

THE DIII-D MULTIPLE GYROTRON CONTROL SYSTEM*

D. Ponce,¹ F.W. Baity,² H.K. Chiu,¹ M. Condon,¹ R. Cool,³ Y. Demers,³ I. Gorelov,¹
R.A. Legg,¹ and S. Raftopoulos⁴

¹General Atomics, P.O. Box 85608, San Diego, California 92186-5608

²Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831

³Centre Canadien de Fusion Magnetique, Quebec, Canada

⁴Princeton Plasma Physics Laboratory, Princeton, New Jersey 08543

The recent DIII-D program to upgrade the 110 GHz ECH system to six 1 MW gyrotrons, presented the opportunity to modernize the control and instrumentation systems. The challenge of the system is to allow a small number of operators to control the gyrotrons, which have individual tuning requirements and are sourced from two manufacturers. The main user interface is written in National Instruments' LabVIEW software. Access to PLC functions not available through the LabVIEW interface are provided by Siemens' TISOFT and by Ci Technologies' Citect. The computer control system uses computers connected by ethernet to distribute the control, status, and data functions. The computers which directly interface with the gyrotron system hardware use a rack-mountable and ruggedized compact PCI format. The waveform digitizers and the timing control module, which gates the high voltage power supply, the gyrotron filament boost, and sends the hardware reset and digitizer triggers, are also located in the compact PCI crate. These computers also control hardware responsible for forming the gyrotron pulse shape, programming the sweep coil waveform, setting the waveguide polarizer angles, and detecting asynchronous system events. Many control functions are handled by PLC's which are under computer control. The PLC's are responsible for the vacuum and waveguide systems, access interlocks, filament power supply control, cooling system interlocks, the high voltage power supply interface, gyrotron tank oil interlocks, and launcher mirror control. Control connections to the waveguide launchers at the DIII-D vessel and to the high voltage power supplies are made through patch panels, allowing rapid configuration changes. This paper will provide more detail on the features of the control system, with emphasis on the upgrades.

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D. Ponce
General Atomics
P.O. Box 85608
San Diego, CA 92186-5608
(858) 455-2919
FAX (858) 455-4190
e-mail: ponce@fusion.gat.com

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