inches and 35 inches from the center of the cyclotron by suitably moving the three probes radially. The chevron seals are located in a housing behind the large Crane valves, and together with the valves, they constitute a small vacuum lock, which allows removal of the probes without affecting the main cyclotron vacuum system. The small locks speeded up the numerous target changes necessary in the final runs. Because the concrete shielding of the cyclotron is only six feet back from the tank, the probes have a joint part way back, which must be disconnected to remove them from the tank. This joint, like others on the system, employs a standard vacuum technique, namely an "O" ring gasket between two flanges, but it acts as a light-tight joint.

The two probes differ in the following respects. The defining counter probe receives only protons from 40 Mev up and these high energy protons can easily penetrate the wall of the stainless steel tube, which is thinned down to 0.016 inch at the end where the crystal is located. The back end of the probe is bolted down to a rigid table in a position that depends on the angle to be studied. The monitor probe must detect particles with energies as low as eight Mev. To do this a light-tight cap with a one mil aluminum window is used. The cap is placed over the end of the probe and has a baffle at the end to allow the interior to be pumped out, since the aluminum could not withstand the vacuum. The vacuum seal is then made inside the probe, about an inch back, by an "O" ring resting directly on the lucite rod. This arrangement causes some light loss but the amount is not appreciable. The rear end of the probe swivels on a ball bearing mounted on a small bench milling machine, firmly bolted