Proton: In Service Since 1965

HISTORY

FIRST LAUNCH
16 July 1965
Proton-1 Spacecraft

FIRST COMMERCIAL LAUNCH
9 April 1996

FIRST COMMERCIAL LAUNCH USING BREEZE M UPPER STAGE
30 December 2002

400TH PROTON LAUNCH
15 December 2014

VEHICLE DESCRIPTION

TOTAL HEIGHT
58.2 m (191 ft)

GROSS LIFT-OFF WEIGHT
705,000 kg (1,554,000 lb)

PROPELLANT
UDMH and NTO

PAYLOAD FAIRING

This mission will utilize the standard PLF-BR-15255 commercial payload fairing which is 4.1 meters in diameter and 15.255 meters in length. The PLF encapsulates the satellite along with the Breeze M upper stage to provide protection from the dense atmosphere for the first 5 minutes and 47 seconds after launch.

BREEZE M UPPER STAGE

The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 20 kN (4,500 lbf). It is composed of a central core and an auxiliary propellant tank which is jettisoned in flight following depletion. The Breeze M control system includes an on-board computer, a three-axis gyro stabilized platform, and a navigation system. The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance.

BOOSTER

The Proton booster consists of three stages (described below). The overall height of the three stages of Proton is 42.3 meters (138.8 ft).

Third Stage

Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant closed-loop digital avionics system mounted in the Proton's third stage.

Second Stage

Of conventional cylindrical design, this stage is powered by three RD-0210 engines plus one RD-0211 engine and develops a vacuum thrust of 2.4 MN (540,000 lbf).

First Stage

The first stage consists of a central tank containing the oxidizer surrounded by six outboard fuel tanks. Each fuel tank also carries one of the six RD-276 engines that provide first stage power. Total first stage vacuum-rated level thrust is 11.0 MN (2,500,000 lbf).

The Proton and the Breeze M are built by Khrunichev State Research and Production Space Center.

EUTELSAT 5 West B

SATELLITE OPERATOR
Eutelsat
www.eutelsat.com

SATELLITE MANUFACTURER
Northrop Grumman
www.northropgrumman.com

PLATFORM
GeoStar-2

SEPARATED MASS
2864 kg

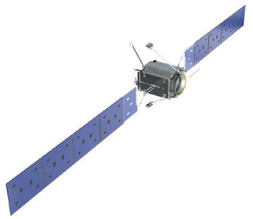
DESIGN LIFETIME
15+ Years

SATELLITE MISSION
EUTELSAT 5 West B is a Ku-band satellite to be located at 5° West, a key video neighbourhood addressing predominantly French, Italian and Algerian broadcast markets.

The new satellite will provide business continuity and improved quality for these markets via a Ku-band payload of 35 equivalent 36 MHz transponders connected to three service areas. Switchable transponders will also increase commercial flexibility.

Eutelsat selected Airbus Defence and Space and Northrop Grumman to build the new satellite. Airbus Defence and Space built the satellite's payload while the platform was manufactured by Northrop Grumman.

MEV-1



SATELLITE OPERATOR
SpaceLogistics LLC
www.northropgrumman.com

SATELLITE MANUFACTURER
Northrop Grumman
www.northropgrumman.com

PLATFORM
GeoStar-3

SEPARATED MASS
2326 kg

DESIGN LIFETIME
15+ Years

SATELLITE MISSION
The Northrop Grumman manufactured Mission Extension Vehicle-1 (MEV-1) delivers a groundbreaking satellite life-extension service through the company's wholly-owned subsidiary SpaceLogistics LLC. MEV-1 docks to client vehicles in geosynchronous orbit using existing satellite features to provide attitude and orbit control of the combined vehicle stack. MEV-1 has the ability to dock and undock several times during its 15 year design life, allowing it to service multiple customers. SpaceLogistics' initial service, using the MEV-1, will extend the life of the Intelsat 901 satellite for five years. SpaceLogistics is delivering the future of space by demonstrating the fundamentals of satellite servicing with MEV-1.

Mission Overview

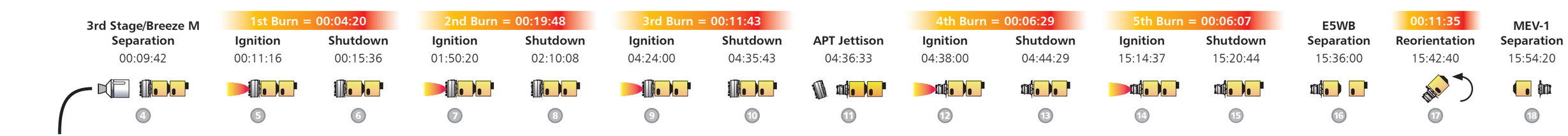
- 1st ILS Proton Launch in 2019
- 2nd ILS Dual Launch/1st Dual Launch with 2 Commercial Satellites
- 97th ILS Proton Launch Overall
- 8th Eutelsat Satellite Launched on ILS Proton
- 6th and 7th NGIS Satellites Launched on ILS Proton
- 1st SpaceLogistics LLC Satellite Launch

