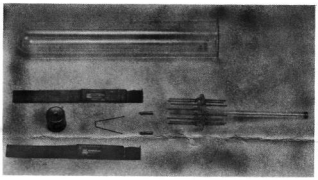
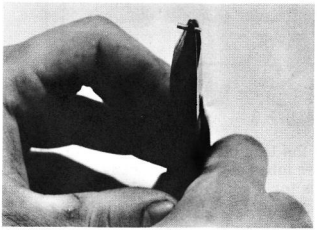
ASSEMBLY INSTRUCTIONS

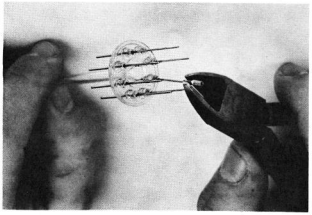


Parts For The Electron Gun

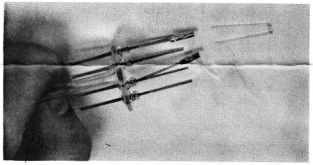
1 8-pin vacuum tube header
1 glass test tube
2 deflection plates
1 anode cap
1 filament (1 spare provided)
2 filament support tubes



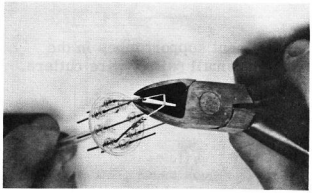
Pinch the filament support tubes in the middle using a small pair of wire cutters.



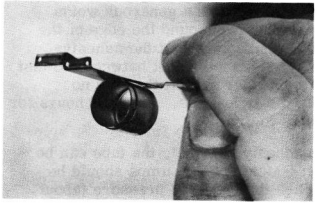
Place a filament support tube on one of the header pins and secure it by squeezing the tube with a pair of wire cutters.



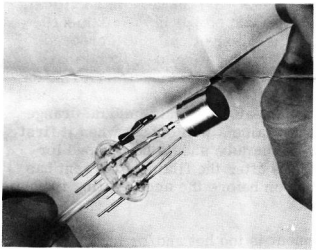
Proceed in either clockwise or counter-clockwise direction, skip two pins and secure the other filament support tube on the third pin. Gently bend the two pins on which the tubes are secured until the distance between them approximately matches the two legs of the filament.



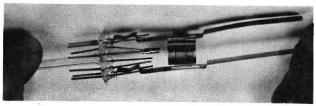
Place the legs of the filament into the filament support tubes and secure firmly with the wire cutters for a good electrical and mechanical connection.



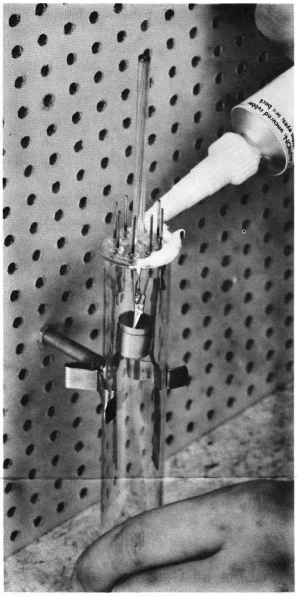
Snap anode cap assembly into the U-shaped cutout provided in one of the deflecting plates. This plate will hereafter be called the anode plate. The tongue of the cutout should be inside the anode cap, and the cap on the outside of the bend, as shown.



Slip the anode plate over the two empty pins which were previously skipped over during the filament assembly. The two pins should go through the four round holes in the anode plate so as to produce a snug fit on the pins. Be careful not to injure the filament. Gently bend the pins on which the filament is mounted, until the filament can be seen through the hole in the anode cap assembly. The ultimate success of your Electron Gun will depend upon this alignment.



Fit the other plate on to the two pins opposite the anode plate, as shown. Note that there will be two empty pins to which no connection is to be made.



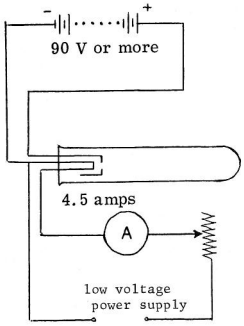
Without disturbing the alignment of the parts, gently place the entire assembly into the test tube, which should be held in a vertical position in a ring stand or other holder. Squeeze a generous worm of silicone adhesive around the edge of the header, and make sure that the adhesive completely covers the crack between the test tube and the header so that there is no possibility of air leakage. Allow 24 hours for the adhesive to dry.

When the adhesive has set, the tube can be evacuated. Most school pumps should be able to reach the required pressure (about 40 microns of Hg or lower; if your vacuum pump has not had adequate maintenance, try changing the oil). Let the tube pump down for a few (10-15) minutes, then connect filament leads, making sure the filament rheostat is at maximum resistance.

Since the filament current is rather critical, an ammeter should be put in the filament circuit and the filament current increased slowly and carefully. We have found that typical values for good filament performance are 1.4 V and 4.5 to 5.0 amps. The filament should not be heated beyond a middle orange color. The filament will outgas when it first heats up, so the tube should be pumped for a few minutes after the filament current has been turned on before the accelerating voltage is applied.

If the filament is too hot and/or too close to the anode sides, the beam current will be large enough to heat the can red hot. If this starts to occur, reduce the filament current quickly, and then slowly bring it back up to a value somewhat lower than before.

By applying different potentials to the plate as shown in the wiring diagram, the beam may be made to deflect toward one or the other plate. A good approach is to apply a potential of 90-100 V to the anode plate and let the potential on the deflection plate vary from 45-50 V to 135-150 V. The Electron Gun will draw about .2 amps of beam current, so a husky battery or other DC source is required.



SCHEMATIC DIAGRAM

SCHEMATIC DIAGRAM:
ELECTRON GUN WITH DEFLECTION PLATE CONNECTION