THE UPGRADED CORRECTOR CONTROL SUBSYSTEM FOR THE NUCLOTRON MAIN MAGNETIC FIELD

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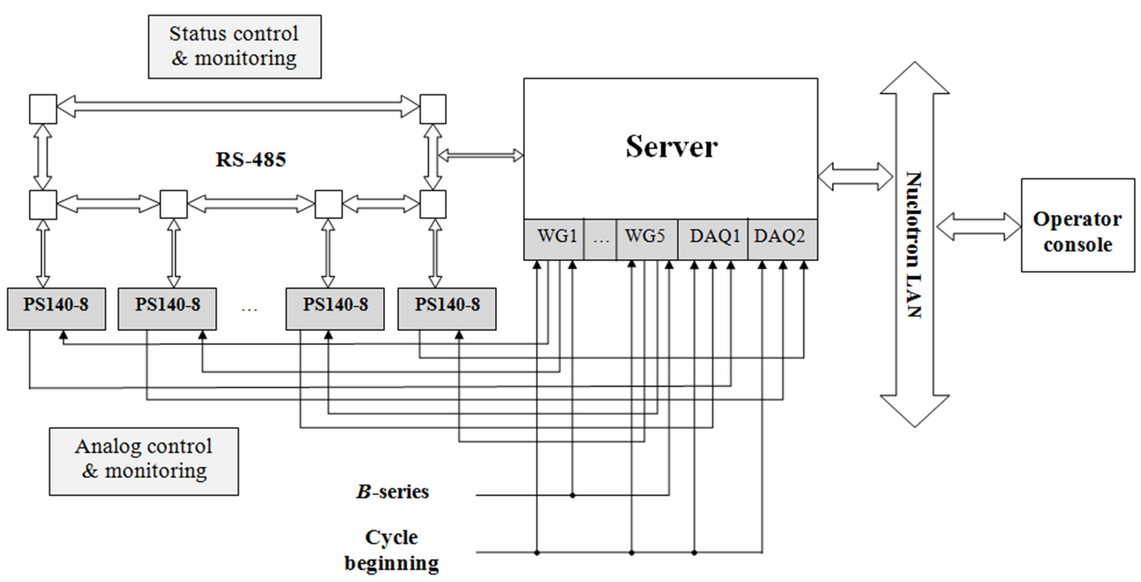
The superconducting synchrotron Nuclotron is one of the JINR basic facilities. It is intended to produce beams of charged ions (nuclei), protons and polarized deuterons with energies up to 6 GeV per nucleon. The purpose of the Orbit Correction System (OCS) is to correct the equilibrium orbit and provide its stable position during acceleration process. It consists of 40 correcting multipole superconducting magnets (21 horizontal and 19 vertical). The control subsystem of the OCS gives the accelerator operators the opportunity of wide and flexible control of the correction system from the OCS console as well as from any authorized workstation of the Nuclotron LAN.

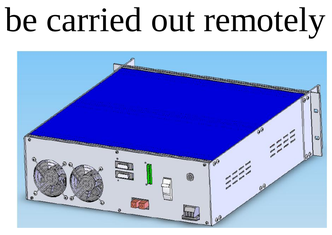
The control subsystem structure scheme

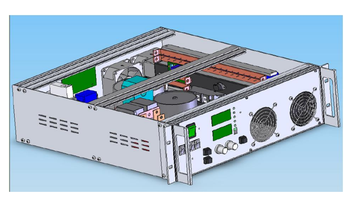


Power Supplies

The correcting multipoles are supplied by PS140-8 ï a transistor converter serving as a source of DC current for R-L load with high stability of time and thermal conditions. The output current is regulated within the range of 0 to 140 A by a corresponding input signal between 0 and 10 V. The power supplies can work in a static mode as well as in a dynamic one with the current change rate from 0 to 100 A/s.

