

Extending the Capabilities of the DIII-D Plasma Control System for Worldwide Fusion Research Collaborations*

B.G. Penaflor,¹ J.R. Ferron,¹ M.L. Walker,¹ D.A. Humphreys,¹ J.A. Leuer,¹
D.A. Piglowski,¹ R.D. Johnson,¹ B.J. Xiao,² S.H. Hahn,³ and D.A. Gates⁴

¹General Atomics, PO Box 85608, San Diego, California 92186-5608

²EAST ASSIP, Hefei, China.

³KSTAR NFRI, Daejeon, South Korea.

⁴PPPL, Princeton, New Jersey.

The DIII-D Plasma Control System (PCS) developed at General Atomics is currently being used in a number of fusion research experiments worldwide. This includes the DIII-D Tokamak Facility in San Diego, the NSTX experiment at Princeton NJ, the MAST experiment in the UK, the EAST tokamak in China, the KSTAR tokamak in South Korea and a pair of experiments at the University of Wisconsin. A number of enhancements have been made in order to support the DIII-D experimental program in addition to meeting the needs of other PCS users worldwide. Among the enhancements specific to DIII-D have been upgrades to utilize faster quad processor computer systems, additional display tools for analyzing and viewing data in real-time during plasma discharges and real-time calculations of the frequency, amplitude, and mode numbers from the smoothed cross power spectrum of Mirnov probe diagnostics. In support of PCS collaborators worldwide, there have been new capabilities added to support various real-time interconnect hardware, improvements to message passing between real-time computers, a major enhancement to the user interface to allow for simultaneous editing of multiple waveforms and more. Details of the present PCS hardware and software architecture along with descriptions of the latest enhancements will be given.

*Work supported by the US Department of Energy under DE-FC02-04ER54698.

1797characters used of the allotted 2000 character count.