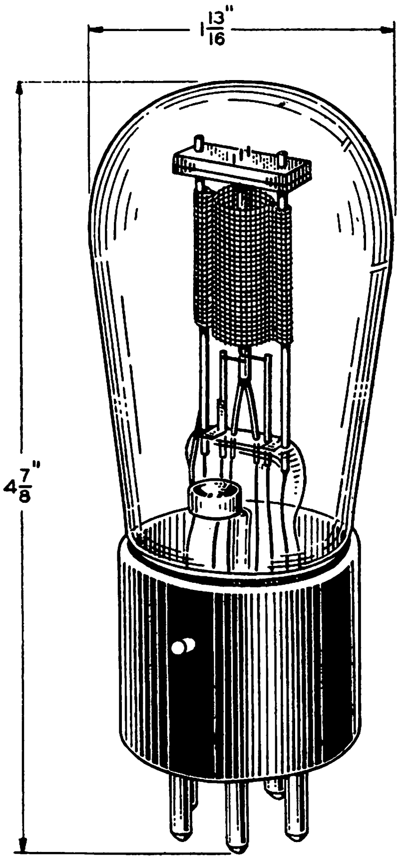
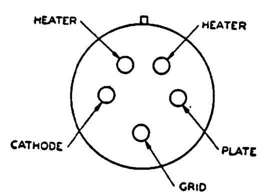
# 272A Vacuum Tube




**Classification**

The No. 272A is a general purpose Vacuum Tube having an indirectly heated cathode which permits operation of the heater element directly on alternating current. It is suitable for use as a detector or power amplifier tube in applications requiring small values of output power.

**Base and Socket**

The No. 272A Vacuum Tube employs a standard five-prong base suitable for use in a Western Electric No. 134A (cushion), No. 137A (rigid), or similar type socket. The arrangement of electrode connections to the base terminals is shown above.

**Rating and Characteristic Data**

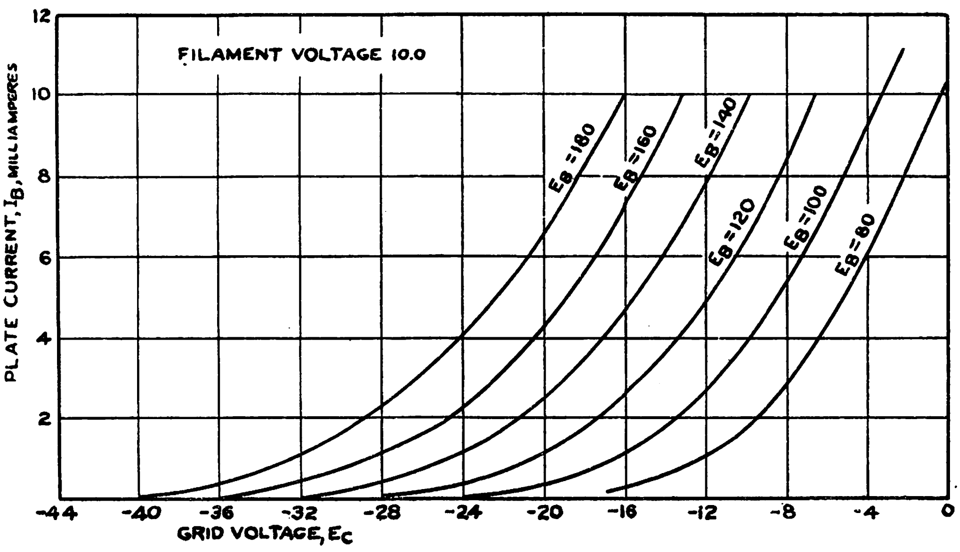
| | | |
|---|---|---|
| Heater Voltage | 10 Volts, AC or DC | |
| Average Heater Current | 0.32 Ampere | |
| Plate Voltage | 140 | 180 Volts Max. |
| Grid Voltage | —15 | —21 |
| Average Plate Current | 5.4 | 5.9 Milliamperes |
| Average Plate Resistance | 7,200 | 7,200 Ohms |
| Average Amplification Factor | 5.6 | 5.5 |

Approximate Direct Interelectrode Capacities

| | |
|---|---|
| Plate to Grid | 2.8 MMF |
| Plate to Cathode | 2.6 MMF |
| Grid to Cathode | 3.4 MMF |

### Average Static Characteristics

The accompanying curves give the average static characteristics of the No. 272A Vacuum Tube.




