

PSLV-C32 / IRNSS-1F Mission

10 March, 2016

THE MISSION

PSLV-C32 carrying on-board the IRNSS-1F Satellite lifted-off from the Satish Dhawan Space Centre (SDSC) SHAR, Sriharikota at 4:10 (IST) PM on March 10, 2016. After a flight of 19 minutes 34 seconds, IRNSS-1F satellite was injected into an elliptical orbit of 284 km X 20,719 km inclined at an angle of 17.866° to the Equator (very close to the intended orbit) and successfully separated from the PSLV fourth stage. It was injected into a sub Geosynchronous Transfer Orbit (sub GTO).

IRNSS- 1F is the sixth navigation satellite of the seven satellites constituting the Indian Regional Navigation Satellite System (IRNSS) space segment. IRNSS -1F carries two types of payloads – navigation payload and ranging payload.

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THE LAUNCH VEHICLE

PSLV-C32 in its 34th flight used the 'XL' variant of PSLV, equipped with six strap-ons. It is the 12th time the 'XL' configuration has been flown.

SPECIFICATIONS

Height	44.4 m
Lift-Off Mass	320 t
No of Stages	4
Payloads	IRNSS-1F
Inclination (deg)	17.866°
Apogee	20,719 km
Perigee	284 km
Launch Pad	First Launch Pad (SDSC, SHAR)



STAGE CHARACTERISTICS

	Stage-1	Stage-2	Stage-3	Stage-4
Nomenclature	Core Stage PS1 + 6 Strap-on Motors	PS2	PS3	PS4
Propellant	Solid (HTPB based)	Liquid (UH25 + N ₂ O ₄)	Solid (HTPB based)	Liquid (MMH + MON-3)
Propellant Mass (t)	138.2 (Core), 6 x 12.2 (Strap-on)	42	7.6	2.5
Stage Dia (m)	2.8 (Core), 1 (Strap-on)	2.8	2	1.3
Stage Length (m)	20 (Core), 12 (Strap-on)	12.8	3.6	3

IRNSS-1F

THE SATELLITE

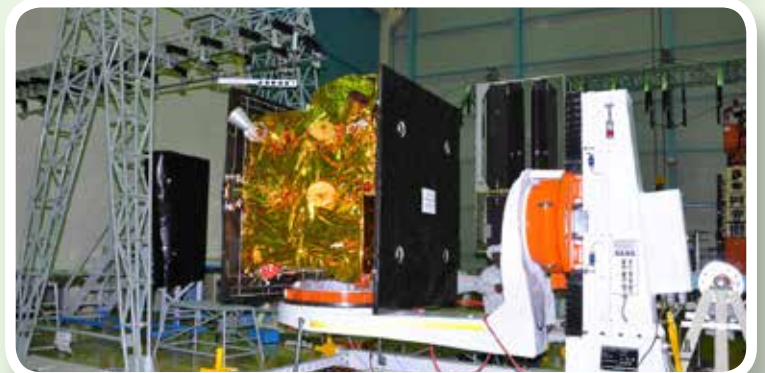
IRNSS is an Independent Regional Navigation Satellite System designed to provide position information in the Indian region. The configuration of IRNSS-1F is similar to that of IRNSS-1A, 1B, 1C, 1D and 1E. The two solar arrays of IRNSS-1F consisting of Ultra Triple Junction solar cells generate about 1660 W of electrical power. Sun and Star sensors as well as gyroscopes provide orientation reference for the satellite. Special thermal control schemes have been designed and implemented for some of the critical elements such as atomic clocks. The Attitude and Orbit Control System (AOCS) of IRNSS-1F maintains the satellite's orientation with the help of reaction wheels, magnetic torques and thrusters. Its propulsion system consists of a Liquid Apogee Motor (LAM) and thrusters.

IRNSS-1F carries two types of payloads – navigation payload and ranging payload. The navigation payload of IRNSS-1F transmits navigation service signals to the users. This payload is operating in L5-band and S-band. A highly accurate Rubidium Atomic Clock is part of the navigation payload of the satellite. The ranging payload of IRNSS-1F consists of a C-band transponder, which facilitates accurate determination of the range of the satellite. IRNSS-1F also carries Corner Cube Retro Reflectors for LASER ranging.



Applications of IRNSS

- Terrestrial, Ariel and Marine Navigation
- Vehicle tracking and fleet management
- Terrestrial navigation aid for hikers and travellers
- Disaster Management
- Integration with mobile phones
- Mapping and Geodetic data capture
- Visual and voice navigation for drivers



SPECIFICATIONS

Weight	1425 kg
Power	1660 W, one Li-Ion battery of 90 Ampere-hour capacity
Stabilisation	Zero momentum system, orientation input from Sun and Star Sensors and Gyroscopes; Reaction Wheels, Magnetic Torquers and 22 Newton thrusters as actuators
Propulsion	440 Newton Liquid Apogee Motor, twelve 22 Newton Thrusters
Type of Satellite	Navigation
Payloads	<ul style="list-style-type: none">• L5 and S-band Navigation with Rubidium Atomic Clocks• C-band Ranging Payload• Corner Cube Retro Reflectors for LASER Ranging
Mission Life	12 Years

