RF-GENERATORS CONTROL TOOLS FOR KURCHATOV SYNCHROTRON RADIATION SOURSE

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Kurchatov Synchrotron Radiation Source (KSRS)

KSRS:
80 MeV linear
        accelerator,
450 MeV booster
        synchrotron,
2.5 GeV main ring.
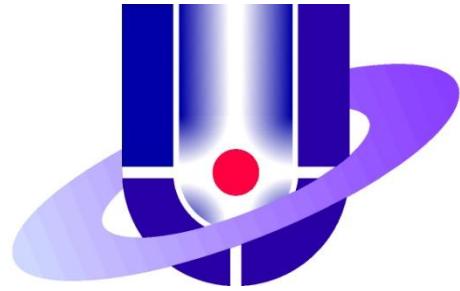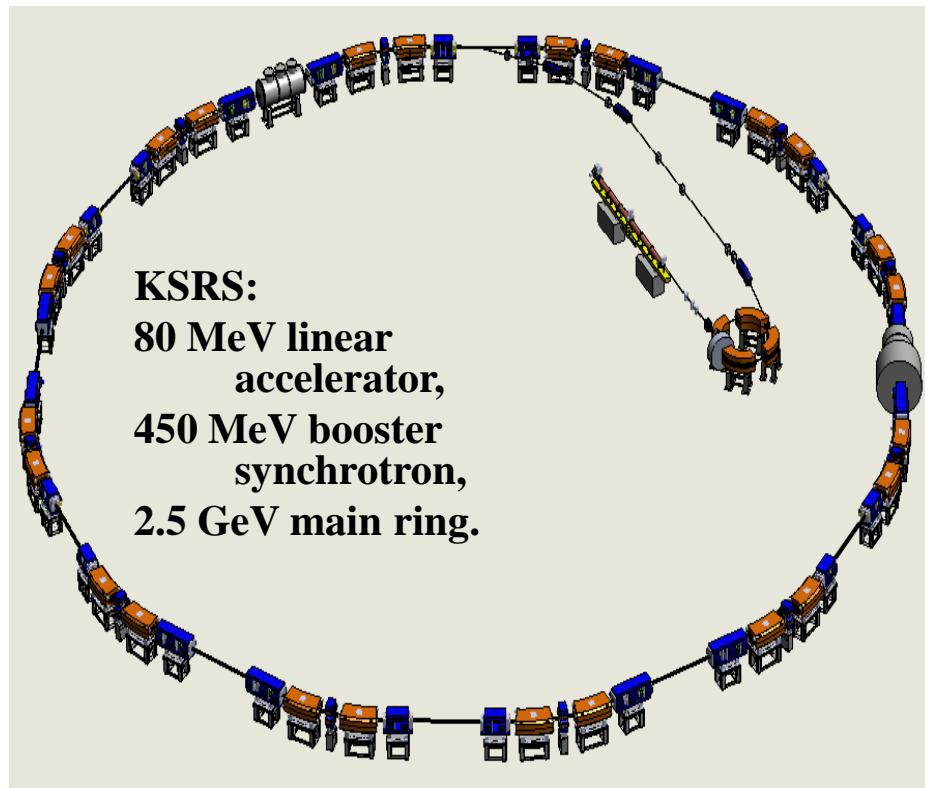
Fig.1. KSRS facility.
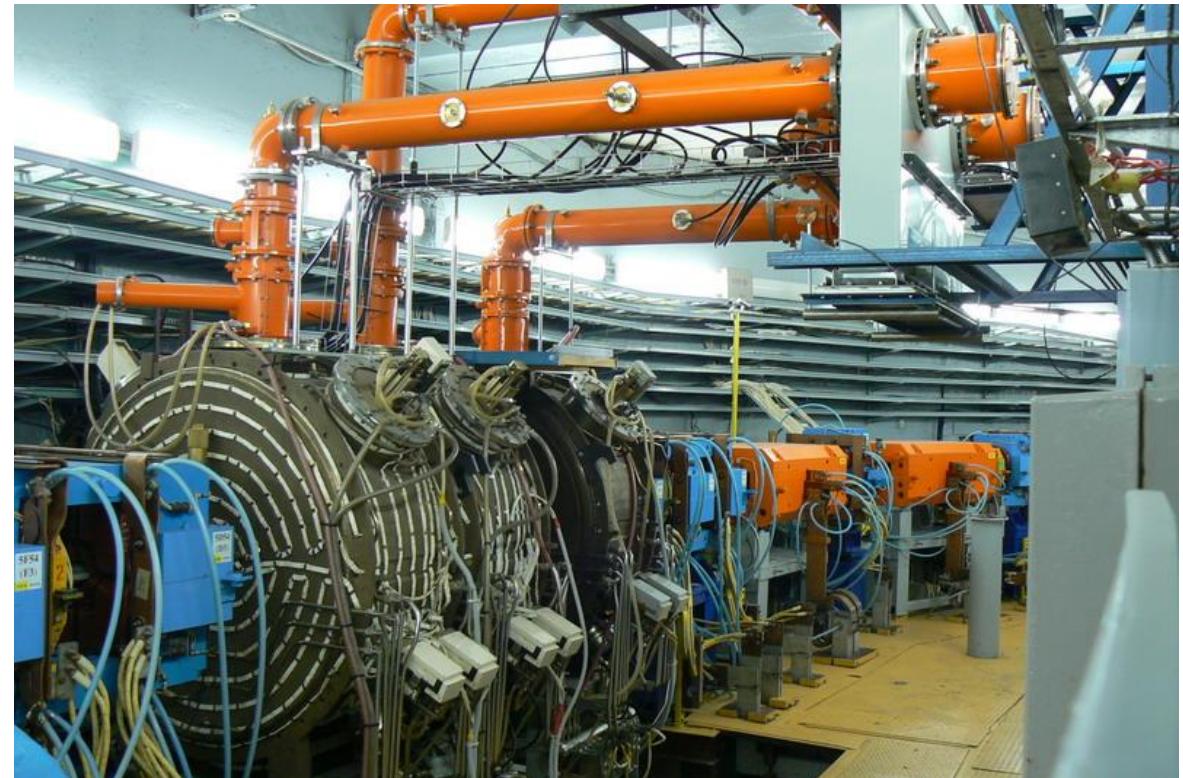
Fig.2. RF-system of the KSRS main ring .