### General Features

The No. 272A Vacuum Tube is adaptable to applications in which it is desirable to have a tube of the heater cathode type with low heater current consumption.

It is suitable for use in the final stages of amplifiers requiring somewhat greater output power than that given by the No. 262A Vacuum Tube.

# *Western Electric*

## 272A Vacuum Tube


**Classification—Low-power triode with indirectly heated cathode**

**Applications**

Radio-frequency antenna-coupling amplifier.

Audio-frequency amplifier where small power outputs are required.

Detector or modulator.

**Dimensions—**Outline diagrams showing dimensions of the tube and base, and the arrangement of the electrode connections to the base terminals are shown in Figures 1 and 2.

**Base—**Medium, five-pin base with bayonet pin.

**Socket—**Standard, five-contact type, such as the Western Electric 141A socket.

**Mounting Positions—**The 272A tube may be mounted in any position.

**Average Direct Interelectrode Capacitances**

| | |
|---|---|
| Grid to plate | 2.8 $\mu\mu$f. |
| Grid to heater and cathode | 3.4 $\mu\mu$f. |
| Plate to heater and cathode | 2.6 $\mu\mu$f. |

## Heater Rating

| | |
|---|---|
| Heater voltage | 10.0 volts, a.c. or d.c. |
| Nominal heater current | 0.32 ampere |

The heater element of this tube is designed to operate on a voltage basis and should be operated at as near the rated voltage as is practicable.

**Cathode Connection**—When the heater is operated on alternating current, a reduction of hum in the tube may usually be obtained by connecting the cathode to a center tap on the secondary of the heater transformer or to the center point of a suitable resistance connected across the heater terminals. If voltage must be applied between the heater and cathode, it should be kept as low as possible and should never exceed 90 volts.

**Characteristics**—Plate current characteristics of a typical 272A tube are shown in Figure 3 as functions of grid voltage for several values of plate voltage. Corresponding amplification factor, plate resistance, and transconductance characteristics are given in Figures 4, 5 and 6, respectively. Plate current characteristics are shown as functions of plate voltage for several values of grid voltage in Figure 7.

**Operating Conditions and Output**—Permissible operating conditions are included within the area, ABCD, in Figure 3. Amplification factor, plate resistance, transconductance, and performance data are given in the table below for a number of typical operating conditions represented by selected points within this area. The less severe operating conditions should be selected in preference to maximum operating conditions wherever possible. The life of the tube at maximum conditions may be shorter than at less severe conditions.

The performance data include the fundamental power output in milliwatts and the second and third harmonic levels in decibels below the fundamental for values of load resistance, R, both equal to and double the plate resistance, $r_p$. The peak value of the sinusoidal input, $E_{gm}$, which gives the indicated power output, $P_m$, and harmonic levels, $F_{2m}$ and $F_{3m}$, in each case, is numerically equal to the grid bias. For a smaller input voltage, $E_g$, the output and harmonic levels, except for the lowest third harmonic levels, are given approximately by the following relations:

$$P = P_m \left( \frac{E_g}{E_{gm}} \right)^2$$

$$F_2 = F_{2m} + 20 \log_{10} \frac{E_{gm}}{E_g}$$

$$F_3 = F_{3m} + 40 \log_{10} \frac{E_{gm}}{E_g}$$

The level of the third harmonic in the 272A tube is usually low and may differ widely in individual tubes. The values given in the table are for a typical tube.

**Microphonic Noise**—With a plate voltage of 100 volts, a grid bias of −7 volts, and a load resistance of 100,000 ohms, the mean microphonic noise output level of the 272A tube, measured in a laboratory reference test set, is 39 decibels below 1 volt. The range of levels of individual tubes extends from 26 to 52 decibels. Since microphonic noise depends on the type and intensity of the mechanical disturbance which produces it, the values given here are useful chiefly for comparison with the levels of other tubes which have been tested in the same way.

