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

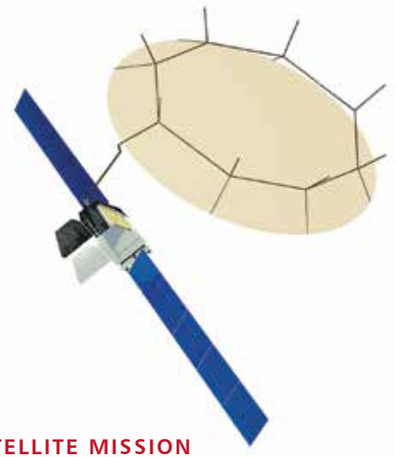
SATELLITE OPERATOR
SCT
www.sct.gob.mx
TELECOMM
www.telecomm.net.mx

SATELLITE MANUFACTURER
Boeing Satellite Systems International
www.boeing.com

PLATFORM
BSS-702HP GEM

SEPARATED MASS
5325 kg

SATELLITE MISSION LIFETIME
15 Years



SATELLITE MISSION

The Mexsat 1 satellite, called CENTENARIO in honor of the 100th anniversary of the Mexican Revolution, is part of an end-to-end satellite communications system that provides 3.5G full IP communications services for voice, data, video and internet access in remote areas to terminals across multiple platforms. This system consists of three satellites, two ground sites and associated network operations. It is Mexico's next-generation satellite communications system.

The Centenario is a fourth generation 702HP GEM geomobile Boeing satellite to serve Mexico, and will offer mobile satellite services to support national security, civil and humanitarian efforts. The Centenario will provide disaster relief, emergency services, telemedicine, rural education, and government agency operations.

It will supply 14 kilowatts of power through 5-panel solar array wings using high-efficiency ultra triple-junction gallium arsenide solar cells. It carries a 22-meter L-band reflector that enables connectivity to handheld terminals, complemented by a 2-meter Ku-band antenna.

Mission Overview

- **1st** SCT Satellite Launched on ILS Proton
- **2nd** ILS Proton Launch in 2015
- **89th** ILS Proton Launch Overall
- **12th** Boeing Satellite Launched on ILS Proton

