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MEA COMPUTER CONTROLLED PERSONAL ACCESS SYSTEM

J.C. Post, J.A.M. Peperkamp
Nikhef-K
Oosterringdijk 18, 1098 TW Amsterdam

Summery

The computer based personal access system (PAS) overlooks eight separate entrances of the MEA linac and experimental areas, it eliminates the interference of the safety staff and and demands limited discipline of the users. The PAS is roughly based on:
1. Machine conditions. The status of magnets, beam stoppers, Etc., controls the access to the rooms by means of conventional electronic door control-units.
2. Room conditions. The result of the automatic measurement of the levels of the gamma radiation or the ozone contents of the air dominates the door controls.
3. Personal registration, based on the use of one lock-cabin per entrance and linked to a central computer. On permitted passage through the lock-cabin the computer authorizes and registers each passerby individually.

In addition to keeping book of the total number of people present in the rooms an independent electromechanical device provides authorization at each lock-cabin. A weighing system guarantees passage of only one person at the time. Safe access of either the beam or a person is secured by this purely instrumental system.

Introduction

The area in and around MEA has been devided into three zones: the white, yellow and red zone. The white zone is free area, the yellow zone is the controlled area and the red zone is the guarded area. This paper deals with the access system of the red zone.
Very stringent rules for access and stay are implied to enter the rooms of the red zone. A door control system and a personal access system (PAS) are installed for the surveillance of the rules. The basic part of the door control system is a control unit at each entrance of the red zone. This unit permits access for persons on well defined conditions only and permits presence of the electron beam in a room with stringent restrictions. The PAS includes one lock-cabin per entrance, connected to a central computer. This system permits entrance to the room for persons on specified conditions and also provides two of the stringent restrictions allready mentioned before. Eight independent entrances to the red zone are controlled by this system. (fig. 1)

Door control system

Every entrance to the red zone has a provision to lock a room effectively during accelerator operation and to give access when working conditions are safe. In case of direct access this provision consists of a concrete door and a control unit with peripherals. For indirect access via a labyrinth, the provision is a steel door and a control unit with peripherals. The concrete door is propelled by an electromotor. The steel door is opened by hand and locked by an electrical bolt and an electrical lock.
The doors are controlled by an electrical steering unit. The actual open or close procedure is performed by this control unit, but is only possible if this action is allowed. The conditions for this purpose differ per room but can be devided into two categories: machine and room conditons. All control units are using the interlocking components that represent the machine conditions. During heavy radiation, in some rooms ozone can be produced and after accelerator operation a relatively high persistent radiation level can be present. In these cases the control unit has been equiped with extra interlocking components triggered by the prevailing room conditions.

Machine conditions

The safety switches that permit a person to enter the accelerator zone are only activated if the status of the machine parts prevent the beam to be present anyhow. The necessary contacts for this purpose correspond with: "1000 Volts power supply out" and "injector steering out" and "high frequency steering out". The three conditions are identical with: "accelerator out".
The necessary contacts for an experimental room correspond with: "accelerator out" or "bending magnets out" and "beamstopper in".

Room conditons

To measure the persistent gamma radiation level we use a GM alarm monitor. To measure the ozone level we use an UV absorption type ozone analyser. Both monitors have three alarm levels linked to the door control unit. If the machine conditions to enter a room are present, the door control unit automatically switches on both monitors. The gamma monitor probe is being transported into the room and air smaples are being taken by the ozone monitor. There upon, the contacts that correspond with the obtained alarm levels, are presented to the door control unit. Only the contacts "entrance radiation level o.k." and "ozone concentration level o.k." make up the necessary room conditons to enter a room.

Personal safety system

If a part of the red zone has been set free by the door control system and the door is opened, without further precoutions access would by possible for anyone. This situation is untollerable, because of the very stringent rules for access and stay that are implied to enter the red zone. To deal with this problem every entrance to the red zone must be controlled. Personal, financial and organisation considerations forced us to choose for an entirely instrumental control system. This system has been composed of a central mini-computer with peripherals. Per entrance a person lock cabin has been projected, which communicates with the computer via an electronical card-reader. Only persons who own our I.D.-card and who are authorised for the room are allowed to enter. Besides registration and counting is achieved, which can interlock the door and accelerator steering.

Computer system

The central unit is a mini-computer (Data General Nova 3/4). For storage of variable data we use a dual diskette subsystem. The control panel is a hard copy terminal with keyboard. For communication between lock-cabin and computer we have chosen an electronical card reader (Benzing Microdec 40-110). This reader identifies cards with a capacitive code. In our configuration all eight card-readers have been installed in a serial full duplex 40 mA current loop system (baud-rate is 2400).

