

## MISSION

A United Launch Alliance (ULA) Delta IV Medium+ (5,4) rocket will deliver the tenth Wideband Global SATCOM (WGS) satellite to supersynchronous transfer orbit. Liftoff will occur from Space Launch Complex-37 at Cape Canaveral Air Force Station (CCAFS), FL.

WGS-10, the fourth Block II follow-on satellite, supports communications links in the X-band and Ka-band spectra. While Block I and II satellites can instantaneously filter and downlink up to 4.410 GHz, WGS-10 can filter and downlink up to 8.088 GHz of bandwidth. Depending on the mix

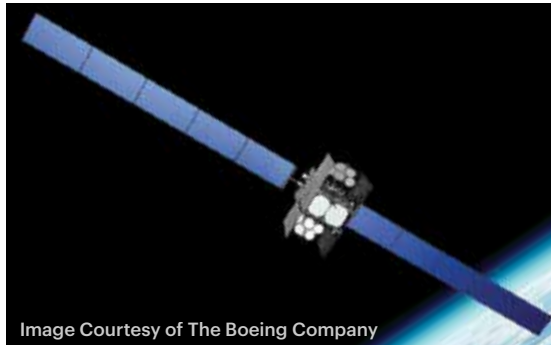


Image Courtesy of The Boeing Company

## LAUNCH VEHICLE

### Payload Fairing (PLF)

The PLF is a composite bisector (two-piece shell), 5-meter diameter fairing. The PLF encapsulates the spacecraft to protect it from the launch environment on ascent. The vehicle's height, with the 47-ft tall PLF, is approximately 218 ft.

### Delta Cryogenic Second Stage (DCSS)

The DCSS propellant tanks are structurally rigid and constructed of formed aluminum plate, spun-formed aluminum domes and aluminum ring forgings. It is a cryogenic liquid hydrogen/liquid oxygen-fueled vehicle, powered by a single RL10B-2 engine that produces 24,750 lbf of thrust. The DCSS cryogenic tanks are insulated with a spray-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.

### Booster

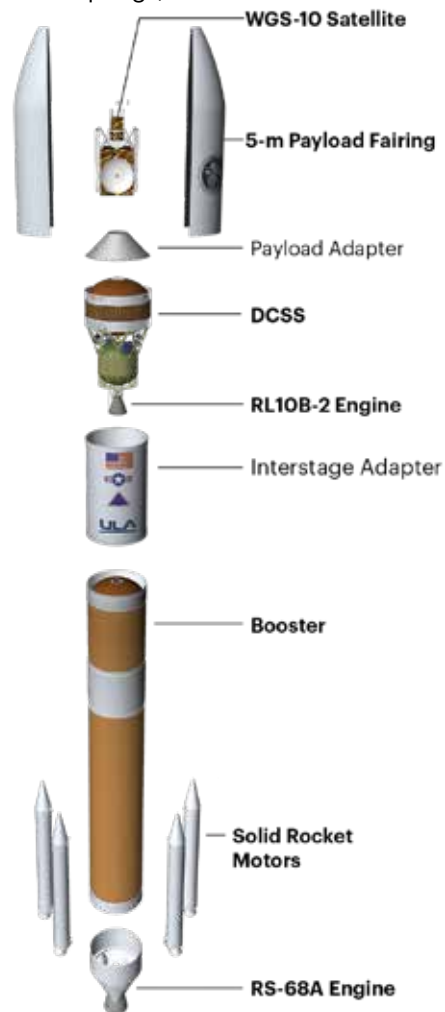
The Delta IV common booster core (CBC) tanks are structurally rigid and constructed of isogrid aluminum barrels, spun-formed aluminum domes and machined aluminum tank skirts. Delta IV booster propulsion is provided by the throttleable RS-68A engine system which burns cryogenic liquid hydrogen and liquid oxygen and delivers 705,250 lbf of thrust at sea level. The booster's cryogenic tanks are insulated with a combination of spray-on and bond-on insulation and helium-purged insulation blankets. The booster is controlled by the DCSS avionics system, which provides guidance, flight control. Four solid rocket motors (SRM) generate the additional power required at liftoff, with each SRM providing 281,000 lbf of thrust. The SRMs are 5 ft in diameter, 53 ft long and are constructed of a graphite-epoxy composite.

of ground terminals, data rates and modulation and coding schemes employed, a single WGS satellite can support data transmission rates over 6 Gbps, and WGS-10 with its advanced digital channelizer may support more than 11 Gbps.

WGS has 19 independent coverage areas, 18 of which can be positioned throughout its field-of-view. This includes eight steerable/shapeable X-band beams formed by separate transmit/receive phased arrays; 10 Ka-band beams served by independently steerable diplexed antennas; and one transmit/receive X-band Earth-coverage beam. WGS can tailor coverage areas and connect X-band and Ka-band users anywhere within its field-of-view. The X-band phased array antenna enables anti-jam functionality without sacrificing performance.

