

DESIGN OF THE DIII-D TOP LEVEL POWER SUPPLY CONTROL SYSTEM FOR AN EIGHTH NEUTRAL BEAM ION SOURCE

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The DIII-D project will be recommissioning an eighth neutral beam ion source. Part of this effort includes returning one of the neutral beam power supplies (NBPS) to full operation. For the past ten years, the high voltage dc portion of this system had been used to power gyrotrons in the DIII-D electron cyclotron heating system. The idle filament, magnet, arc and suppressor power supplies will be refurbished using their existing technology. The Modulator/Regulator for the accelerator grid voltage is being upgraded with new controls. Interlocking and coordination of the individual supplies within the NBPS is performed by the local control station (LCS). The new design of the LCS will be presented. The current implementation of the LCS is characterized by discrete relay and CMOS logic, and the use of CAMAC interfaces to the neutral beam control and data acquisition systems. These older and difficult to maintain components will be replaced with an Ethernet connected programmable logic controller and a Field Programmable Gate Array (FPGA) design for fast protection functions. Operator interfaces will change from hardwired switches and panels to Graphical User Interfaces (GUIs) on multiple screens with the capability for remote monitoring and operation. Due to schedule constraints some of the more reliable solid state circuits in the LCS will not be immediately replaced, but an easy migration path has been mapped that can be implemental with minimal downtime once the eighth source is in operation. This project is expected to result in a viable prototype for upgrading other LCS in the neutral beam power systems at DIII-D.

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