



Quality

Proton Production

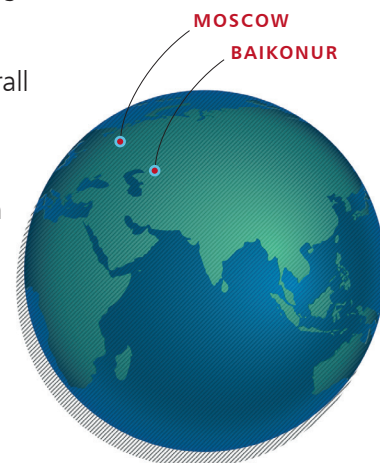
Proton Launch Vehicles and Breeze M Upper Stages are designed and built by Khrunichev in Moscow. Khrunichev is home to all engineering, assembly and test functions of the Proton production.

KHRUNICHEV SPACE CENTER

- Proton and Breeze M manufacturing
- Design, manufacturing, integration, testing
- Engineering and mission design
- More than 410 Protons launched
- Over 70 Proton M/Breeze M missions overall

BAIKONUR COSMODROME

- Proton Breeze M launch operations
- Launch vehicle processing and integration
- All satellite launch preparations
- ISO Class 8 clean room facilities
- Two operational Proton launch pads



Proton Launch Operations

The spacecraft is transported to the Baikonur Cosmodrome by air and is off-loaded at the on-site Yubileiny Airfield. It is then transported by rail to the state of the art processing facility for testing, fueling, mating to the Breeze M upper stage and encapsulation within the payload fairing. Launch vehicle and spacecraft time on pad is 3 to 5 days.

Proton is designed to launch from Baikonur with very few weather restraints. Coupled with the two launch pads available for commercial missions, Baikonur offers optimal schedule assurance to customers.

ILS and Khrunichev provide manifest flexibility for customers by allowing overlapping launch campaigns, minimizing the required spacing between commercial missions to support timely launches.

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Our Mission Statement

ILS creates value for our customers by providing dependable access to space through proven and innovative launch solutions.

International Launch Services

FLEXIBILITY | PERFORMANCE | EXPERIENCE | DEDICATION



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Features

HISTORY:

More than 410 flights since 1965

PRODUCTION:

Capability to support up to 12 missions per year

SUPPLIERS:

Main components Russian-supplied

TYPICAL GTO MISSION:

~9 hours utilizing 5-burn Breeze M GTO mission design

STAGES:

Three-stage Proton with restartable Breeze M upper stage

PROPELLANTS:

Nitrogen Tetroxide(N₂O₄) Unsymmetrical DiMethyl Hydrazine (UDMH)

AVIONICS:

Closed-loop 3-string majority vote

MATERIALS:

Aluminum and composites

STRUCTURE TYPE:

