

A.6: Indigenous development of solid state pulse modulators and related pulsed technologies for 3MeV H RFQ at RRCAT

An state of the art 100kV, 20A, 500 microsec solid state bouncer modulator has been developed indigenously along with crucial high voltage components like 100kV pulse transformer, 10kV solid state switches, waveguide components for self reliance as import substitutes.

An effort has been successfully made at RRCAT to achieve complete self reliance in this crucial technology. In this endeavour complete design, fabrication, improvements and tests were done in house for the most crucial technologies like high voltage pulse transformers, high voltage solid state switches, bouncer circuits, fast interlock and protections circuits. The system was interfaced and tested for endurance first on resistive loads and later connected to the klystron to obtain the RF power.

Klystron TH 2089 and three port circulators obtained from CERN for ion accelerator program at RRCAT were successfully tested and rated output power is obtained.

Table A.6.1 : Measured performance of solid state bouncer modulator and klystron

Parameter	Value
Output Voltage(-ve)	10kV-100kV
Output Current	20A
Pulse duration	500 microsecs
PRR	2Hz
Flat top variation	<1%
Klystron Output power	0.86 MW @86kV
Frequency	352.2 MHz



Fig A.6.1: 100kV Solid state bouncer modulator with PC based control system for 1MW Klystron TH 2089.

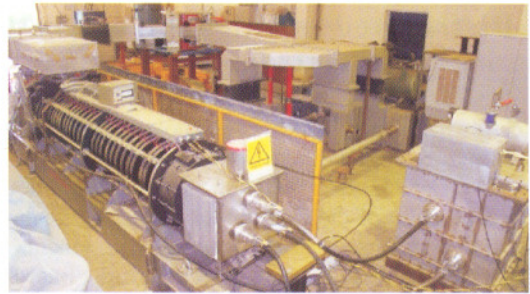


Fig A.6.2: 1MW Klystron TH 2089 interfaced with the Solid state bouncer modulator and WR 2300 waveguide system for tests at the Test Stand.

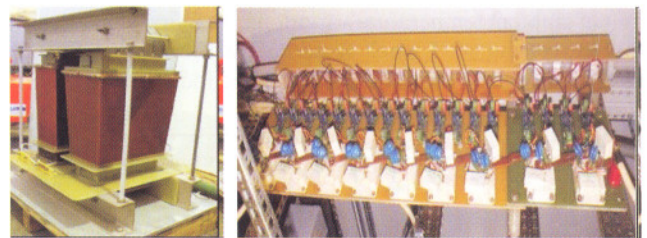


Fig. A.6.3 : Indigenously developed 100kV Pulse transformer and 10kV, solid state switch for the bouncer modulator.

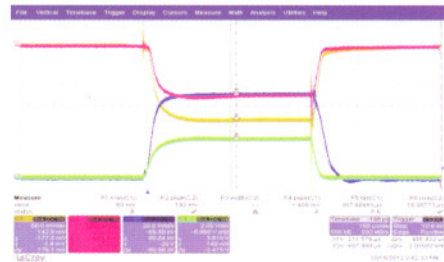


Fig. A.6.4 : C1: Forward Power @860kW pk, C2: Reflected power signal @12kW pk, C3 : Cathode pulse voltage @ 86 kV, C4 : Cathode Current @ 14.54A



Fig. A.6.5 : Klystron RF output on a peak power meter, Yellow: forward power@ ~860kW, Blue: Reflected power @ ~12kW

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