

Control System Upgrade

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The upgrade of the K500 control system is complete and the system is fully operational. The switch from the old control system to the new control system had minimal impact on the operation of the facility. The new control system was installed in two stages, first the control for the sources, injection line, and K500 machine was brought on line in September 2000. The beam-lines and other related subsystems were brought on line during the January 2001 shutdown.

The new system exhibits three distinct advantages over the old system: the graphical user interface, the ability to reload saved run-sheets, and the ability to control the cyclotron from any windows machine on the network. The graphical user interface enables operators to visualize the elements they are tuning and the relationship of the elements to other elements in the subsystem. The reloadable database (run-sheets) enables operators to reload previously saved run-sheets and quickly restore the old values, while eliminating typing mistakes, and reducing time.

To promote reliability of the control system we have tried to identify all single points of failure. Several have been identified and corrected. During the time that we have been operating the cyclotron with the new control system, we have noted two fundamental problems. First, the database monitor program faults with a `tcpserv.exe` error. When this happens, the database monitor program must be

restarted carefully. Before the error is cleared, the database monitor sever must be disconnected from the Arcnet, otherwise, clearing the error may cause the standard bus crates to perform a reboot resulting in loss of some machine values. Once the database monitor server has been disconnected from the Arcnet, the error can be cleared and the server reconnected to the Arcnet and be restarted. We believe the problem lies in how we use Labview's call by reference of the virtual instrument to update the screens. Each client screen on the graphical user interface calls the database table across the network at its leisure, pulling the data from the database with one tcp exchange per graphical user interface every 300 msec. We are currently investigating the possibility of using user datagram protocol to push the data every 300msecs to the screens, so that with one broadcast we could update all the screens at one time. The second problem arose when we added new devices to the control system. Simple changes to the database would render all previous databases useless unless they incorporated the modification. We are currently reviewing the structure of the database and its implementation to allow changes to be made in a controlled manner.

The new control system has been operational for approximately six months and has performed well except for the problems encountered with the database monitor program and the database. These problems are being addressed and should be solved soon.