ACCELERATOR CONTROL SYSTEMS

J. W. Sinclair, R. C. Juras, M. J. Meigs, B. A. Tatum

During the period of this report, large-scale changes have been made to tandem accelerator and ORIC control systems, but work to improve control system robustness is still needed. The tandem accelerator's venerable 1970's Perkin Elmer computers were retired during this period and almost all ORIC controls have been moved from the old Modcomp-based control system to the newer control system. Final Modcomp decommissioning is expected to be complete in 1999.

Tandem accelerator control system conversion required very little new hardware. All tandem accelerator controls are based on CAMAC and all communications to CAMAC originate from two CAMAC crates containing Kinetic Systems 3992 serial highway drivers. New hardware consists of a DEC Alpha computer, a VME crate containing a Heurikon processor, and a Kinetic Systems 2917/3922 link to the two CAMAC serial driver crates. In addition, inexpensive PC hardware running the Linux operating system was used to implement operator displays and assignable control knobs.

The new tandem accelerator control system is based on toolkit software (Vsystem) available from Vista Control Systems, running under UNIX, and real-time front-end software (VxWorks) from Wind River, Inc. Work involved converting the tandem accelerator controls database, creating control screens, and writing custom "scanner" software to interface Vsystem to CAMAC. Conversion routines, "handlers", and software for operator controls including assignable meters, knobs and other controls the operators are accustomed to and desired to retain were also written.

ORIC controls conversion has been more hardware intensive. Controls previously wired to the MODCOMP had to be redone in every case, rewiring to Allen-Bradley PLCs. At the same time, several new power supplies, purchased as part of the ORIC Accelerator Improvement Project, incorporated Allen-Bradley PLCs. Control computers presently consist of a VAX4000-90 with several satellite rt300 ELN processors in VME crates and several Allen-Bradley PLC5 processors. This is the same system, now five years old, which controls the RIB injector and associated beam lines as well as some tandem beam lines. Communication to Allen-Bradley, originally through ELN, has largely been converted to ethernet and Allen-Bradley ControlNet.

Control of ORIC, the RIB injector and some tandem accelerator beam lines is based on a VMS version of the same toolkit software (Vsystem) and real time front-end software (ELN) from DEC. The version differs from the tandem accelerator version because between the time Vsystem was implemented for each accelerator, DEC announced that they would no longer support ELN. Since ELN is no longer viable for the future, and because the VME Allen-Bradley hardware is problematic, Allen-Bradley communication with Vsystem has almost entirely been moved to Allen-Bradley Interchange software, and ControlNet is utilized for communication between PLCs.

Work is underway to convert all controls to an alternate software toolkit (EPICS) produced by a collaboration of laboratories. Vsystem was originally chosen primarily because EPICS requires a much higher user level of software expertise for which we were not staffed in 1993. Vsystem is proving to be a limitation in our current

environment. Vista Control Systems has indicated that our configuration is not the future direction of their business and has not allocated resources to solve problems related to our configuration. Vsystem on UNIX/VxWorks has an attractive operator interface (Vdraw) but has network limitations for our configuration that cause it to lock up several times per week (fortunately, recovery can be accomplished with minimal beam time loss). This behavior prevents installation of crucial utilities, such as logging, and prohibits replacement of the slow, overloaded VMS system with the more responsive UNIX environment. Conversion to EPICS will provide a proven, robust system that is designed for accelerator facilities.