**TABLE**

| Plate Voltage | Grid Bias | Plate Current | Amplification Factor | Plate Resistance | Transconductance | Input Voltage | Load Resistance | Power Output | Second Harmonic | Third Harmonic |
|---|---|---|---|---|---|---|---|---|---|---|
| Volts | Volts | Milliamperes | | Ohms $r_p$ | Micromhos | Peak Volts | R | Milliwatts | db | db |
| 80 | −2 | 8.7 | 6.6 | 5400 | 1220 | 2 | $R=r_p$ | 3.5 | 36 | 65 |
| | | | | | | | $R=2r_p$ | 3 | 39 | 65 |
| 80 | −5 | 5.4 | 6.1 | 6600 | 930 | 5 | $R=r_p$ | 17 | 26 | 60 |
| | | | | | | | $R=2r_p$ | 15 | 28 | 55 |
| 80 | −8 | 2.9 | 5.6 | 8600 | 650 | 8 | $R=r_p$ | 30 | 21 | 65 |
| | | | | | | | $R=2r_p$ | 25 | 24 | 50 |
| 100 | −7 | 6.6 | 6.0 | 6300 | 950 | 7 | $R=r_p$ | 35 | 25 | 55 |
| | | | | | | | $R=2r_p$ | 30 | 28 | 50 |
| 100 | −11 | 3.3 | 5.5 | 8800 | 630 | 11 | $R=r_p$ | 55 | 19 | 55 |
| | | | | | | | $R=2r_p$ | 50 | 23 | 50 |
| 120 | −10 | 6.7 | 5.8 | 6400 | 910 | 10 | $R=r_p$ | 65 | 23 | 55 |
| | | | | | | | $R=2r_p$ | 60 | 26 | 50 |
| 120 | −14 | 3.7 | 5.5 | 8600 | 630 | 14 | $R=r_p$ | 90 | 18 | 50 |
| | | | | | | | $R=2r_p$ | 80 | 22 | 55 |
| 140 | −15 | 5.4 | 5.6 | 7400 | 760 | 15 | $R=r_p$ | 120 | 19 | 50 |
| | | | | | | | $R=2r_p$ | 110 | 23 | 50 |
| 140 | −18 | 3.4 | 5.3 | 9400 | 570 | 18 | $R=r_p$ | 130 | 17 | 42 |
| | | | | | | | $R=2r_p$ | 120 | 21 | 60 |
| 160 | −20 | 4.5 | 5.4 | 8400 | 650 | 20 | $R=r_p$ | 180 | 17 | 43 |
| | | | | | | | $R=2r_p$ | 160 | 21 | 65 |
| 160 | −22 | 3.3 | 5.3 | 10000 | 530 | 22 | $R=r_p$ | 180 | 16 | 40 |
| | | | | | | | $R=2r_p$ | 160 | 20 | 55 |
| *100 | −3 | 11.2 | 6.6 | 5000 | 1320 | 3 | $R=r_p$ | 9 | 34 | 65 |
| | | | | | | | $R=2r_p$ | 8 | 36 | 65 |
| *120 | −7.5 | 9.2 | 6.1 | 5500 | 1100 | 7.5 | $R=r_p$ | 45 | 26 | 60 |
| | | | | | | | $R=2r_p$ | 40 | 29 | 55 |
| *140 | −12 | 8.0 | 5.8 | 6100 | 960 | 12 | $R=r_p$ | 100 | 23 | 60 |
| | | | | | | | $R=2r_p$ | 90 | 26 | 50 |
| *160 | −17 | 6.6 | 5.6 | 6800 | 820 | 17 | $R=r_p$ | 170 | 19 | 50 |
| | | | | | | | $R=2r_p$ | 150 | 24 | 55 |
| *180 | −21 | 6.2 | 5.5 | 7200 | 760 | 21 | $R=r_p$ | 230 | 18 | 46 |
| | | | | | | | $R=2r_p$ | 210 | 22 | 60 |
| *180 | −27 | 2.5 | 5.1 | 11700 | 440 | 27 | $R=r_p$ | 220 | 15 | 38 |
| | | | | | | | $R=2r_p$ | 200 | 19 | 46 |

*Maximum operating conditions.

