

# SINGLE CONVECTRON



## DESCRIPTION

The introduction of the Type-TT-25 Single Convector Unit marks an important advance in the technique of determining and correcting deviations from a vertical reference position wholly by electronic means. This tube consists of a fine wire sensing element supported in a gaseous atmosphere within a glass envelope. Connections to the sensing element are made to external metal caps at both ends of the tube.

Two Type TT-25 tubes are required for the installation. These are mounted so that their axes form an angle of 90 degrees and they are connected electrically to form a bridge circuit as illustrated in the drawing on the reverse side of this sheet.

The filaments carry sufficient current to heat them to an average temperature of about 400° C. The heat leaves the filaments by (1) metal conduction (2) gas conduction (3) radiation and (4) gas convection. The percentage of heat leaving by the first three means is comparatively small, while that leaving by convection is large. Gas convection currents rise along the vertical and so pass the filament at whatever angle it happens to be relative to the vertical.

The relative rate at which each filament loses its heat to these convection currents and, consequently, the filament temperature, depends on this angle. Since the filament material is nickel which changes its electrical resistivity with temperature, the bridge is thrown out of balance as the tubes are moved from the vertical reference.

The vertical or null position is any position where the two sensing elements form equal angles with the vertical and produce electrical zero. This permits using the tubes to control servo mechanisms or instruments because the signal has sense as to whether the displacement is to the right or to the left of null.

With the axes of the tubes set at an angle of 90 degrees, a plot of the output voltage against angular deflection will approximate a sine wave. An increase in sensitivity can be obtained for the indication of small angles by decreasing the angle between the tubes to approximately 60 degrees.

A deviation in the indication from the true vertical may occur if the tube is accelerated or subjected to a magnetic field. The effect of the magnetic field may be reduced by magnetic shielding. Sometimes a slight shift in the null position occurs in the earlier convector type. This shift in null position is minimized when a pair of TT-25 units are used. Hysteresis effect is also decreased by the use of TT-25 tubes.

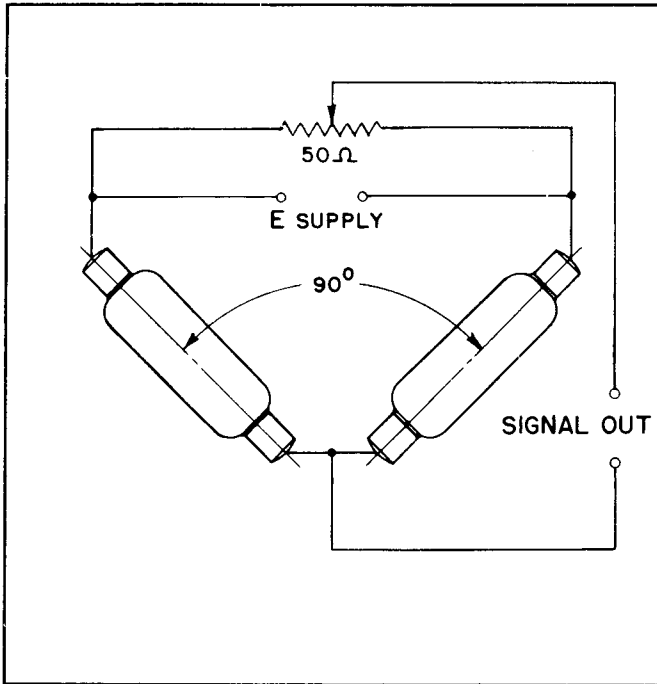
## RATINGS (2 UNITS AT 90°)

Supply Voltage .....	8 volts
Sensitivity .....	10 Mv./Deg.
Null—A.C. supply .....	0.75 Mv. Max.
Time Constant .....	0.1 sec.

