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## DM-F3 Mission Book

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### Mission-At-A-Glance

#### LAUNCH WINDOW

(4-hour length)

23 Aug, 7:00 — 11:00 EST

#### LAUNCH SITE

Cape Canaveral Air Station,  
Fla. SLC 17B

#### LAUNCH VEHICLE PAYLOAD

Boeing Delta III  
DM-F3 Spacecraft



- 0.0 sec Liftoff
- 33.1 sec Mach 1
- 42.7 sec Maximum dynamic pressure
- 77.1 sec Ground-lit SRM burnout w/o TVC (3)
- 77.6 sec Ground-lit SRM burnout w/ TVC (3)
- 79.0 sec Air-lit SRM ignition (3)
- 80.5 sec Ground-lit SRM separation w/o TVC (3)
- 81.5 sec Ground-lit SRM separation w/ TVC (3)
- 156.2 sec Air-lit SRM burnout (3)
- 159.5 sec Air-lit SRM separation (3)
- 226.5 sec Jettison fairing
- 260.4 sec Main-engine cutoff (MECO)
- 269.0 sec Stage one and two separation
- 302.5 sec Stage two ignition signal
- 820.3 sec Begin post-SECO hydrazine settling
- 820.6 sec First cutoff – Stage two (SECO 1)

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## Delta III DM-F3 Mission Book

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### DM-F3

The DM-F3 mission marks the third launch of the Boeing Delta III launch vehicle. This launch will place the 4348 kg (9586 lb) DM-F3 payload into a geosynchronous transfer orbit. To maximize vehicle performance, DM-F3 will demonstrate a propellant depletion shutdown (PDS) on the RL10B-2 second-stage engine.

Flying a mission profile that matches the last Delta III flight, DM-F3 will demonstrate the repeated performance of the systems verified during the last mission, and prove that the issues seen during the previous launch have been resolved. We will be able to compare the data gathered by a global network of tracking stations and a suite of on-board instrumentation on this mission with the complete set of flight data gathered from Delta 269.

Boeing, the U.S. Air Force, and the Colorado Center for Astrodynamics Research (CCAR) at the University of Colorado will utilize the simulated payload from the DM-F3 mission to conduct a variety of post-launch missions and studies.

In an unique partnership between the Air Force and private industry, Boeing has prepared the payload to assist in the calibration and testing of electro-optical space imaging systems. CCAR will conduct a series of studies to determine the effects of space weathering on the payload's surface materials and orbit.

Many thanks to the Boeing Delta III team, USAF, NASA, Pratt & Whitney, the Aerospace Corporation, and many of our commercial customers who through hard work and dedication to the Delta III program made this mission possible.

**Dan Marin**  
**Delta II/III Commercial Programs**  
**Expendable Launch Systems**  
**The Boeing Company**

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## DM-F3 Mission Book

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## DM-F3 Mission Description

- Spacecraft weight 4348 kg/9586 lb
- Injection orbit (defined at spacecraft separation)
  - Apogee altitude Maximize
    - TAG trajectory 13,719 nmi (25,408 km)
    - 100 nmi (185 km)
  - Perigee altitude 27.5°
  - Inclination 174.2°
  - Argument of perigee Propellant depletion shutdown (PDS)
- Second-stage probability of command shutdown (PCS) 0.1 Btu/ft<sup>2</sup>-sec (1135 W/m<sup>2</sup>)
- Free molecular heating rate at fairing separation -6°/sec
- Spin rate at spacecraft separation

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## DM-F3 Mission Launch Window

Date	Open — EST (hr:min)	Close — EST (hr:min)	Window (hr:min)
23 August, 2000	7:00	11:00	4:00

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### DM-F3 Sequence of Events

