

De La Rive Tube Construction

□ A spectacular demonstration of the effects of a magnetic field on a streamer discharge is demonstrated by the modified De La Rive tube shown in Fig. 5 (right) and detailed in Fig. 8. The components of the tube are contained in a heavy-wall screw-cap jar having a well-rounded bottom edge. Commercial vacuum chambers, excepting plastic types, may be used to house the components. However, vacuum chambers are too large for the purpose and result in longer pump-down time.

Begin construction by making and installing the copper exhaust tube H (Fig. 8) on the jar cap. Carefully round one end of the copper tube, tin and wipe off excess solder from both ends. Make the flanged end by first flaring the end, reversing the tube in the flaring tool, and hammering the flare flat. Next, clean the central area of both surfaces of the jar cap and tin. Then, using a tapered punch, punch the $\frac{1}{4}$ -in. hole from the inside surface of the cap. Finally, install the copper

tube, crimp the burr to the tube, and solder quickly using a hot iron.

Drill the $\frac{3}{32}$ -in. hole in the center of the jar bottom, using either a hollow drill tube or a solid tube and a suitable drilling compound such as carborundum. Apply some kerosene while drilling. Support the inside surface of the bottom on a wooden block and work slowly.

Next, make positive terminal F (Fig. 8). Drill a small hole in the center of the copper disc and solder the #22 bare copper wire to the disc. Clean the jar bottom and terminal assembly using carbon tetrachloride. Then, apply a liberal amount of *Duro E-Pox-E* cement to the disc and position the terminal assembly on the jar bottom. Allow the cement to cure for two days. The terminal may be sealed to the jar with vacuum wax but the wax seal will melt and fail at a lower temperature than that of the E-Pox-E seal.

Using either sheet iron or brass, make

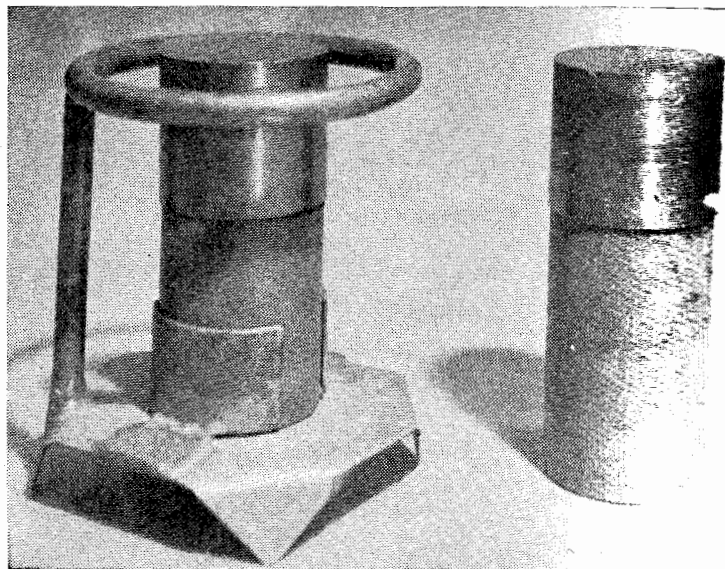


FIG. 9. At right is a view of the lower ring electrode and interchangeable magnet assembly of the modified De La Rive tube described here.

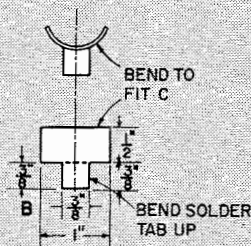
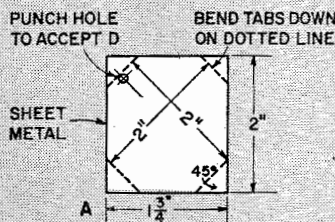
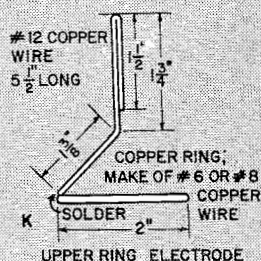
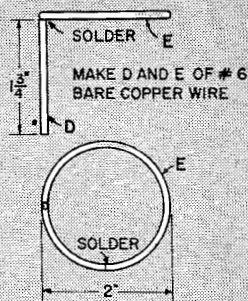
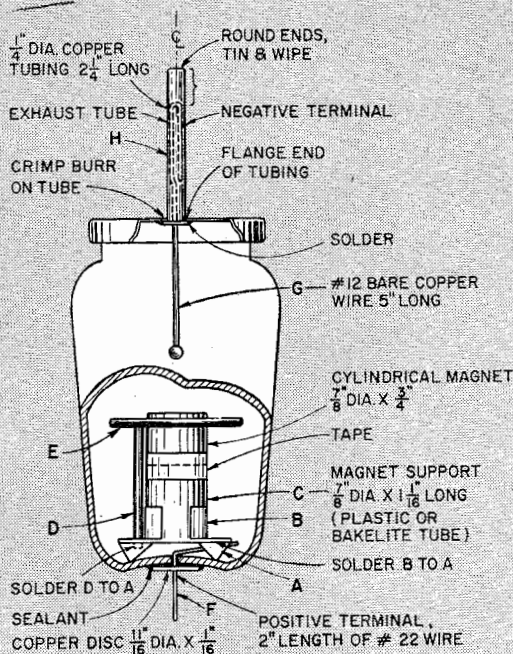


FIG. 8

lower electrode base A (Fig. 8). Make two clips, B, and temporarily tape them in position on Bakelite or plastic magnet support C. Align this assembly on base A and solder B to A. Make lower ring electrode E and its vertical support D of #6 bare copper wire.

Make the ring by wrapping the wire several times around an undersize cylinder and cutting with a hacksaw after adjusting the ring diameter. Next, solder upright D to ring E. Then, using a C-clamp and a wooden spacer block, align ring E on base A and solder upright D to base A. Bend and file the feet of base A, as required, to prevent the assembly from rocking and sliding about

when installed in the jar. Tape or cement the cylindrical magnet to magnet support C. Bend clips B to obtain a tight slide fit with support C. The completed lower electrode assembly is shown in Fig. 9.

Before installing this assembly in the tube, bend the copper wire projecting inside the tube bottom so that it lightly contacts base A. The upper electrode G is a length of #12 copper wire doubled back and pushed into the copper exhaust tube as shown. Adjust the upper electrode, by bending, so that it is well centered over the magnet and ring electrode. To complete the tube, clean all parts thoroughly and paint the jar cap black.