

Proton

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 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.

Satellite

SATELLITE OPERATOR
Inmarsat
www.inmarsat.com

SATELLITE MANUFACTURER
Boeing Satellite Systems
www.Boeing.com

PLATFORM
BSS-702HP

SEPARATED MASS
6070 kg

SATELLITE MISSION LIFETIME
15 Years



SATELLITE MISSION

Inmarsat Global Xpress (GX) will be the first globally available high-speed broadband network. It will be delivered over three Inmarsat-5 satellites and will offer the unique combination of global coverage from a single operator and the network reliability for which Inmarsat is renowned. Based on Ka-band technology, GX will consistently deliver higher performance through more compact terminals at a lower cost than existing VSAT services, making it accessible to many more users.

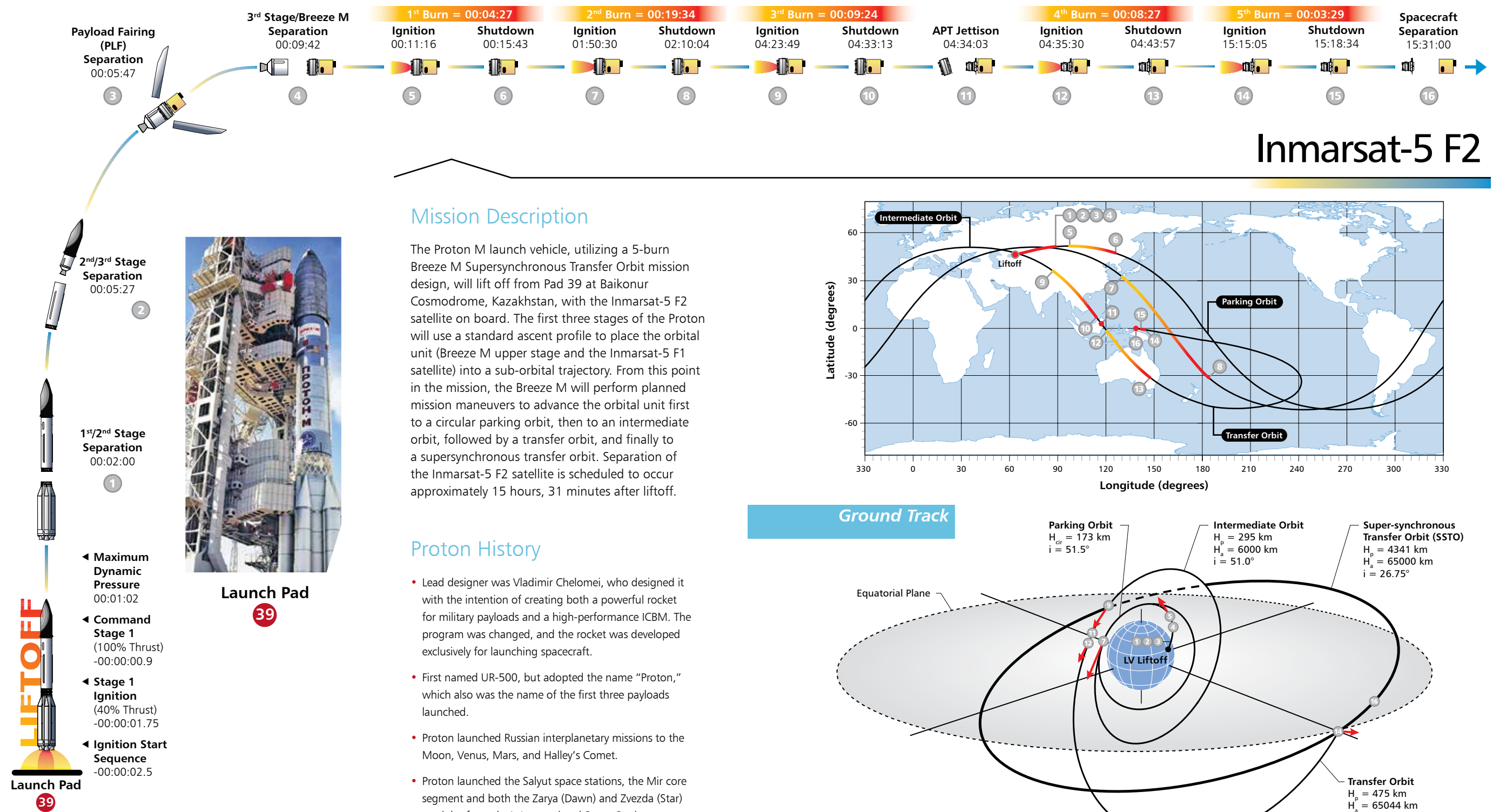
Mission Overview



- **1st** ILS Proton Launch in 2015
- **88th** ILS Proton Launch Overall
- **3rd** Inmarsat Satellite Launched on ILS Proton
- **11th** Boeing Satellite Launched on ILS Proton

Inmarsat-5 F2





Inmarsat-5 F2

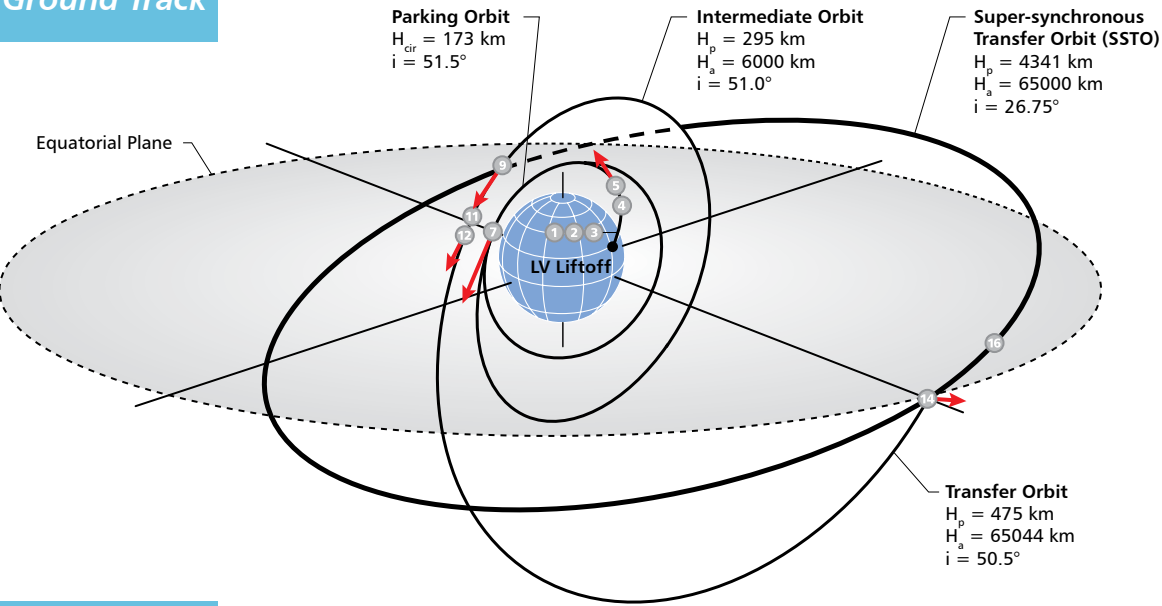
Mission Description

The Proton 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 Inmarsat-5 F2 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 Inmarsat-5 F1 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 supersynchronous transfer orbit. Separation of the Inmarsat-5 F2 satellite is scheduled to occur approximately 15 hours, 31 minutes after liftoff.

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 — 9 April 1996.
- First commercial Proton M Breeze M launch — 30 December 2002

Ground Track



Flight Design