

In practice, we do not believe that the etching procedure was necessary. We tested several grids electrically, which had not been etched, and could not find any significant difference from the normal ones.

The 15 cycle r.f. pulses produce fields of 10^7 volts/meter between the drift tubes, or 4 gm/cm^2 on the drift tube ends. This pulsed force is sufficient to loosen the grid holders, so set screws are used to lock them into the drift tubes.

(7) Radiation Shielding. The stray radiation around the linear accelerator has been investigated to determine its sources and energies. The radiation comes almost entirely from x-rays produced by electron bombardment of the drift tube ends. These sources were determined by exposing x-ray plates through an iron slat collimator "telescope" laid on top of the accelerator. The energies of the x-rays near the exit end of the accelerator were found by absorption measurements to be up to 2 Mev, corresponding to electrons passing through one or two gaps between No. 45 drift tube and the end of the liner.

One-half inch of lead shielding hung on frames near the sides and top of the linear accelerator has reduced the x-ray level, measured two feet from the machine, to $\sim 10 \text{ MR/hr}$. The shielding has many openings, such as holes for the transmission lines, and a four-foot wide space below the Pb, so that there is scattered radiation throughout the room. The level 30 feet from the machine is $\sim 5 \text{ MR/hr}$.

Three inches of lead glass are provided over the tank windows through which the inside of the liner can be viewed.

After the tank has been let down to air and re-evacuated, the radiation level is higher by a factor of 2 to 5, but improves quickly with running of the r.f. which serves to outgas the system. Outgassing can also be speeded by running hot water through the liner cooling lines, though that has very seldom been done. After the accelerator has been run for several months,