BELL SYSTEM PRACTICES
Transmission Engineering and Data
Vacuum Tube Data

SECTION AB46.025
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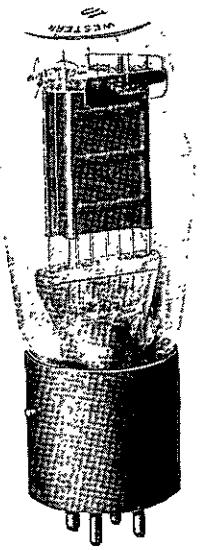
A T & T Co Standard

Western Electric

101FA Vacuum Tube



Classification—Low-power, filamentary triode

This tube is similar to the 101F (dome) tube except for modifications in the characteristics to obtain higher gain.

Applications—Voice-frequency repeaters and other telephone equipment requiring higher gain than can be obtained from the 101F tube.

Dimensions and Connections—The outline diagrams of the tube and base, giving the dimensions and the arrangement of the electrode connections to the base terminals are shown in Figures 1 and 2.

Base and Mounting—This vacuum tube employs a four-pin bayonet type base having special contact metal at the ends of the pins. It is suitable for use in a Western Electric 100L, 100R, or similar type socket, preferably provided with contact-metal contacts.

The tube may be mounted in either a vertical or horizontal position. If mounted in a horizontal position the plane of the filament, which is indicated in Figure 2, should be vertical. To assure adequate ventilation the tubes should be mounted with not less than 2⅝ inches between centers when two or more tubes are used.

Average Direct Interelectrode Capacitances

Grid to plate	5.1 $\mu\mu$f
Grid to filament	4.9 $\mu\mu$f
Plate to filament	2.7 $\mu\mu$f

These values are for a based tube without socket.

Filament Rating

Filament current	0.50 ampere, d.c.
Nominal filament voltage	4.15 volts

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

The filament resistance of this tube increases slightly during the first 2000 hours of operation. The voltage given above is the nominal value after this resistance change has stabilized.

Characteristics—Typical curves showing plate current as a function of grid voltage for several values of plate voltage are shown in Figure 3. The grid and plate voltages are measured from the negative end of the filament. Corresponding amplification factor, plate resistance and transconductance characteristics are given in Figures 4, 5 and 6 respectively. Plate current as a function of plate voltage for several values of grid voltage is shown in Figure 7.

Operating Conditions and Output—Permissible operating plate and grid voltages are included within the area, ABCD in Figure 3. A number of recommended and maximum operating conditions and the corresponding values of amplification factor, plate resistance and performance data are given in the table below. Recommended conditions or others of no greater severity should be selected in preference to maximum conditions wherever possible. The life of the tube at maximum operating conditions may be shorter than at less severe conditions.

The performance data shown includes the fundamental power output in milliwatts and the second and third harmonic levels in db below the fundamental for values of load resistance equal to the plate resistance and for a load resistance of 12000 ohms. The peak value of the sinusoidal input voltage E_{gm}, which gives the indicated 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 approximate levels may be computed from the following relations:

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

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

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

Microphonic Noise

For a plate voltage of 130 volts, a grid bias of −8 volts, and a load resistance of 100,000 ohms, the mean microphonic output level of this tube, measured in a laboratory reference test set is 30 db below 1 volt. The range of levels of individual tubes extends from 20 to 40 db below 1 volt. Since microphonic noise output 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 types of tubes which have been tested in the same way.

TABLE

	Plate Voltage Volts	Grid Bias Volts	Plate Current Milliamperes	Amplification Factor	Plate Resistance Ohms	Load Resistance Ohms	Power Output Milliwatts	Second Harmonic db	Third Harmonic db
Recommended Operating Conditions	100	−4	5.3	9.0	5400	5400	30	28	47
						12000	25	33	55
	130	−8	4.4	8.9	6100	6100	94	20	34
						12000	91	26	43
	130	−6	7.5	9.0	4900	4900	72	26	44
						12000	63	34	55
	130	−4	11.6	9.2	4200	4200	39	34	55
						12000	30	43	70
	160	−10	6.6	8.9	5400	5400	170	21	35
						12000	150	28	45
Maximum Operating Conditions	160	−8	10.4	9.1	4500	4500	140	26	43
						12000	115	35	55
	190	−14	5.6	8.8	5800	5800	285	16	29
						12000	260	22	34
	190	−12	9.0	9.0	4800	4800	275	20	34
						12000	255	29	46

