



SAC TECHNOLOGIES

for know-how transfer



Antenna

RF and Electronics

Communication

Application Software

Radar Imaging

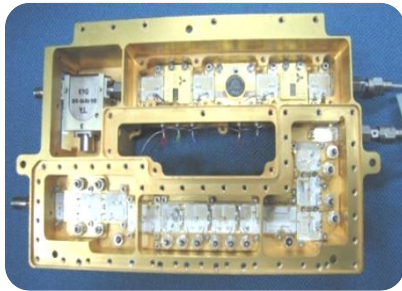
Navigation

Mechanical

Surface Finishing

RF and Electronics

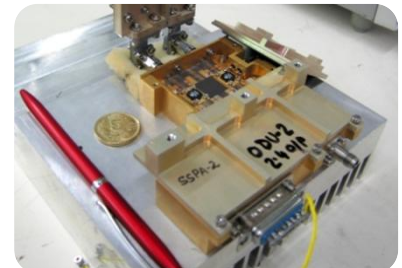
15W C band Solid State Power Amplifier (SSPA)



The growing demand for bandwidth to support applications such as broadcast, communications and networking is calling for a large number of transponders to be deployed. SSPAs are used extensively in such transponders. SAC has developed and qualified a design for normal C-band operation, tailored to meet this requirement on board GEOSAT satellites. Typically one C-band communication satellite may have 12 to 24 such SSPAs. The SSPA has mainly two parts, RF Tray and EPC.

5W Ka band SSPA

5W Ka-Band SSPA was successfully designed, developed and integrated in the ground terminal of GSAT-4 project. The MMIC based SSPA at Ka-Band (30 GHz) with 5 Watt of output power is first time developed in SAC. It makes use of indigenously developed waveguide based extremely low loss symmetric 3dB Quadrature coupler to derive the 5 Watt of output power.

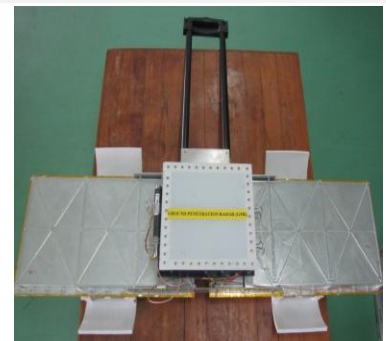


Power Conditioning and Processing Unit

SAC has developed a Power Conditioning and Processing Unit (PCPU) for use in microwave remote sensing missions. PCPU is a very complex multi output dc - dc converter that delivers around 100W of peak power and around 10W of average power. Planar magnetics is used for the first time which was realized using 18 and 16 layer PCBs. Magnesium Alloy had been used for weight reduction. In-built EMI filter isolates the satellite bus from the pulsed load transients.

Ground Penetrating Radar

It is based on stepped-frequency continuous wave (SFCW) approach, ultra-wideband with centre-frequency of 500MHz. Depth Resolution is better than 30cm. It is built using components readily available in the market. It is an indigenously developed GPR at the cost 20 times lower than imported versions) for commercial and scientific use. The total mass of the system is 10kg out of which 5kg is for electronics and antennas and the rest for the structure (can be further optimized) . Power requirement of the instrument is 10W.



L band True Time Delay Phase Shifter

SAC has developed an integrated 6-bit GaAs MMIC digital phase shifter featuring two MMIC dies catering to 1024ps delay requirement . It operates at 1.25 GHz with 250 MHz bandwidth, providing 1024ps of delay coverage, with a resolution of 16 ps. It features very low RMS delay error of 8 ps. It requires an external driver circuit and works on negative control logic of 0/-5V. It is ideal for integration into Multi-chip Modules due to its small size.



C band Active Radar Calibrator

This C band active radar calibrator is designed for the calibration of microwave imaging sensors. It is a ground based equipment developed indigenously. It can calibrate individual Like and Cross-Polarised C-band SAR Channels ; VV, HH, VH, HV & Circular Polarisation using two ARC Rx's.

Antenna

Multi Layer Printed Antenna

There is an ever increasing demand of multilayer printed antenna from mobile communication to space qualified active phased array antenna systems. The salient features are its light weight structure, conformal to the surface, computer controlled automated fixture for aligning layers, inspection and bonding of layers. Presently high efficiency multilayer antenna is designed at L and C band and can be designed at other frequency range as per the industry / institution.



