

Radiation Safety Control System for SPring-8

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Introduction

A Radiation Safety Control System for SPring-8 (RSCS) consists of a Radiation Monitoring System (RMS) , an Access Control System (ACS) and a Safety Interlock Control System (SICS) . A large number of devices for the RSCS are distributed in the injection accelerator (Linac and Synchrotron) building and Storage Ring building.

Radiation monitoring system ^[1]

Three monitoring posts outside the injection accelerator building have been installed to measure the leakage-radiation during operation of Linac and Synchrotron, beside a lot of ionization chambers and neutron counters are used to measure the radiation level at the accelerator rooms (Linac accelerator room, Synchrotron room, Storage Ring enclosure), and the experimental hall.

In order to measure the radioactivity in the air of the accelerator rooms and at the exit of the exhaust duct, the activity monitoring stations have been built in the SPring-8.

Access control system and Safety interlock control system

The ACS consists of identity card security system, personal keys (safety keys), operation status lamps and shield doors.

The entrance to and exit from the controlled area are checked very strictly by personal card. At the entrance of each the accelerator rooms, the operation conditions of the accelerators (Linac, Synchrotron, Storage Ring) are displayed on the operation status lamps.

The accelerators are controlled with a computer system which is linked with the RSCS. For radiation

safety, the RSCS has the highest priority in accelerator operation.

Before starting operation , an operator should ask the SICS for permission . If any erratic condition occur in the ACS and RMS during operation, the SICS sends a beam stop command.

The SICS permits the accelerators operation, when

- The safety keys are returned in the key-box of the accelerator rooms.
- The shield doors are closed in the accelerator rooms.
- The emergency buttons are not pushed in the accelerator rooms.

The SPring-8 workers are not permitted to enter the accelerator rooms when the accelerators are in operation.

Figure 1 shows a block diagram of the RSCS.

Data logging and Display

All the data coming from the devices are logged periodically by the data server of the RSCS and stored in disk files ; the RSCS can draw graphs and tables by using those data.

The radiation level and the activity in the air from RMS are displayed on CRT, which are placed on the main control room , at the entrance of the experimental hall and the safety center.

The status of safety keys, emergency buttons, accelerator operation, shield doors and the number of persons working in the controlled area are also displayed on CRT.

Figure 2 shows an example of display on CRT.

Reference

- [1] Yukihiro Miyamoto, Hisao Ueda, and Yasunori Harada, "Journal of Health Physics", Vol.32, No.2 (June 1997)

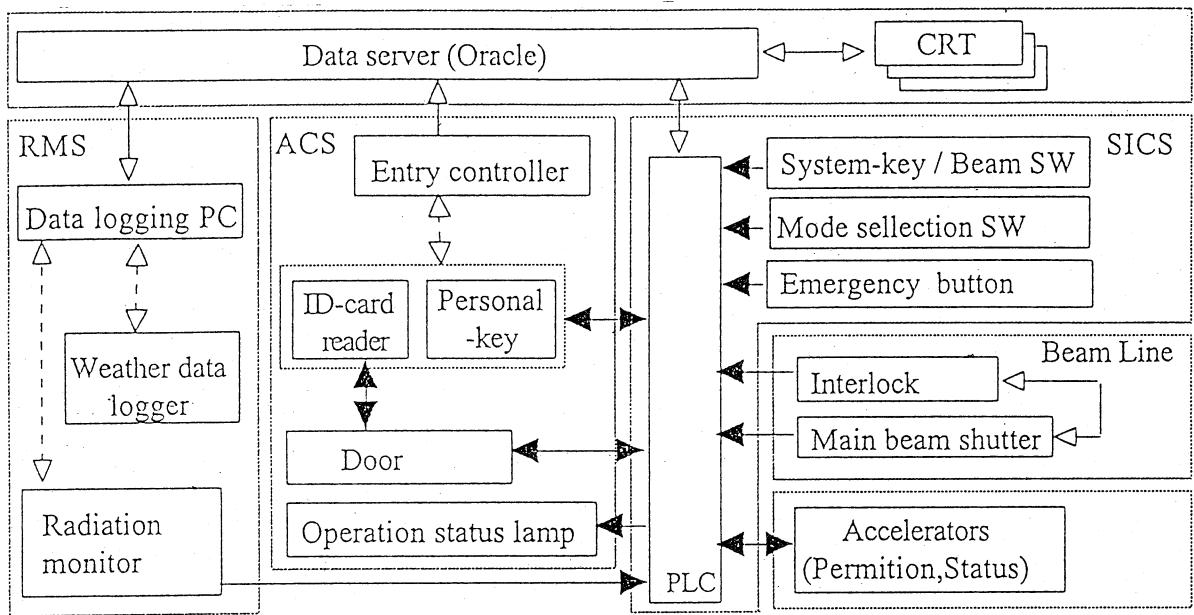


Fig-1 Block diagram of the RSCS.