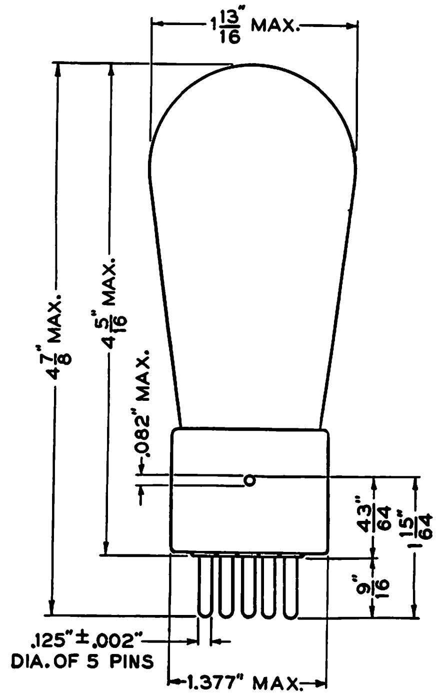



FIG. 1

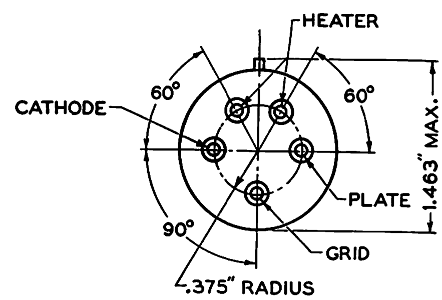



FIG. 2

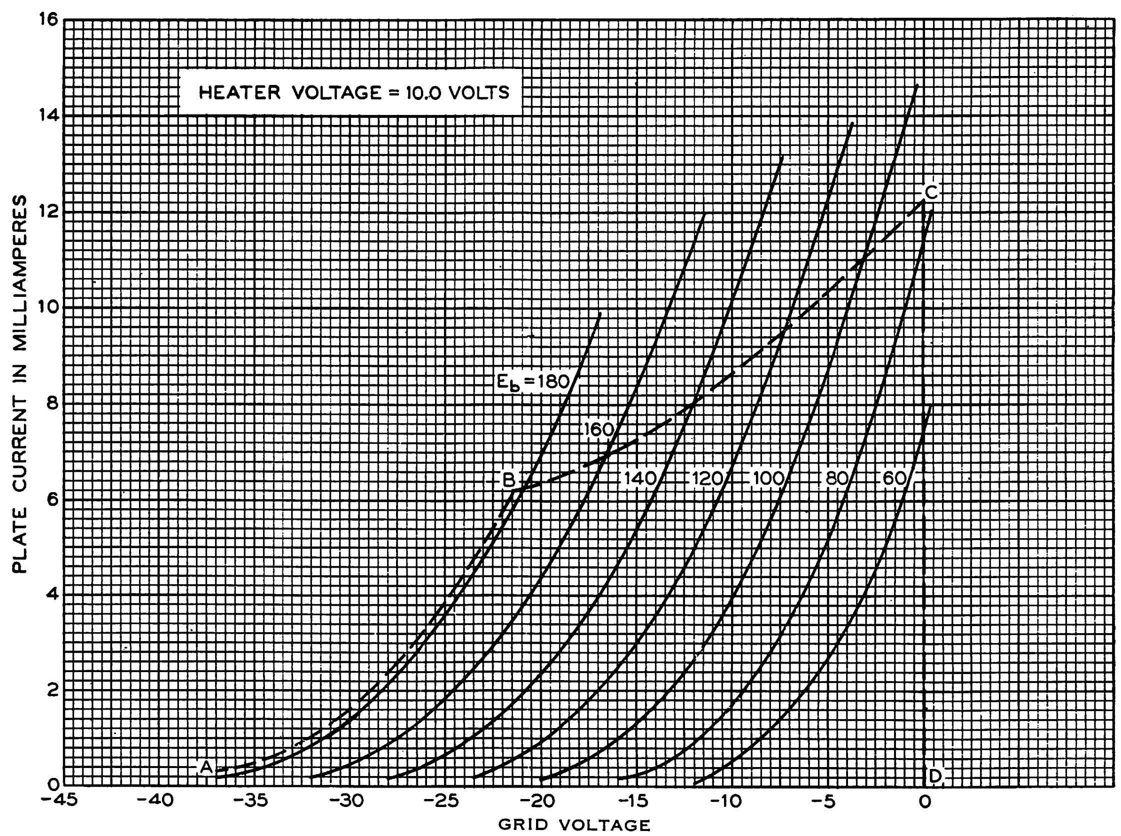



FIG. 3

