

# PSLV-C22 / IRNSS-1A Mission

01 July, 2013

## THE MISSION

PSLV-C22 carrying on-board the IRNSS-1A Satellite lifted-off from the Satish Dhawan Space Centre (SDSC) SHAR, Sriharikota at 11:41 PM (IST) on July 01, 2013. After a flight of 20 minutes 17 seconds, IRNSS-1A Satellite was injected to the intended elliptical orbit of 282.46 km X 20,625.37 km. After injection, the solar panels of IRNSS-1A were deployed automatically. ISRO's Master Control Facility assumed the control of the satellite and in the following days five orbit manoeuvres were conducted from Master Control Facility to position the satellite in its Geosynchronous Circular Orbit at 55° East longitude.

IRNSS is an independent regional navigation satellite system designed to provide position information in the Indian region and 1500 km around the Indian mainland. IRNSS would provide two types of services, namely, Standard Positioning Services (SPS) provided to all users and Restricted Services (RS) provided only to authorised users.

A number of ground stations responsible for the generation and transmission of navigation parameters, satellite control, satellite ranging and monitoring, etc., have been established in as many as 15 locations across the country.

IRNSS-1A is the first of the seven satellites constituting the space segment of the Indian Regional Navigation Satellite System (IRNSS). The Satellite carries two types of payloads - navigation payload and ranging payload.



## PSLV-C22

### THE LAUNCH VEHICLE

PSLV-C22 in its 24<sup>th</sup> flight used 'XL' variant of PSLV. This is the 4<sup>th</sup> time 'XL' configuration is being flown.

### SPECIFICATIONS

|                          |                               |
|--------------------------|-------------------------------|
| <b>Height</b>            | 44.4 m                        |
| <b>Lift-Off Mass</b>     | 320 t                         |
| <b>No of Stages</b>      | 4                             |
| <b>Payloads</b>          | IRNSS-1A                      |
| <b>Inclination (deg)</b> | 17.86°                        |
| <b>Apogee</b>            | 20,625.37 km                  |
| <b>Perigee</b>           | 282.46 km                     |
| <b>Launch Pad</b>        | First Launch Pad (SDSC, SHAR) |



## STAGE CHARACTERISTICS

|                         | Stage-1                            | Stage-2   | Stage-3               | Stage-4                 |
|-------------------------|------------------------------------|---|-----------------------|-------------------------|
| <b>Nomenclature</b>     | Core Stage PS1 + 6 Strap-on Motors | PS2   | PS3                   | PS4                     |
| <b>Propellant</b>       | Solid<br>(HTPB based)              | Liquid<br>(UH25 + N <sub>2</sub> O <sub>4</sub> ) | Solid<br>(HTPB based) | Liquid<br>(MMH + MON-3) |
| <b>Mass (t)</b>         | 138 (Core), 6 x 12 (Strap-on)      | 41.7  | 7.6                   | 2.5                     |
| <b>Max Thrust (Kn)</b>  | 4819 (Core) 6 x 716 (Strap-on)     | 804   | 240                   | 7.3 x 2                 |
| <b>Burn Time (s)</b>    | 101.5 (Core), 49.5 (Strap-on)      | 149   | 112.1                 | 513                     |
| <b>Stage Dia (m)</b>    | 2.8 (Core), 1 (Strap-on)           | 2.8   | 2.0                   | 2.8                     |
| <b>Stage Length (m)</b> | 20 (Core), 14.7 (Strap-on)         | 12.5  | 3.6                   | 2.6                     |

## IRNSS-1A

### THE SATELLITE

The satellite is powered by two solar arrays, which generate power up to 1,660 W. IRNSS-1A carries two types of payloads – navigation payload and ranging payload. The navigation payload of IRNSS-1A 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-1A consists of a C-band transponder which facilitates accurate determination of the range of the satellite. IRNSS-1C 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
- Precise Timing



#### SPECIFICATIONS

|                          |  |
|--------------------------|--|
| <b>Weight</b>            | 1425 kg  |
| <b>Power</b>             | 1660 W, one Lithium-ion battery of 90 Ampere-hour capacity   |
| <b>Stabilisation</b>     | Zero momentum system, orientation input from Sun and Star Sensors and Gyroscopes; Reaction Wheels, Magnetic Torquers and 22 Newton thrusters as actuators  |
| <b>Propulsion</b>        | 440 Newton Liquid Apogee Motor, twelve 22 Newton Thrusters   |
| <b>Type of Satellite</b> | Navigation   |
| <b>Payloads</b>          | <ul style="list-style-type: none"> <li>• L5 and S-band Navigation with Rubidium Atomic Clocks</li> <li>• C-band Ranging Payload</li> <li>• Corner Cube Retro Reflectors for LASER Ranging</li> </ul> |
| <b>Mission Life</b>      | 10 Years   |

