Physics Operations with the DIII-D Plasma Control System*

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***Abstract*—**The DIII-D device began operation in 1986, and a fully digital plasma control system (PCS) was implemented in 1993. Over time, the success of the PCS to exploit the inherent versatility of the DIII-D device led to a philosophy of using the PCS to control all available plasma system actuators. This made the PCS a very powerful physics tool that is at the core of Physics Operations at DIII-D. The complexity of the DIII-D device and all the systems the PCS must control makes proper setup of the PCS for new experiments a daunting task. A cadre of physicists specially trained in PCS operation forms the bulk of the Physics Operations staff at DIII-D. They are the interface between experimental plans and successful execution and, as such, are a critical component of each experiment. Physics Operations is also a set of tools and procedures. We will briefly examine some of those tools, such as the TokSys control design and modeling environment, and the 'smart' PCS setup checklist, that greatly reduces human error in reconfiguring the PCS for a new experiment. We will examine the procedures that allow efficient use of those tools and some of the human factors that can affect productivity.

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