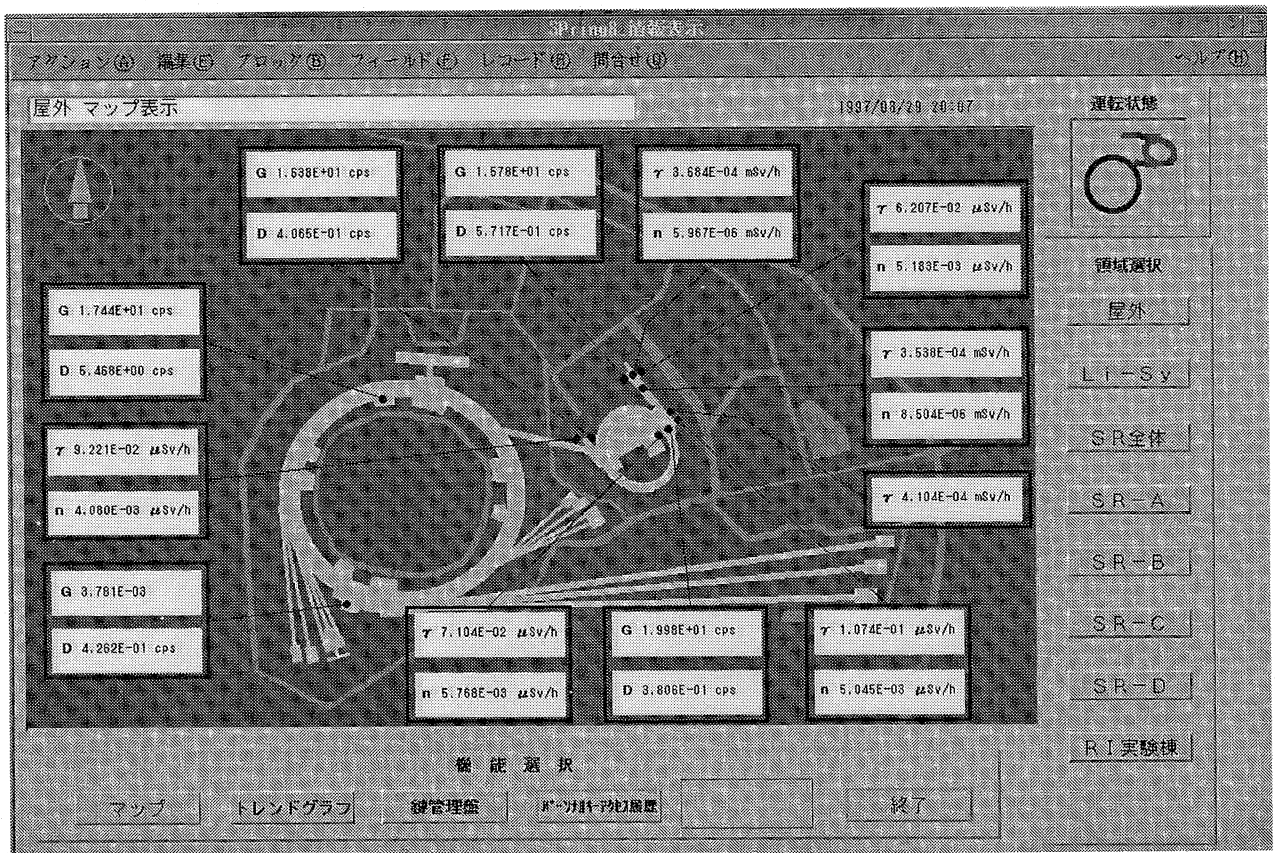


Fig-2 Example of display on CRT.