<b>Boost Sequence of Events</b>	<b>Time (hh:mm:ss)</b>
Liftoff	0.0 sec
Mach 1	33.1 sec
Maximum dynamic pressure	42.7 sec
Ground-lit solid motor burnout – without TVC* (3)	1 min 17.1 sec
Ground-lit solid motor burnout – with TVC* (3)	1 min 17.6 sec
Air-lit solid motor ignition (3)	1 min 19.0 sec
Ground-lit solid motor separation – with TVC* (3)	1 min 20.5 sec
Ground-lit solid motor separation – without TVC* (3)	1 min 21.5 sec
Air-lit solid motor burnout (3)	2 min 36.2 sec
Air-lit solid motor separation (3)	2 min 39.5 sec
Jettison fairing	3 min 46.5 sec
Main-engine cutoff (MECO)	4 min 20.4 sec
Stage one and two separation	4 min 29.0 sec
Stage two ignition signal	4 min 42.5 sec
Begin post-SECO hydrazine settling	13 min 40.3 sec
First cutoff – Stage two (SECO 1)	13 min 40.6 sec
<b>Injection Sequence of Events</b>	<b>Time (hh:mm:ss)</b>
Stage two restart ignition	21 min 55.5 sec
Second cutoff – Stage two (SECO 2)	24 min 38.8 sec
Begin maneuvers to spacecraft separation attitude	28 min 34.5 sec
End maneuvers to spacecraft separation attitude	34 min 24.5 sec
Begin spacecraft spin-up	36 min 02.5 sec
Spacecraft separation	36 min 18.5 sec
*Thrust Vector Control	

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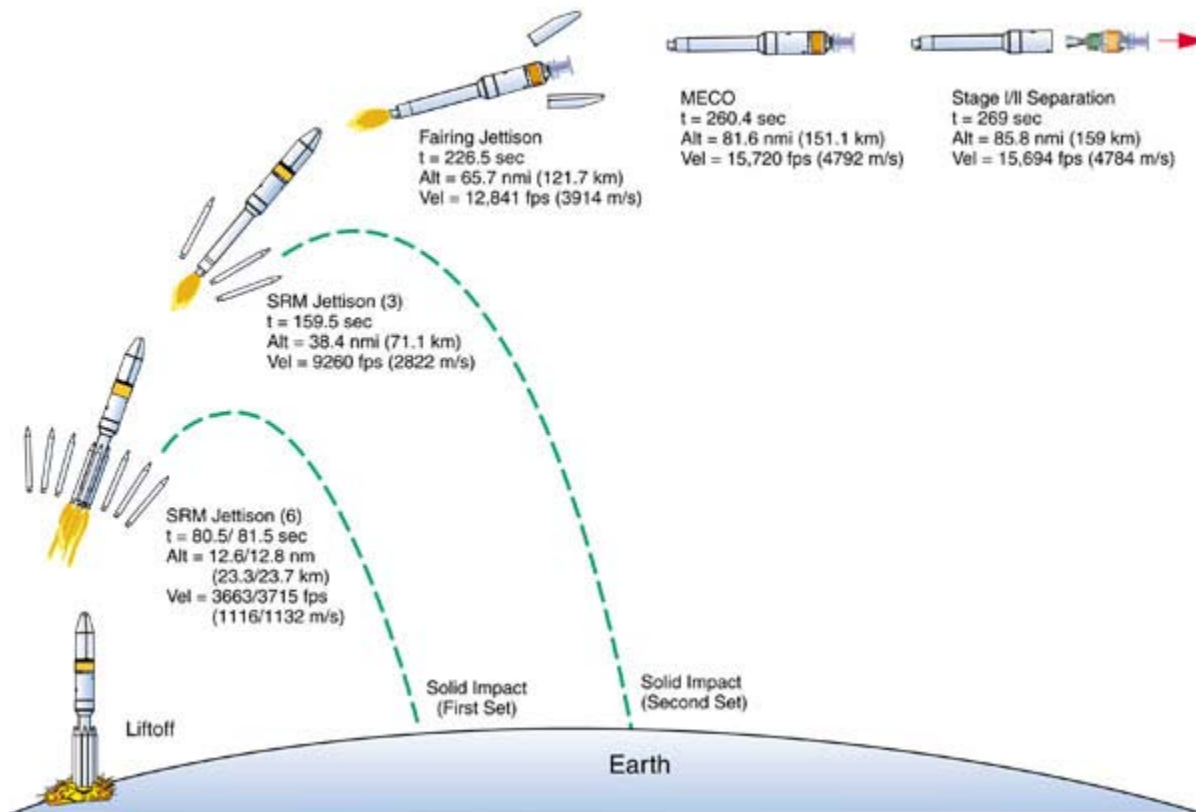


