

TESTING OF INDUCTIVE OUTPUT TUBE BASED **RF AMPLIFIER FOR 650 MHz SRF CAVITIES**

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ABSTRACT

A 650 MHz IOT based RF amplifier has been developed in VECC. It can be used to power several cavity modules in high energy high current proton linear accelerator to be built for ADSS programme in India and in Project-X at Fermilab, USA. The IOT based amplifier requires different powers supplies, water cooling and forced air cooling for its operation. A Programmable Logic Controller (PLC) based interlocks has been incorporated to take care of systematic on/off of the power supplies and driver amplifier, water flow, air flow and other interlocks for the safe operation of the RF System. In addition to that EPICS based RF operating console and data logging/monitoring system has been added.

INTRODUCTION

- The amplifier uses the TH 793-1 Inductive Output Tube that delivers an output power of typically 85 kW in CW operation
- Water cooled amplifier requires five different power supplies naming filament PS, ion-pump PS, Grid PS, Collector PS and focus Coil PS.
- Auxiliary power supplies filament, ion-pump and grid are floating are in high voltage potential
- High voltage deck are electrically isolated by means of an isolating transformer
- PLC works as main control device
- EPICS has been implemented for control and monitoring of the system

CONTROL SYSTEM OVERVIEW



lon Pump 🌒 💵

Filament 🛛 💷

Grid 🛛 💿 🚥

Collector 🔵 🔤 🎹

F Coil 🛛 🛯 🖬

Reset All

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Figure 2. Schematic diagram of the Amplifier

SUPERVISORY CONTROL SYSTEM

- EPICS has been used to interface and control different devices in the system
- It's a three layer architecture Device layer, IOC layer and User interface layer
- Device Layer : PLC and I/O modules
- IOC: A linux server where IOC is running
- User Interface: GUI for Remote operation created using MEDM



Figure 1. HV Isolation Scheme

CONCLUSIONS

•The amplifier operated continuously k delivering power to a RF dummy load •All the I/O devices are configured in fail safe mode which guarantees a safe operation •EPICS enables us to scale up the control system or integrate with another control system • In future the system can be used to power several RF cavities.

REFERENCE

[[1] IOT TH 793-1: Thales Group [2] Working with STEP 7 https://moodle.dce.fel.cvut.cz/file.php/17/Manualy/S7gsv54_e.pdf [3] EPICS: http://www.aps.anl.gov/epics/