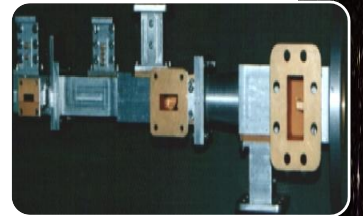
Near Field Test Range

It is indigenously developed facility for testing of antenna (especially radars) for near field measurement system which is using pulsed FMCW /Chirped pulse. Most of the radar systems are equipped with chirped pulse and the radar system itself can be utilized to characterize the antenna in the integrated system itself. This facility includes electronic hardware, mechanical system and software.



8-Port 4-frequency Orthomode Transducer

It is an indigenously designed, developed and space qualified transducer to feed a common aperture four frequency corrugated horn. This transducer had been successfully flown onboard Oceansat- I, as integrated part of scanning antenna system of MSMR payload. It is designed for multi-frequency dual polarization operation at 4 widely separated channels at 6.6, 10.65, 18 and 21 GHz.



Dual-channel Waveguide Rotary joint

It is an indigenously designed, developed and qualified to cater to conical scanning of space borne scatterometer antenna. It is designed for higher power handling capability for both channels at Ku-band. Rotation independent RF performance having low insertion loss and high isolation between channels. It is successfully flown onboard Oceansat-II as integrated part of the scatterometer payload offering satisfactory in-orbit performance.



Surface Finishing

Silver (Electro) Plating on Waveguides

SAC has developed a process to carry out silver plating from inside in aluminum waveguides. It is a difficult task to plate due to the complexity and shape of the component. The purpose of this process is to get uniform deposition throughout inside & outside surfaces. Silver plated waveguides are used in various communication payloads like GSAT, RISAT etc. Silver plating is required to obtain good RF performance, as silver gives the best known electrical conductivity.



Thermal Control (High Temperature) Coating

SAC has qualified the process of thermal control coating for spacecraft subsystem component made of different materials such as Anodized Aluminium, Chromated Aluminium, Bare Aluminium, Electroless Nickel plated Invar, Bare Invar, Silver plated Aluminium, Chromated Magnesium, Black anodic coated Magnesium etc for space use. This coating facilitates radiant heat transfer among internal components of the satellite.



Photosynthesis Irradiance Incubator



This photosynthetic irradiance incubator (photosynthetron) is designed and developed for marine and fresh water applications. It is used to measure the photosynthetic-rate parameters (PI) of phytoplankton, the microscopic, photosynthesizing green plants of the ocean. PI parameters constitute an important element for modeling and estimating oceanic primary production using remote sensing data.

Distress Alert Transmitter (DAT)

DAT is a low cost transmitter for emergency communication for alert messages from fishing boats. On activation of emergency, it transmits a short message containing its position, time, ID and type of emergency through satellite to a central receiving hub station located at Maritime Rescue Coordination Centre (MRCC), Chennai. It will repeat the message every minute for first five minutes and then every five minutes till it is switched off. On reception of alert message, MRCC coordinates rescue operation through Indian Coast Guard.

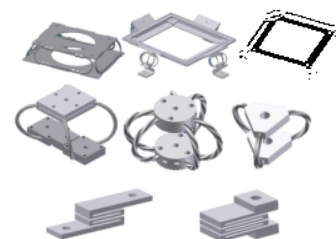


e-SMART (e-System for Mechanical Workflow Management And Reporting Tool)

e-SMART is an online software tool to automate and provide seamless end-to-end workflow management from designer to delivery. It is tested and time proven software being used in-house since last 10 years.

Vibration Management Solutions

It is developed by SAC, ISRO, Ahmedabad. All the delicate electronic and optical systems which are vulnerable to vibration and shock can be protected from these. This Vibration Management Solutions(SVMS) solves vibration and shock difficulties during transportation on ground and space. These systems are based on wire rope mounts that provide inherent damping by virtue of relative motion between wire strands.



Digital Monopulse Tracking Receiver

The two-channel digital monopulse tracking receiver for earth station is a 70 MHz receiver. It is one of the sub-systems of antenna tracking system in large earth stations. It generates DC error signals proportional to antenna off-pointing by processing the input IF signals in digital domain. These output error signals are used to drive the antenna in appropriate direction to correct the off-pointing error.

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