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## DM-F3 Flight Profile



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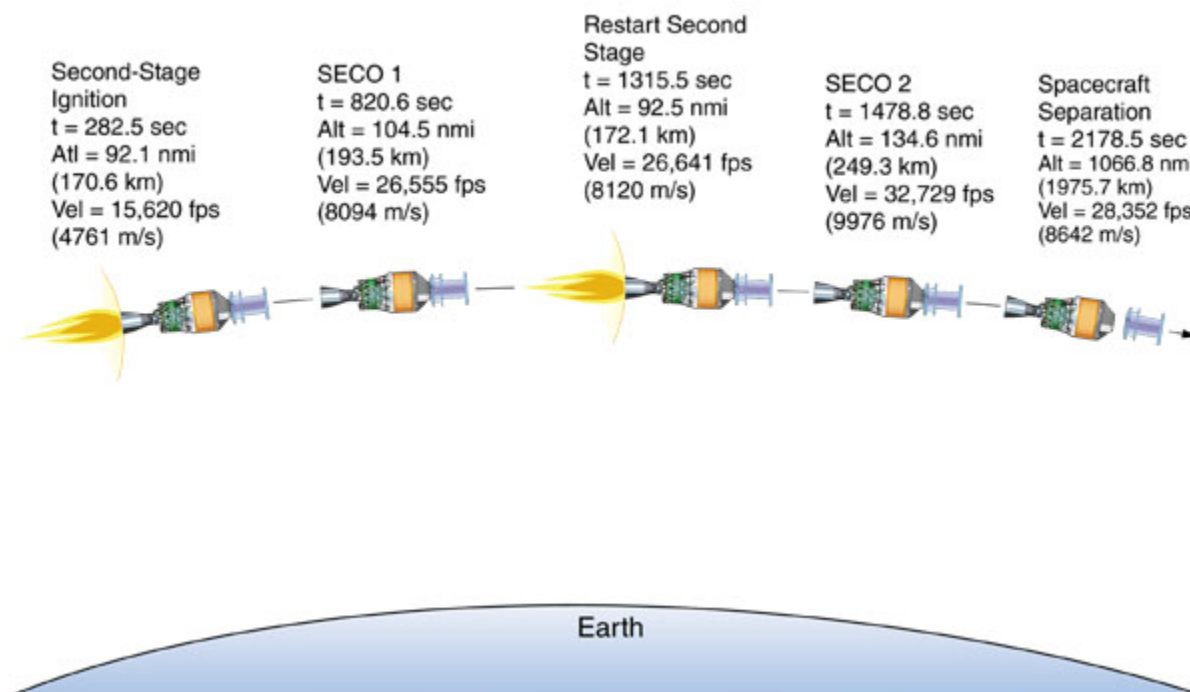


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## DM-F3 Flight Profile (cont.)



