

ATLAS V TDRS-M MISSION

An Atlas V 401 rocket will launch the Tracking Data and Relay Satellite-M (TDRS-M) into a geosynchronous transfer orbit. Liftoff will occur from Space Launch Complex-41 at Cape Canaveral Air Force Station, Florida. ULA is proud to partner with NASA to deliver these vital space communication satellites to orbit. ULA's Atlas rocket was used for the second generation series and will complete the three-satellite third generation series with the launch of TDRS-M.

The Tracking and Data Relay Satellite System (TDRSS) is a space-based communication system used to provide tracking, telemetry, command and high-bandwidth data return services. The TDRSS, also referred to as the NASA Space Network, consists of satellites in geosynchronous stationary orbits and the associated TDRS ground stations. The TDRSS is a basic agency capability and a critical national resource.

Microwave communications equipment and gimbaled antennae are the primary payload of each satellite. The TDRSS is capable of providing near continuous high bandwidth (S, Ku and Ka band) telecommunications services for Low Earth orbiting spacecraft (including the International Space Station) and expendable launch vehicles like ULA's Atlas V and Delta IV rockets that use the network to receive and distribute telemetry data during flight.

Payload Fairing (PLF)

The TDRS-M mission is encapsulated in the 4-m (14-ft) diameter extended payload fairing (EPF). The EPF is a bisector (two-piece shell) fairing consisting of aluminum skin/stringer construction with vertical split-line longerons. The vehicle's height with the EPF is approximately 191 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.

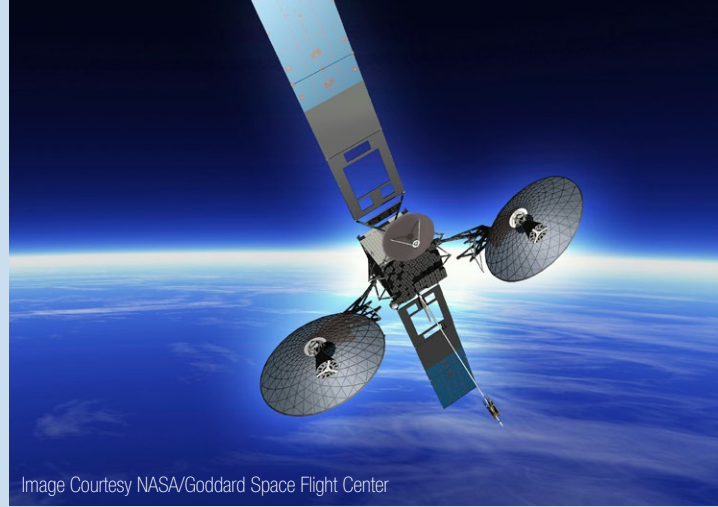
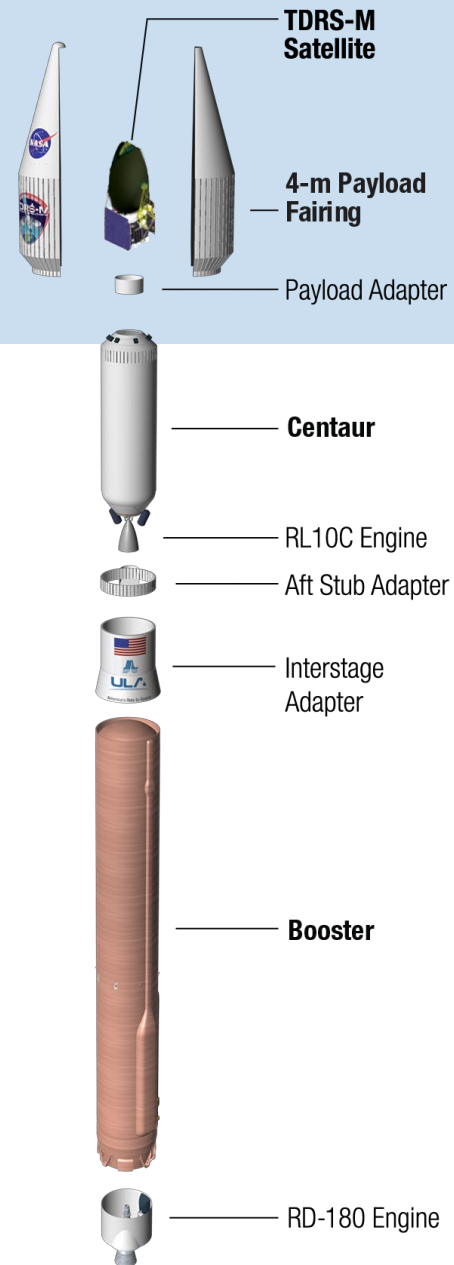