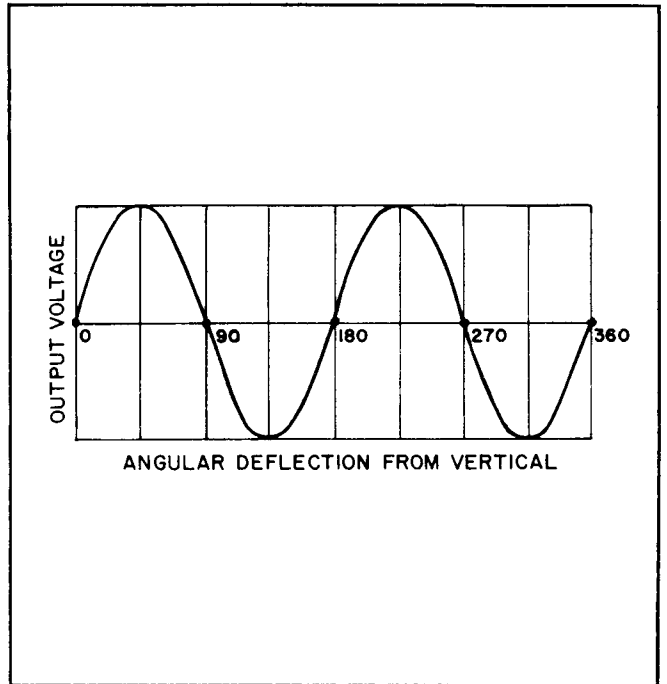
## PHYSICAL CHARACTERISTICS

Connections .....	Small Cap RTMA C1-1
Overall length .....	3 1/8" Nom.
Max. diameter, less tip.....	3/4"

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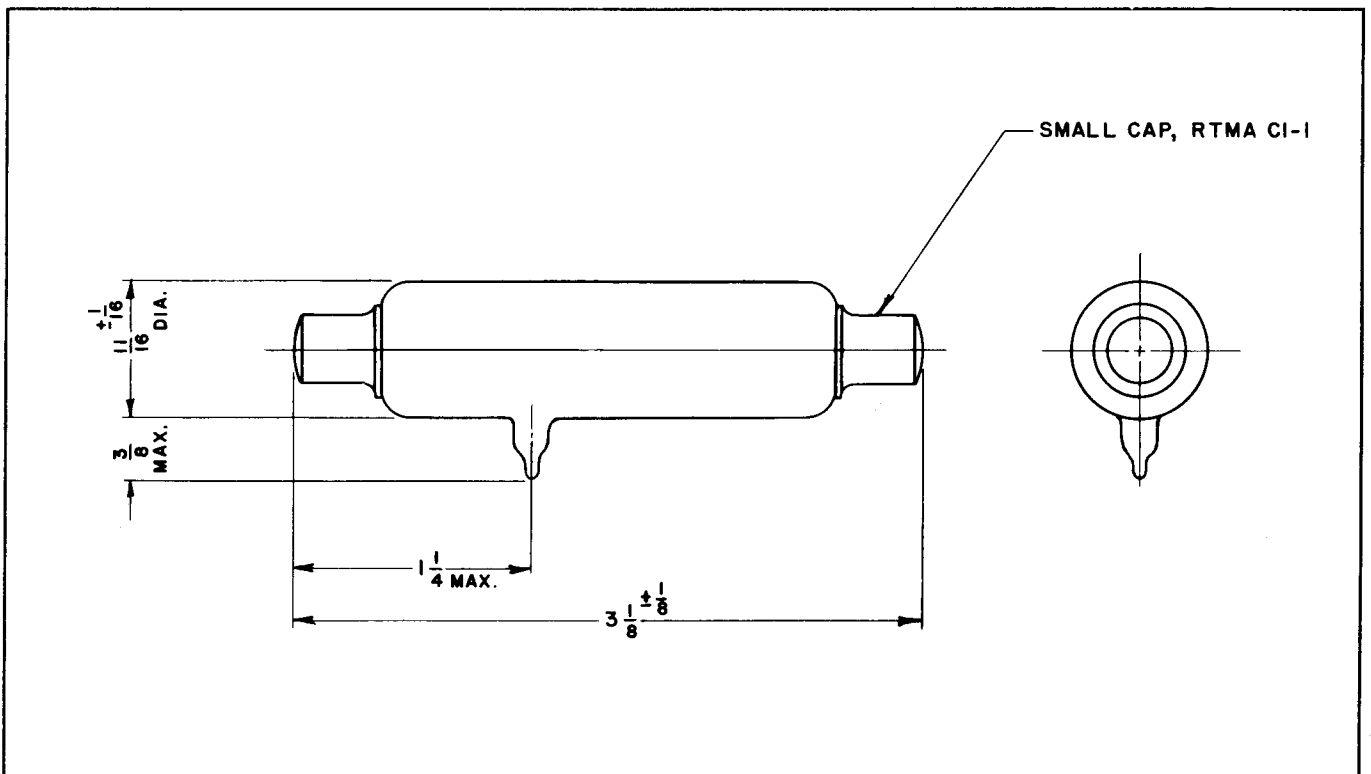


TUBES ELECTRICALLY CONNECTED TO FORM TYPICAL BRIDGE CIRCUIT



CONVECTRON BRIDGE OUTPUT SIGNAL

Note: With a pair of tubes set at a 90° angle to each other, a plot of the output voltage against angular deflection will approximate a sine wave. An increase in sensitivity can be obtained for the indication of small angles by decreasing the angle between tubes to 60°.



OUTLINE DRAWING