RF-system of the KSRS main ring includes two generators of 181 MHz connected by wave guides with three resonators.

Total acceleration voltage of resonators changes from 200 kV to 1.8 MV within 100 seconds of the ramping of energy of an electron beam from 450 MeV to 2.5 GeV.

RF-generators support a stability of acceleration voltage for compensating of energy losses of the electron beam during long session (sometimes more than one day) on users of synchrotron radiation.

RF-Generators Control System

is the multilayer and multiprocessor design consisting of three levels: executive, server and operator. All equipment is connected by two local area networks: public and technological.

The upper level consists of operator workstations, connected with the public LAN of the PC working under control of Windows or Linux OS.

The server level includes two application servers and DB server under control of the MS Windows Server OS. The system of monitoring, control and data acquisition of Citect SCADA works at application servers.

The executive level is based on bus-modular equipment in the VME standard and controlling equipment with the embedded processors, running under operating systems like LynxOS.

OPERATOR LEVEL

Public LAN

SWU4

SWU1   SWU2   SWU3

SCADA SERVER

SERVER LEVEL

DB SERVER

Technological LAN   SWD1   SWD2

SWD3   SWD4

EXECUTIVE LEVEL

CAN

CCxx   CCxx   CCxx

VME   VME   VME

—— - CAN
—— - Ethernet, Cu line
—— - Ethernet, optic line

To RF-generators equipment
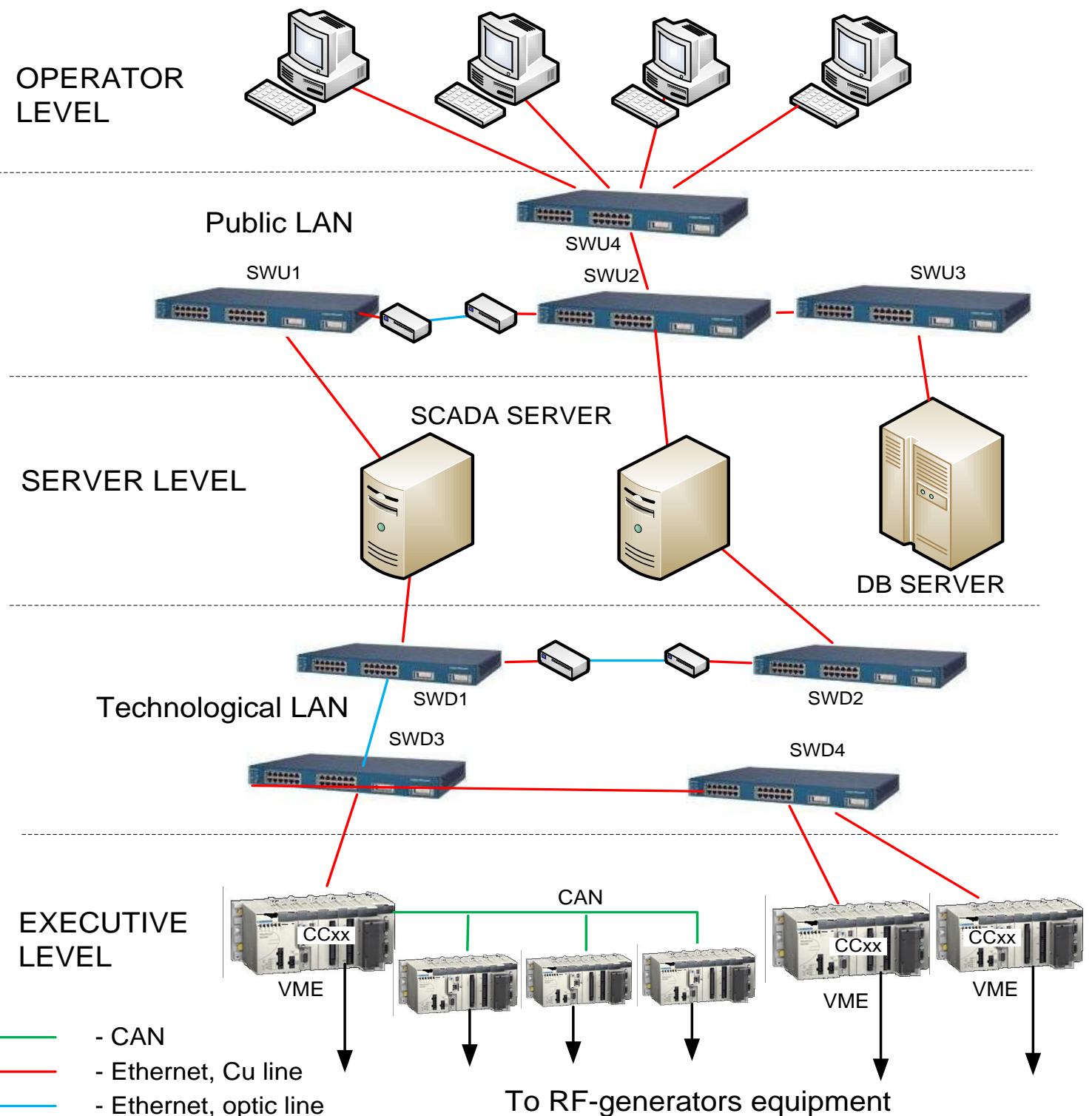
Fig.3. Structure of RF-generators CS.
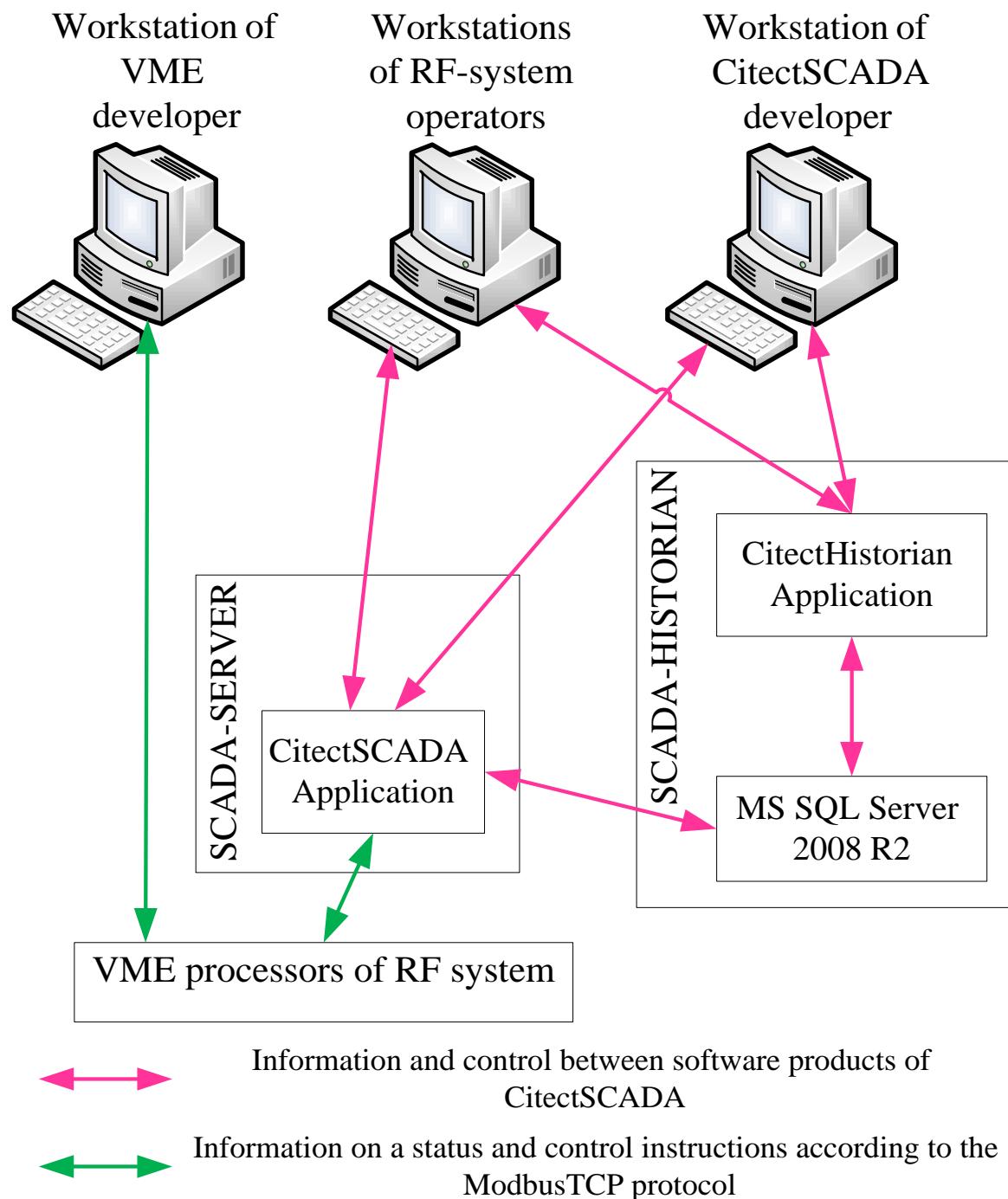
Functional structure of RF-generators

