

S, X Dual band Antenna Feed for LEO satellite Auto tracking and payload data reception.

Introduction:

Modern remote sensing satellites transmit information in different frequency bands. Therefore, the ground station antenna should be compatible enough to support multiple frequency bands using a single aperture antenna. So, Design and realization of a dual band, dual polarized composite Monopulse tracking feed, covering S-band (2.0-2.3 GHz) and X-band (7.8-8.5 GHz) is successfully accomplished by NRSC.

Salient Features:

- Frequency bands: S and X simultaneous.
- Monopulse Auto tracking Capability:
 - S band - RHCP & LHCP
 - X band - RHCP & LHCP
- Data Reception Capability:
 - S band and X-band:
Simultaneous RHCP & LHCP
- G/T achieved:
 - S band: 17.0 dB/deg K @ 5 deg EL
 - X band: 32.0 dB/deg K @ 5 deg EL

Description:

X-band feed is a five element Monopulse feed, comprising a corrugated horn acting as the main or Sum element surrounded by four circular septum polarizers serving as tracking elements. S-band feed is a four element Monopulse feed consisting of square dielectric array arranged in 2 X 2 configurations. S/X composite feed is systematically designed, fabricated and experimentally characterized in LAB facility with network analyzer and at CATF for Radiation characteristics. The designed composite feed is fully operational in S/X Band Antenna at NRSC, IMGEOs. The specifications of G/T with 32.0 dB/K in X-band and 17 dB/K in

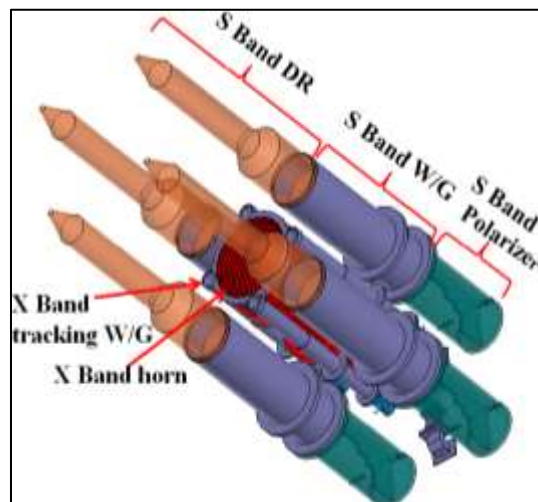
S-band are achieved in Antenna System. The proposed feed is highly efficient, compact, simple and cost-effective. The realized Antenna Feed is perfectly suitable for ground station reflector antenna, meeting the stringent specifications for Auto Track and data reception

Antenna Feed Specifications:

- Frequency Range (X Band) : 7.8 to 8.5 GHz
- Frequency Range (S Band) : 2.2 to 2.3 GHz
- Primary Feed Gain : 21 dBi
- Polarization : RHCP & LHCP
- Auto Track Capability : RHCP/LHCP
- Axial Ratio (X Band) : <1.0 dB
- Axial Ratio (S Band) : < 1.5 dB
- X band G/T : 32.0 dB / deg K at 5 deg EL
- S band G/T : 17.0 dB / deg K at 5 deg EL

Major components of the feed:

The proposed S-X band tracking feed consists of i) X-band corrugated horn, ii) X-band tracking elements; iii) X-band Auto Track network; iv) S-band 2x2 dielectric rod array; v) S-band phase matched tracking network and vi) RF uplink/downlink systems



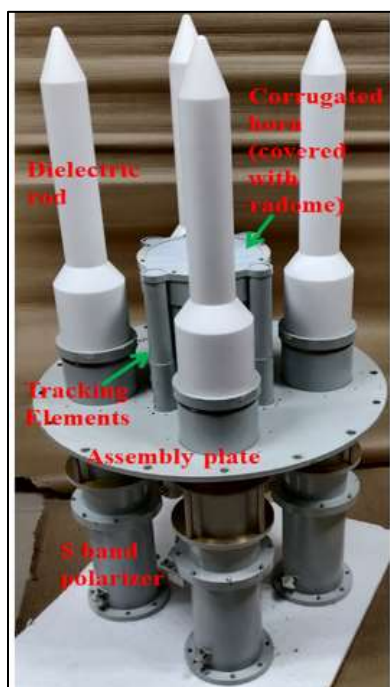


Figure 1 Designed model and Fabricated model of S/X Dual band Feed



Figure 2 Dual band Feed installed in 7.5m Antenna System

Technology Transfer from NRSC/ISRO :

NRSC/ISRO is willing to offer the knowhow of this technology to suitable entrepreneurs / industries in India. Capable manufacturing industries interested in acquiring this knowhow may write with details of their present activities, requirements and plans for implementation, infrastructure and technical expertise available with them, their own market assessment, if any, and plans for diversification to the address given below:

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