

Proton

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 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

JCS Gazprom Space Systems
www.gazprom-spacesystems.ru

SATELLITE MANUFACTURER

JSC Academician M.F. Reshetnev Information Satellite Systems
www.iss-reshetnev.ru

PLATFORM

Express-2000A

SEPARATED MASS

2976 kg

SATELLITE MISSION LIFETIME

15 years

SATELLITE MISSION

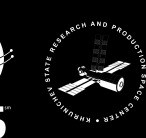
At an orbital location of 90° East longitude, the Yamal-401 communications satellite will provide services to users in Russia and CIS countries. The combined payload of the satellite will include: 17 x 72 MHz transponders in standard C-band, 18 x 72 MHz transponders in standard Ku-band and 18 x 36 MHz transponders in planned frequency bands of Ku-band. Thus, the total capacity of the Yamal-401 satellite will amount to 53 physical transponders or 88 equivalent (36 MHz) transponders, which will compose 1 fixed beam in C-band covering Russia and CIS countries and 2 fixed beams in Ku-band (Russian and Northern). JSC Gazprom Space Systems has ensured the development of the ground infrastructure to control and operate the satellite. With the addition of the Yamal-401 satellite into the company's orbital constellation, JSC Gazprom Space Services will strengthen its position on the global space communications market.

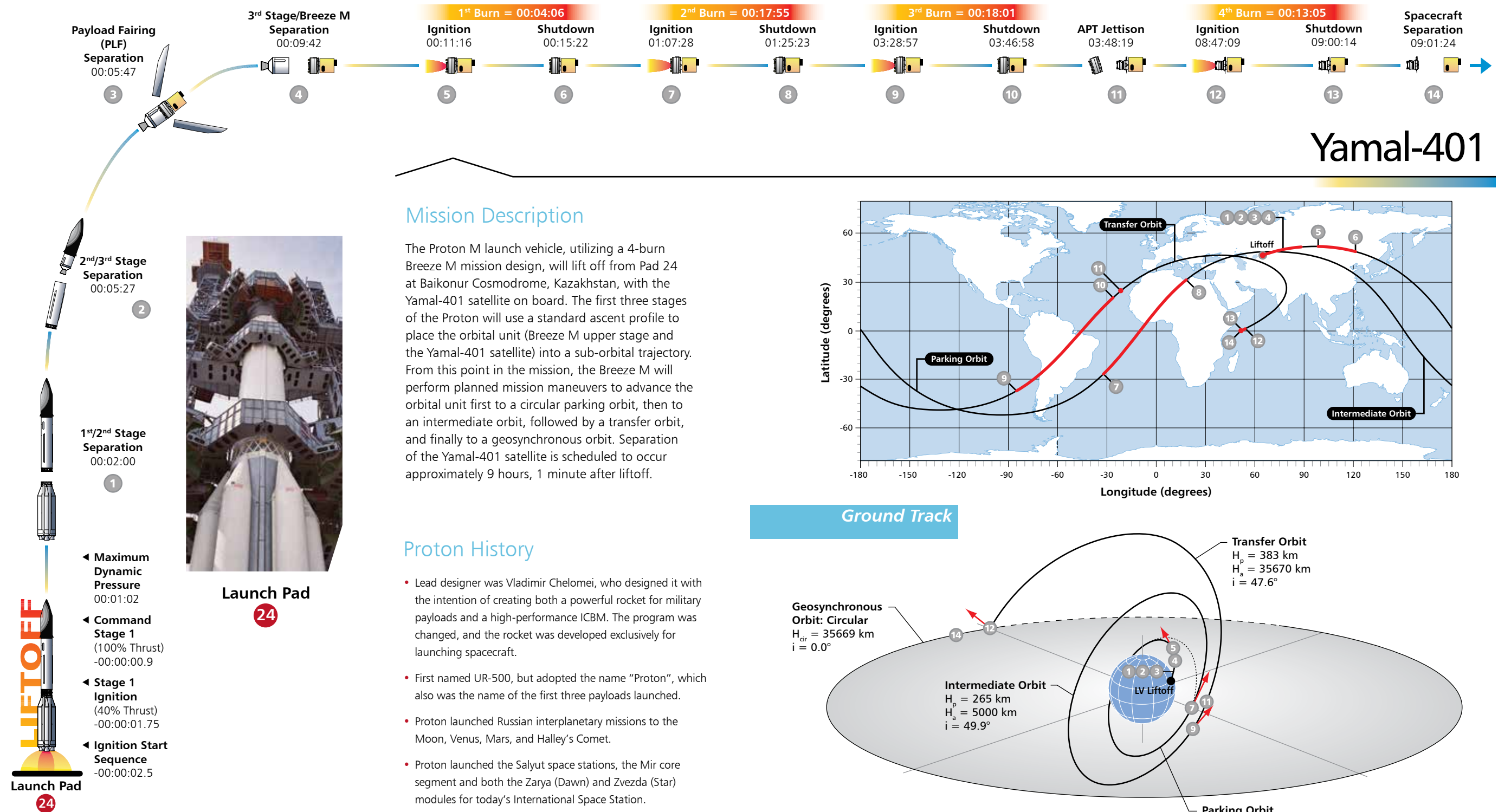
Mission Overview



- 2nd ILS Proton Launch in 2014
- 86th ILS Proton Launch Overall
- 2nd Gazprom Space Systems Satellite Launched on ILS Proton
- 1st ISS Reshetnev Satellite Launched on ILS Proton

Yamal-401





Mission Description

The Proton M launch vehicle, utilizing a 4-burn Breeze M mission design, will lift off from Pad 24 at Baikonur Cosmodrome, Kazakhstan, with the Yamal-401 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 Yamal-401 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 orbit. Separation of the Yamal-401 satellite is scheduled to occur approximately 9 hours, 1 minute 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