Such commands as load switching on and off, checking of the power supply status, changing of the load current direction and so on, can be carried out remotely via communication channel RS-485





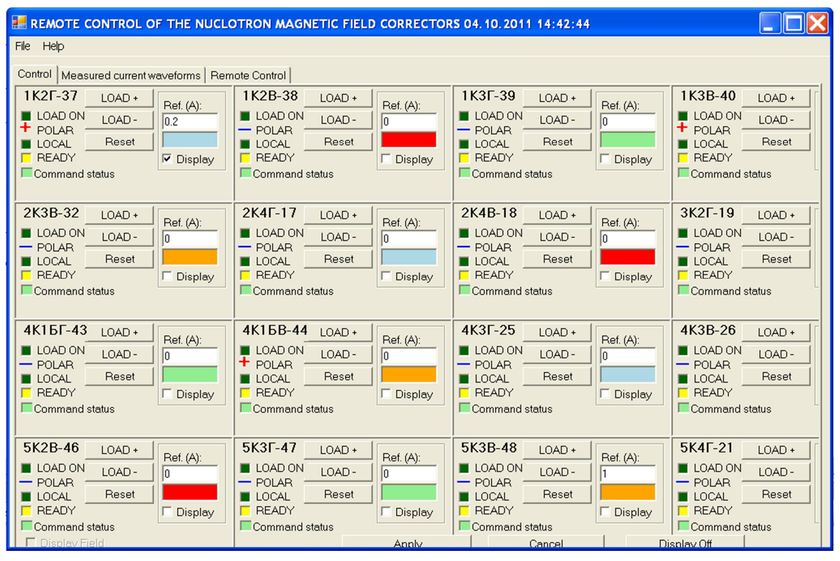
The main part of the control subsystem is a rack-mounted industrial PC. It performs all interactions with power supplies such as generation of reference signals, monitoring of the power supply output current and status controlling.

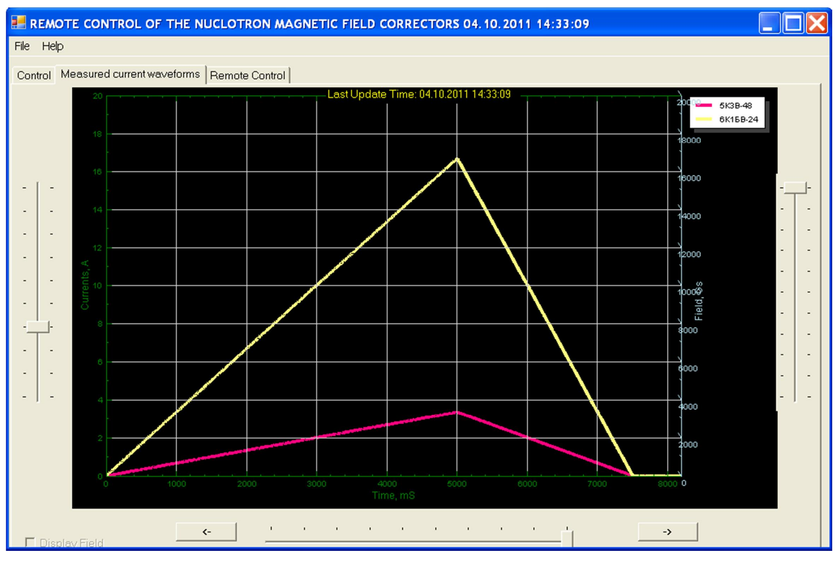
The subsystem uses five 8-channel 16-bit Waveform Generators (WG) and two 32-channel 18-bit DAQ boards for the power supply analog control and output current monitoring.

For status operations the subsystem server interacts with PS140-8 via RS-485 interface forming a ring topology.

The Nuclotron Control Room is placed 400 m away from the accelerator hall where the power supplies and subsystem server are located. The remote control is carried out via 1 GbE Nuclotron LAN. The operator can access the subsystem server from any authorized workstation connected to the LAN

The subsystem operator interface





At the moment the development of the project NICA (Nuclotron based Ion Collider fAcility) is carried out at JINR. The experience of the corrector control subsystem construction can be used in another part of the NICA complex ï a superconducting Booster.