A Thermocouple Telemetry System Replacement for the DIII-D Neutral Beams*

S. Noraky
General Atomics, P.O. Box 85608,
San Diego, California 923186-5608 USA

The DIII-D neutral beams thermocouple telemetry system was recently replaced with a new system to reduce signal noise. The original system, which utilized multi-channel ice point reference devices and a Computer Automated Measurement and Control (CAMAC) standard interface, provided unreliable data due to excessive signal noise. This obscured the actual temperature rise and fall on beam system components. A new telemetry system was sought to improve data reliability, and thus reduce operational risk to beam system components. A prototype system was configured using commercially available data input/output (I/O) modules that feature built-in thermocouple reference junction temperature compensation and an Ethernet interface. The prototype system was installed and connected to a group of beam system thermocouples. Using the application programming interface supplied with the I/O modules, test code was developed within the MS Windows® operating system to monitor the acquired data. Performance and reliability of the prototype system were observed over a six month period of DIII-D experiment operations, and data was compared to that acquired with the original telemetry system. The measured reduction in signal noise prompted the implementation of this upgrade in all DIII-D neutral beams systems. A Linux version of the code was developed and integrated as a procedure for data acquisition during neutral beam operations. Data obtained from the replacement system showed reduced signal noise. In addition, the replacement telemetry system provides improved performance and data acquisition capability.

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