

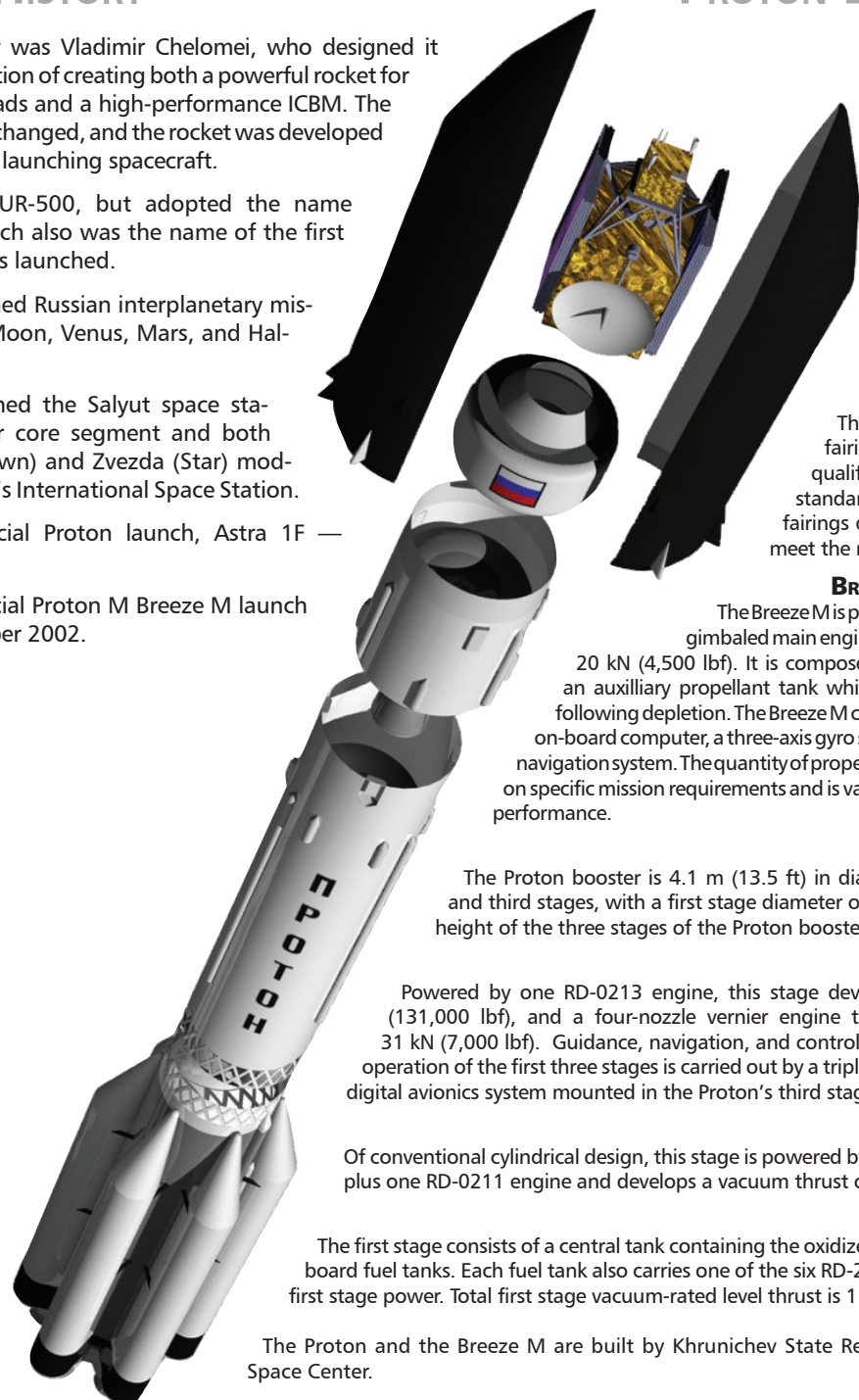
# THE VEHICLE

# THE SATELLITE

## PROTON HISTORY

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating both a powerful rocket for military payloads and a high-performance ICBM. The program was changed, and the rocket was developed exclusively for launching spacecraft.
- First named UR-500, but adopted the name "Proton," which also was the name of the first three payloads launched.
- Proton launched Russian interplanetary missions to the Moon, Venus, Mars, and Halley's Comet.
- Proton launched the Salyut space stations, the Mir core segment and both the Zarya (Dawn) and Zvezda (Star) modules for today's International Space Station.
- First commercial Proton launch, Astra 1F — 9 April 1996.
- First commercial Proton M Breeze M launch — 30 December 2002.

## PROTON DESCRIPTION



**TOTAL HEIGHT**  
58.2 m (191 ft)

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

**PROPELLANT**  
UDMH and NTO

**INITIAL LAUNCH**  
16 July 1965  
Proton-1 Spacecraft

**PAYLOAD FAIRINGS**  
There are multiple payload fairing designs presently qualified for flight, including standard commercial payload fairings developed specifically to meet the needs of our customers.

