

§8. ECH Antenna Remote Control System

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The ECH antenna is composed of a set of focusing mirrors and flat mirrors. In order to change injection angle, one of the flat mirrors of each antenna is steerable around vertical and horizontal axis. The steering mechanism is driven by a super sonic motor. The driver of the super sonic motor is governed by Programmable Logic Controller (PLC) located in Heating Power Equipment Room. A new system is developed to control this PLC remotely through Local Area Network (LAN). The communication program for remote control of these antennas was installed on the workstation at the R.F. Site Control Room.

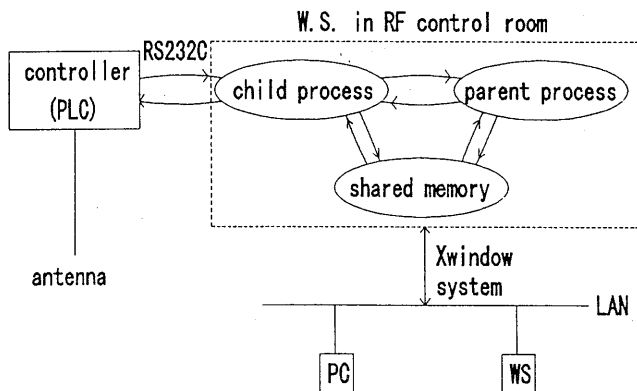


Fig.1: The new system for control of antenna mirror.

The program is composed of two processes and one shared memory. There is parent and child relationship between two processes. Parent process waits the event in Graphical User Interface (GUI). Child process sends the setting parameters to PLC according to events in GUI. The

operation parameters and error status are sent from PLC by one second.

Two kinds of SIGNAL in UNIX OS are used for communication between two processes. (SIGUSR1 and SIGUSR2) There should be two levels in the communication. One is such a high level that the child process informs error status from PLC to the parent one. When the parent process notifies the child process of the event to set the parameters, the lower level SIGNAL is used. After receiving the SIGNAL, the child process sends the setting parameter to PLC. The child process waits until the antenna position is moved to the setting one. If this setting is finished in PLC, the child process sends the lower level SIGNAL to the parent one, in order to display the parameters in GUI panels. Then, the setting parameters are written at the shared memory in the child process.

The remote control system has been able to change the setting value of injection angles between shots of the LHD experiment. Since we adopt X-Window System for GUI, this antenna system can be controlled at the terminal of not only RF Site Control Room but also LHD Control Room.

We have a plan to construct the other type of antenna system, with remote control application.

We have also a plan to install a capability to communicate with LHD Man-machine interface System (LMS) in this program for making an operation log.