

RMA
33

PRELIMINARY
TECHNICAL INFORMATION
ON THE



A NEW ELECTRON-RAY TUBE
FOR INDICATOR USE

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by
RCA Manufacturing Company, Inc.

RCA RADIOTRON DIVISION
RCA Manufacturing Company, Inc.
Harrison, N.J.

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 **Cunningham** 
Radiotron
RCA-6E5

ELECTRON-RAY TUBE
(Indicator Type)

The 6E5 is a high-vacuum, heater-cathode type of tube designed to indicate visually the effect of change in the controlling voltage. The tube, therefore, is essentially a voltage indicator and as such is particularly useful to facilitate exact tuning of a radio receiver.

The visible effect is observed on a fluorescent target located in the dome of the bulb. For different controlling voltages, the pattern on the target varies through a shaded angle from 90° to approximately 0° . Exact tuning is indicated by the narrowest shaded angle obtainable.

The RCA-6E5 provides a convenient and non-mechanical means to indicate accurate tuning of a receiver to the desired station.

ELECTRON-RAY TUBE CONSIDERATIONS

In the basic design of an electron-ray tube, a hot cathode provides a source of electrons. These are attracted to a positively-charged target coated with a fluorescent material. Electrons impinging on the coated target cause it to glow. The extent of the fluorescent area can be controlled by means of a third electrode placed between cathode and target. The pattern developed on the fluorescent target depends on the contour of the target as well as on the position and shape of the third electrode.

Details of the physical arrangement of electrodes are illustrated in Fig. 1 which shows a cut-a-way view of the RCA-6E5. The third elec-

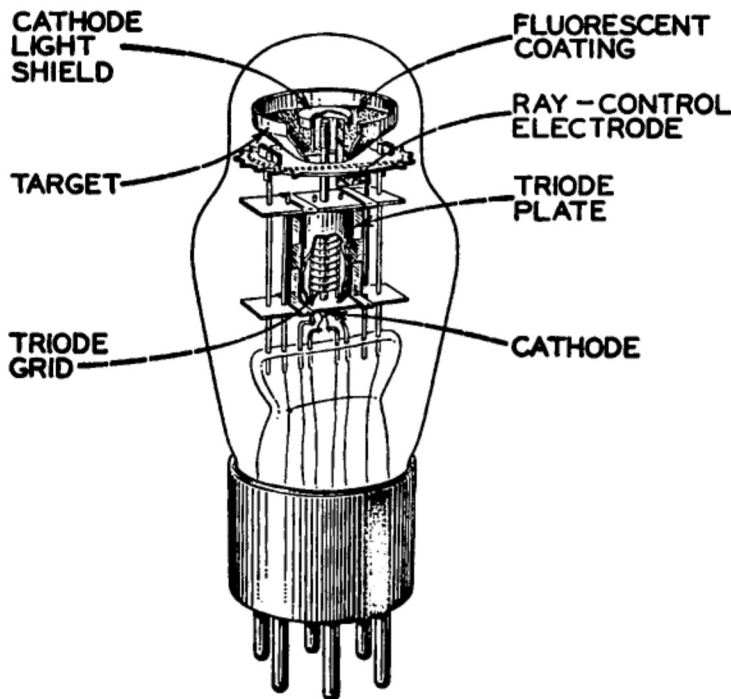


FIG.1

trode is identified as "ray-control electrode", and is an extension of the triode plate. The visible effect produced by different voltages on this electrode is shown for two adjustments by the shaded areas of Fig.2. The voltage on the ray-control electrode is determined by the voltage applied to the grid of the triode connected as a d-c amplifier.

A series resistor of one megohm is placed between the triode plate and the high-voltage supply to which the target is directly connected, as shown in Fig.3.

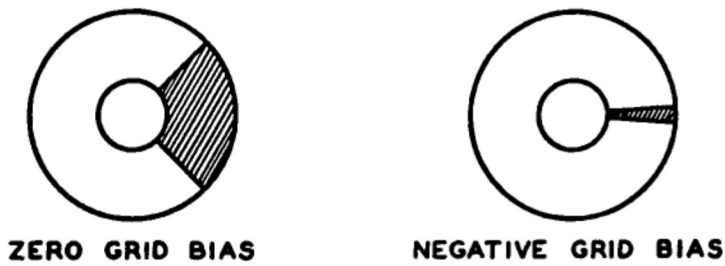


FIG. 2

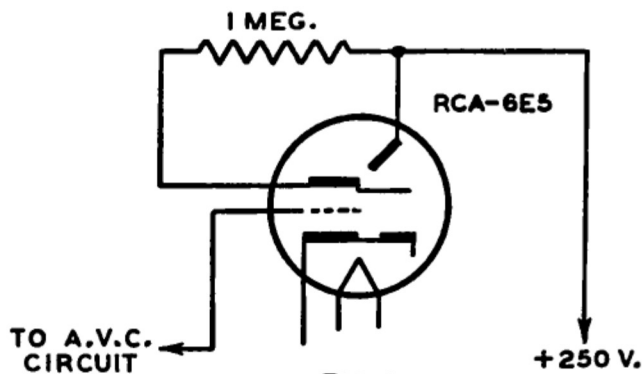


FIG. 3

The effect of the series resistor is to reduce the voltage applied to the triode plate, and consequently to the ray-control electrode, under conditions of decreased triode-grid bias (increased triode-plate current). For conditions of increasing triode-grid bias (decreasing triode-plate current), the triode-plate voltage increases and approaches the value of the supply voltage. In the practical use of the 6E5 as a tuning indicator, controlling voltage applied to the triode grid is obtained from a suitable point in the a.v.c. circuit.


