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Monitoring and control system for average voltage electric stations

Notations:

In the follows has used the abbreviations:

- PLC –programmable logic controller
- CPU – central processing unit
- CP – process computer
- SCADA – Supervizor Control And Data Aquisition
- OPC – (OLE for Process Control) – OLE technology for processes control
- MMS – data exchange by messages
- VB – Microsoft Visual Basic
- DET – Territorial Energetic Dispatcher
- MMI – Local Energetic Dispatcher (control room)

The aim of the work: Aquisition and registration system of electrical values from 20KV and 0,4KV cells, and telecontrol of instalation from MMI and DET.

System details:

Electrical installation: The 20 KV electric station from Urechesti, Gorj consist in five cells:

- Cell 1: TSI No. 1. Schortcircuite and overcharge protection for 20KV/0,4KV electric transformer of aferent electric circuit,
- Cell 2: IUM. By this cell receive electric voltage from electric line I.U.M
- Cell 3: Couplers. Coupling to earth the air electric lines – IUM and Tg-Jiu South , feeding of cell 1.
- Cell 4: Tg. Jiu South. By this cell receive electrical voltage from 20 KV electric lines.
- Cell 5: TSI No. 2. Feeding , schortcircuite and overcharge protection for 20KV/0,4KV electric transformer of afferent electric circuit and coupling it to earth .

Description of local instalation of control and data aquisition. The local system consist in distributed PLC which contains:

- Processing central unit, 1 buc.
- Communication module with equipment from field., 1 buc.
- CPU comunication module , 1 buc.
- 24 Vcc, 16 bits digital inputs module, 5 buc.
- 4..20mA with 8 bits analog inputs module, 2 buc.
- 8 bits relay digital outputs module , 2 buc.
- Unified signal converters, 16 buc.

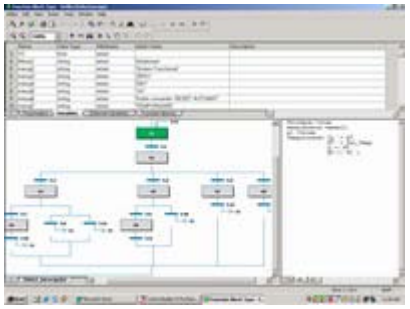
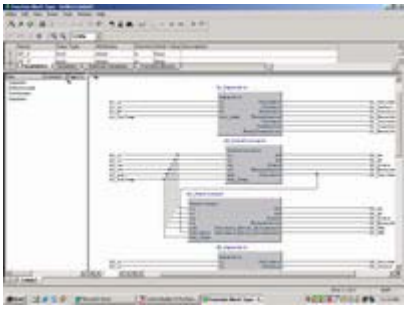
Description of the MMI and DET installation

To MMI is plased a process computer (with function of Aspect Server and Connection Server) supplimentary equipped with RS485/RS232 convertors and optical fibre /RS232, and to DET a general use computer (personal computer) equipped with modem. Communication between automation equipment and PLC make by RS232C, and between MMI and DET make by modem (TCP/IP).

Description of the software applications. Software program pack consist in:

- Application pack for PLC (local equipment)
- Application pack for CP.

Program pack for PLC. In this program have deffined the mathematics models for separators, automatic switchers, etc. The mathematics models there are in the functions library (fetlib). For automatic switcher asignate two types of functions : the first function for monitoring and detection of errors which appear during the running of switcher (Flow defection), and the second function for monitoring and telecontrol of automatic switcher (Running).

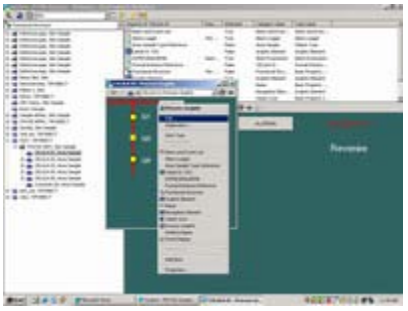
Flaw defection function (wrote in SFC-GRAFCET-, according to IEC 61131).

Flow defection function. For every cell have made a library (which use the main functions : Flow defection and contactor running)

The program pack for PC.

The PC realizes the interface between operator and installation. For a maxim portability have created specific libraries of electric symbols, which make automatically the connetion with the function implemented in the PLC. The programming has made in VB.
The application consist in more subapplications:

- Connecting to PLC by OPC
- Library of symbols
- Own system configuration
- System and operator password
- Data bases with events, damages.
- Control frame of the automatic switcher
- Validation frame and confirming control
- Supervising of PLC software
- Every operator can configure the own system for interfacing with electric installation.



Configuration of the cell 01