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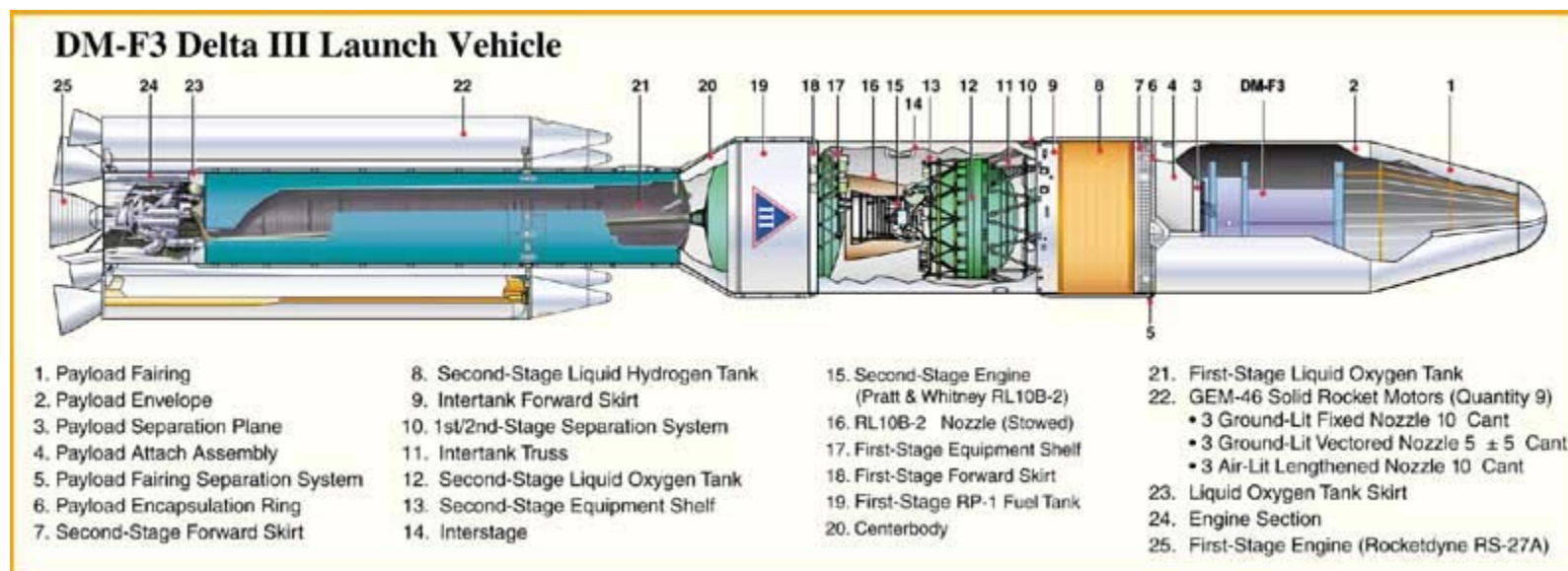


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## Delta III Cutaway View



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### DM-F3 Flight Mode Description (*continued*)

- Following SECO 1, vehicle is reoriented to restart attitude
- During transfer to apogee, vehicle performs coast phase thermal attitude maneuver (~1°/sec roll rate)
- Restart occurs near apogee and places the vehicle in a 916.5 km (494.9 nmi) circular orbit at 52.0° inclination, which results in a 920 km (496.8 nmi) average altitude above an equatorial radius of 6378.1 km (3443.9 nmi)
- Following SECO 2, the second stage is first reoriented for U1/U2 spacecraft separation and later for L1/L2 spacecraft separation
- Separation occurs in view of Dubbo telemetry tracking station
  - ~ 700-second pass
  - U1/U2 upper tier spacecraft separate at 35° relative to local horizontal in orbit plane
  - L1/L2 lower tier spacecraft separate at 75° relative to local horizontal in orbit plane

