

## ATLAS V MUOS-3 MISSION

The third Mobile User Objective System (MUOS) satellite will ensure continued mission capability of the existing Ultra-High Frequency Satellite Communications (UHF SATCOM) system, and is the third satellite in the next-generation narrowband tactical satellite communications system that will provide significantly improved and assured communications for the mobile warfighter. The MUOS constellation will ultimately replace the current UHF SATCOM system, providing military users with 10 times more communications capacity over existing systems, including simultaneous voice (full-duplex) and data, leveraging 3G mobile communications technology.



Image courtesy of Lockheed Martin Corporation

From its vantage point in geostationary orbit, the MUOS-3 satellite will cover approximately a third of the Earth's surface and uses its 14-meter diameter reflecting mesh antenna to communicate with ground-based users. Lockheed Martin Space Systems is the MUOS prime contractor and system integrator.

The Mobile User Objective System will provide netcentric use of UHF SATCOM as well as the following enabling capabilities:

- Beyond line-of-site communication for mobile warfighters with focus on usability.
- Global communications to connect any set of users, regardless of location with the exception of polar regions.
- Improved connectivity in stressed environments including urban canyons, mountains, jungle, weather and scintillation.
- "Bandwidth on Demand" architecture that is future upgradeable with "smarts" on the ground and accessibility to Global Information Grid (GIG), Non-secure Internet Protocol Router Network (NIPRNet), Secure Internet Protocol Router Network (SIPRNet), and Defense Information Systems Network (DISN).

### Payload Fairing (PLF)

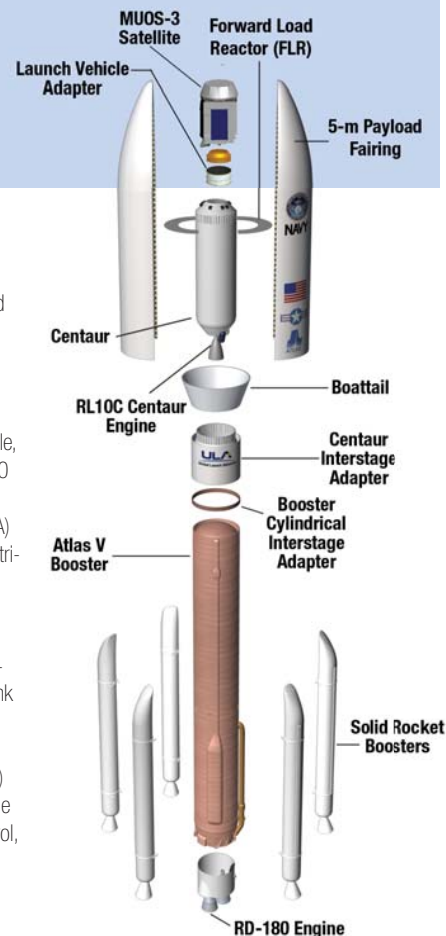
The MUOS-3 satellite is encapsulated in a 5-m (14-ft) diameter medium payload fairing. The 5-m PLF is a sandwich composite structure made with a vented aluminum-honeycomb core and graphite-epoxy face sheets. The bisector (two-piece shell) PLF encapsulates both the Centaur and the satellite. The vehicle's height with the 5-m medium PLF is approximately 206 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 cryogenic vehicle, fueled with liquid hydrogen and liquid oxygen. It uses a single RL10C-1 engine producing 22,900 lb 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. Five solid rocket boosters (SRB) generate the additional power required at liftoff, with each SRB providing 348,500 lb of thrust. 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.



United Launch Alliance (ULA) is proud to be a part of the deployment of the U.S. Navy's Mobile User Objective System (MUOS) satellite constellation.

MUOS-3 is the third of a five-satellite constellation to be launched and operated by PMW 146, the Navy's Communications Satellite Program Office. MUOS is a next-generation narrowband tactical satellite communications system designed to significantly improve ground communications to U.S. forces on the move around the globe.

The MUOS-3 satellite will be the heaviest payload to ride into space atop any of ULA's Atlas V launch vehicles. The Atlas V will generate more than two and half million pounds of thrust at liftoff in order to meet the demands of lifting the nearly 7.5-ton satellite.