Image Courtesy NASA/Goddard Space Flight Center



ATLAS V 401

The Atlas V 401 rocket is the workhorse of the Atlas V fleet, delivering about half of all Atlas V missions to date. In its nearly 15 years of service, the 401 has launched a diverse set of missions including national security, science and exploration, commercial as well as International Space Station resupply.

First Launch: Aug. 21, 2002
Launches to date: 36

Performance to GTO: 4,750 kg (10,470 lb)
Performance to LEO-Reference: 9,800 kg (21,600 lb)



MISSION OVERVIEW

- 3rd ULA TDRS Mission
- 72nd Atlas V Launch
- 120th ULA Launch

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 115 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

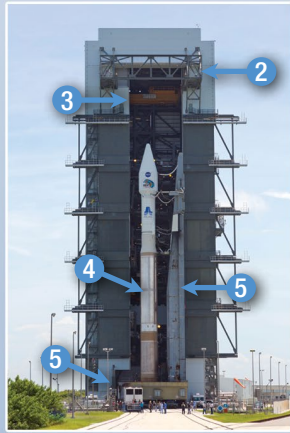
ATLAS V PRODUCTION AND LAUNCH

- 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

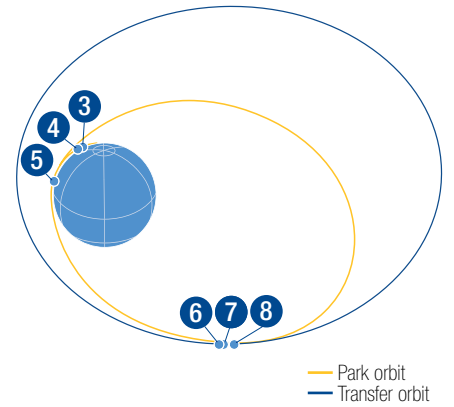
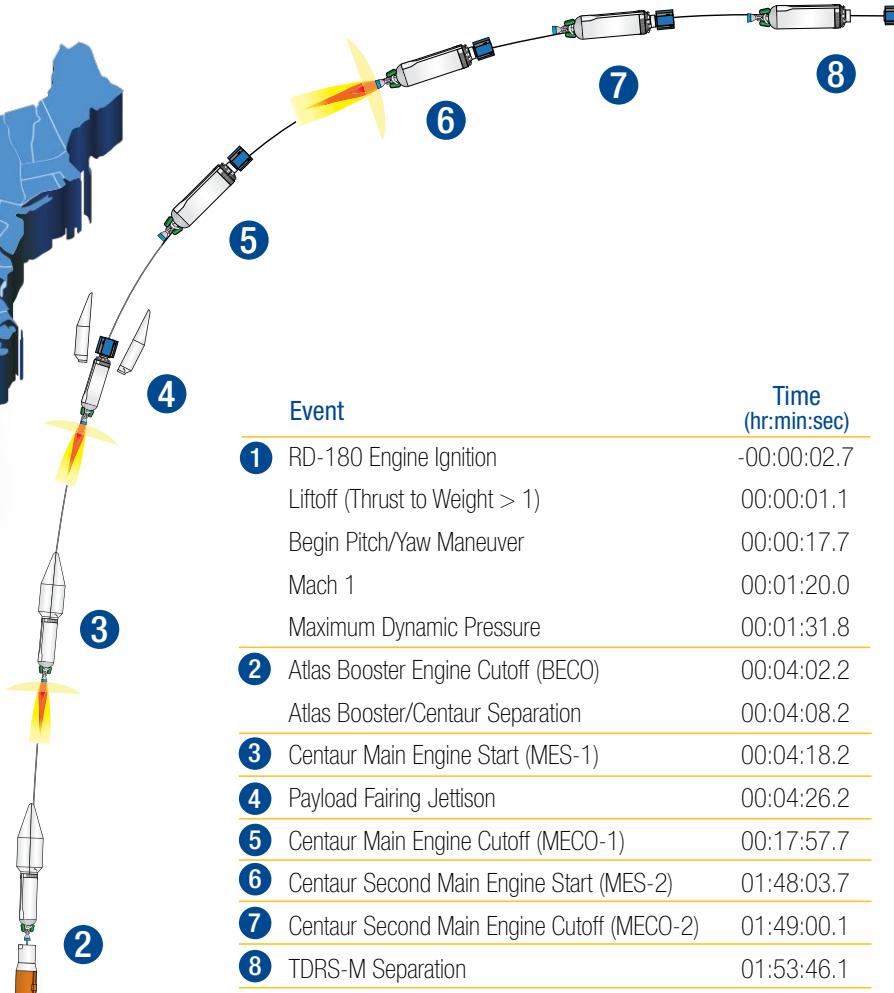


