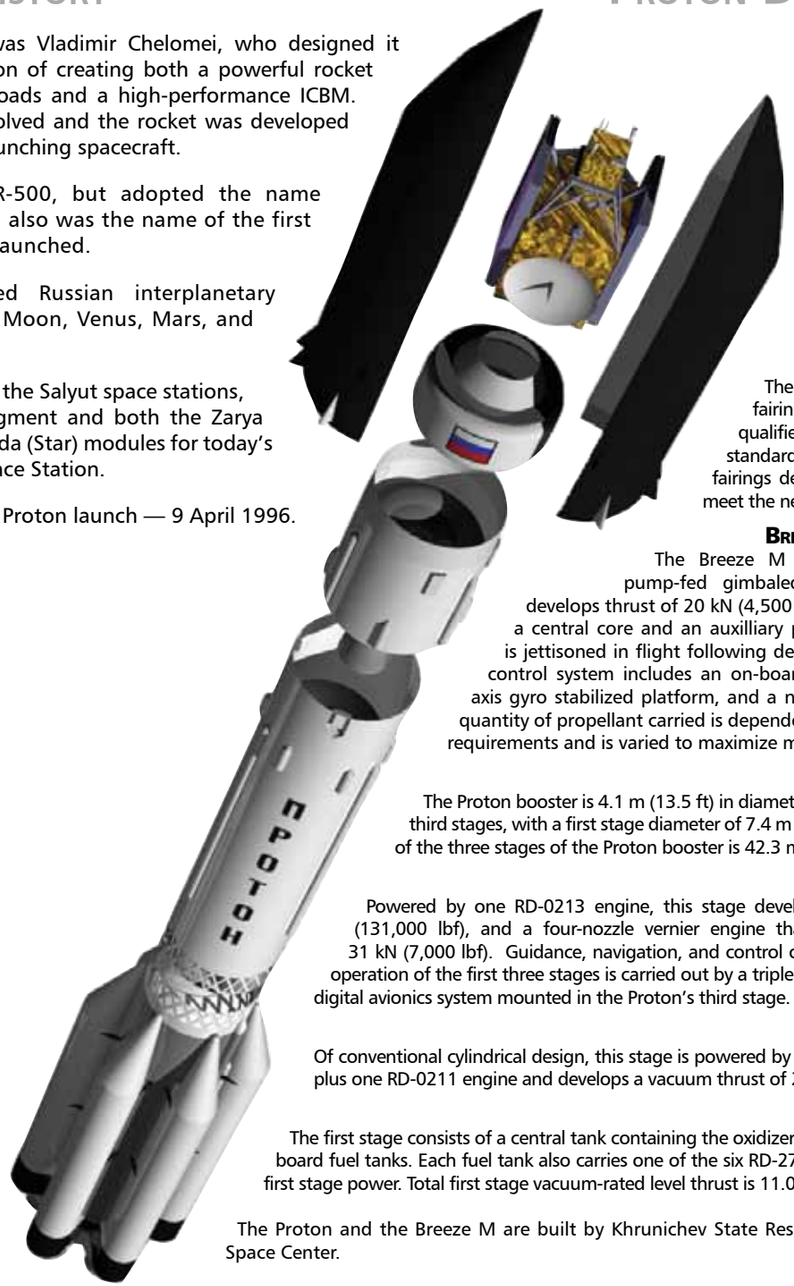
THE VEHICLE

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 evolved 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.

Proton Description



Total Height
58.2 m (191 ft)

Gross Liftoff 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 auxilliary 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).

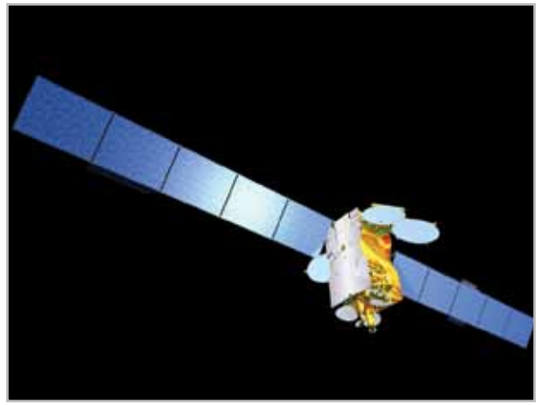
Third Stage
Powered by one RD-0213 engine, this stage develops thrust of 583 kN (131,000 lbf), and a four-nozzle vernier engine that produces thrust of 31 kN (7,000 lbf). Guidance, navigation, and control of the Proton M during operation of the first three stages is carried out by a triple redundant 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.

THE SATELLITE



Satellite Operator
ARABSAT
www.arabsat.com

Satellite Manufacturers
EADS Astrium
www.astrium.eads.net

Thales Alenia Space
www.thalesaleniaspace.com

Platform
Eurostar E3000

Separated Mass
5420 kg

Satellite Design Life
15 Years

Satellite Mission
BADR-5 will be co-located with BADR-4 and BADR-6 Direct-To-Home satellites at ARABSAT's 26° east longitude video "hot-spot". This newest satellite will guarantee to ARABSAT's broadcasting customers a unique "hot" redundancy, the highest level of service provided within the MENA region. Complementary capability will include supporting the projected expansion of HD-TV broadcast and the development of sophisticated interactive services.

