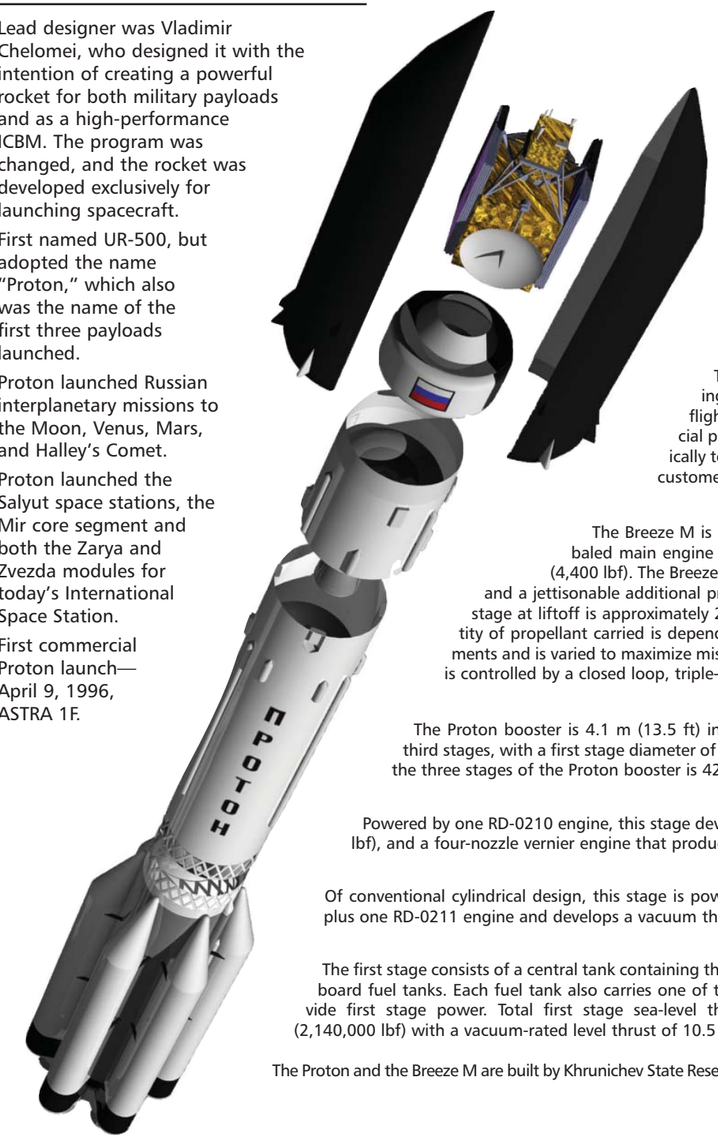
THE VEHICLE

Proton History

- Lead designer was Vladimir Chelomei, who designed it with the intention of creating a powerful rocket for both military payloads and as 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 and Zvezda modules for today's International Space Station.
- First commercial Proton launch—April 9, 1996, ASTRA 1F.



Proton Description

Total Height
56.2 m (184 ft)

Gross Liftoff Weight
691,272 kg
(1,523,565 lbm)

Propellant
UDMH and N_2O_4

Initial Launch
July 16, 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 Western customers.

Breeze M Upper Stage
The Breeze M is powered by one pump-fed gimbaled main engine that develops thrust of 19.6 kN (4,400 lbf). The Breeze M is composed of a central core and a jettisonable additional propellant tank. Inert mass of the stage at liftoff is approximately 2,370 kg (5,225 lbm). The quantity of propellant carried is dependent on specific mission requirements and is varied to maximize mission performance. The Breeze M is controlled by a closed loop, triple-redundant guidance system.

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-0210 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (6,900 lbf).

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 2.3 MN (524,000 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-275 engines that provide first stage power. Total first stage sea-level thrust is approximately 9.5 MN (2,140,000 lbf) with a vacuum-rated level thrust of 10.5 MN (2,360,000 lbf).

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

THE SATELLITE

Satellite Operator
Telenor
www.telenorsbc.com

Satellite Manufacturer
Orbital Sciences Corporation
www.orbital.com

Platform
STAR-2

Separated Mass
1960 kg

Design Life
15 years

Mission
The THOR 5 satellite was developed and built for Telenor Satellite Broadcasting (TSBc) which is part of Telenor Broadcast, one of the three core businesses of Norway's leading communications operator, Telenor ASA. TSBc provides extensive television broadcasting services for distribution, contribution and occasional applications to the Nordic region and throughout Europe. TSBc owns and operates the THOR series of communications satellites, which provide broadcasting and interactive services to these regions.The Telenor THOR 5 spacecraft will replace and expand the current THOR II satellite capacity. THOR 5 will provide regional Ku-band coverage for Fixed Satellite Service (FSS) and Broadcast Satellite Service (BSS). There will be 15 active FSS transponders and nine active BSS transponders for fixed coverage regions. In addition, five more active transponders are routed through a steerable antenna that can be pointed toward any other region on Earth visible from the 0.8° W longitude.

