

# THE VEHICLE

# THE SATELLITE

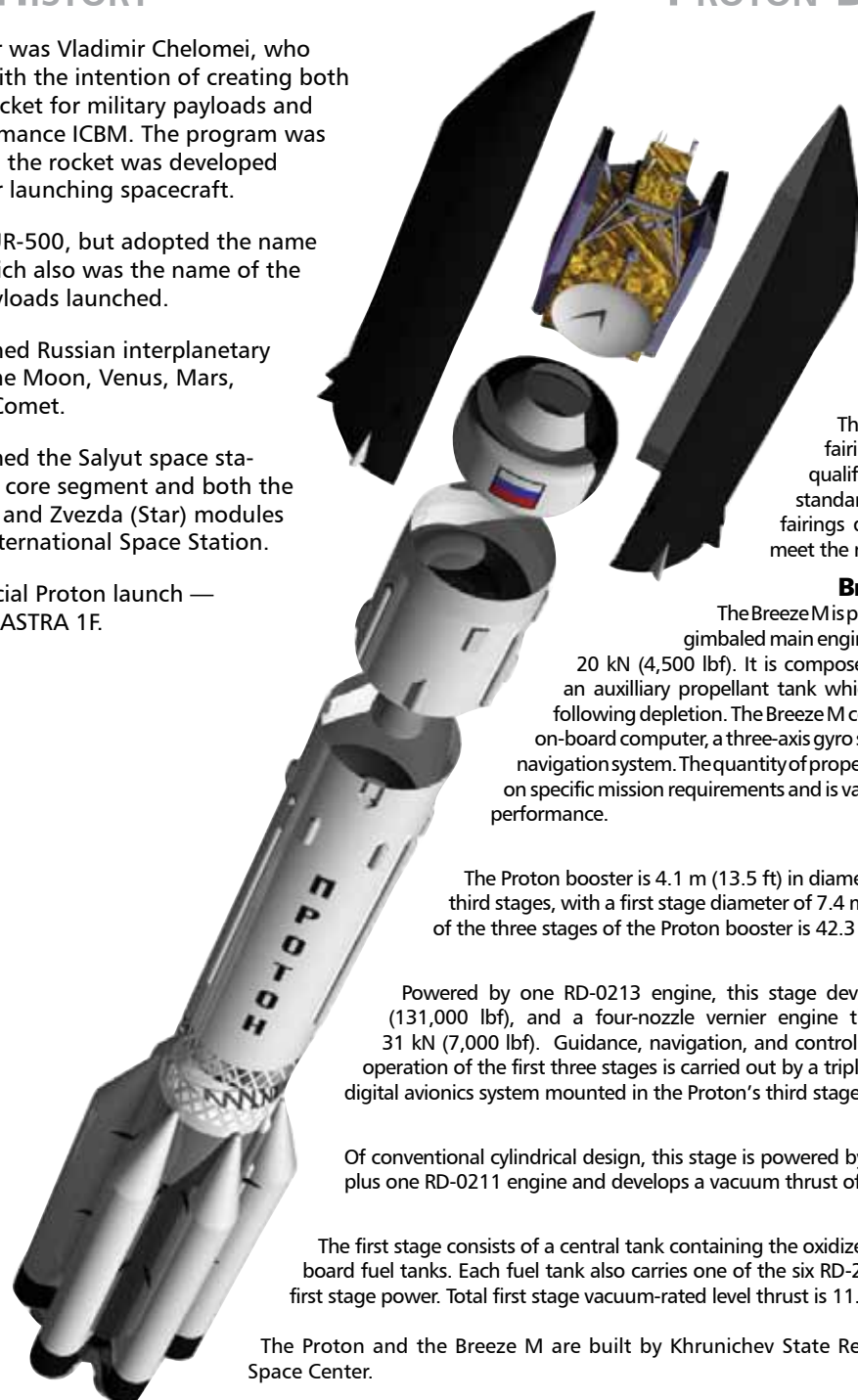


www.ilslaunch.com

## 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, ASTRA 1F.

## 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 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.

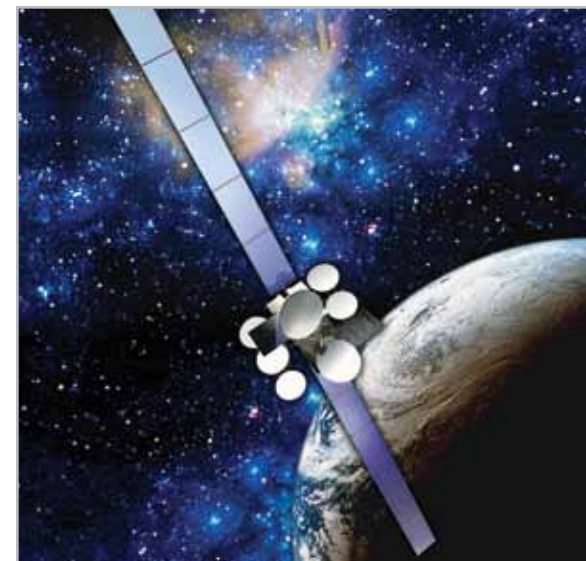
**PROTON BOOSTER**  
The Proton booster is 4.1 m (13.5 ft) in diameter along its second and third stages, with a first stage diameter of 7.4 m (24.3 ft). Overall height of the three stages of the Proton booster is 42.3 m (138.8 ft).

**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 out-board 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 OPERATOR**  
DIRECTV  
www.directv.com

**SATELLITE MANUFACTURER**  
Boeing Space & Intelligence Systems  
www.boeing.com

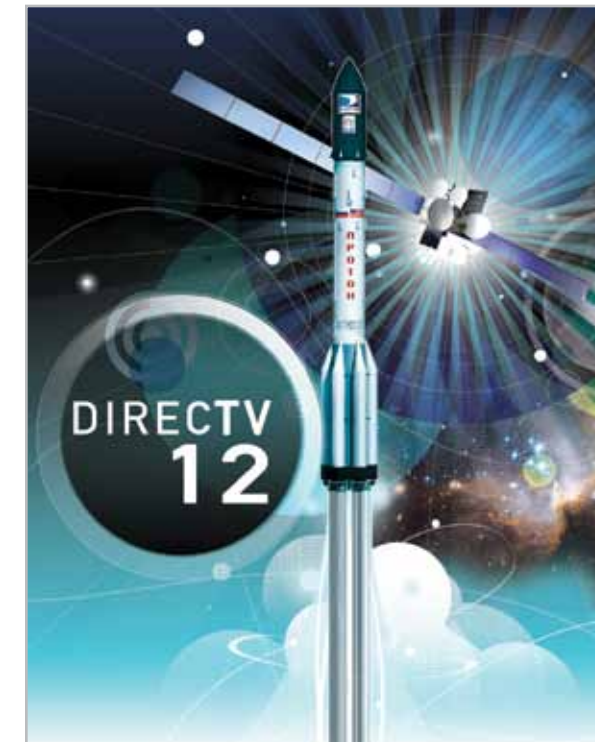
**PLATFORM**  
702

**SEPARATED MASS**  
5900 kg

**SATELLITE DESIGN LIFE**  
15 Years

### SATELLITE MISSION

The DIRECTV 12 next-generation satellite will play an important role in extending DIRECTV's content leadership position in the pay TV industry. When it becomes operational in the first half of next year, it will expand DIRECTV's HD capacity by 50 percent to more than 200 national channels and enable DIRECTV to deliver 1,500 local HD and digital channels and more advanced services for its customers nationwide. The powerful 131-transponder payload integrates 32 active and 12 spare TWTAs (Traveling Wave Tube Amplifiers) at Ka-band for national service and 55 active and 15 spare TWTAs for spot beams. The payload is powered by a gallium arsenide solar array that spans more than 48 meters. DIRECTV 12 will receive and transmit programming throughout the United States with two large Ka-band reflectors, each measuring 2.8 meters in diameter and nine other Ka-band reflectors.