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ELECTRON-RAY TUBE
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TENTATIVE DATA

| | | | |
|--|------|----------|--------------|
| Heater Voltage (A.C. or D.C.) | | 6.3 | Volts |
| Heater Current | | 0.3 | Ampere |
| Plate-Supply Voltage | | 250 max. | Volts |
| Target Voltage | | 250 max. | Volts |
| Typical Operation: | | | |
| Plate- and Target-Supply Voltage | 200 | 250 | Volts |
| Series Triode-Plate Resistor | 1 | 1 | Megohm |
| Target Current (Approx.) | 4.0 | 4.5 | Milliamperes |
| Triode-Plate Current for Zero Triode-Grid Voltage | 0.2 | 0.25 | Milliampere |
| Triode-Grid Voltage for Shadow Angle of 0° (Approx.) | -6.5 | -8.0 | Volts |
| Triode-Grid Voltage for Shadow Angle of 90° (Approx.) | 0 | 0 | Volts |
| Maximum Overall Length | | | 3-5/8" |
| Maximum Diameter | | | 1-9/16" |
| Bulb | | | ST-12 |
| Base | | | Small 6-Pin |

INSTALLATION

The *base* pins of the 6E5 fit the standard six-contact socket which may be installed to hold the tube in any position.

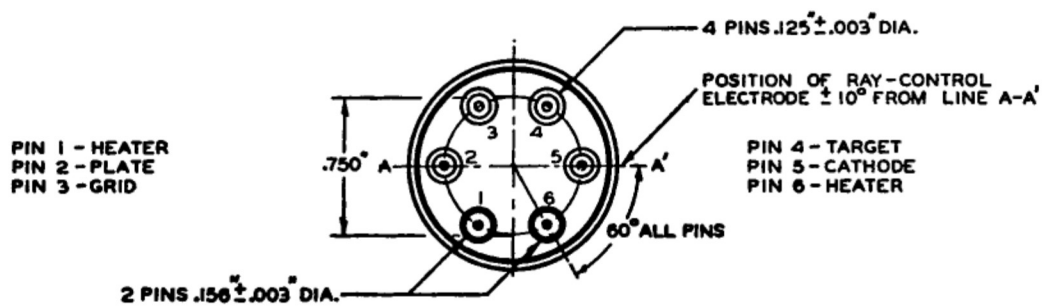
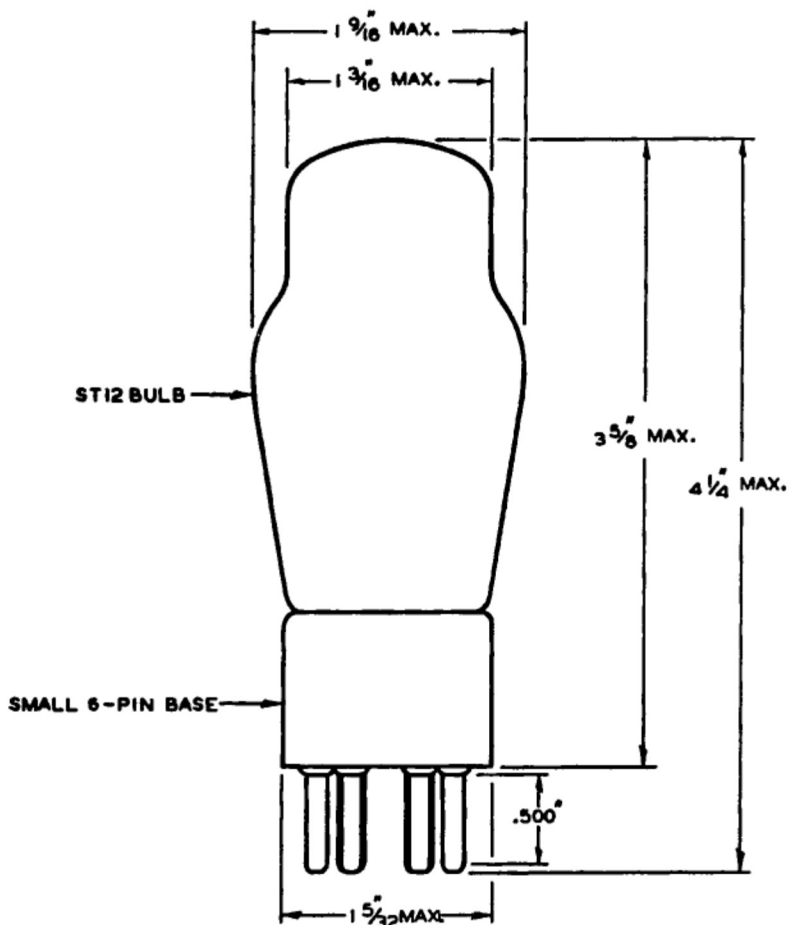
The *bulb* of this tube becomes hot under certain conditions of operation. Sufficient ventilation should be provided to circulate air freely around the tube to prevent overheating.