The software for operator's workstations includes the Windows 7 Professional 64 bit operating system, and applications, which were developed in the environment of version 7.2SP4 Citect SCADA, and version 4.3 Citect Historian.

Workstation of VME developer

Workstations of RF-system operators

Workstation of CitectSCADA developer

SCADA-SERVER

CitectSCADA Application

SCADA-HISTORIAN

CitectHistorian Application

MS SQL Server 2008 R2

VME processors of RF system

Information and control between software products of CitectSCADA

Information on a status and control instructions according to the ModbusTCP protocol

Fig.4. Functional structure of RF-generators CS.

SCADA Sitect application servers and Citect Historian DB SQL server under control of MS Windows Server.

Fig.5. Servers.

Processor assemblies of VME under control of LynxOS.

The users applications software
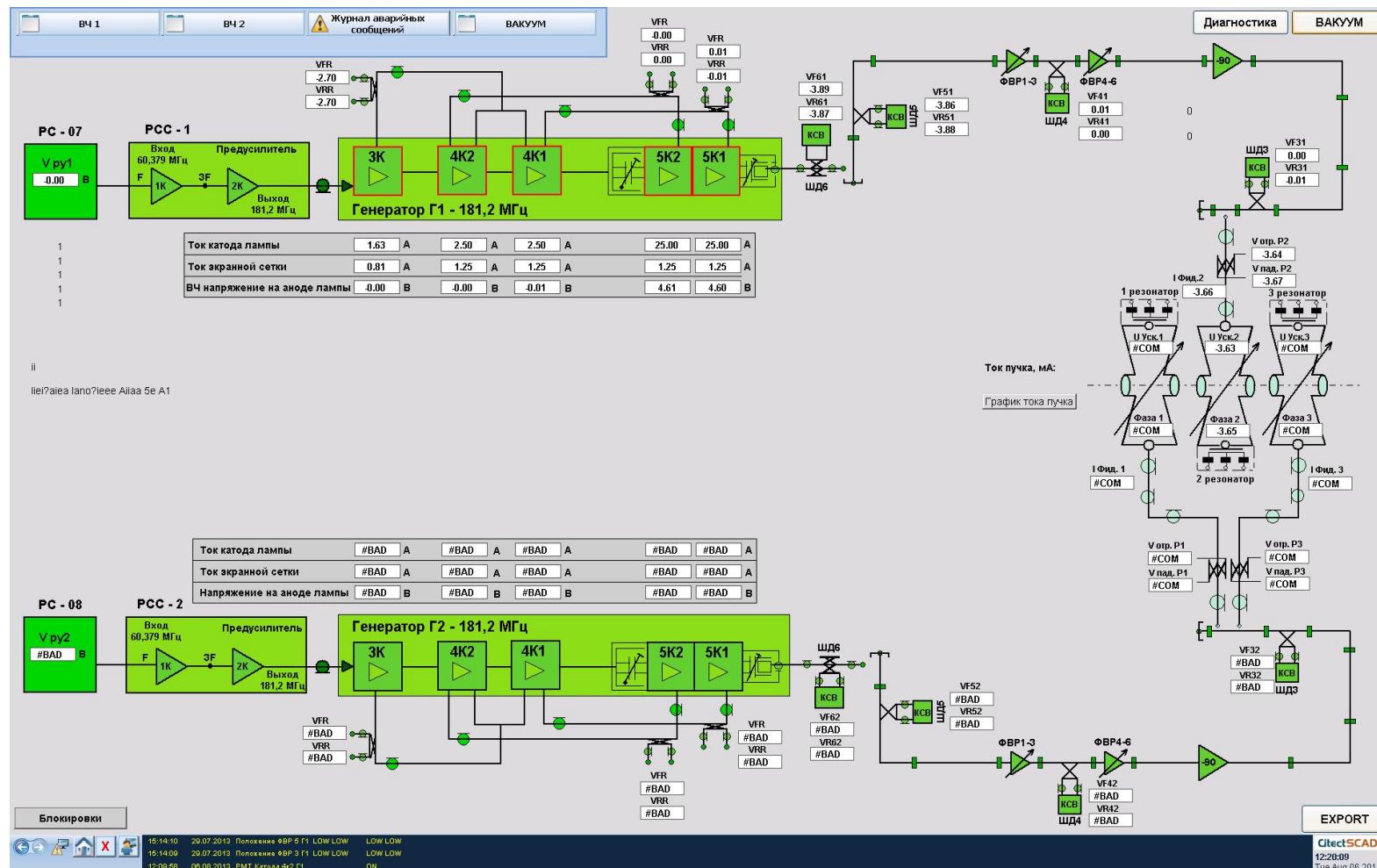
- *Display on the monitor of a circuit of RF-system of main ring SIBERIA – 2.*
- *Viewing of archive and current parameter values in the form of diagrams.*
- *Display of preventive and alarm messages.*
- *Control of tuning mechanisms of RF-resonators.*
- *Authentication of operators.*

Fig.6. The video frame of the main program of the RF-system operator.

The functional diagram of RF-system of the KSRS main ring shows two sets of radio racks, preamplifiers, RF-generators, wave guides and three RF-resonators.