DELTA IV AFSPC-4 MISSION

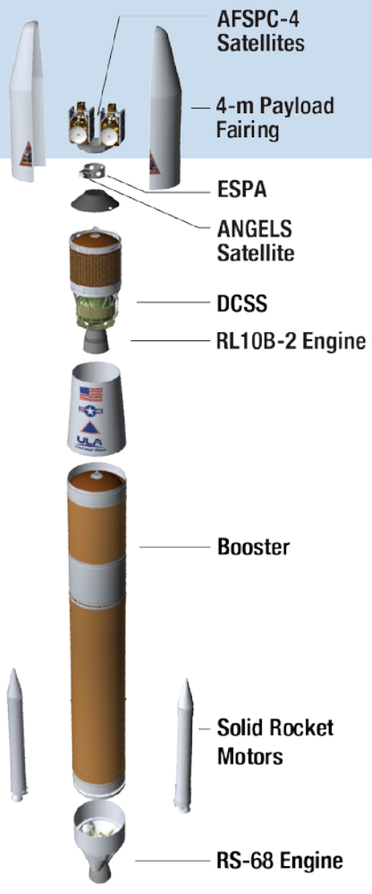
A United Launch Alliance Delta IV Medium+ (4,2) will deliver two Geosynchronous Space Situational Awareness Program (GSSAP) satellites to near-geosynchronous orbit and will also carry an Automated Navigation and Guidance Experiment for Local Space (ANGELS) satellite. Liftoff will occur from Space Launch Complex 37 at Cape Canaveral Air Force Station, FL.

The twin GSSAP spacecraft, built by Orbital Sciences Corporation, will support U.S. Strategic Command space surveillance operations as a dedicated Space Surveillance Network (SSN) sensor. The GSSAP will also support Joint Functional Component Command for Space (JFCC SPACE) tasking to collect space situational awareness data, allowing for more accurate tracking and characterization of man-made orbiting objects. The satellites will have unobstructed and distinct vantage points for viewing resident space objects orbiting earth without the disruption of weather or atmosphere that can limit ground-based systems. Data from the GSSAP will uniquely contribute to timely and accurate orbital predictions, enhancing our knowledge of the geosynchronous orbit environment and further enabling space flight safety to include satellite collision avoidance.

The GSSAP will communicate information through the world-wide Air Force Satellite Control Network (AFSCN) ground stations, then to Schriever Air Force Base, CO where 50th Space Wing satellite operations will oversee day-to-day command and control operations.

The ANGELS satellite is managed by the Air Force Research Laboratory (AFRL) Space Vehicles Directorate. As part of AFRL's research in advanced Space Situational Awareness (SSA), ANGELS examines techniques for providing a clearer picture of the environment surrounding our nation's vital space assets. Launch integration and flight operations of the ANGELS spacecraft are performed in partnership with the Department of Defense (DoD) Space Test Program (STP).

During the planned one-year mission life, ANGELS will test several new spacecraft technologies and operations methodologies. The spacecraft hosts an SSA sensor payload to evaluate techniques for detection, tracking, and characterization of space objects, as well as, attribution of actions in space. ANGELS will evaluate these SSA techniques in a limited region around the second stage of the Delta IV rocket, testing maneuvering concepts above geosynchronous earth orbit (GEO). Additional payloads that aid spacecraft operations include a GPS system for GEO and high-performance accelerometers. The GPS system uses advanced algorithms from NASA to receive GPS side lobe signals and generate near-continuous navigation solutions. The high-performance accelerometers precisely measure small spacecraft accelerations for enhanced guidance and navigation while the experimental on-board vehicle safety system explores methods for dramatically reducing the probability of collision with other space objects in an increasingly congested space environment.



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 is 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 (SRM)

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.

The ULA team is proud to be the launch provider for the U.S. Air Force Space Command (AFSPC) -4 mission comprising two Geosynchronous Space Situational Awareness Program (GSSAP) satellites and the Automated Navigation and Guidance Experiment for Local Space (ANGELS) satellite.

The GSSAP will uniquely contribute to timely and accurate orbital predictions, enhancing our knowledge of the geosynchronous orbit environment, and further enabling space flight safety to include satellite collision avoidance. ANGELS, a microsatellite, is designed to achieve a high level of safety and experimental flexibility.

The ULA team is focused on attaining Perfect Product Delivery for the AFSPC-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 partners: the USAF, AFRL, Orbital Sciences Corporation and major suppliers of ULA for their hard work and commitment to mission success.

Go Delta, Go AFSPC-4!

Jim Sponnick
Vice President, Atlas and Delta Programs

United Launch Alliance

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 80 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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DELTA

MISSION OVERVIEW

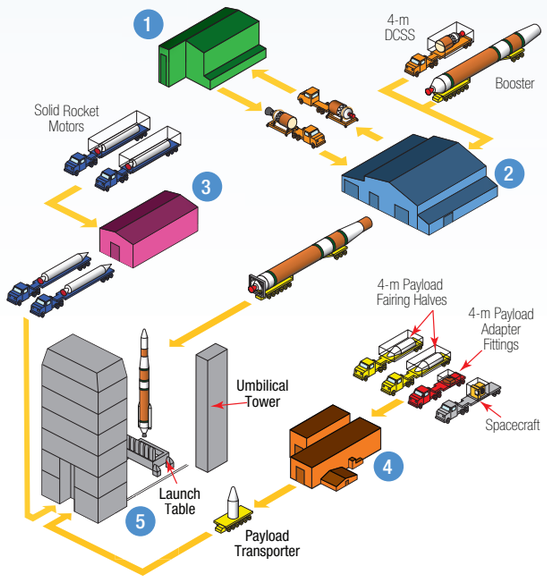
- 33rd ULA Launch for the United States Air Force
- 27th Delta IV Launch
- 1st and 2nd Geosynchronous Space Situational Awareness Program (GSSAP) System Satellites
- 1st EELV Secondary Payload Adapter (ESPA) to Launch on a Delta IV Rocket

