



THE SMALL PORTABLE FREON CHAMBER

The portable 8 inch diameter freon-filled chamber was designed for the examination of charged beams extracted from a high energy accelerator to facilitate the adjustment of beam components as they are installed in the beam line. After being used at one position in the beam the chamber must be wheeled away before the beam is used or examined by any other device. A further use is the determination of the background level of particles penetrating the experimental areas that would produce tracks in the large research chambers. Since the stopping power of freon is as high as that of any chamber liquid envisaged for use at the Laboratory, stray particles that would produce tracks in the large chambers will be seen in this smaller one. In this way the amount of shielding required to reduce the background tracks to an acceptable level may be estimated before the large chambers are operated, enabling the required shielding to be erected at the same time as the chamber is installed.

The tracks of charged particles become visible when the liquid in the chamber is made superheated by reducing the pressure. General boiling is prevented by restoring the pressure to its original value within a few thousandths of a second, in which time the beam particles have passed through the chamber and the trails of bubbles left along their tracks have been photographed or viewed using closed circuit television.

The Chamber body, 8 inches diameter by 5 inches deep, is machined from an aluminium forging. The expansion is effected by deflecting a compound rubber diaphragm at the bottom of the chamber.

The diaphragm is deflected by altering the pressure under it using high speed changeover valve to switch between the large expansion and recompression tanks. The tanks are housed underneath the chamber together with the temperature controlled water circuit and vacuum pumps.

The optical system is able to provide an end-on view of the chamber with either a side or top view, in this way the beam profile may be observed in detail, one window being used for the 90° illumination. The T.V. camera is used when setting up a beam. For recording purposes a 35 mm 100 foot roll camera is used in its place. Provision is also made for the use of a Polaroid camera.

This chamber was designed and constructed at the Nuclear Physics Department of Oxford University.