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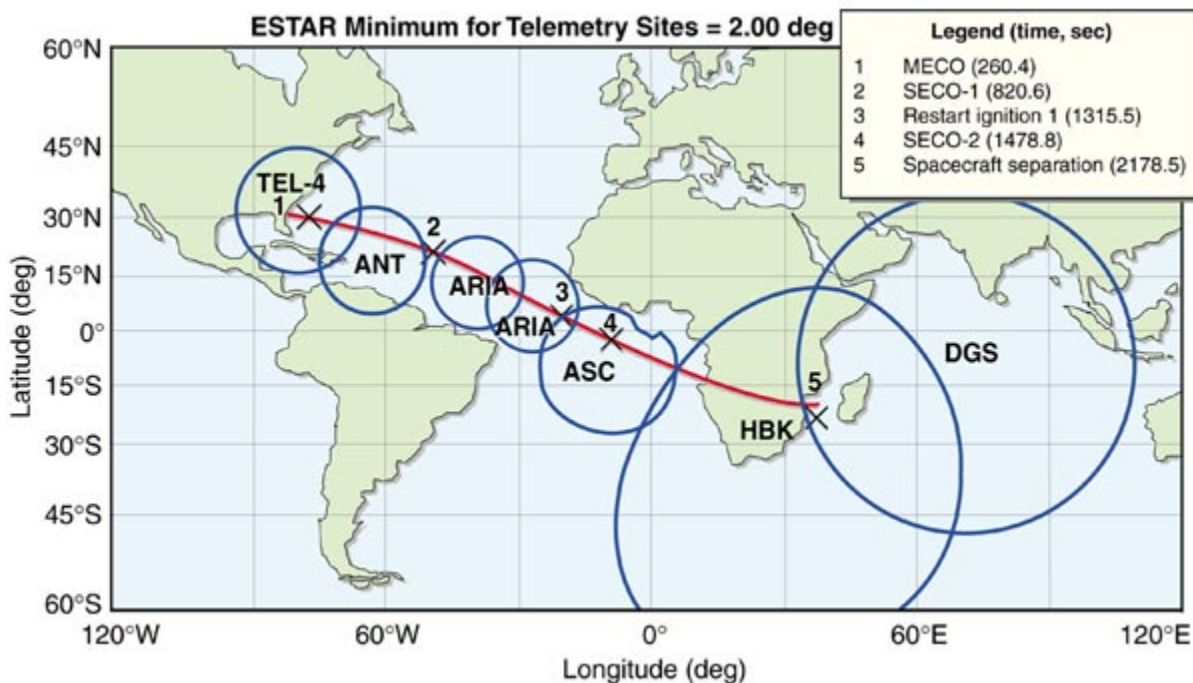


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## Orbit Trace



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## An Experienced and Capable Team



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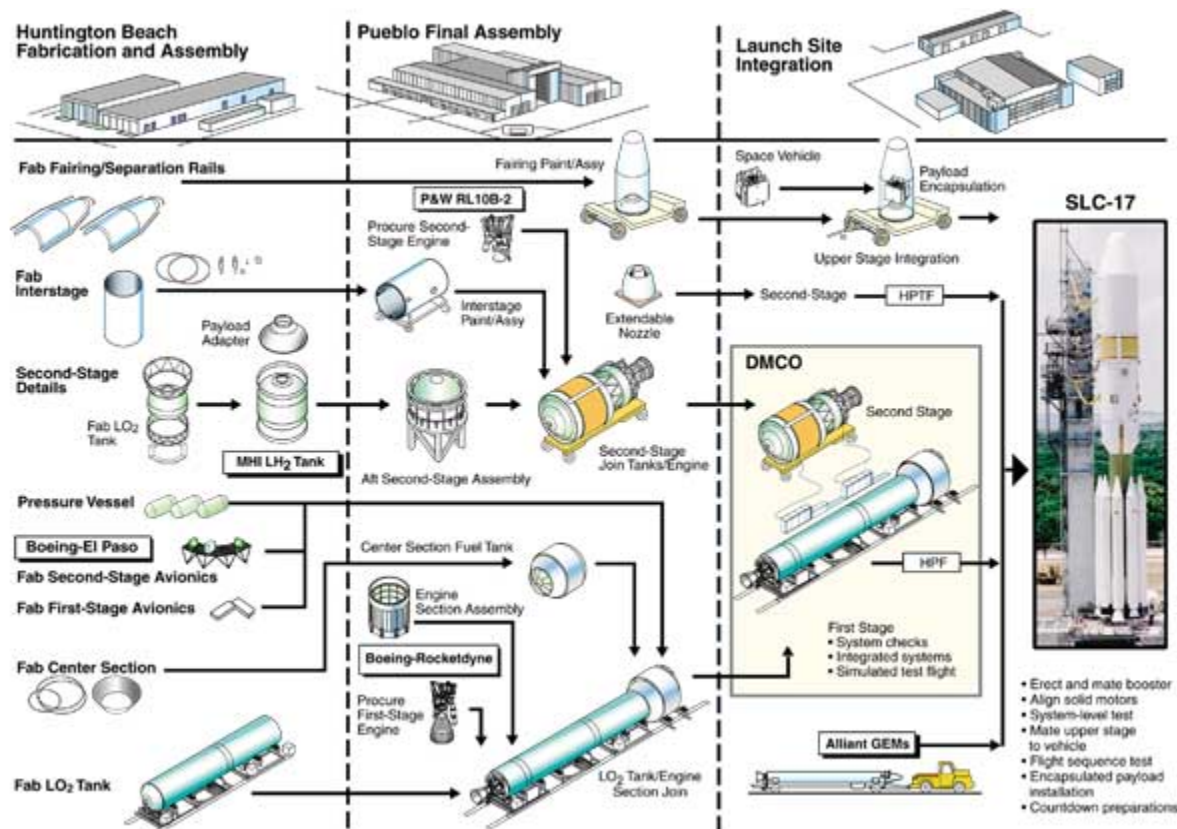


