CONTROL SYSTEM FOR BOOSTER SYNCHROTRON UTILIZATION FACILITY

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Booster Synchrotron Utilization Facility (BSF) has begun work since July 18 of this year. The control system for the BSF is almost completed. In this report the present status of the control system is briefly described.

Fig. 1 shows the schematic diagram of the hardware interconnections. The system consists of three divisions: (A) interactions with the PS central control room (CCR), (B) those with experimental facilities and (C) the BSF internal control system.

(A) Interactions with the central control room

Timing clocks and beam-gate signal are transmitted from the CCR. Timing clocks are used for synchronizing pulsed operating devices to the booster cycle. Triggering a pulsed switching magnet, acquiring beam profile data, rotating a neutron chopper etc. should be in synchronization. Beam-gate is the gate pulse of about 1.9 sec. width which corresponds to an excess of the booster beam over the main ring injection. In this gate we can choose the booster beam in any form of a pulse sequence according to the beam requests from users. The selected beam gate signal (arc-gate) is sent to the CCR and fed into the arc-triggering system. Timing relation among these signals is shown in Fig. 2. "BSF ready" and emergency signals from the BSF interlock the CCR beam switch.

(B) Interactions with experimental facilities

Beam request, trouble signals and any other informations are sent from the experimental areas. The beam request status is READY/PRESET/PAUSE/REJECT and each facility sends one of these requests to the BSF control room. A programmable sequence controller (5TI sequencer) decides the beam delivery mode to the experimental areas following their requests. After checking all conditions for beam injection, the sequencer sends "BSF ready" signal to the BSF control desk and the CCR. Trouble signals directly interlock the beam switch by hardwiring (relay-logic). Informations of experimental facilities are taken by a mini-computer (MELCOM 70/25, hereafter M-70) and displayed on a color character CRT terminal (80 × 25 characters). Clocks and trigger pulses are distributed to each facility.

(C) BSF internal control system

Internal control system includes the beam line control, access control and personnel protection system. ON/OFF and UP/DOWN control of the magnet power supplies are executed by the M-70. Beam profile data along the beam line are also taken by M-70 and displayed on a graphic terminal (1024 × 780 points). Beam current monitor output is fed into a sample/hold module and integrated by ADC and counter circuits. The M-70 takes these integrated values by an external synchronizing signal and displays on the CRT or the control desk in units of protons per pulse or counts per second.

Beam lines, experimental areas and transfer tunnels are all

radiation controlled areas. All doors of those areas are electrically locked. Access to those areas is possible after releasing the electric lock by a key and under TV surveillance from the control room. When a personal key is removed from a key board, it is impossible to turn on the beam switch and the relevant magnet power supplies. The radioactive contamination of whole human body surface or equipments is checked by a gate monitor which is located at the entry gate to the primary beam line.

Operational record or access and contamination record are accumulated in a disc file of the M-70 and these data can be always read out and printed out in an arranged form.

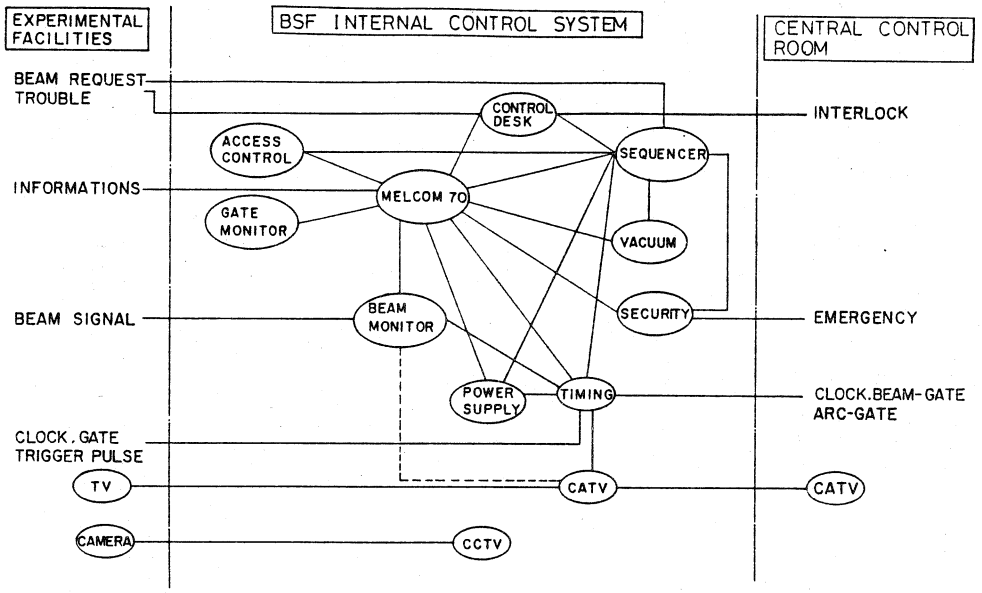

Fig. 1 Simplified schematic diagram to show the hardware interconnections

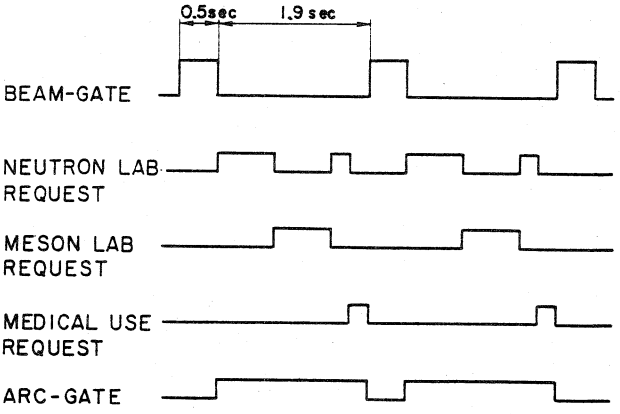

Fig. 2 Timing relation among beam-gate, requests and arc-gate signals