WBS Number: 55	Title: NCSX Real Time Plasma and Power Supply Control

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Description

General Description of Work to be Performed:
Real Time Plasma Control System will share the system developed for NSTX. The NSTX system consists of a Sky Computer Inc. high-speed array processor with a Force Inc. host control computer, a real time data acquisition system and Front Panel Data Port communication links to remote digitizers. This work package will provide a new real time data acquisition system in the NCSX test cell. It will consist of ADCs, timing and clock interfaces, Digital I/O, and a communication interface to the existing NSTX processor.

The real time software is divided into two functions, the power supply real time control system (PSRTC) and the plasma control system (PCS). The PSRTC will calculate the alpha control signal required by the power conversion firing generators. The alpha control signal is communicated to the power supply building via a custom designed fiber link, however a new interface may be in place in 2005. This signal is calculated using coil currents, machine state permissives, and fault conditions. The PCS will use the existing user-interface/data server software system developed at General Atomics. It consists of real time control category routines (i.e. gas, shape, position, etc.), a waveform manager, hooks to IDL user interface and internal messaging and lock management software.

The Day 1 system will consist of a new software PSRTC to support NCSX requirements. It will include 64 channels of remote digitizers for magnetics sensors in the test cell, Systran FiberExtreem Fiber Channel communications links providing real time data transfer between the two voltage classes in the Test Cell and Power Supply building. The PCS infrastructure will be available for limited plasma control on Day 1, however, the system will be capable of expansion to several hundred real time signals.

Description of Existing Equipment/Facilities to be Reused:
The NSTX Plasma Control System will be shared with NCSX.

Description of Major Modifications Required to Existing Equipment/Facilities:
Modifications of the existing NSTX plasma control system will include new PSRTC software and new PCS algorithms.