§1. Development of an Access Control System for the LHD Experimental Hall (3)

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Construction of an access control system applied for the LHD (large helical device) experimental hall was nearly completed and its practical operation was started in March 1998. Continuously, improvement of the system have been carried out through practical operation. The whole access control system including the interlock signal was shown in previous annual reports, 1997 and 1998. In the present report, the access control computer system centered at the access control system will be detailed.

At the LHD experimental hall, we will find four entrances and three carriage entrances. At all those entrances and carriage entrances, the shielding doors are installed, respectively. And besides, one more shielding door is also found at a hall overview. Therefore, the access control system is especially demanded fundamental functions as shown in Table 1. The access control computer system was developed so as to perform those demands.

Table 1 Main functions demanded for the access control system

① Certification of the four shielding doors to be closed at three carriage entrances and a hall over view.
② Management and control of several entrance gates and personnel access along many involved path patterns.
③ Prohibition against incoming of persons without authorization or permission.
④ Watching the number of persons in the LHD controlled area base on real-time counting.
⑤ Prohibition of all incoming while the LHD plasma experiment is in execution.
⑥ Real time provision of the information relating to access control over workers and the LHD control system.

The access control computer system consists of a main computer, a sequencer control system and a manual control box, and connected to the entrance gates, the shielding doors, the electric bulletin boards and the LHD control system. In the access control computer system, the sequencer control system is employed because of its high response speed and avoiding involvement in some troubles happening in other devices. Owing to the introduction of the sequencer control system, off-line works using the main computer get to be possible even if the whole access control system is in operation.

The sequencer control system consists of several sequencers which are situated in the middle of between the main computer and the entrance gates, the main computer and the shielding doors, the main computer and the electric bulletin boards, and the main computer and the LHD control system. These mean the device directly connecting to the entrance gates, the shielding doors, the electric bulletin boards and the LHD control system is not the main computer but the respective sequencers. Besides, the sequencers are used as temporally storages of access data generated from the use of the entrance gates. The data stored in the sequencers are, one by one, sent to the main computer. One of the sequencers also watches whether the shielding doors are shut or open all through the day, and successively send the information of the shielding doors to the main computer. However, practical opening and shutting operation-in-itself of the shielding doors is not automatically done by the access control system, but manually done by the manual control boxes by the side of the shielding doors. That goes for the electric bulletin boards, too. That is, several messages of access control are registered beforehand in a sequencer, and the sequencer indicates necessary information on the electric bulletin boards as taking orders from the main computer. In this case, the main computer is used to send the orders of a notice to be indicated on the boards and the sequencer practically post up the notice in the way of an illuminated sign spelling out information items on the boards. Thus the devices which directly manage peripheral devices related to access control are not the main computer but the sequencers. However, the main computer is used to fulfill the other important roles. Those are shown in Table 2.

Table 2 Principal roles of the main computer

① Personnel data process (registration, alternation and deletion) and the registered data sending to the sequencers.
② Acceptance of access (coming and outgoing) records from the entrance gates through the sequencers
③ Sending and receiving of interlock signals to and from the LHD control system
④ Alteration of access control modes corresponding to the LHD operation modes at that time
⑤ Surveillance of movement of the person's coming and outgoing, and counting the number of persons in the LHD controlled area
⑥ Real time grasp and bulletin of the whole state of access control, the number of persons in the LHD controlled area, the interlock signals and the shielding doors.