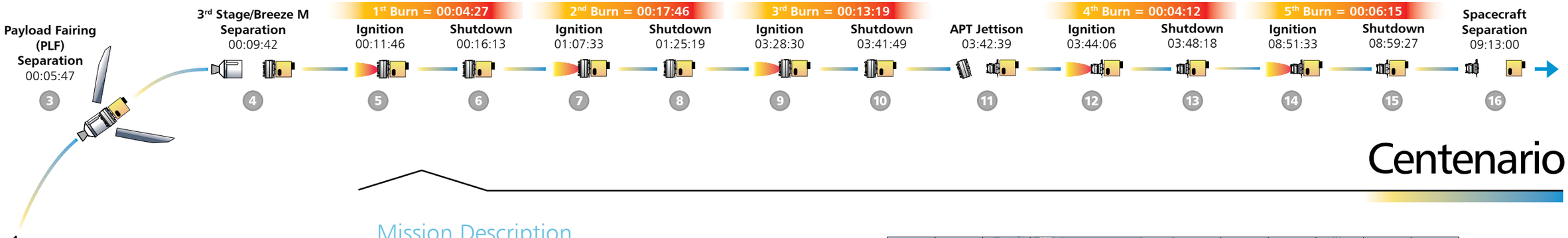
Centenario

SCT
SECRETARÍA DE COMUNICACIONES Y TRANSPORTES

Telecomm

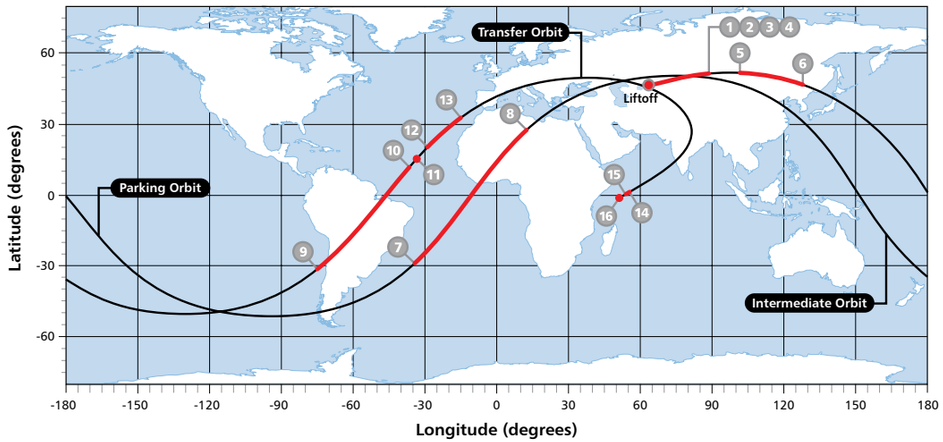
www.ilslaunch.com

Centenario

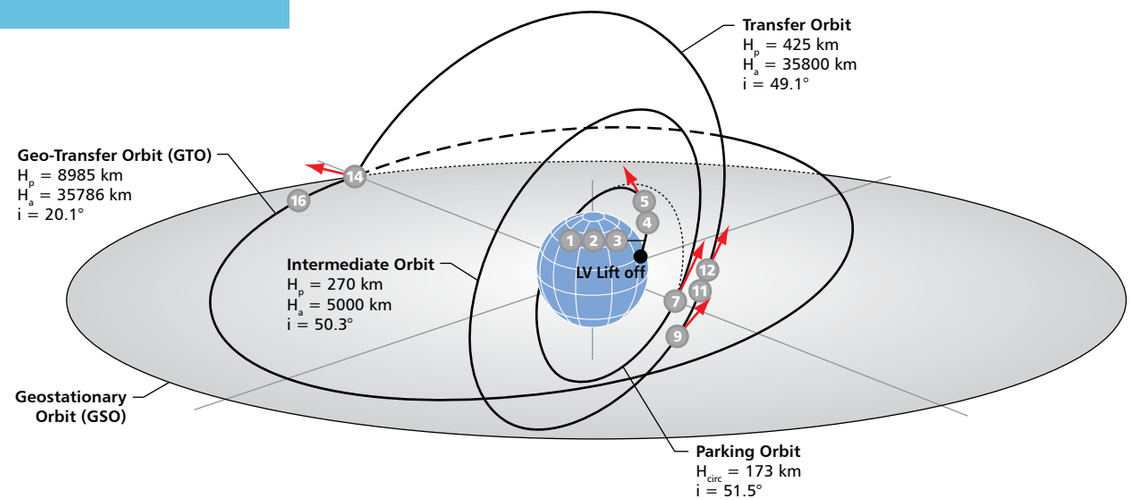


Mission Description

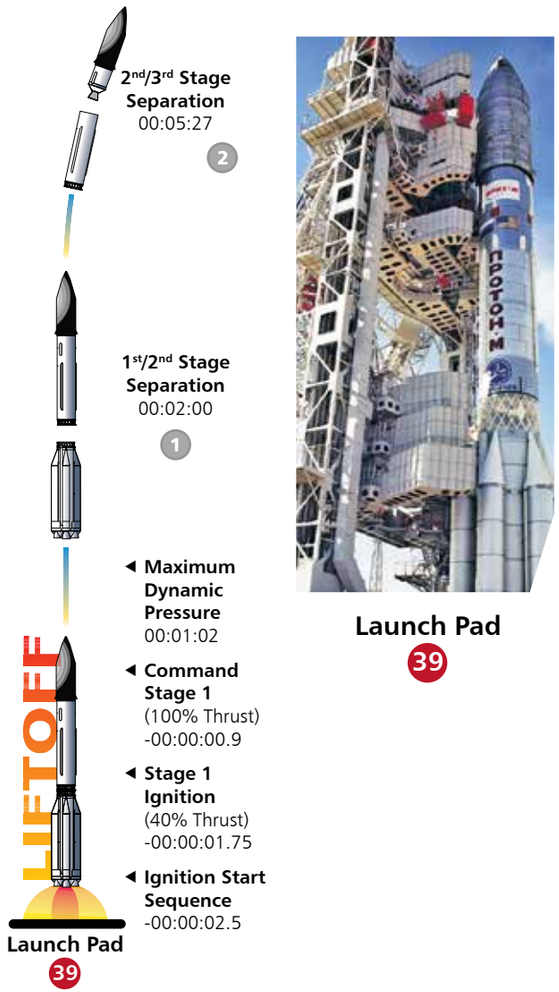
The Proton M launch vehicle, utilizing a 5-burn Breeze M mission design, will lift off from Pad 39 at the Baikonur Cosmodrome in Kazakhstan, with the Centenario satellite on board. The first three stages of the Proton will use a standard ascent profile to place the orbital unit (Breeze M upper stage and the Centenario 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 Centenario satellite is scheduled to occur approximately 9 hours, 13 minutes after liftoff.



Ground Track



Flight Design



Ascent Profile

Launch Pad
39

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
- 400th Proton launch — 15 December 2014