

ELECTRICAL STANDARDS

TIME AND FREQUENCY

Improvements were made in the STFS transmission setup at Sikandrabad Earth Station with the installation of PC-XT and two new format generators. Several user institutions including All India Radio, Tata Electric and MCF, Hassan were helped in the usage of STFS transmissions. Some experiments were carried out to compare the clock between NPL and Sikandrabad Earth Station and an accuracy of one microsecond could be achieved.

The expertise developed for reconditioning the physics package of HP aged Rb standards was being used by outside organisations. The theoretical studies on squeezed states were carried out. Several electronic sub-assemblies of the Maser project were completed.

DC STANDARD

The maintenance of the e.m.f. values of group of saturated standard cells was continued. The dc standards of resistance were also maintained. The calibration of dc measuring instruments including standard cells, electronic voltage standards, digital multimeters and calibrators was carried out.

HF IMPEDANCE

AC AND LF

The project of automatic precision capacitance bridge, in collaboration with Jadavpur University was successfully completed. The automatic capacitance bridge can be used for measurement of capacitances in the range 10 pF-1000 pF with an accuracy of 1 ppm. Capacitances upto 1 μ F can be measured in the frequency range 50 Hz to 1 kHz. A transfer standard of ac resistance of kilohm was reassigned value against the standards of capacitance with an uncertainty of 3-parts in 10^7 using quadrature and ac resistance bridges. Using William's bridge facilities, high frequency impedance measurements were established in the frequency range 1 MHz to 100 MHz with a basic accuracy of 0.02% at 1 MHz for capacitance. A

set of high frequency quasi-inductance standards having nominal values of 10 μ H, 100 μ H and 1 mH were designed and fabricated.

Single phase reference standard of ac power and energy was inter-compared with the PTB standard with an uncertainty of 0.02%. Facilities were established to determine the effect of variation of voltage ($\pm 20\%$ of reference), frequency ($\pm 5\%$ of power freq) and temperature ($\pm 10^\circ\text{C}$ of ambient) on the accuracy of ac power and energy measurements. The range of phase measurement was extended upto 30 kHz. Techniques were established for the calibration of ac high current shunts upto 500 A capacity and for testing fireman's axe.

HF & MW VOLTAGE, CURRENT, POWER, FREQUENCY & NOISE

The primary standards of voltage, current, power, frequency and noise were maintained and updated. Towards establishing primary coaxial power standard in the frequency range of 10 MHz to 18 GHz, a new project on the development of "coaxial HF & microwave microcalorimeter" was initiated in the year with the collaboration of PTB. The fabrication of various parts of the microcalorimeter as per the drawings was completed and the assembly was in progress. Assistance was provided for assessment of laboratories under NCTCF programme. The calibration of a number of precision instruments from the user organisations was done.

MW ATTENUATION & IMPEDANCE

A prototype laboratory model of 30 MHz WBCO attenuator was designed and fabricated. The cylindrical precision waveguide, launching and receiving coils were designed for the attenuator. The preliminary testing and evaluation of attenuator gave an uncertainty of 0.05 dB/10dB for a range of 60 dB. The improvements were made in the design of K-band standard mismatches. Calibration of attenuators and matched terminations was carried out for different government departments and undertakings.