- 1 Atlas Spaceflight Operations Center (ASOC)** | Launch Control Center and Mission Director's Center
- 2 Delta Operations Center** | ISA, Centaur, Boattail Vertical Integration
- 3 Spacecraft Processing Facility** | Spacecraft processing, testing and encapsulation
- 4 Vertical Integration Facility**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

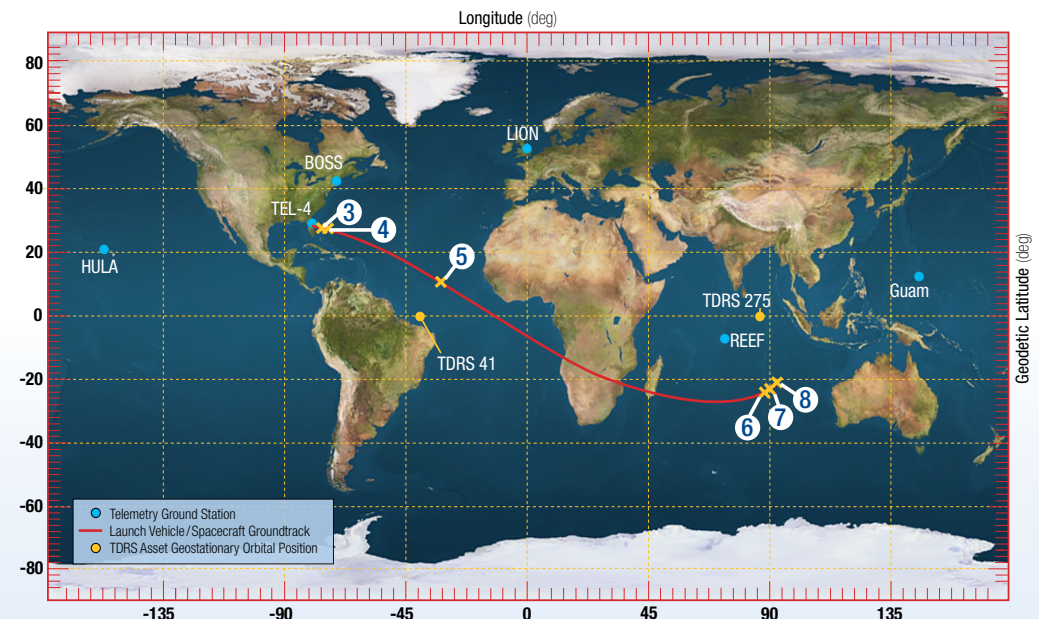
- 1 Vertical Integration Facility (VIF)** (See inset)
- 2 Bridge Crane Hammerhead**
- 3 Bridge Crane**
- 4 Launch Vehicle**
- 5 Mobile Launch Platform (MLP)**
- 6 Centaur LO₂ Storage**
- 7 High Pressure Gas Storage**
- 8 Booster LO₂ Storage**
- 9 Pad Equipment Building (PEB)**
- 10 Pad ECS Shelter**



MISSION PROFILE AND GROUND TRACE



TDRS-M Orbit at Separation:
 Perigee: 2,505.5 nmi | Apogee: 19,323.8 nmi
 Inclination: 26.2 deg | Argument of Perigee 180.0 deg



All Values Approximate