

ECR ION SOURCE CONTROL SYSTEM IN HIRFL

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Abstract

The ECR ion source control system is a main part of the HIRFL distributed control system. The system is used to control two sets of ECR ion sources, the online source and the offline source. A compactPCI system with an embedded Pentium CPU is used as main computer. A new fieldbus, CANbus, will be used in the control area. A CANbus adapter is located in the compactPCI crater. CANbus modules, such as AI/O, DI/O, are used to control the equipment in the ECR ion source. A Fast Ethernet is used to communicate between the ECR control station and other control stations in the HIRFL control system. The WINSOCK is used to provide network programming. The applications that are used to control equipment are written in C and C++ . They are linked into a DDL(dynamic linking library) which is called by standard windows' applications. The GUI is programmed in C++ or VB and runs under Windows/95 Chinese version (next: Windows/ NT). The system was built in 1998 and will be completed in 2000.

1 INTRODUCTION

The ECR beam source is a important part of HIRFL. The ECR control system is a part of the HIRFL control system but has not been finished as a new ECR beam source has been installed in the middle of 1999. The plan for ECR control system was developed in 1998. Some experiments for the control system have been completed in 1999. The control system will be completed in 2000.

2 SYSTEM CONFIGURATION

The schematic diagram of the ECR control system is shown in Fig.1. It is a PC-based fieldbus control system. The PC(Compact PCI) is located in the ECR hall and connected to HIRFL control system network via a fast ethernet network adapter. There are two control buses in the control system: CAN bus and GROUP3 bus. The CAN bus is used to control the equipment that is located at ground and the GROUP3 bus is used to control equipment which is floating at 15KV .

3 GROUP3 CONTROLNET

GROUP3 is a commercial product, which is manufactured by GROUP3, New Zealand, and is suitable for the accelerator control system. It is easy to construct a control network using GROUP3. GROUP3 controlnet is a fiber optically distributed control system . Data is sent over fiber optic cables to small intelligent outstations(Device Interface or Dis) that contain the I/O boards, ADC, DAC, digital, motor drivers, etc. In order to build a GROUP3 controlnet, a Loop Controller(or LC) card must be plugged into the control computer to handle all the communications on the fiber loop. A typical GROUP3 controlnet is shown in Fig. 4. Some ECR devices floating at more than 15KV , such as 30KV power supply, -80KV power supply, stove, etc., will be controlled by GROUP3.

4 CAN BUS CONTROLNET

As accelerator control system should be flexible and open . The introduction of a field bus based I/O system is a step in this direction. Controller Area Network (CAN) can provide an excellent noise immunity , reliable protocol and low hardware costs. CAN is a good choice to achieve an easy supportable I/O system . There are many CAN modules in the market. Thus it is easy to complete a CAN controlnet. Some ECR equipment, for example, vacuum device, FARADAY-cup, the microwave-generator and the 1300A/110Vpower supply ,will be controlled via CAN bus.

5 SOFTWARE OF ECR CONTROL SYSTEM

The I/O drivers will be programmed in c or c++ and installed in the PC nearby the ECR devices. An operator can easy control the equipment using GUI in the ECR hall during control system. Testing. In the central control room, the ECR equipment can be controlled via a fast Ethernet network .

6 CONCLUSION

The ECR control system is a cheaper one since there are no CAMAC or VME components

