# THE DIII–D MULTIPLE GYROTRON CONTROL SYSTEM*

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DIII–D's ECH upgrade with 1 MW, 110 GHz gyrotrons is ongoing, and with it, an upgrade of the control system. The Multiple Gyrotron Control System uses software distributed among networked computers, interfaced to a programmable logic controller (PLC), the timing and pulse system, power supplies, vacuum and waveguide controls, and instrumentation. During DIII–D operations, the system will allow control and monitoring of a number of gyrotrons from different manufacturers.

The software, written using LabVIEW, allows for remote, and multiple, operator control. Any supported computer can become a control station, and multiple tasks can be simultaneously accommodated. Each operator can be given access to the controls of all gyrotrons or to a subset of controls. Status information is also available remotely.

The use of a PLC simplifies the hardware and software design. It reduces interlock and control circuitry, includes monitoring for slow analog signals, and allows one software driver to efficiently interface to a number of systems. In addition, the interlock logic can be easily changed, and control points can be forced as needed.

The pulse system is designed around arbitrary function generators. Various modulation schemes can be accommodated, including real-time control of the modulation.

This discussion will include the hardware and software design of the control system and its current implementation.

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