Five globally-located Army Wideband SATCOM Operations Centers provide 24/7 payload monitoring and command and control of the WGS constellation. Each Global Satellite Configuration and Control Element has the capability to control up to ten WGS satellites at a time.

Spacecraft platform control and anomaly resolution is accomplished by the 4th Space Operations Squadron at Schriever Air Force Base in Colorado Springs, CO.



## DELTA IV



The Delta IV family of launch vehicles combines design simplicity, manufacturing efficiency, and streamlined mission and vehicle integration to meet customer launch requirements. The Delta IV Medium+ (5,4) configuration has launched seven WGS satellites.

**First Launch:** Dec. 5, 2009  
**Launches to date:** 7

**Performance to GTO:**  
6,890 kg (15,109 lb)  
**Performance to LEO-Reference:**  
13,370 kg (30,250 lb)

## MISSION SUCCESS

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 130 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.

# MISSION OVERVIEW



Supporting the Warfighter with Enhanced Communications Capabilities

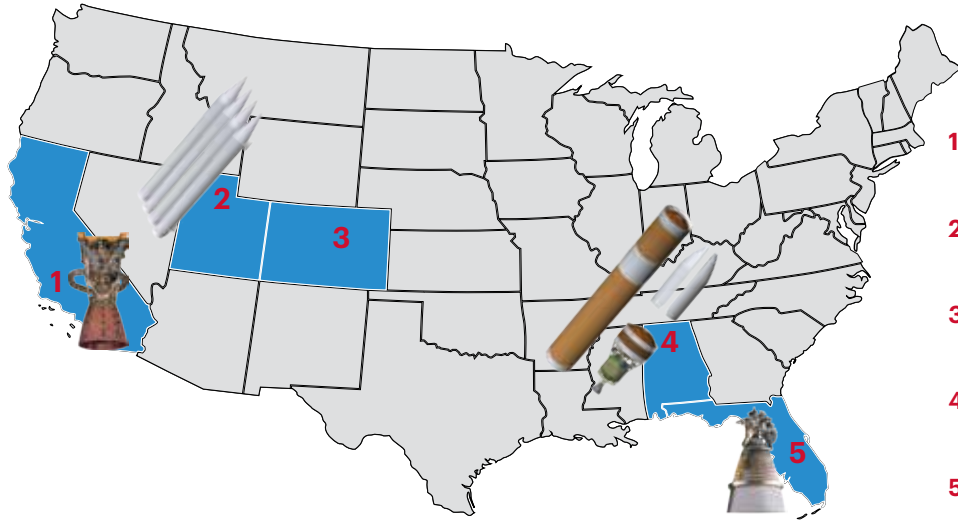


ulalaunch.com

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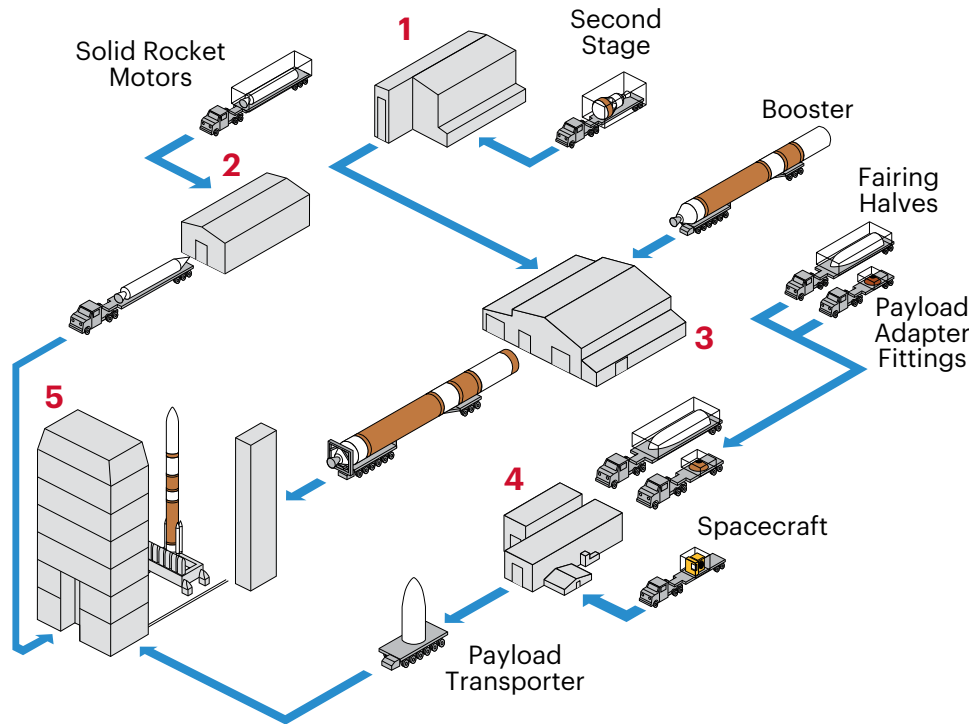