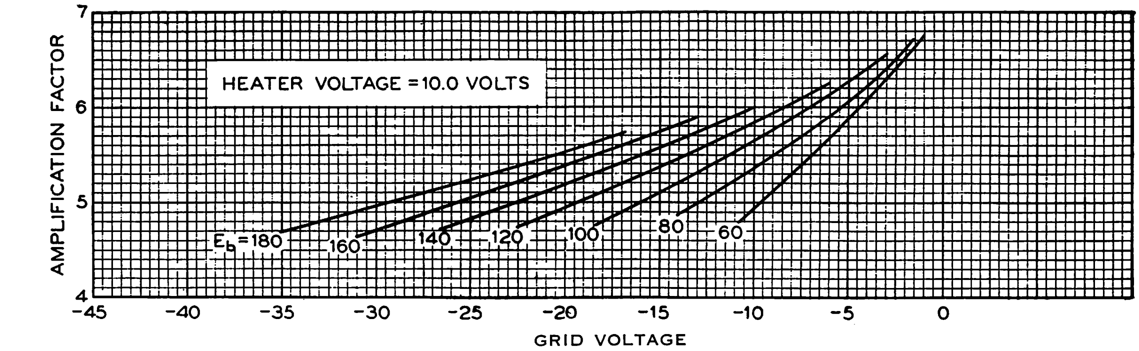



FIG. 4

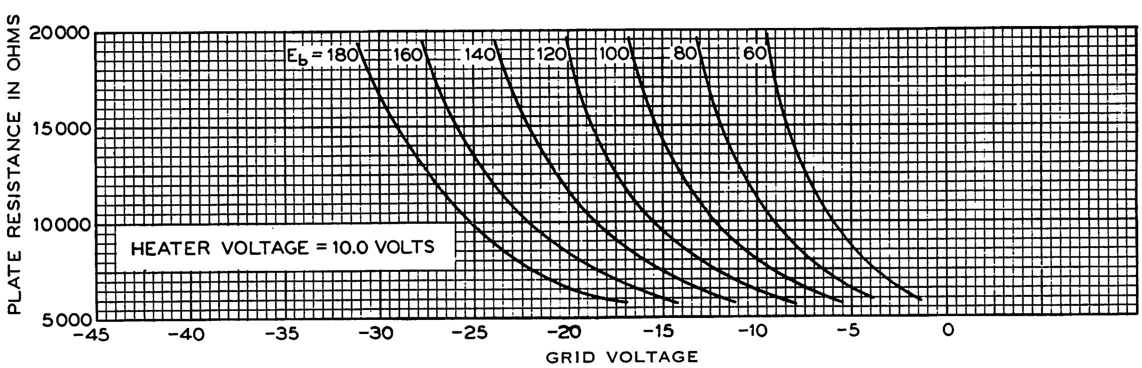



FIG. 5

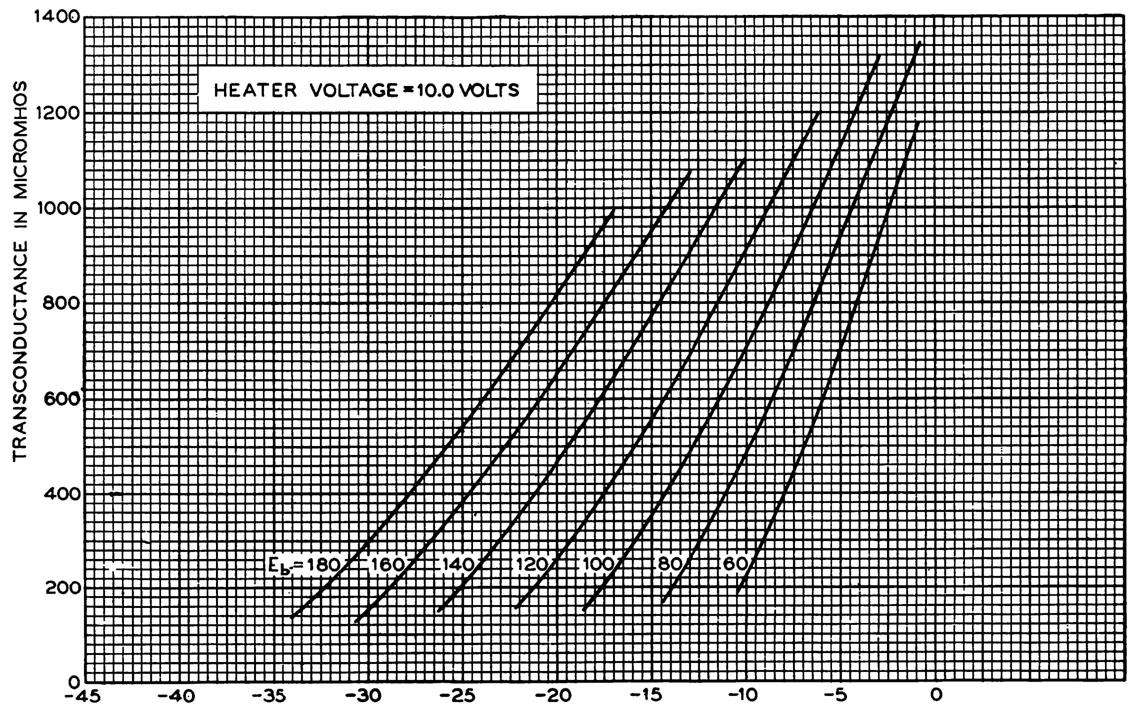



FIG. 6

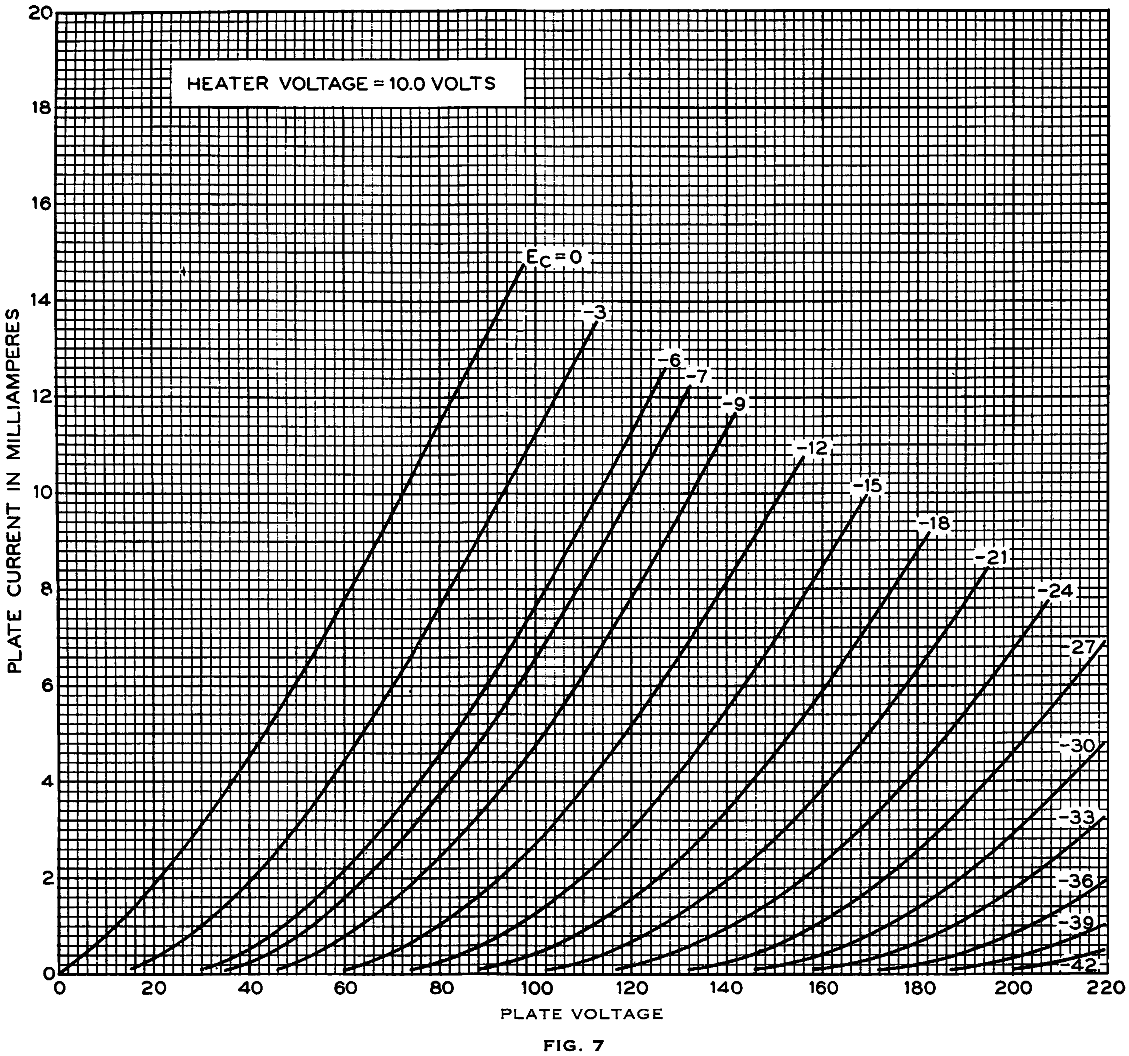



FIG. 7



A development of Bell Telephone Laboratories, Incorporated, the research laboratories of the American Telephone and Telegraph Company, and the Western Electric Company