The ULA team is focused on attaining Perfect Product Delivery for the MUOS-3 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).

Thank you to the entire ULA team and to our mission partners. Your dedication has made this game-changing mission possible.

Go Atlas, Go Centaur, Go MUOS!

Jim Spornick  
Vice President, Atlas and Delta Programs



### 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 90 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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America's Ride to Space



## MISSION OVERVIEW

- 5<sup>th</sup> Atlas V 551 Configuration
- 52<sup>nd</sup> Atlas V Launch
- 92<sup>nd</sup> ULA Launch

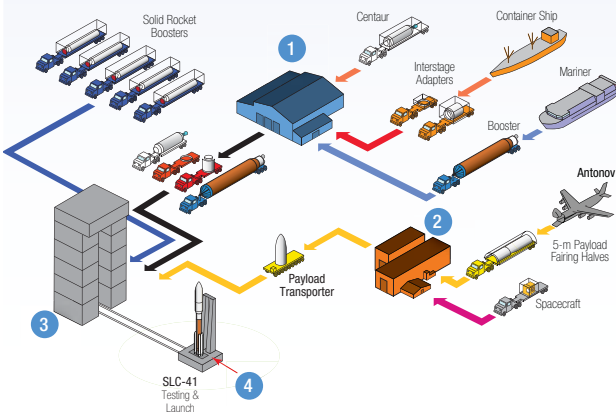
## ATLAS V PRODUCTION AND LAUNCH

- 1 Sacramento, CA**  
– Solid Rocket Booster Fabrication at Aerojet Rocketdyne
- 2 Denver, CO**  
– ULA Headquarters & Design Center Engineering
- 3 Harlingen, TX**  
– Payload Adapter, Booster and Centaur Fabrication
- 4 Decatur, AL**  
– Booster Fabrication & Final Assembly  
– Centaur Final Assembly
- 5 West Palm Beach, FL**  
– RL10 Engine Fabrication at Aerojet Rocketdyne
- 6 Khimki, Russia**  
– RD-180 Engine Fabrication at NPO Energomash
- 7 Zurich, Switzerland**  
– 5-m Payload Fairing Fabrication at RUAG Space

