A.16: Indigenous development of S-Band Test facility upto 45MW peak power for testing accelerator components

RRCAT is engaged in the design and development of high energy electron LINAC as future injectors for the Booster Synchrotron for Indus 1 and Indus-2 SRS. The high energy LINAC will need microwave power over 30MW depending on the number of sections to be energised and the overall energy and current requirements. In order to have advance preparations for this development a 45MW S Band Test facility was designed and developed at RRCAT. The test stand is built around a 45MW S Band klystron.

A conventional pulse forming network based modulator for klystron has been designed and developed. The WR 284 waveguide transmission system consisting of dual directional couplers, SF_6 gas pressurisation unit, high power load and arc sensor was developed and interfaced with the klystron. The klystron has been successfully tested upto 30MW peak power at 2856 MHz on SF_6 pressurised waveguide line. Further efforts on developing vacuum compatible waveguide line is planned to increase the power level.

A solid state S Band driver amplifier upto 1kW output power was designed, developed for driving the 45MW klystron. The microwave system consists of signal generator, 1kW solid state driver amplifier, circulator, high power klystron, E plan bend, dual directional coupler, SF_6 gas pressurisation system, arc sensor and 50MW peak power microwave load. The 300kV klystron modulator is realised with 15 section pulse forming network of 6ohm characteristic impedance. The PFN is switched by means of a high voltage thyratron through the primary of a 1:15 turns ratio pulse transformer. The pulse transformer has capacitive divider and current transformer for measuring the cathode pulse voltage and current. The output of klystron is measured using microwave peak power meter with proper attenuation in the measurement channel.

Table A.16.1 : First test results of 45MW klystron test facility

Parameter	Value
Klystron Output power	30 MW peak max.
Output Voltage(-ve)	300kV max.
Output Current	300A
Pulse duration	4 microsecs
PRR	10Hz
Frequency	2856 MHz

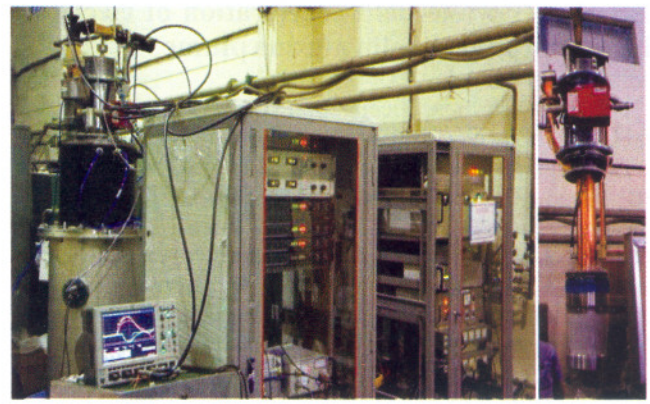

Fig A.16.1: S Band Test Stand with capability upto 45MW peak power designed and developed by PHPMS, RRCAT

Fig. A.16.2 : Klystron RF output @ 30MW at 2856MHz, on a peak power meter.

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