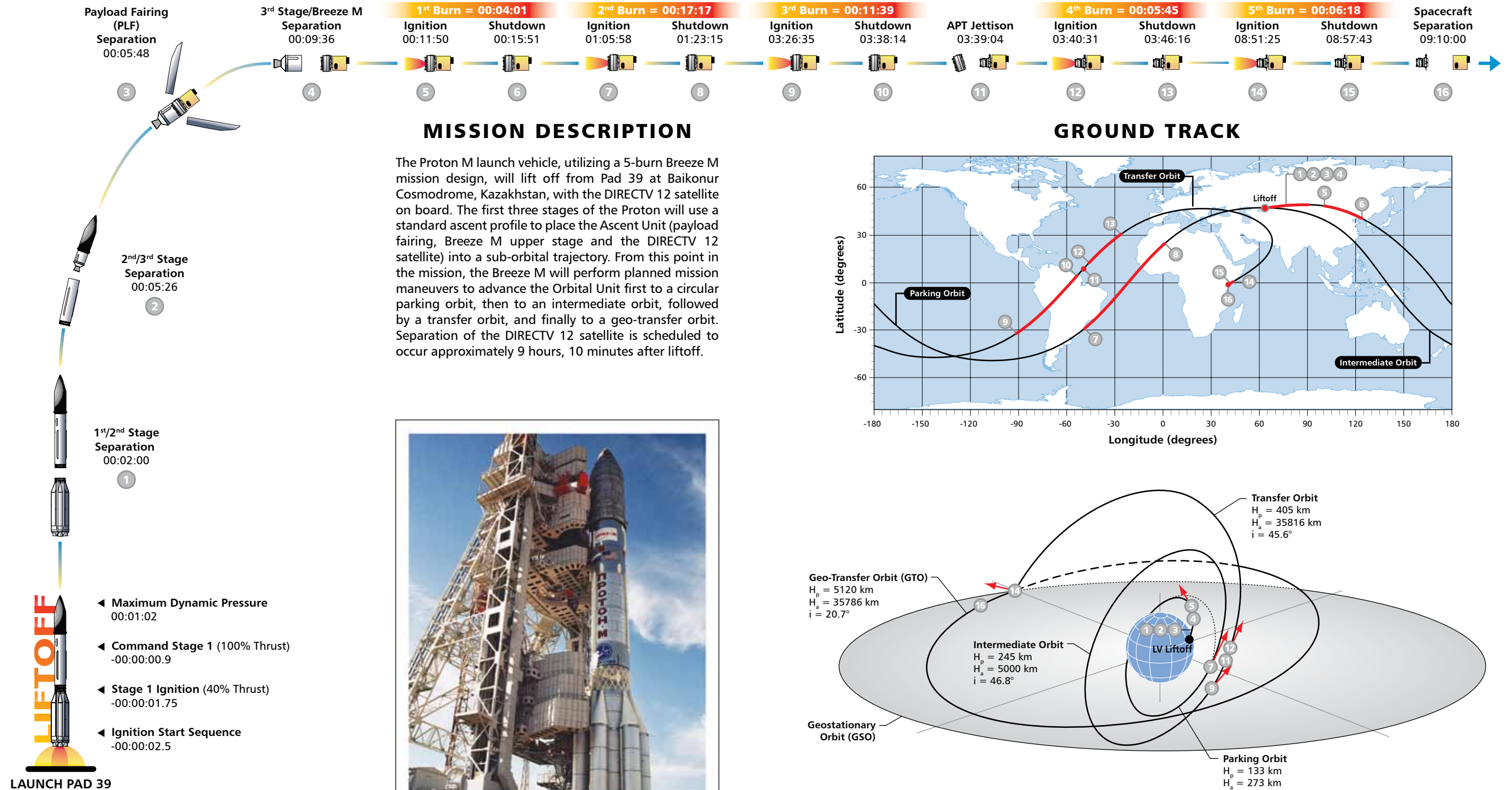
## DIRECTV 12

### MISSION OVERVIEW

- **7th** ILS Proton Launch of 2009
- **56th** Proton Launch for ILS
- **4th** DIRECTV Satellite Launched with ILS Proton
- **13th** Boeing Satellite Launched on a Proton



# THE MISSION



PROTON ON PAD 39