

xi. Sextupole Power Supplies

Power Supplies

There are a total of 24 sextupole power supplies in both rings. All of the sextupole power supplies are located in the alcoves. The sextupole power supplies are current regulated DC power supplies with an inner voltage loop. In addition to this inner voltage loop these sextupole power supplies have a linear MOSFET output stage with a 12 pulse SCR Pre-Regulator. These power supplies use a DCCT as the current sensing element. The required power supply current reproducibility is 0.025% of maximum current rating. The power supply maximum ratings are 100Volts at 100Amps. The AC input is 3 phase 480V at approximately 14 Amps maximum. The maximum voltage ripple is 0.2Vpp in the 100% tap setting. The power supplies have a 70V tap setting as well. The block diagram is shown in Fig. 2-21.

Power Supply Controls

Each power supply receives an analog setpoint from an external fiber optic interface card. This fiber optic interface card receives the setpoint over fiber and converts it to an analog current setpoint utilizing a 16 bit D/A. The OFF, STANDBY and ON Commands to the power supply, as well as the statuses from the power supply, are sent to a NODE CARD which then communicates over a MODBUS PLUS network with a MODICON Programmable Logic Controller (PLC). This MODICON PLC communicates with the VME front end computer over an Ethernet connection. A NODE CARD is an inexpensive multichannel I/O device designed at BNL which receives commands from the PLC and distributes these commands out to as many as 12 power supplies. The power supply statuses are also sent back to the NODE CARD and then onto the PLC from the NODE CARD. There are four analog readbacks which are sent back to the Multiplexed Analog to Digital Converter (MADC). These four signals are Setpoint, Output Current, Output Voltage, and Power Supply Current Error.

Power Supply Magnet Load

Each Sextupole power supply is connected across 12 sextupole magnets. The 12 sextupole magnets are all connected in series. These magnets are connected in two families, focussing and defocussing in each arc. The inductance of each sextupole magnet is about 0.83H. When twelve sextupole magnets are connected in series the total inductance the power supply sees is about 10H. The only resistance the power supply sees is the warm DC cables to each of the sextupole magnets. This resistance is approximately 0.42 ohms.

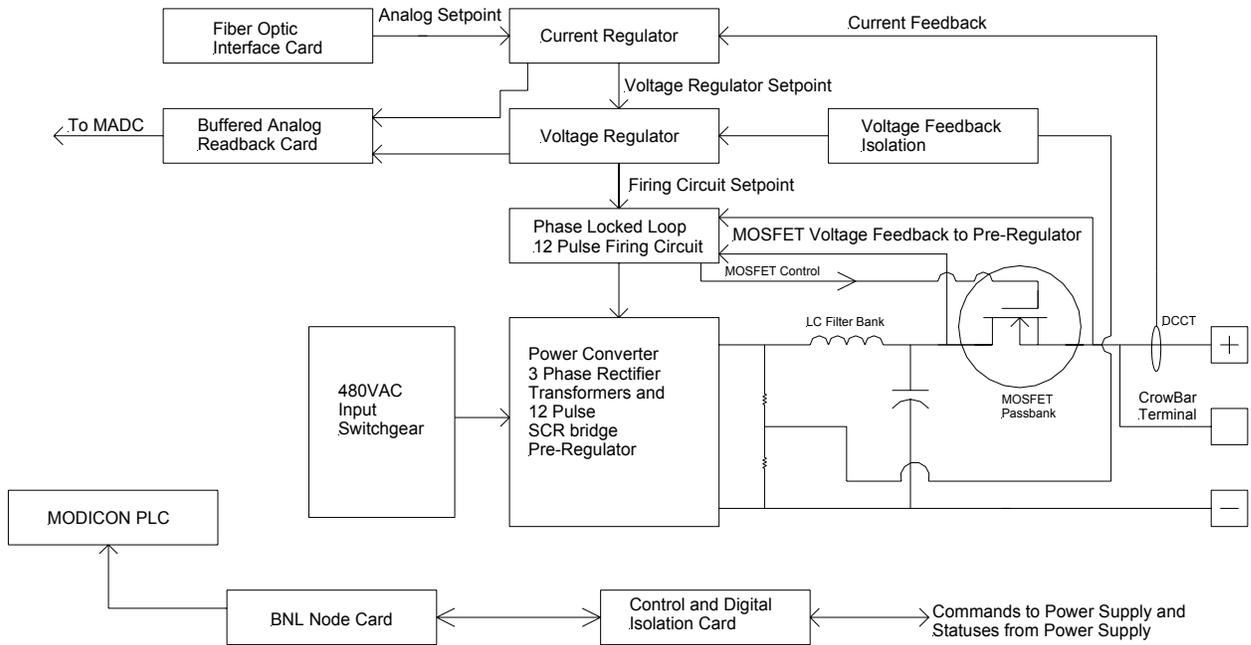


Fig. 2-21 RHIC Bipolar Power Supply Simplified Block Diagram