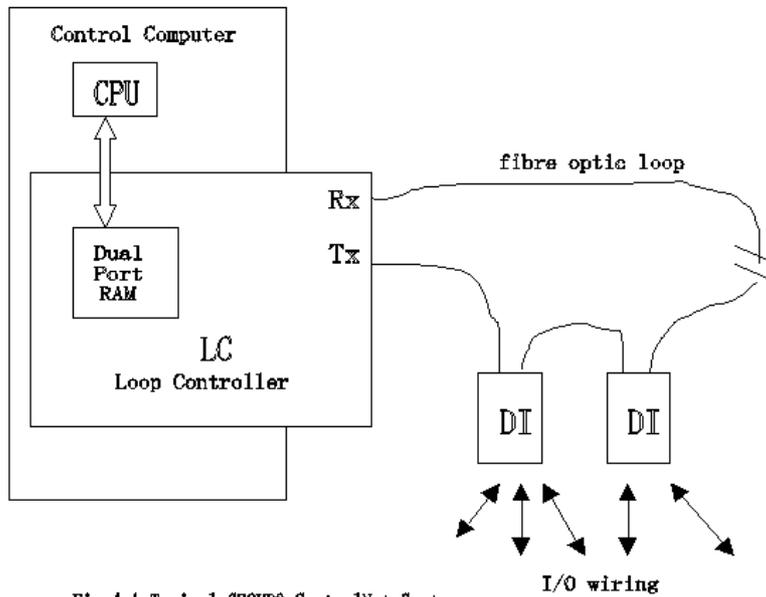


Fig.4 A Typical GROUP3 ControlNet System

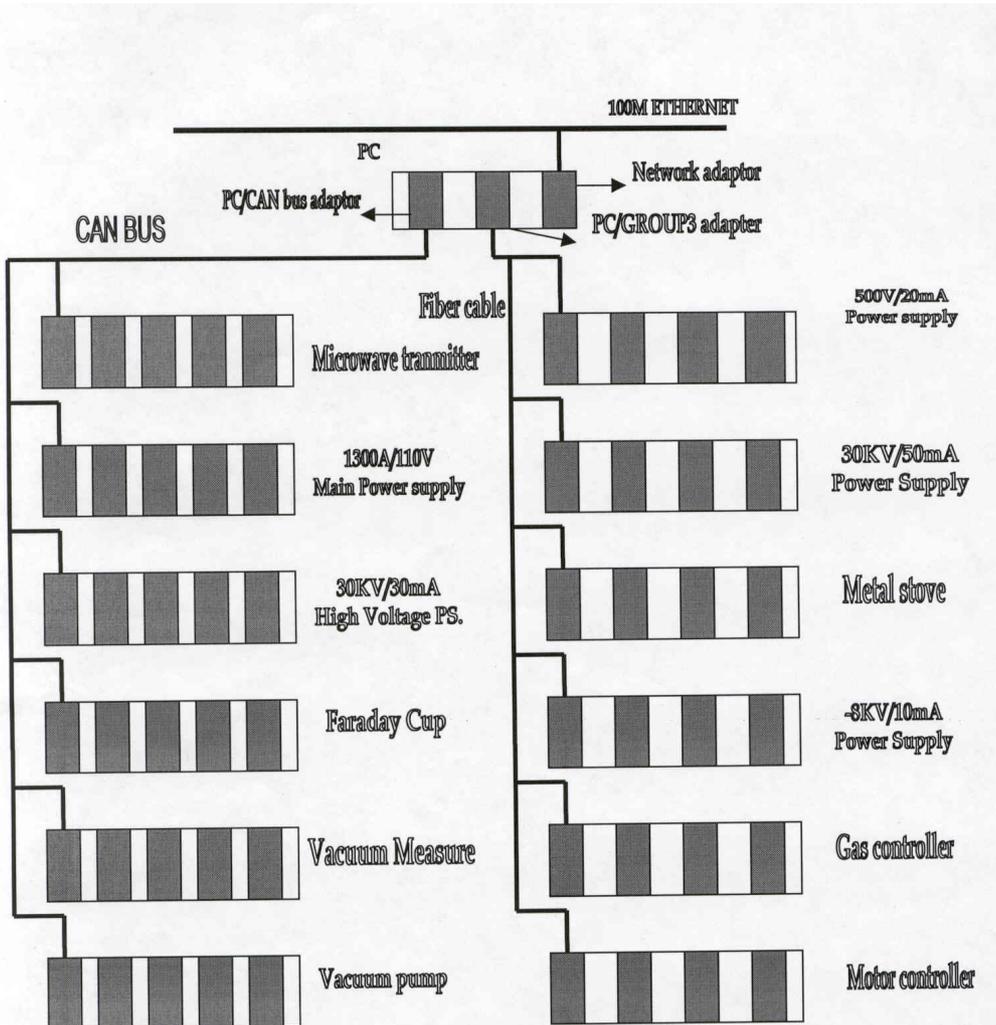


Fig.1 ECR control system