# PRODUCTION



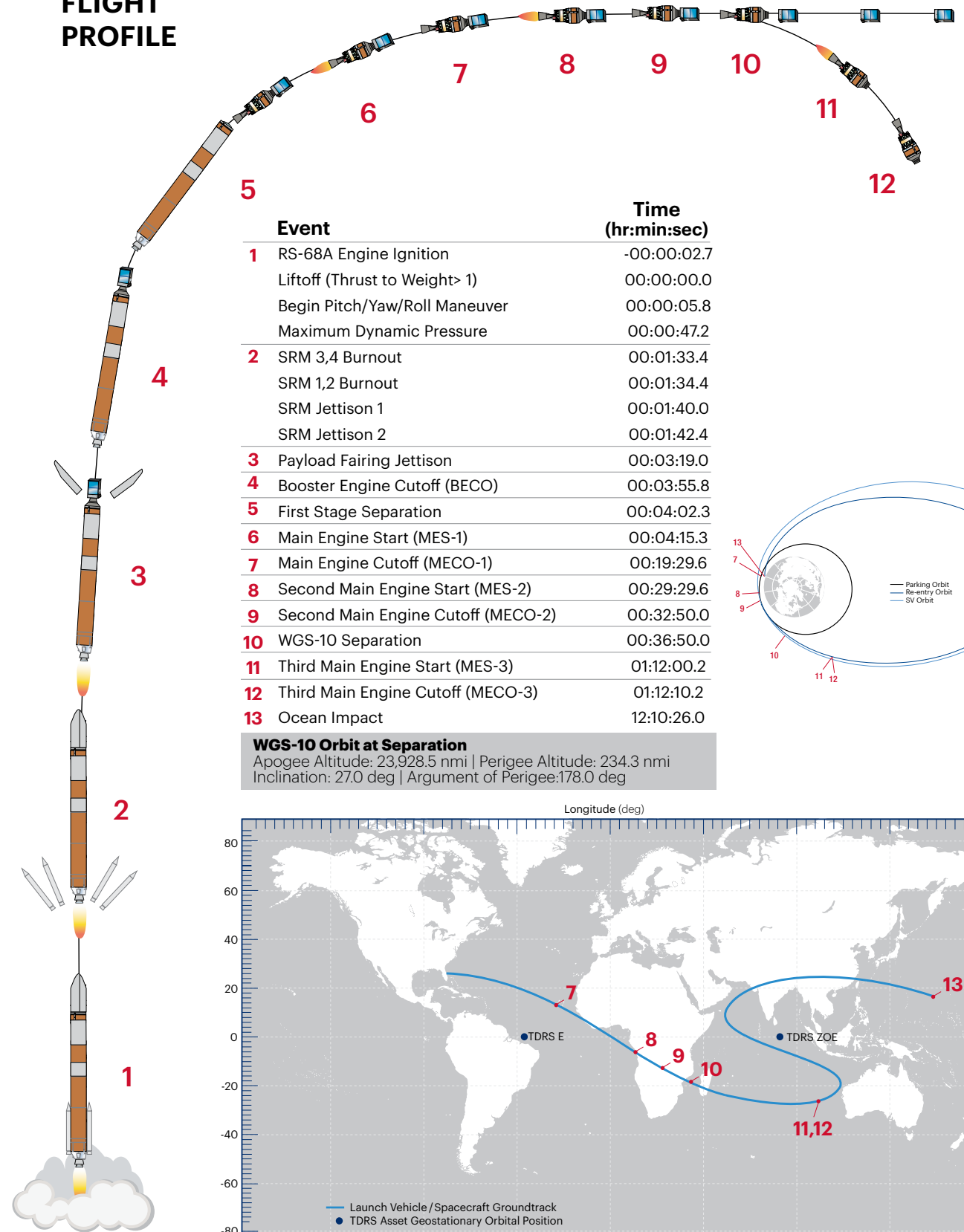
- 1 De Soto, CA**  
RS-68A Engine Fabrication at Aerojet Rocketdyne
- 2 Brigham City, UT**  
Solid Rocket Motor Fabrication at Northrop Grumman
- 3 Denver, CO**  
ULA Headquarters & Design Center Engineering
- 4 Decatur, AL**  
ULA Booster, Payload Fairing and Second Stage Fabrication
- 5 West Palm Beach, FL**  
RL10 Engine Fabrication at Aerojet Rocketdyne