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## Delta III Production Flow



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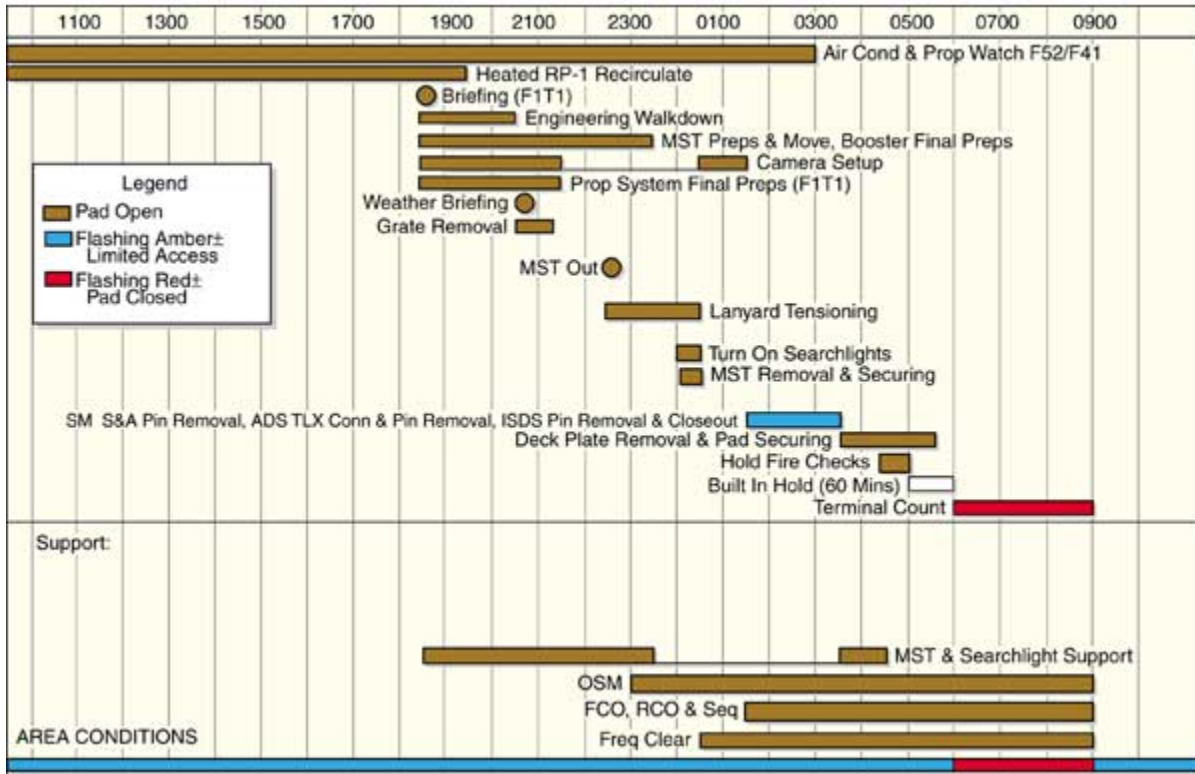


