

## A.2: Machine state based switch off of Indus-2 Injection system

**Introduction:** Indus-2 beam injection and extraction Pulse Power Supplies (PPS) are required during the beam filling. It consists of the septum and kicker power supplies (6 nos.) for injection of beam from Transport Line-3 (TL-3) into Indus-2 ring. These power supplies have a thyatron switch whose operational lifetime is dependent on the number of operational hours of the PPS. Earlier these power supplies were switched off manually after beam is filled in Indus-2.

Considering this, an automatic sequence based on machine states (Fig. A.2.1) is implemented which switches off the injection PPS, parks the TL-3 power supplies (total 36 power supplies) at their minimum settings, displays alert messages to the operator for switching off the extraction system. The sequence also takes care for the stabilization time required for PPS by issuing timely messages for switching ON the injection and extraction PPS.

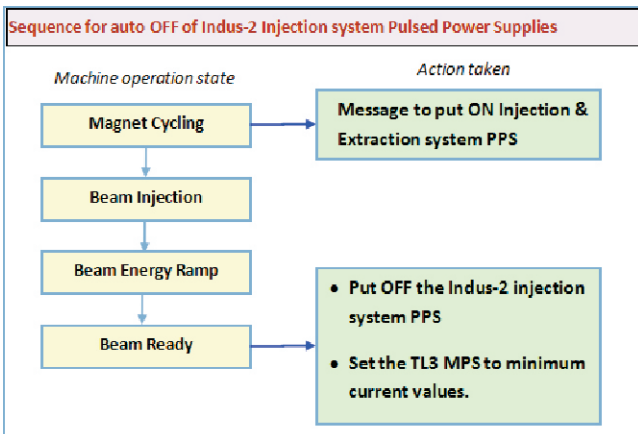


Fig. A.2.1: Automatic sequence based on machine states

**Implementation:** The above shown sequence has been implemented in the SCADA based Indus-2 control system software. TL-3 power supplies are controlled and monitored by Magnet Power Supply (MPS) control system and the PPS by the Timing control system.

**Switching OFF the PPS:** The shift-in-charge declares Beam-Ready from the Beam-line Front-end panel. On receiving this, the machine state event handler functions in MPS and Timing sub-system Layer-1 software take corresponding actions. Figure A.2.2 shows the Timing

System panel with a message regarding auto switching off of injection PPS.

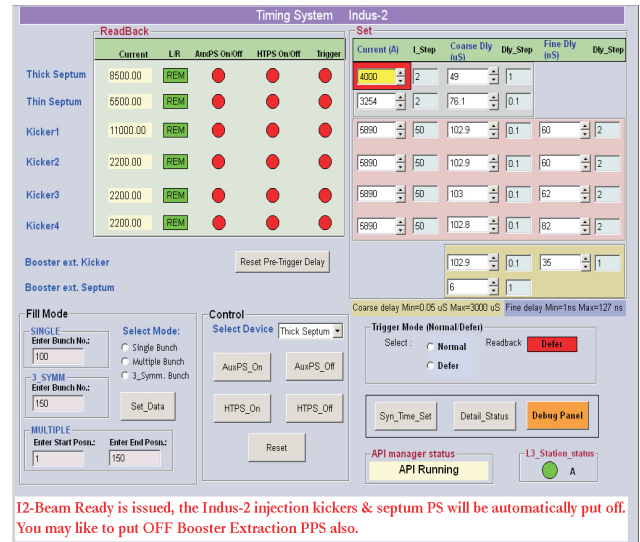


Fig. A.2.2: Timing System Panel with auto switch off message

**Switching ON:** As soon as Indus-2 magnet cycling process is started manually by the operator, an alert message is shown on the cycling panel to switch ON the PPS. This ensures enough time for the PPS to stabilize.

This machine state based switching off of Indus-2 Injection system PPS will enhance the life of PPS and TL-3 magnet power supplies along with power saving.

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