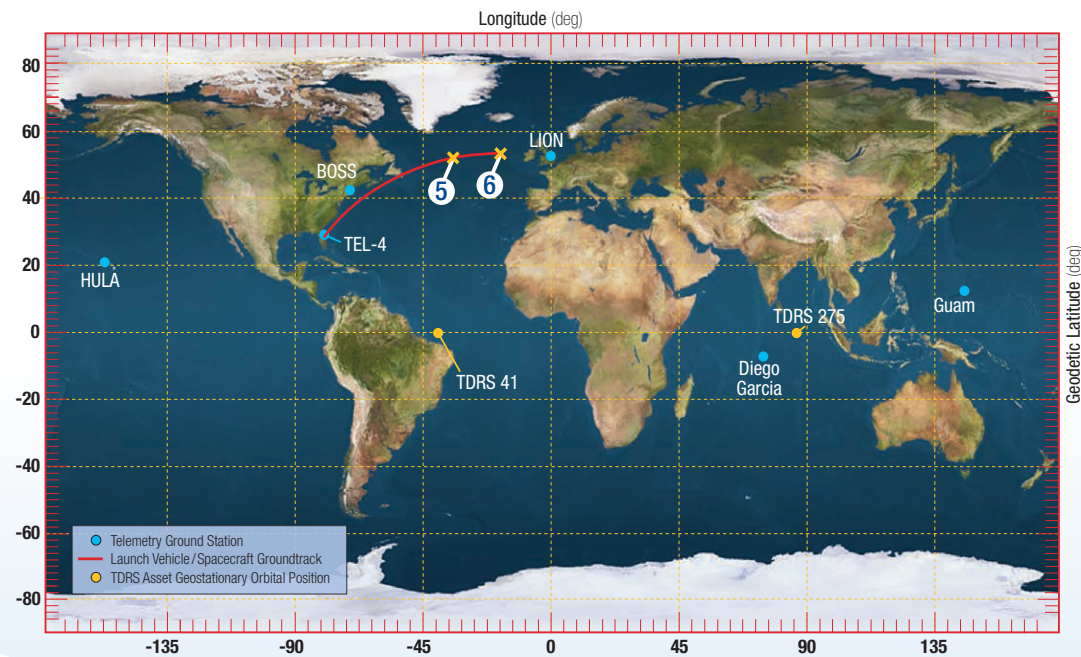


MISSION PROFILE AND GROUND TRACE



Event	Time (seconds)	Time (hr:min:sec)
1 RD-180 Engine Ignition	-2.7	-00:00:02.7
Liftoff (Thrust to Weight > 1)	1.1	00:00:01.1
Begin Pitch/Yaw Maneuver	18.4	00:00:18.4
Mach 1	82.6	00:01:22.6
Maximum Dynamic Pressure	93.8	00:01:33.8
2 Atlas Booster Engine Cutoff (BECO)	255.6	00:04:15.6
Atlas Booster/Centaur Separation	261.6	00:04:21.6
3 Centaur Main Engine Start (MES-1)	271.6	00:04:31.6
4 Payload Fairing Jettison	279.6	00:04:39.6
5 Centaur First Main Engine Cutoff (MECO-1)	1,096.7	00:18:16.7
6 Cygnus Separation	1,265.7	00:21:05.7

Perigee Altitude: 124.1 nmi | Apogee Altitude: 124.2 nmi | Inclination: 51.6 deg | Flight Azimuth: 44.4 deg



All Values Approximate