

DELTA IV GPS IIF-6 MISSION

A United Launch Alliance Delta IV Medium+ (4,2) will deliver the GPS IIF-6 satellite to semi-synchronous circular orbit. Liftoff will occur from Space Launch Complex 37 at Cape Canaveral Air Force Station, FL.

The Navstar GPS is a constellation of satellites that provides navigation data to military and civilian users worldwide. The system is operated and controlled by the 50th Space Wing, located at Schriever Air Force Base, CO.

GPS utilizes 24 satellites, in six different planes, with a minimum of four satellites per plane, positioned in orbit approximately 11,000 miles above the Earth's surface. The satellites continuously transmit digital radio signals pertaining to the exact time (using atomic clocks) and exact location of the satellites. The GPS IIF series have a design life of 12 years. With the proper equipment, users can receive these signals to calculate time, location, and velocity. The signals are so accurate that time can be measured to within a millionth of a second, velocity within a fraction of a mile per hour, and location to within feet. Receivers have been developed for use in aircraft, ships, land vehicles, and to hand carry.

As a result of increased civil and commercial use as well as experience in military operations, the USAF has added the following capabilities and technologies to the GPS IIF series to sustain the space and control segments while improving mission performance:

- Two times greater predicted signal accuracy than heritage satellites.
- New L5 signals for more robust civil and commercial aviation.
- An on-orbit, reprogrammable processor, receiving software uploads for improved system operation.
- Military signal "M-code" and variable power for better resistance to jamming hostile environments, meeting the needs of emerging doctrines of navigation warfare.



The ULA team is proud to be the launch provider for the U.S. Air Force (USAF) Global Positioning System (GPS) Directorate by delivering replenishment satellites aboard Atlas V and Delta IV launch vehicles. GPS IIF-6 is one of the next generation GPS satellites, incorporating various improvements to provide greater accuracy, increased signals, and enhanced performance for users.

The ULA team is focused on attaining Perfect Product Delivery for the GPS IIF-6 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).

We sincerely thank the entire team, which consists of the USAF, The Aerospace Corporation, ULA, and major suppliers of ULA.

Go Delta, Go GPS!

Jim Spornick
Vice President, Atlas and Delta Programs



GPS IIF-6

Delta IV

Payload Fairing (PLF)

The PLF is a composite bisector (two-piece shell), 4-meter diameter fairing. The PLF encapsulates the spacecraft to protect it from the launch environment on ascent. The vehicle's height, with the 38.5-ft tall PLF, is approximately 206 ft.

Delta Cryogenic Second Stage (DCSS)

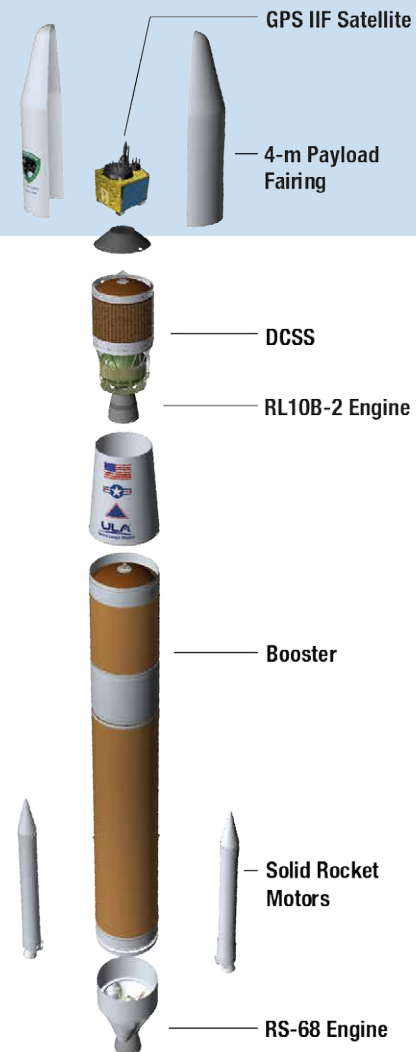
The DCSS stage propellant tanks are structurally rigid and constructed of isogrid aluminum ring forgings and spun-formed aluminum domes. It is a cryogenic liquid hydrogen/liquid oxygen-fueled vehicle, and uses a single RL10B-2 engine that produces 24,750 lb of thrust. The DCSS cryogenic tanks are insulated 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.

