DARESBURY RECOIL SEPARATOR CONTROL SYSTEM

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The installation and ion-optical configuration of the Daresbury Recoil Separator (DRS) was reported in 1996 by Blackmon et al.[1] and James et al.[2] The control system for this device has been completed, extensively tested, and is in routine operation. This system utilizes a host workstation running UNIX connected to a VME based front-end via a private Ethernet. The function of this system is to control and/or monitor devices associated with the DRS; included are 4 high voltage (HV) power supplies associated with two ExB velocity filters (VF), 14 magnet power supplies, 14 Hall probes, 14 temperature sensors, 6 stepper motors and a number of vacuum gauges. A list of the major control system hardware is given below.

Device	**Function or use**
1 - DEC 3000 Alpha	Host workstation
1 - FORCE-CPU-40	VME processor
1 – KSC-2917A CAMAC interface	HV voltage set points
2 - DATEL-613 16-chan, 16-bit ADC	HV voltage readout
	HV current readout
	Dipole and VF Hall probe readout
1 - VMIC-3128 64-chan, 14-bit ADC	Quad and sextapole Hall probe readout
	Temperature readout
2 - VMIC-6015 4-port serial I/O	Monitor and control of
	Magnet power supplies
	Vacuum gauges
1 - Green Springs Comp. VIPC610	Stepper Motor Controller

The multiprocess VME software that manages all hardware operations and communications with the workstation is essentially transparent to the user. The workstation software that directs the overall process and provides the human interface consists of two processes; DCON and DMON. DCON is primarily a user interface process and passes data to DMON via shared memory as required. DMON performs all real time repetative monitor, control, display, logging and histogramming functions. Main features of the system include:

- Automated conditioning of electrostatic dipoles
- Automated cycling and ramping of magnets
- Automated adjustment of magnet currents to achieve specified fields
- Automated setting of electrostatic and magnetic elements as required for a given ion, energy and charge state
- User controlled adjustment of elements coupled in a prescribed way via the KNOB command
- Selection of different modes of operation corresponding to different optical requirements
- Processing of files containing hardware configuration, mode, knob, field and calibration data
- Processing of command files - useful for initializing the system and setting up standard operating conditions, etc.
- Repetitive display and logging of electrostatic voltages, conditioning currents, magnet currents and fields, interlock status, vacuum gauges, etc.
- Histogram records of all voltages, currents, magnetic fields and vacuum gauge readings

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[1] J.C. Blackmon et al., *Phys. Div. Prog. Rep. for Period Ending Sept. 30, 1996, ORNL-6916*, p. 1-66.

[2] A.N. James et al., *Phys. Div. Prog. Rep. for Period Ending Sept. 30, 1996, ORNL-6916,* p. 1-67.