**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.

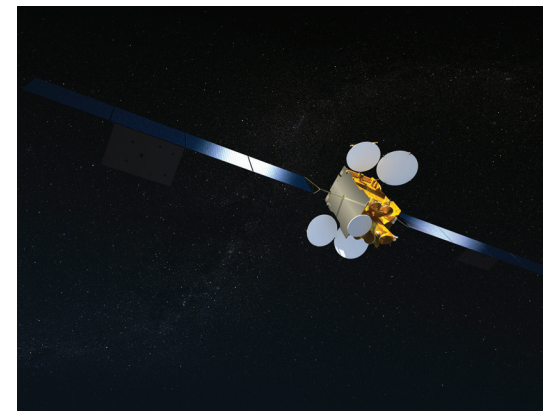
**PROTON BOOSTER**  
The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

**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 out-board 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 Khronichev State Research and Production Space Center.



**SATELLITE OPERATOR**  
SES  
[www.ses.com](http://www.ses.com)

**SATELLITE MANUFACTURER**  
Astrium  
[www.astrium.eads.net](http://www.astrium.eads.net)

**PLATFORM**  
Eurostar E3000

**SEPARATED MASS**  
6020 kg

**SATELLITE MISSION LIFETIME**  
15 Years

### SATELLITE MISSION

ASTRA 2E will carry Ku- and Ka-band payloads for the delivery of high-performance Direct-to-Home (DTH) and next generation broadband services in Europe, Middle East and Africa. Built by Astrium, Astra 2E will bring replacement and growth capacity at 28.2° East to enhance SES' fleet of over 50 geostationary satellites, and ensure reliable and secure connectivity to over 99% of the world's population.

