

PC BASED ALARM ANNUNCIATOR SYSTEM

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Abstract

At present, Panel-Based Alarm Annunciator System for the existing 130Mev AVF cyclotron of our centre is used to draw the attention to the operator only for the 64 Nos. of top-level alarms. The lower level faults, which cause the top level alarm, are not visible from the control panel. Moreover, huge amount of maintenance cost and manpower is involved in keeping the system alive. To alleviate these problems, one PC-Based Alarm Annunciator System has been developed using C++ [1] under WIN-NT. A PC plug-in card from ADVANTECH [2] is used for the Input/Output (I/O) interface. The 64 top level alarms are displayed on the screen using buttons with pre-defined names and different colors are used to indicate the system's status ; e.g. RED for fault, GREEN for O.K. and BLINKING with AUDIO for alarms. Lower level alarms can be displayed with a mouse click on the top-level alarm button. The system keeps records of different parameters with time stamp in a database. The facility to monitor the on-line status of the alarms over the network, through WWW browser is also incorporated. The system is working satisfactorily and will be connected with the main system shortly.

1 INTRODUCTION

Cyclotron System needs several kinds of control systems for managing its smooth operations. In a large system, one can identify several separate subsystems, such as vacuum system, RF system, High Voltage system, Power Supply system, LCW system etc. These subsystems are controlled to ensure their proper operation, availability and safety at all times. A subsystem consists of various types of equipment. Several levels of alarms are used to diagnose and isolate the faults of the system. At our centre, presently Panel-Based Alarm Annunciator system is used to draw immediate attention to the operator only for the 64 Nos. of top-level alarms. In the present system, information of lower level faults, which are responsible for this top-level alarms is not available from its control panel. One has to be physically present at the site to diagnose such low-level fault, which is very inconvenient. Again, a lot of manpower is

involved in the operation of such system. Considering all these difficulties the new system has been developed. Top level alarm status are shown on a single screen using buttons with text and different colors are used to show the status of the system at a particular time. By clicking the mouse on that particular top level alarm button, one can go to further lower level alarm window to identify the actual fault. In this way the fault can be easily diagnosed from the control room itself. This system has the provision to keep records of different parameters of several subsystems in a database. The facility has also been developed to access the database over the Local Area Network (LAN) to get the status of alarms at any time through WWW browser. The hardware and software details have been described in the following sections.

2 MAIN FEATURES

- 64 Nos. of Alarms are displayed on a single screen of a PC.
- Lower level of alarms may also be checked by clicking the mouse on a particular top-level alarm box on the same screen but in a different window.
- Alarm information with time is recorded in a database for further analysis.
- Maintenance of the system is very easy.
- Status of alarms may be observed over the LAN through a WWW browser from any client on the network.

3 HARDWARE ARCHITECTURE

The hardware architecture used for the Alarm-Annunciator system is shown in Fig – 1. The top-level 64 Nos. of alarm signals comes from the existing relay contacts. The same relay contacts are used to provide the signals for the Panel-Based alarm circuit. One interface circuit has been specially designed and developed to avoid any kind of interference from the prevailing circuit. The signals have been properly conditioned and then fed to two 32-channel PC-Plug in, optically isolated digital I/O cards [2]. PCL-733 from ADVANTECH is used for the purpose. One Pentium PC (233 MHz) is used to monitor the status of all alarms of the annunciator system.

This PC is also connected to the (LAN) through its Ethernet interface.

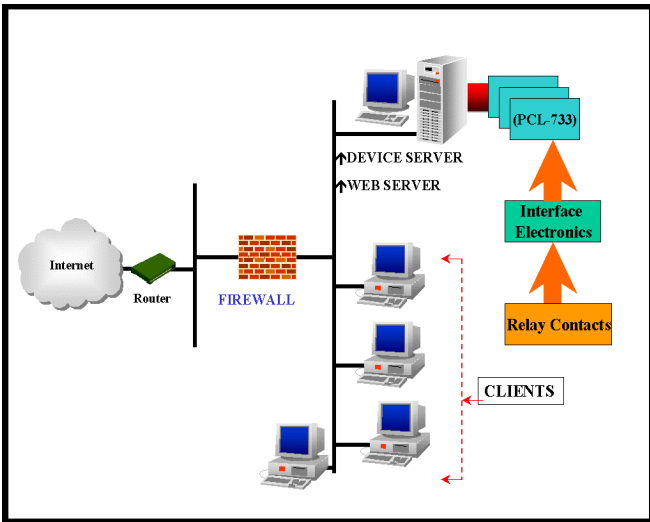


Fig - 1.

4 SOFTWARE

The basic objective of this software is to read the data from its I/O card for the top-level alarm signals and to display the status on the screen using descriptive buttons and colours. It is capable of generating audio-visual alarms in case of emergency. The software has been written in a modular fashion using Visual C++ [3] under Windows NT 4.0 and can be divided into different modules as described in the following. The schematic of this is as shown in Fig-2.

- Control Module
- Input Module
- Output Module
- Server Module

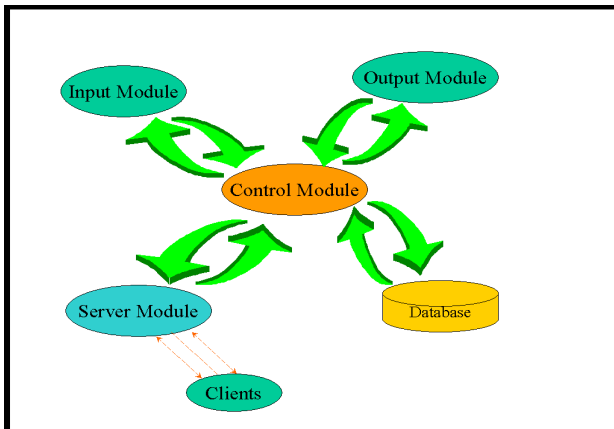


Fig -2

4.1 Control Module

It is the core module of this software and it controls all other modules in a time-slice fashion. This has been implemented using TIMER call of MFC library [3].

4.2 Input Module

This module reads the data from the PCL-733 card in programmable input/output (PIO) mode and writes in a buffer for its use in output module. This has been implemented using dynamic linkage library (DLL) call, provided in the driver routines of PCL-733.

4.3 Output Module

It verifies the status of the alarm signals from the data written by the input module and sets the colours of the pre-defined buttons on the screen accordingly, e.g. RED for fault, GREEN for O.K. and BLINKING with AUDIO for alarms. One such screen dump is shown in Fig-3. Sound Blaster card is used to produce the AUDIO alarm. This module generates the log file to keep text-based information for the status of the system and also writes the same in the master database.



Fig-3.

4.4 Server Module

This module runs in the background and allows TCP/IP connectivity on the port 1075 to different clients over the LAN for viewing the status of alarms remotely.

5 STATUS

This system has been tested in the lab environment and working satisfactorily. This will be integrated with the main system very soon.

6 CONCLUSION

This device is basically presented as a monitoring and status display system. Presently, PIO mode is used to read the data from the PCL-733 card. Interrupt driven driver has also been developed to read the data from the I/O card and will be incorporated soon. With some modification and introducing proper control algorithm, it may also be used as a front end computing system (FEC) in accelerator control system.

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8 REFERENCES

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