EUTELSAT 5 West B/ MEV-1

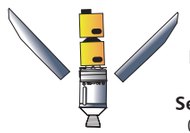
ILS

KHRUNICHEV STATE RESEARCH AND PRODUCTION SPACE CENTER

www.ilslaunch.com



EUTELSAT 5 West B/MEV-1

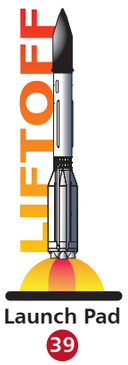


Payload Fairing Separation
00:05:47
3

2nd/3rd Stage Separation
00:05:27
2

1st/2nd Stage Separation
00:02:00
1

Launch Pad
39



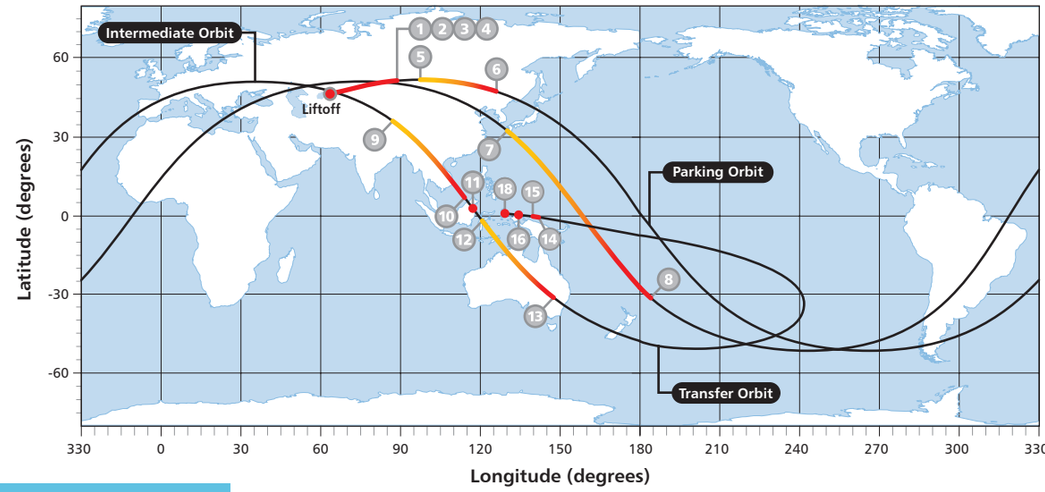
Launch Pad
39

- **Maximum Dynamic Pressure**
  00:01:02
- **Command Stage 1**
  (100% Thrust)
  -00:00:00.9
- **Stage 1 Ignition**
  (40% Thrust)
  -00:00:01.75
- **Ignition Start Sequence**
  -00:00:02.5

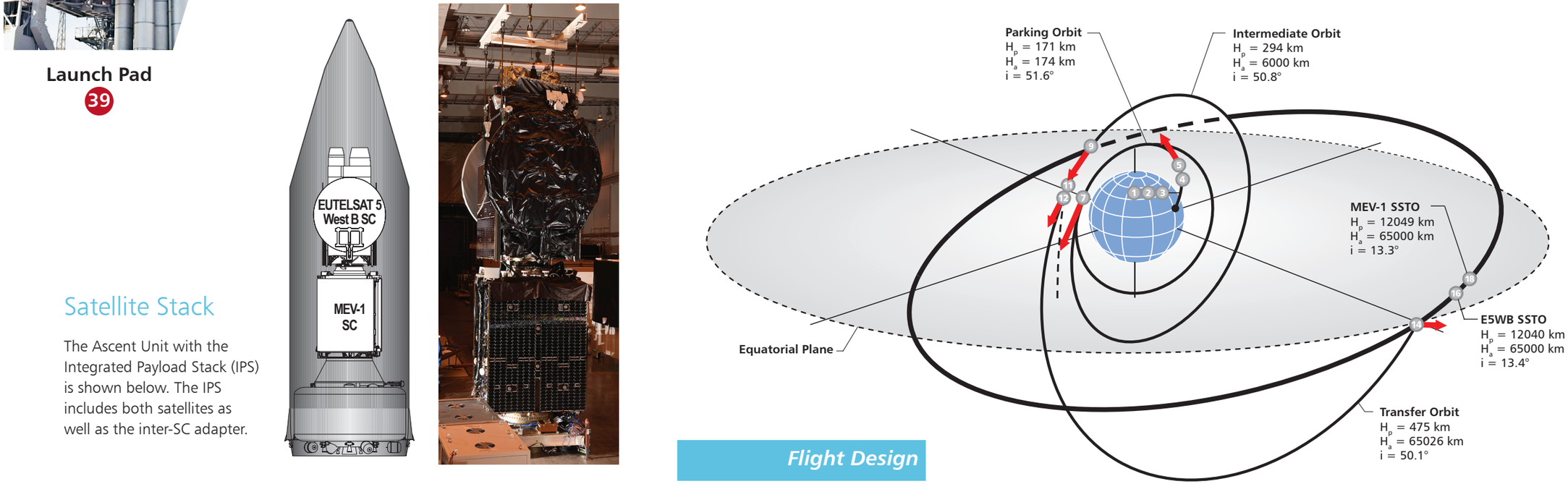
Ascent Profile

Mission Description

The Proton M/Breeze M launch vehicle, utilizing a 5-burn Breeze M Supersynchronous Transfer Orbit mission design, will lift off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the EUTELSAT 5 West B/MEV-1 satellites on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the EUTELSAT 5 West B/MEV-1 satellites) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned maneuvers to inject the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a supersynchronous transfer orbit. Separation of the EUTELSAT 5 West B and MEV-1 satellites is scheduled to occur approximately 15 hours, 36 minutes and 15 hours, 54 minutes after liftoff, respectively.



Ground Track



Flight Design

Satellite Stack

The Ascent Unit with the Integrated Payload Stack (IPS) is shown below. The IPS includes both satellites as well as the inter-SC adapter.