ILS
www.ilslaunch.com

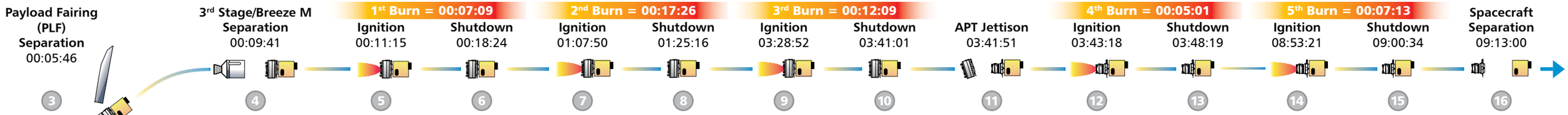
BADR-5

Mission Overview

- **6th** Proton Launch in 2010
- **4th** ILS Proton Launch in 2010
- **60th** Proton Launch for ILS
- **3rd** ARABSAT Launch with ILS
- **12th** Eurostar Satellite Launched on ILS/Proton

KHRUNICHEV STATE RESEARCH AND PRODUCTION SPACE CENTER

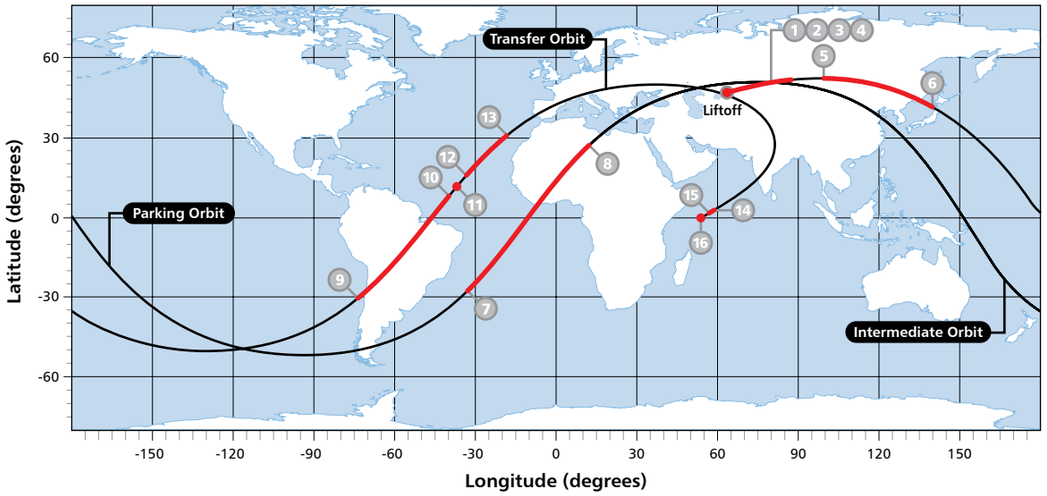
THE **MISSION**

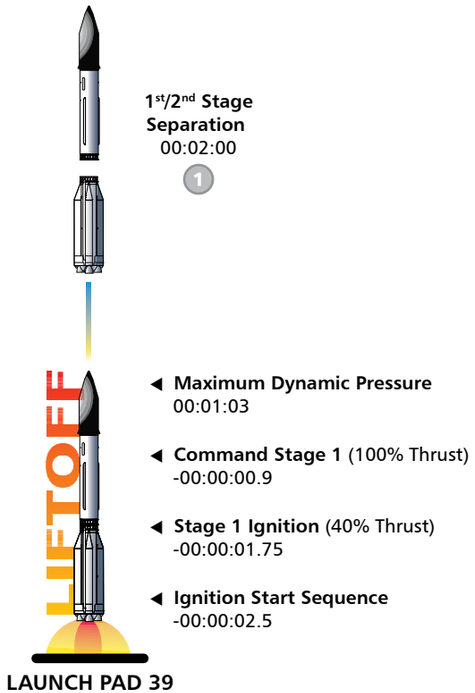


MISSION DESCRIPTION

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 BADR-5 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 BADR-5 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 BADR-5 satellite is scheduled to occur approximately 9 hours, 13 minutes after liftoff.

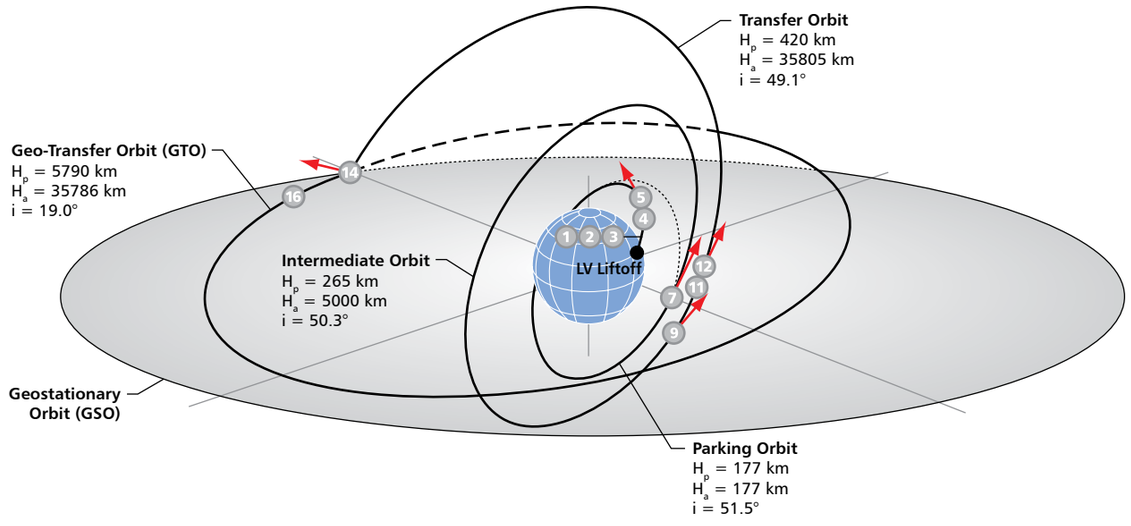
GROUND TRACK





ASCENT PROFILE

PROTON ON PAD 39



FLIGHT DESIGN