ILS

www.ilslaunch.com

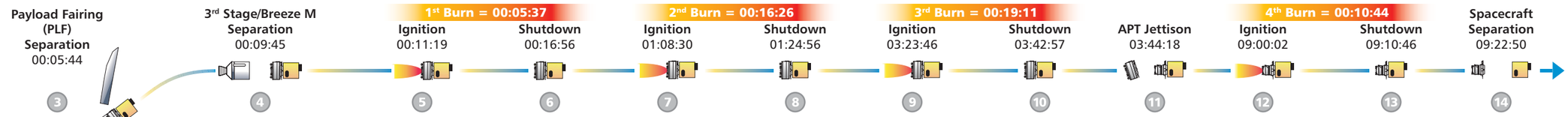
February 2008

THOR 5

Mission Overview

- 1st Orbital spacecraft launched by Proton
- 1st ILS launch of 2008
- 44th launch for ILS joint venture

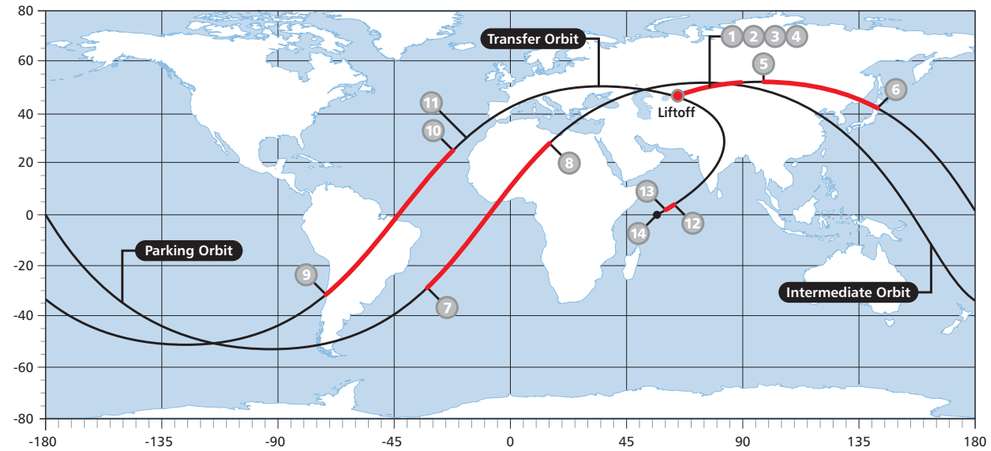
THE MISSION

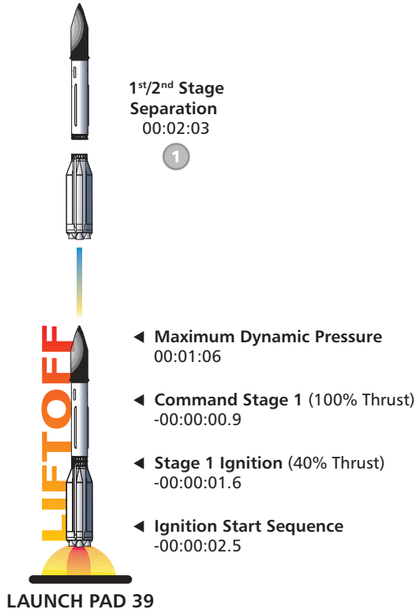


MISSION DESCRIPTION

The Proton Breeze M launch vehicle, utilizing a 4-burn Breeze M mission design, will lift off from Pad 39 at the Baikonur Cosmodrome, Kazakhstan, with the THOR 5 satellite on board. The first three stages of the Proton will use a standard ascent trajectory to place the Breeze M fourth stage and the THOR 5 satellite into a suborbital trajectory, from which the Breeze M will place itself and the spacecraft into a circular parking orbit. Once THOR 5 is in the parking orbit, it will be injected directly into geostationary orbit following a series of additional burns of the Breeze M. Separation occurs approximately 9 hours, 22 minutes and 50 seconds after liftoff.

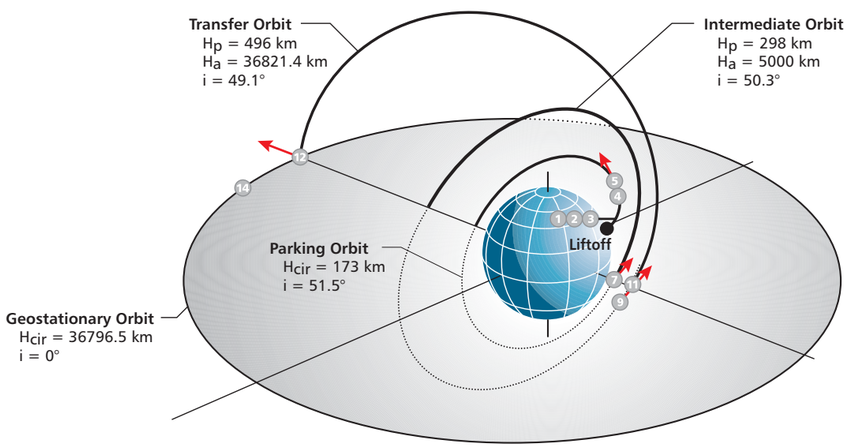
GROUND TRACK





ASCENT PROFILE

PROTON M ON PAD 39



ORBIT INSERTION