# SPACE LAUNCH COMPLEX-37 PROCESSING



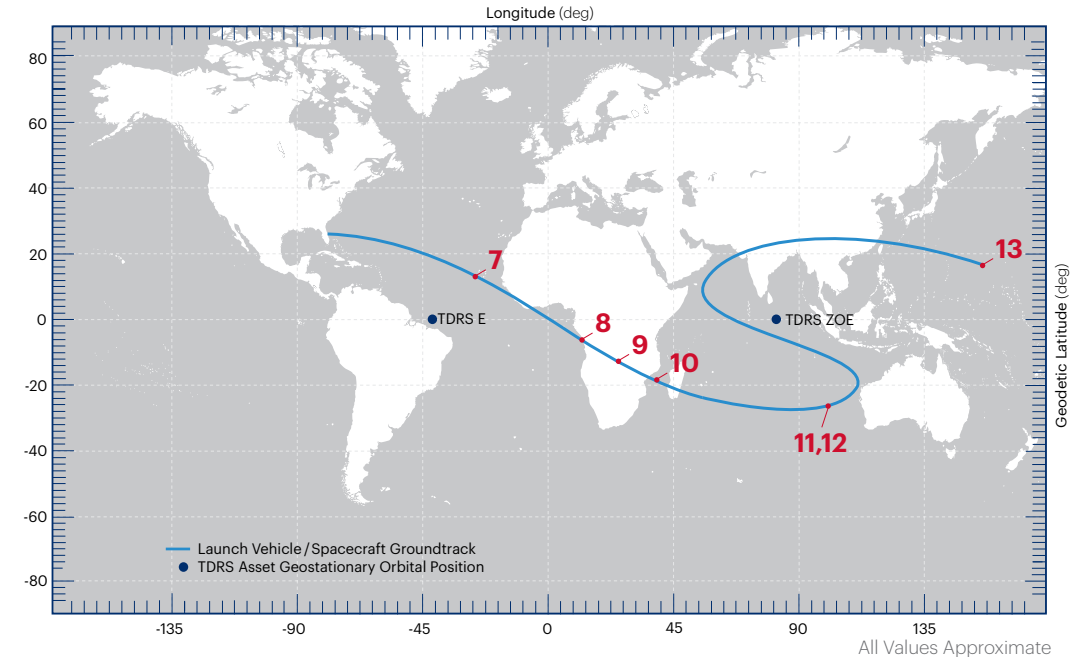
- 1 Delta Operations Center**  
ISA, Centaur, Boattail & Vertical Integration
- 2 Receipt Inspection Shop**  
Receiving, Inspection, Staging & Final Processing
- 3 Horizontal Integration Facility**  
Receiving, Inspection & Vehicle Integration
- 4 Spacecraft Processing Facility**  
Spacecraft Processing, Testing & Encapsulation
- 5 Mobile Service Tower**  
Launch Vehicle Integration & Testing, Spacecraft Mate & Integrated Operations

# FLIGHT PROFILE



Event	Time (hr:min:sec)
<b>1</b> RS-68A Engine Ignition	-00:00:02.7
Liftoff (Thrust to Weight > 1)	00:00:00.0
Begin Pitch/Yaw/Roll Maneuver	00:00:05.8
Maximum Dynamic Pressure	00:00:47.2
<b>2</b> SRM 3,4 Burnout	00:01:33.4
SRM 1,2 Burnout	00:01:34.4
SRM Jettison 1	00:01:40.0
SRM Jettison 2	00:01:42.4
<b>3</b> Payload Fairing Jettison	00:03:19.0
<b>4</b> Booster Engine Cutoff (BECO)	00:03:55.8
<b>5</b> First Stage Separation	00:04:02.3
<b>6</b> Main Engine Start (MES-1)	00:04:15.3
<b>7</b> Main Engine Cutoff (MECO-1)	00:19:29.6
<b>8</b> Second Main Engine Start (MES-2)	00:29:29.6
<b>9</b> Second Main Engine Cutoff (MECO-2)	00:32:50.0
<b>10</b> WGS-10 Separation	00:36:50.0
<b>11</b> Third Main Engine Start (MES-3)	01:12:00.2
<b>12</b> Third Main Engine Cutoff (MECO-3)	01:12:10.2
<b>13</b> Ocean Impact	12:10:26.0

**WGS-10 Orbit at Separation**  
 Apogee Altitude: 23,928.5 nmi | Perigee Altitude: 234.3 nmi  
 Inclination: 27.0 deg | Argument of Perigee: 178.0 deg



All Values Approximate