Booster

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. 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.

Solid Rocket Motors (SRMs)

The SRMs are 5 ft in diameter and 53 ft long and constructed of a graphite-epoxy composite. The SRMs are connected to the booster by two ball-and-socket joints and structural thrusters.



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 75 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. Reliable launch, real-world benefits.

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MISSION OVERVIEW

- 32nd ULA Launch for the United States Air Force
- 26th Delta IV Launch
- 6th GPS Block IIF Satellite
- 53rd Operational GPS Satellite to Launch on a ULA Rocket

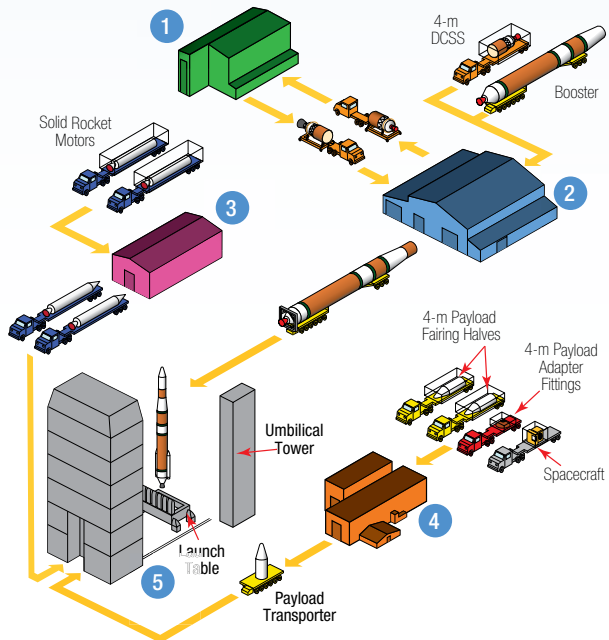


DELTA IV PRODUCTION AND LAUNCH

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



- 1 Delta Operations Center (DOC)** | Launch Control Center and Mission Director's Center
- 2 Horizontal Integration Facility** | Receiving, inspection and integration
- 3 Receipt Inspection Shop** | Receiving, inspection and processing
- 4 Spacecraft Processing Facility** | Spacecraft processing, testing and encapsulation
- 5 Mobile Service Tower** | Launch vehicle integration and testing, spacecraft mate and integrated operations