United Launch Alliance

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

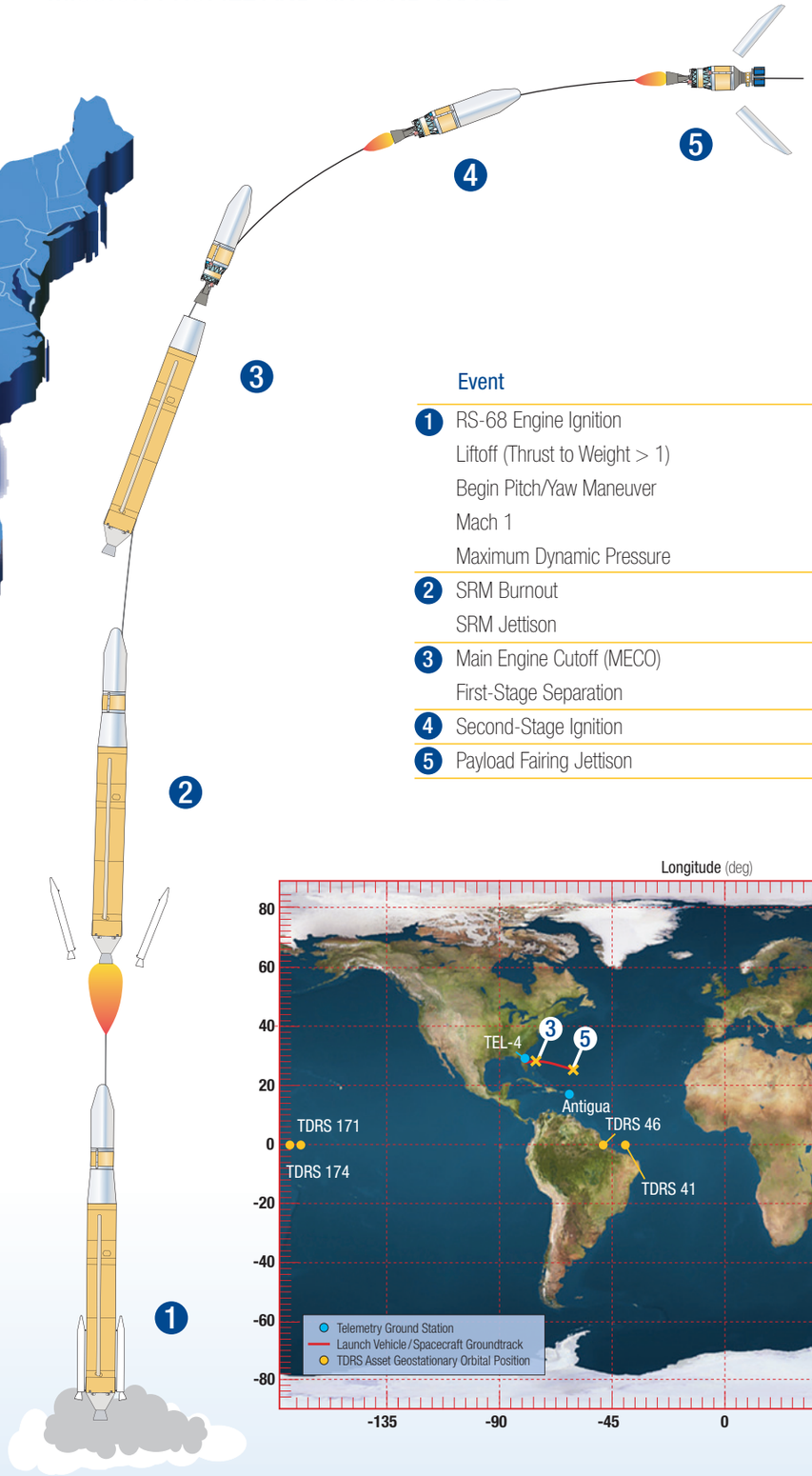
1. **Delta Operations Center (DOC)** | Launch Control Center and Mission Director's Center
2. **Horizontal Integration Facility** | Receiving, inspection and integration
3. **Receipt Inspection Shop** | Receiving, inspection and processing
4. **Spacecraft Processing Facility** | Spacecraft processing, 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 AND GROUND TRACE



	Event	Time (seconds)	Time (hr:min:sec)
1	RS-68 Engine Ignition	-5.0	-00:00:05.0
	Liftoff (Thrust to Weight > 1)	0.0	00:00:00.0
	Begin Pitch/Yaw Maneuver	8.0	00:00:08.0
	Mach 1	46.5	00:00:46.5
	Maximum Dynamic Pressure	59.3	00:00:59.3
2	SRM Burnout	94.1	00:01:34.1
	SRM Jettison	100.0	00:01:40.0
3	Main Engine Cutoff (MECO)	245.3	00:04:05.3
	First-Stage Separation	251.3	00:04:11.3
4	Second-Stage Ignition	265.8	00:04:25.8
5	Payload Fairing Jettison	276.0	00:04:36.0

All Values Approximate