The *heater* is designed to operate at 6.3 volts a.c. The transformer winding which supplies the heater circuit should operate the heater at its recommended rating for full-load operating conditions at average line voltage.

The *cathode* of the 6E5 should preferably be connected directly to the electrical mid-point of the heater circuit. In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

RCA-6E5

OUTLINE DRAWING



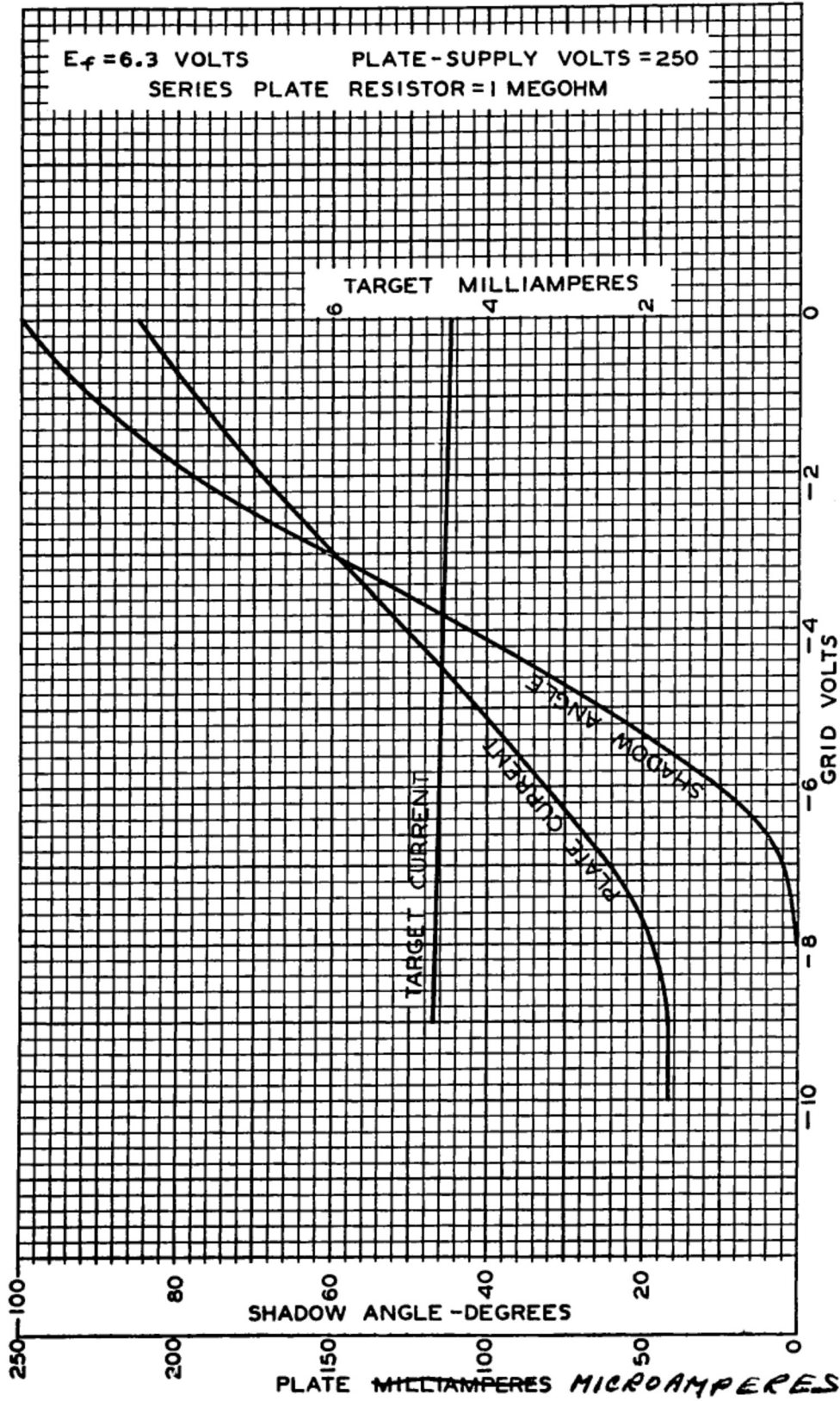
BOTTOM VIEW OF BASE

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JUNE 5, 1935

92C-4421

AVERAGE CONTROL CHARACTERISTICS



JUNE 10, 1935

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