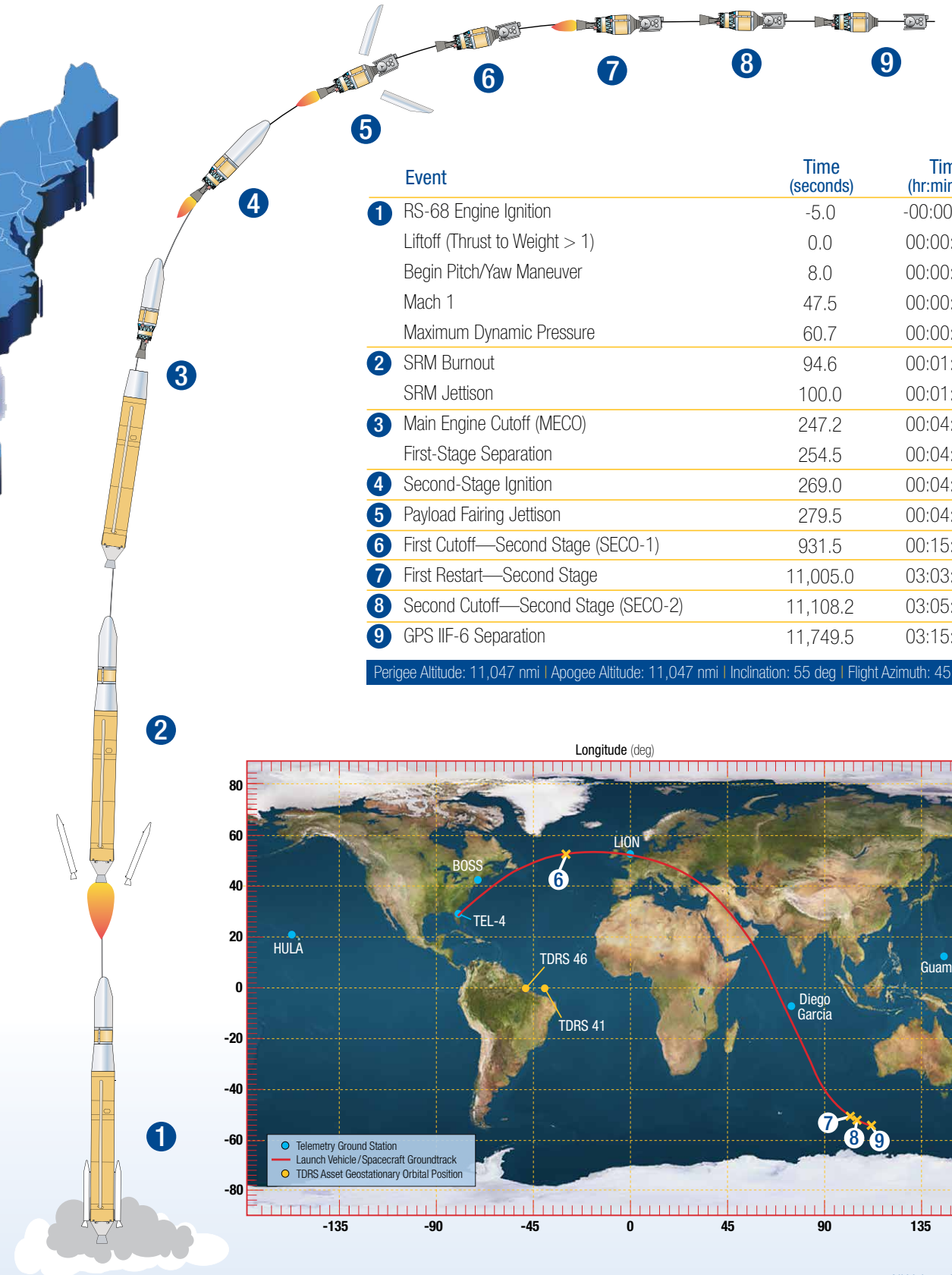


- 1 Mobile Service Tower (MST)**
- 2 Launch Vehicle**
- 3 Launch Table**
- 4 Fixed Umbilical Tower (FUT)**
- 5 Lightning Protection Towers**
- 6 LH2 Storage Tank**
- 7 LO2 Storage Tank**



Space Launch Complex-37

MISSION PROFILE & GROUND TRACE



Event	Time (seconds)	Time (hr:min:sec)
1 RS-68 Engine Ignition	-5.0	-00:00:05.0
Lift-off (Thrust to Weight > 1)	0.0	00:00:00.0
Begin Pitch/Yaw Maneuver	8.0	00:00:08.0
Mach 1	47.5	00:00:47.5
Maximum Dynamic Pressure	60.7	00:00:60.7
2 SRM Burnout	94.6	00:01:34.6
SRM Jettison	100.0	00:01:40.0
3 Main Engine Cutoff (MECO)	247.2	00:04:07.2
First-Stage Separation	254.5	00:04:14.5
4 Second-Stage Ignition	269.0	00:04:29.0
5 Payload Fairing Jettison	279.5	00:04:39.5
6 First Cutoff—Second Stage (SECO-1)	931.5	00:15:31.5
7 First Restart—Second Stage	11,005.0	03:03:25.0
8 Second Cutoff—Second Stage (SECO-2)	11,108.2	03:05:08.2
9 GPS IIF-6 Separation	11,749.5	03:15:49.5

Perigee Altitude: 11,047 nmi | Apogee Altitude: 11,047 nmi | Inclination: 55 deg | Flight Azimuth: 45.55 deg

