

## ELECTRON BEAM PROFILE MONITOR

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A beam profile monitor of multi-wire type has been developed to measure the trajectory and the emittance of the 15 MeV electron beam from the injector linac to the synchrotron. The monitor detects the secondary emission from the sense wire hit by the electron beam.

18 wires made of Be-Cu with a diameter of 200  $\mu\text{m}$  are spanned with a pitch of 1 mm both in horizontal and vertical directions. Since 64 % of the beam is, in principle, free from the influence of the wires, one can utilize the output beam while monitoring the characteristics of the beam.

Horizontal and vertical wires are expanded on a metalized ceramic frame, as depicted in Fig. 1. Leftover of the frame surface needed for supporting the wires is coated with metal and is kept at electric ground level to prevent the electric field from the charge in the ceramic.

Whole the frame is, except the beam path, covered by copper sheet which is connected to high tension of +1 kV. This serves to eliminate the low energy ions accompanying the electron beam, as well as to gather the electrons emitted off the sense wires. Without this cover, the monitor shows broader extension of the beam than the actual size.

Diagram of the read out circuit is shown in Fig. 2. The charge at each wire induces voltage at the capacitor which is scanned successively with 1 msec duration for each and is displayed on a oscilloscope. An example of the beam profile thus detected is shown in Fig. 3. One can recognize the full width at half maximum of the beam to be 6 mm and 8 mm in horizontal and vertical direction, respectively.

After the scanning, all the charges are liberated in the earth. The read out process is triggered by the pulse synchronized to the repetition of the beam acceleration, 21.5 cycles per second.

Typical output voltage is 0.2 V for the electron beam pulse of 2  $\mu\text{sec}$  width with the peak intensity of 200 mA. If necessary, one can increase the output voltage by reducing the read put rate to stack the charge in the capacitor. From the measured parameters, the secondary emission rate has turned out to be 0.06, which is close to the expected value.

A pair of the monitor mentioned above are located along the beam transport line from the injection to the synchrotron. It is expected that the monitor system will contribute to improving the emittance of the beam from the linac and to confirming the best condition for the synchrotron to accept the beam.

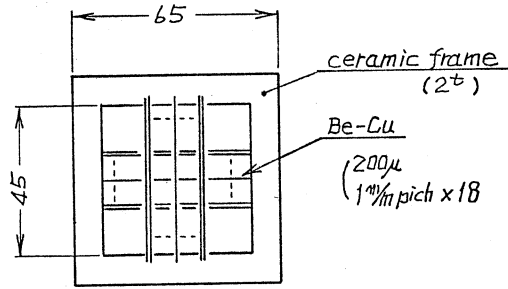


Fig. 1

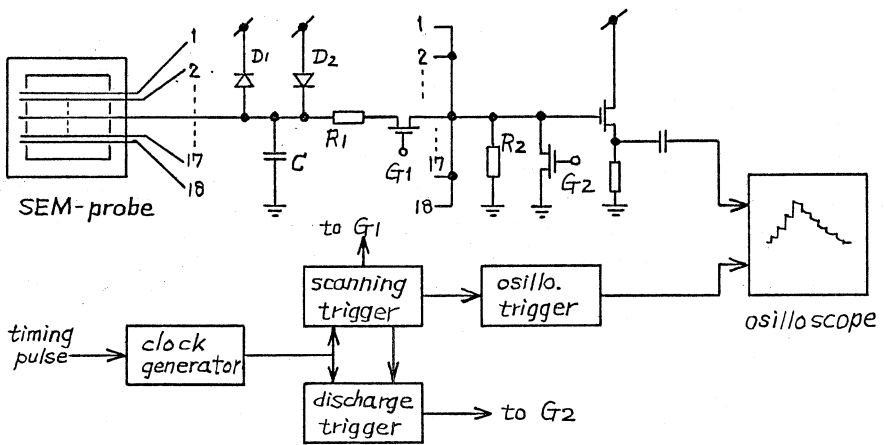


Fig. 2

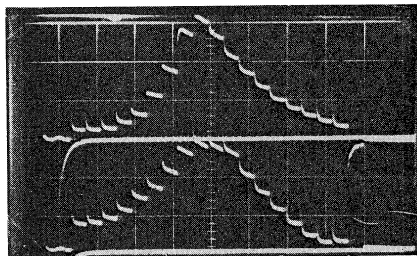


Fig. 3