

DATA ACQUISITION AND PROTECTION FOR NEW DIII-D IN-VESSEL COILS*

G.L. Campbell, D.D. Szymanski, D.A. Piglowski, D.H. Kellman, P.M. Anderson,
G.L. Jackson, A.G. Kellman
General Atomics, P.O. Box 85608, San Diego, California 92186-5608
Greg.Campbell@gat.com

The installation of new internal magnetic coils (I-Coils) in the DIII-D tokamak at General Atomics required extensive additions to the experiment data acquisition and protection capabilities. This set of 12 coils (up to 7 kA each) is designed to allow improved feedback stabilization of resistive wall modes which limit the plasma performance. The acquisition and signal conditioning needs of the I-Coil power system presented an opportunity to try a new data acquisition approach which increased both the sampling rate and sample size per channel compared to the standard DIII-D CAMAC acquisition equipment. A 96 channel Compact-PCI (cPCI) digitizer system was purchased for the I-Coil project to acquire up to approximately 380 MB of power supply and coil current data per plasma discharge. Additional instrumentation and control was provided to protect personnel, the new coils, the tokamak, the facility and improve machine availability. This paper will present discussions of technical and programmatic requirements, bases for requirements, the design selection outcome, installation experience, integration issues, commissioning experience, and lessons learned. The data acquisition system is described in detail including a conservative signal isolation scheme, signal grounding standards, anti-aliasing filters, and synchronization of acquisition. Protection interlocks are described, including high voltage isolation, water flow measurement, and the coil grounding-shorting switches.

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G.L. Campbell
General Atomics
P.O. Box 85608
San Diego, CA 92186-5608
(858) 455-4178
Fax (858) 455-4190
e-mail: Greg.Campbell@gat.com

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