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Person lock-cabin

At every entrance a person lock-cabin has been placed. This part of the system guarantees every passage to and from the red zone to be executed orderly. Its function aims at forcing any individual visitor to make known his coming and going to the control system. (fig. 2,3)

Construction. The person lock-cabin is a solid, transportable cabin, with doors on the front and the back side. The cabin is normally fastened to the wall near an entrance of the red zone. Special contructive provisions ensure that access is restricted to passing the lock-cabin. In case of heavy or big transport, the cabin can be removed, so that the original passage is available again. To quarantee that only one person is using the lock-cabin at a time, we have contructed its bottom as a weighing-floor.

Weighing system. The bottom plate of the lock-cabin is supported by four elastic elecments. A fixed electrical transducer measures accurately the vertical displacement. By means of an electronical threshold device we can indicate several weighing levels. Only between certain levels, the electrical lock control unit is operational.

Lock control unit

The control unit in the local lock-cabin commands both doors and books the number of passages. Only if some conditions have been realised, the card-reader is activeted, the correct door is opened and a up-down counting of the number of in- and outbooking is registrated. If the counter marks "zero" a contact is made. The central computer is keeping book of the passages as well. If the computer has no registration of persons in a certain room, another contact "no persons in this room" is made in the corresponding card-reader. These two contacts are very strict conditions for the door control unit and the accelarator steering.

Conclusion

The PAS for MEA has been operational for more than one year in experimental working conditions. This system has been proved to be a reasenable alternative for a conventional access control by surveilling servants. The designers object is to allow on the one hand authorised people in the red zone only if the situation is safe and on the other to allow the accelarator to be put in active operation only on safe conditions. PAS, which is a integrated part of the total accelerator steering, has realised this object adequately by this double interlinked door and person safety system.

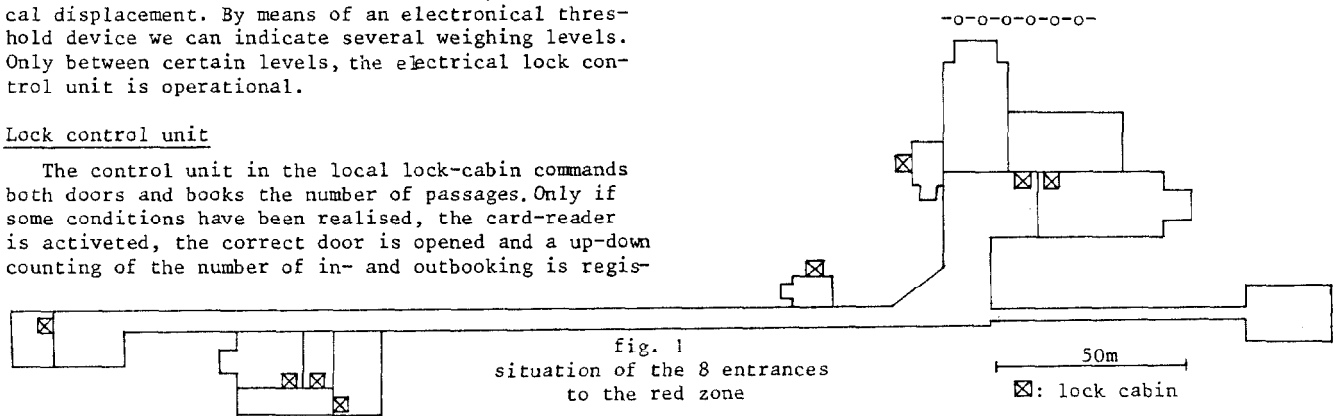

fig. 1
situation of the 8 entrances
to the red zone

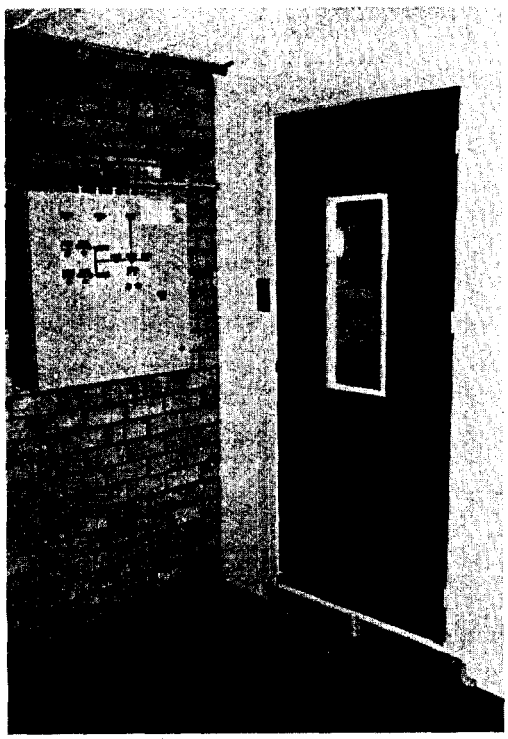

fig. 2

Lock-cabin showing front (red) door.
On the wall the door control-unit.

fig. 3

Lock-cabin with both doors open, showing local control-unit above and card-reader beneath.