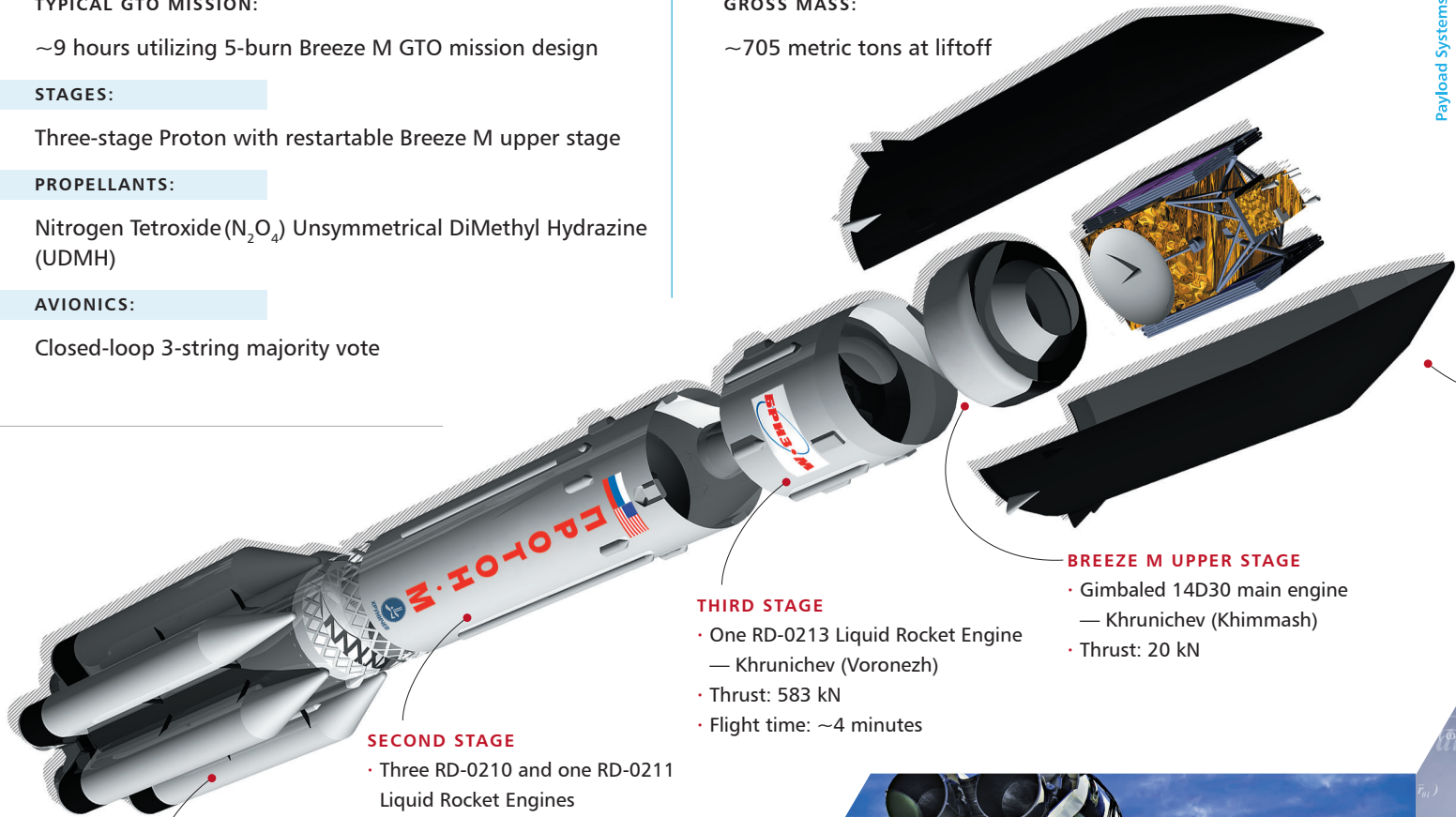
Monocoque

DIMENSIONS:

Length: 56.2 m or 58.2 m | Core diameter: ~4.1 m

GROSS MASS:

~705 metric tons at liftoff



FIRST STAGE

- Six RD-276 Liquid Rocket Engines — Khrunichev (Perm)
- Sea level thrust: 10.0 MN
- Vacuum rated thrust: 11.0 MN
- Flight time: ~2 minutes

SECOND STAGE

- Three RD-0210 and one RD-0211 Liquid Rocket Engines — Khrunichev (Voronezh)
- Thrust: 2.4 MN
- Flight time: ~3.5 minutes

THIRD STAGE

- One RD-0213 Liquid Rocket Engine — Khrunichev (Voronezh)
- Thrust: 583 kN
- Flight time: ~4 minutes