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# Delta Countdown T-1/T-0 Day



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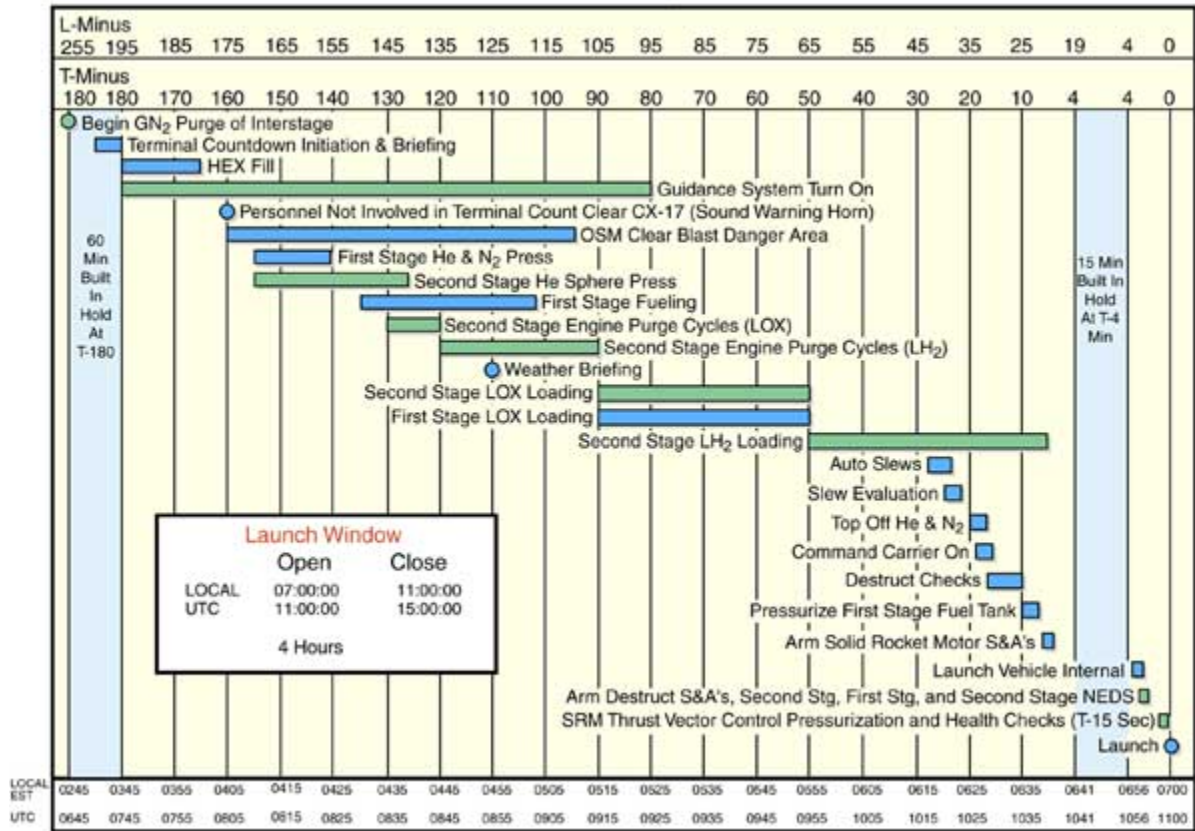


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# Terminal Countdown T-0 Day



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