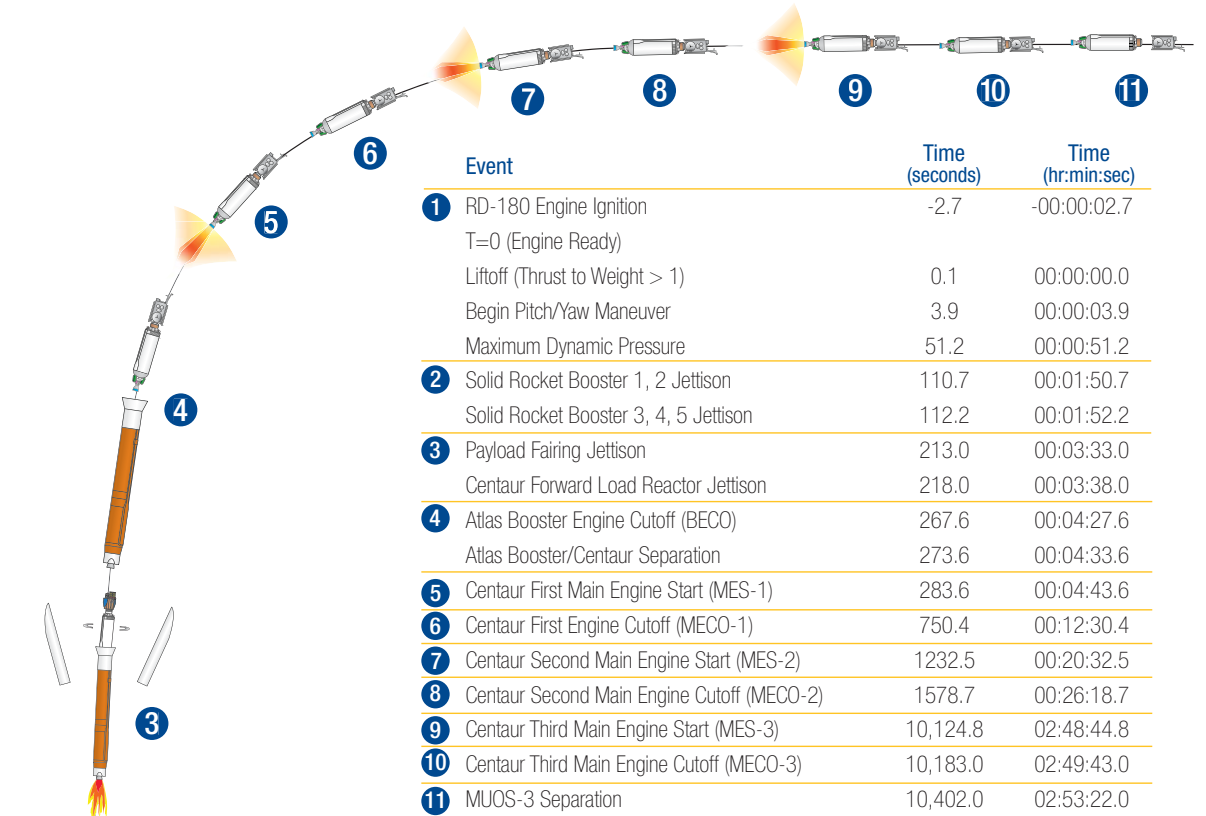


- 1 Atlas Spaceflight Operations Center (ASOC)** | Receiving & inspection, communication center, spacecraft control room, launch control center, mission director's center, ITAR facility
- 2 Spacecraft Processing Facility** | Spacecraft processing, testing and encapsulation
- 3 Vertical Integration Facility** | Launch vehicle integration and testing, spacecraft mate and integrated operations
- 4 Mobile Launch Platform**

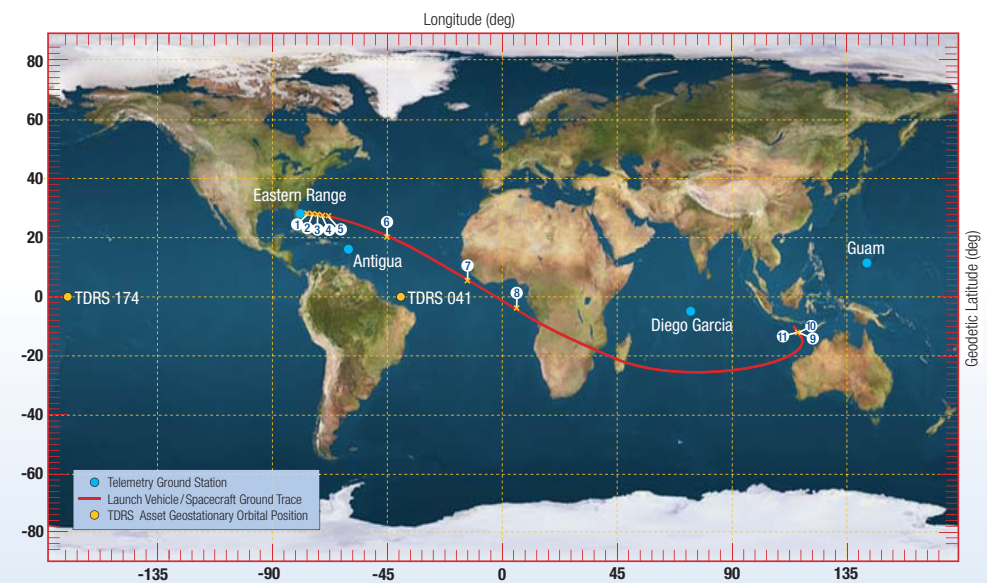
- 1 Vertical Integration Facility (VIF)**
- 2 Launch Vehicle**
- 3 Centaur LO<sub>2</sub> Storage**
- 4 High Pressure Gas Storage**
- 5 Booster LO<sub>2</sub> Storage**
- 6 Pad Equipment Building (PEB)**
- 7 Pad ECS Shelter**



## MISSION PROFILE AND GROUND TRACE



Perigee Altitude: 2,060.9 nmi | Apogee Altitude: 19,323.3 nmi | Inclination: 19.11 deg | Flight Azimuth: 94.58 deg



All Values Approximate