The RF Control System of the SSRF 150MeV Linac

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Introduction

The injector of the Shanghai Synchrotron Radiation Facility (SSRF) is a 150 MeV linear electron accelerator.

The RF system of the 150MeV Linac is composed of many individual components with different interfaces. A universal RF device interface was designed and manufactured to accomplish the RF system control mission.

Connections between the local controller and RF devices are fully isolated by either the controller interface or the devices itself. Besides direct control devices, there are several sub-control system:

- The controls for the 2 set modulators of RF power system make use of PLCs.
- Phase control is a sub-system and consist of a compact PCI cabinet and several modules.
- The Sub-Harmonic cavity is tuned by a stepping motor which is controlled through a Serial communication server.

This system has been put into operation since July of 2007, and worked stably.

System operation

The system operate in standard EPICS environment

Configuration

- **VME Controller:** MVME 5500 CPU in a 9 slots cabinet
  - VMIVME 2536
    - Digital 32 In / 32 Out Ch Isolated Interface
  - VMIVME 3125
    - Analog 32 Ch A/D Isolated Interface

- **RF Devices Interface:** SSRF Design & manufacture
  - PLC: S7-300 ,for modulators control
  - Serial comm. server: Nport-5610, for stepping motor control
  - Compact PCI: Phase control

- **Software:**
  - EPICS 3.14.8.2 ,edm
  - SSRF-edition EPICS Drivers for VME Modules & Comm server
  - S7-PLC epics driver

- **Linac RF control architecture**

- **RF Amplifiers**
  - High-Power Phase Shifter
  - Sub-Harmonic Cavity
  - 1 of 2 KLY (TED E37302)
  - 12 Focus P.S. of KLY

- **OPI Interface** for
  - 3 Amplifiers
  - 12 Focus P.S.
  - 3 Phase Shifters
  - 1 Sub-Harmonic cavity
  - Klystron vacuum monitors
  - Reverse Power Protection Reset

- **RF Power Supply System** (use PLC Controller)

- **Control Net**
  - VME Controller & Device Interface
  - Phase Shifter & Controller Unit

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