**SES**  
your satellite company

**ASTRIUM**  
AN EADS COMPANY



## Mission Overview



**Experience ILS: Achieve Your Mission**  
QUALITY | PERFORMANCE | EXPERIENCE | DEDICATION

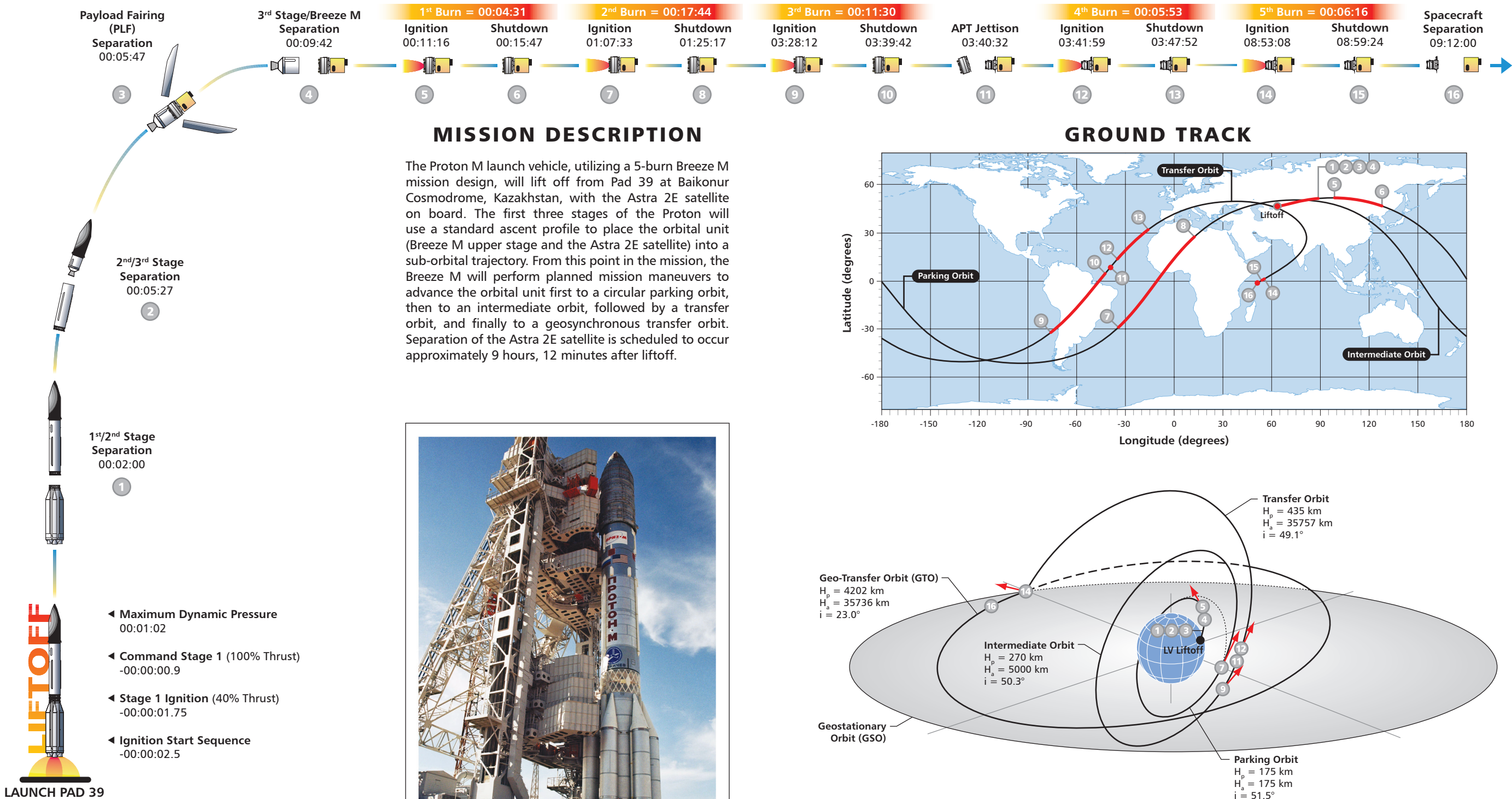


[www.ilslaunch.com](http://www.ilslaunch.com)

## Astra 2E

- **5th** ILS Proton Launch in 2013
- **82nd** ILS Proton Launch Overall
- **23rd** SES Satellite Launched on Proton
- **17th** Astrium Satellite Launched on Proton

# THE MISSION



## MISSION DESCRIPTION

The Proton M launch vehicle, utilizing a 5-burn Breeze M mission design, will lift off from Pad 39 at Baikonur Cosmodrome, Kazakhstan, with the Astra 2E satellite 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 Astra 2E satellite) into a sub-orbital trajectory. From this point in the mission, the Breeze M will perform planned mission maneuvers to advance the orbital unit first to a circular parking orbit, then to an intermediate orbit, followed by a transfer orbit, and finally to a geosynchronous transfer orbit. Separation of the Astra 2E satellite is scheduled to occur approximately 9 hours, 12 minutes after liftoff.

## GROUND TRACK

