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The automatic control system of 8th Phasotron tract

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The JINR Phasotron is the basic research facility of the Laboratory of Nuclear Problems of JINR. In 1985, a clinical complex of proton therapy of cancer patients was created on the basis of the facility. For the tasks of the complex, the 8th Phasotron tract is used. The tract consists of 15 elements: 2 rotary electromagnets and 13 electromagnetic lenses controlled by an automatic control system. The system in automatic mode ensures the achievement and maintenance of the necessary modes of operation of the elements, and allows personnel to control the operation of the beam from two control stations.

The report describes the current version of the automatic control system of the 8th Phasotron tract - the composition, operating principles, issues that arose during the implementation and their solution.

Based on ICP-DAS industrial controllers, 3 types of control and stabilization units for motor-generators (and after upgrade –for inverter power sources) of elements of the 8th tract were developed and implemented. According to the results of the primary runs, the oily shunts were replaced with current sensors.

To control the elements of the 8th tract through the control units, special software has been developed. The software can be ran on a PC running Windows or Linux and can be used to control the system from several locations at the same time. Software deployed in 2 control posts. The software allows, in automatic or manual mode, to achieve and maintain the required values of currents on the elements of the 8th tract, correct system measuring errors and signal problems.

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