

QUESTION CORNER: WHAT IS THE DIFFERENCE BETWEEN GSLV AND PSLV?

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What is the difference between GSLV and PSLV?

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Both PSLV (Polar Satellite Launch Vehicle) and GSLV (Geosynchronous Satellite Launch Vehicle) are the satellite-launch vehicles (rockets) developed by ISRO. PSLV is designed mainly to deliver the “earth-observation” or “remote-sensing” satellites with lift-off mass of up to about 1750 Kg to Sun-Synchronous circular polar orbits of 600-900 Km altitude.

The remote sensing satellites orbit the earth from pole-to-pole (at about 98 deg orbital-plane inclination). An orbit is called sun-synchronous when the angle between the line joining the centre of the Earth and the satellite and the Sun is constant throughout the orbit.

Due to their sun-synchronism nature, these orbits are also referred to as “Low Earth Orbit (LEO)” which enables the on-board camera to take images of the earth under the same sun-illumination conditions during each of the repeated visits, the satellite makes over the same area on ground thus making the satellite useful for earth resources monitoring.

Apart from launching the remote sensing satellites to Sun-synchronous polar orbits, the PSLV is also used to launch the satellites of lower lift-off mass of up to about 1400 Kg to the elliptical Geosynchronous Transfer Orbit (GTO).

PSLV is a four-staged launch vehicle with first and third stage using solid rocket motors and second and fourth stages using liquid rocket engines. It also uses strap-on motors to augment the thrust provided by the first stage, and depending on the number of these strap-on boosters, the PSLV is classified into its various versions like core-alone version (PSLV-CA), PSLV-G or PSLV-XL variants.

The GSLV is designed mainly to deliver the communication-satellites to the highly elliptical (typically 250 x 36000 Km) Geosynchronous Transfer Orbit (GTO). The satellite in GTO is further raised to its final destination, viz., Geo-synchronous Earth orbit (GEO) of about 36000 Km altitude (and zero deg inclination on equatorial plane) by firing its in-built on-board engines.

Due to their geo-synchronous nature, the satellites in these orbits appear to remain permanently fixed in the same position in the sky, as viewed from a particular location on Earth, thus avoiding the need of a tracking ground antenna and hence are useful for the communication applications.

Two versions of the GSLV are being developed by ISRO. The first version, GSLV Mk-II, has the capability to launch satellites of lift-off mass of up to 2,500 kg to the GTO and satellites of up to 5,000 kg lift-off mass to the LEO. GSLV MK-II is a three-staged vehicle with first stage using solid rocket motor, second stage using Liquid fuel and the third stage, called Cryogenic Upper Stage, using cryogenic engine.

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