

HARDWARE AND SOFTWARE UPGRADES TO DIII-D MAIN COMPUTER CONTROL SYSTEMS*

D.A. Piglowski, B.G. Penaflor, B.B. McHarg Jr., K.L. Greene, R.M. Coon, and J.C. Phillips

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

The complexities of monitoring and controlling the various DIII-D tokamak systems have always required the aid of high-speed computer resources. Because of recent improvements in computing technology, the existing resources have become antiquated and cannot meet increasing demands. Also expected maintenance costs make it more feasible to replace the older hardware rather than continue their upkeep. State-of-the-art machines not only outperform the present systems, they can be purchased easily off-the-shelf from major distributors with standardized components. These newer systems also take advantage of more established and robust operating systems, i.e. Linux. With computer hardware upgrades in mind, a unique opportunity has presented itself: a major redesign of the high-level control software which manipulates the major subsystems of the DIII-D tokamak.

As expected, upgrading the corresponding computer software has become the more time consuming and expensive part of this upgrade. During this redesign, the main issues focused on making the most of existing in-house codes, speed with which the new system could be brought on-line, the ability to add new features/enhancements, ease of integration with all DIII-D systems, future portability and upgrades. The resulting blueprint has addressed all these issues and may well be used by others with similar constraints. As in the past, consideration was given first to third party commercial software. However, all the evaluated packages were removed from consideration after they failed to meet certain criteria. In all the potential upgrade systems, a key part of the DIII-D control software was the interface to CAMAC. A custom Linux software driver, mated with the Kinetic Systems 2115 serial highway driver, was created to meet this need. Other components of a control software packaged fell into place soon thereafter; I/O handling, real-time data storage, graphical user interfaces (GUI), procedural codes. Long term data storage is accomplished via a commercial relational database management system (RDMS), Microsoft's SQLserver. Graphical displays are created with the aid of Borland's Kylix development tools. The procedural codes were adapted from the previous system of rules and actions and then merged with the new I/O handling. This resulting system is modular and easily customizable to fit the needs of the target system.

The initial phases of this upgrade encompass the central tokamak control, neutral beam, and main data acquisition hardware/software systems. Other data acquisition systems and diagnostics are being considered.

*Work supported by U.S. Department of Energy under Contract No. DE-AC03-99ER45563.