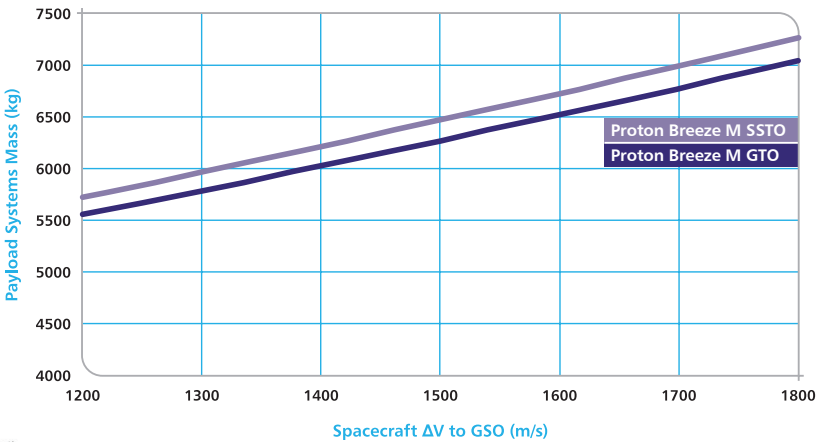
BREEZE M UPPER STAGE

- Gimbaled 14D30 main engine — Khrunichev (Khimmarsh)
- Thrust: 20 kN

PAYLOAD FAIRING & ADAPTER STAGE

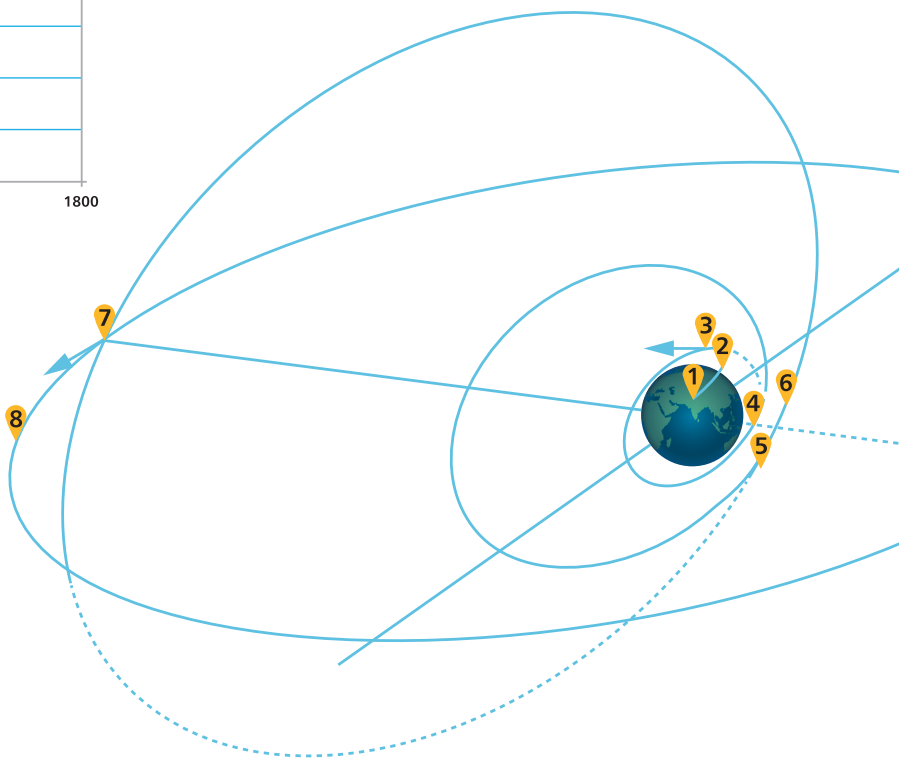
- Two symmetrical payload fairing halves
- Static envelope diameter up to 3.87 m
- Post encapsulation spacecraft access available
- Composite sandwich monocoque structure
- Multiple adapter and separation system configurations available
- 13 m and 15 m PLF lengths available

Payload Systems Mass vs ΔV to Geosynchronous Orbit (GSO)



Typical Mission

- 1 LV Liftoff
- 2 Breeze M Separation from Proton LV
- 3 First Burn into Parking Orbit
- 4 Second Burn into Intermediate Orbit
- 5 Third Burn and APT Jettison
- 6 Fourth Burn into Transfer Orbit
- 7 Fifth Burn into Geosynchronous Transfer Orbit (GTO)
- 8 Spacecraft Separation



Compatibility

Satellite Bus

	702	A2100	E2000/3000	SSL 1300	SB3000/4000	STAR	EXPRESS	DS2000
Compatible	•	•	•	•	•	•	•	•
Launched	•	•	•	•	•	•	•	•



• With over 50 years of experience and over 410 flights, Proton is a proven, heritage launch system. International Launch Services (ILS) is a U.S.-based company with the exclusive rights to commercially market the Proton Breeze M, Proton Medium and the Angara 1.2 launch vehicles developed and built by Khrunichev State Research and Space Production Center (Khrunichev) of Moscow.

The **ILS Proton Breeze M** has the lift capability of 6.27 metric tons to reference GTO and 6.47 metric tons to reference SSTO at 1500 m/s ΔV. In addition, ILS Proton’s restartable Breeze M upper stage allows for optimizing each mission and maximizing projected in-orbit lifetime. ILS Proton can deliver single or multiple satellites into LEO, MEO, HEO, GTO, GSO and SSTO.

