

GSLV-F04 / INSAT-4CR Mission

02 September, 2007

THE MISSION

GSLV-F04 carrying on-board the INSAT-4CR Satellite lifted-off from Satish Dhawan Space Centre (SDSC) SHAR, Sriharikota at 6:20 PM (IST) on September 02, 2007. GSLV-F04 placed India's INSAT-4CR into the Geosynchronous Transfer Orbit (GTO).

INSAT-4CR was placed into GTO with a perigee (nearest point to Earth) of 168 km and an apogee (farthest point to Earth) of 34,710 km with an orbital inclination of 21.7° with respect to the Equator.

G S L V - F 0 4

THE LAUNCH VEHICLE

GSLV-F04 is the 5th flight of India's Geosynchronous Satellite Launch Vehicle and the fourth successful one. The 49 m tall GSLV, with a lift-off mass of 415 tonne, is a three-stage vehicle with solid, liquid and cryogenic stages. The first stage of GSLV, one of the largest in the world, uses Hydroxyl Terminated Polybutadiene (HTPB) based propellant. The second stage and the four strap-on motors surrounding the first stage use liquid propellant 'Vikas' engine burning UH25 and Nitrogen Tetraoxide. The third stage is a cryogenic stage using liquid Hydrogen as fuel and liquid Oxygen as oxidiser. GSLV employs S-band telemetry and C-band transponders for enabling vehicle performance monitoring, tracking, range safety / flight safety and Preliminary Orbit Determination.

The payload fairing, which is 7.8 m long and 3.4 m in diameter, protects the vehicle electronics and the spacecraft during its ascent through the atmosphere. It's discarded when the vehicle reaches an altitude of about 115 km.

SPECIFICATIONS

Height	49 m
Lift-Off Mass	415 t
No of Stages	3
Payloads	INSAT-4CR
Inclination (deg)	21.7°
Apogee	34,710 km
Perigee	168 km



STAGE CHARACTERISTICS				
Parameters	GS1 Stage (First Stage)		GS2 Second Stage (L37, 5H)	GS3 Third Stage (C12)
	S139 Booster	L40H Strap-on		
Length (m)	20.13	19.7	11.56	8.7
Dia (m)	2.8	2.1	2.8	2.8
Propellant Mass (t)	138	42	39	12.5
Case/Tank Material	Maraging Steel	Aluminium Alloy	Aluminium Alloy	Aluminium Alloy
Propellant	HTPB	UH25 & N ₂ O ₄	UH25 & N ₂ O ₄	LH ₂ & LOX
Burn Time (s)	106.9	148	137	709
Max. Vac. Thrust (kN)	4768	763	799	73.5 (Normal)
Control System		Engine gimbaling - Single Plane	Engine Gimbaling – two place for pitch and yaw control, hot gas Reaction Control System (RCS) for roll control	2 Vernier engines for thrust phase control and cold gas RCS for coast phase control

INSAT-4CR

THE SATELLITE

INSAT-4CR spacecraft is configured with exclusive Ku-band employing the I-2K Bus. INSAT-4CR carries 12 high-power Ku-band transponders designed to provide Direct-to-home (DTH) Television Services, Video Picture Transmission (VPT) and Digital Satellite News Gathering (DSNG). Envisaged as replacement to INSAT-4C satellite which was lost due to launch failure in July 2006, it was successfully launched from SDSC, SHAR, Sriharikota. The spacecraft is co-located with INSAT-3C, KALPANA-1 & GSAT-3 (EDUSAT) at 74° E longitude in Geostationary Orbit with a planned mission life of 12 years. One of the achievements of the project is the judicious management of the mission and initial phase of orbit raising due to non-nominal inclination in which the spacecraft was launched.

SPECIFICATIONS

Weight	2130 kg
Power	Solar Array: 3264 W Batteries: Ni-H2 70 Ah
Stabilisation	3-axis body stabilised using Momentum / Reaction Wheels, Magnetic Torquers, Sensors and Thrusters
Type of Satellite	Communication
Payloads	<ul style="list-style-type: none"> 12 Ku-band Transponders employing 140 W Traveling Wave Tube Amplifiers (TWTA) Ku-band Beacon
Mission Life	12 Years