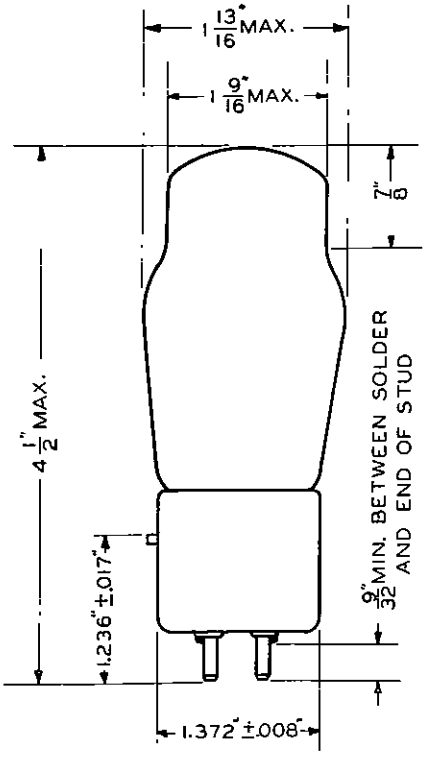


FIG. 1

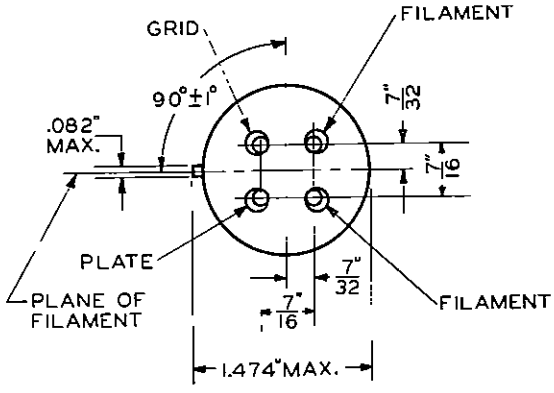


FIG. 2

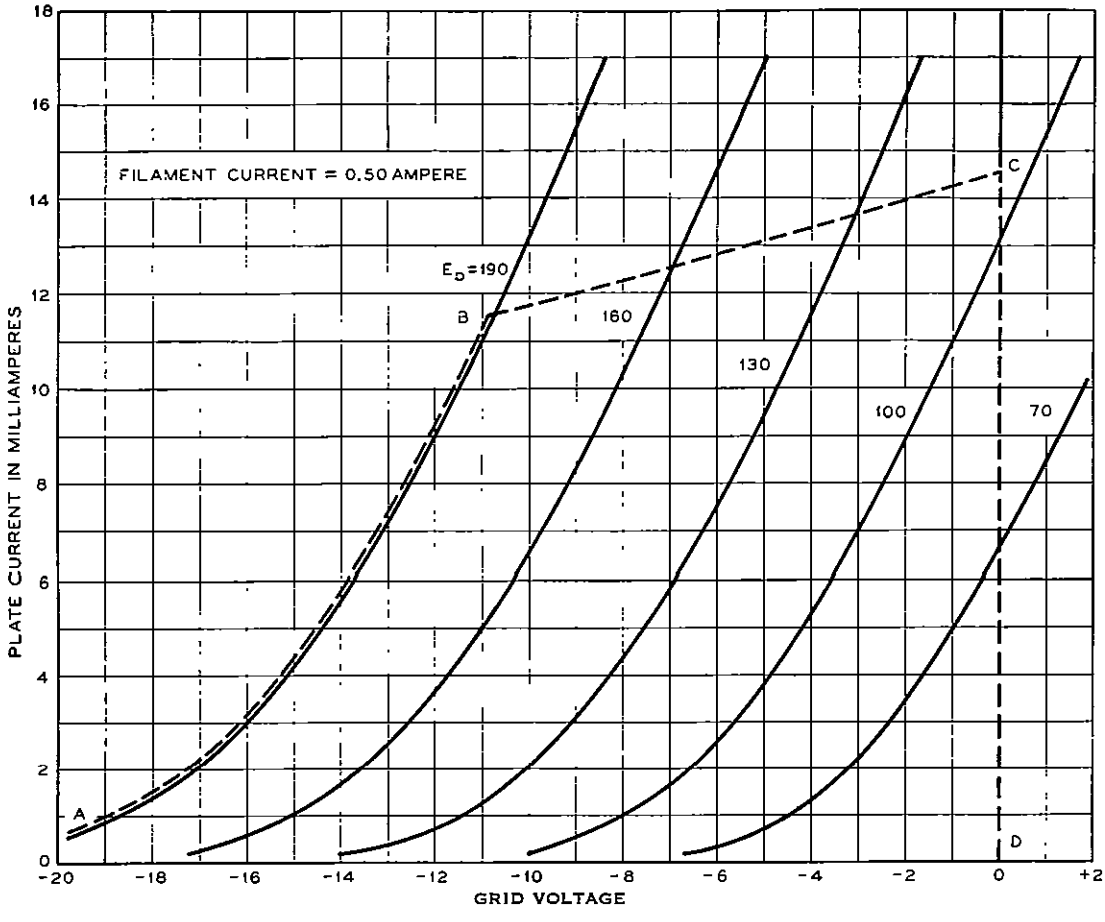


FIG. 3

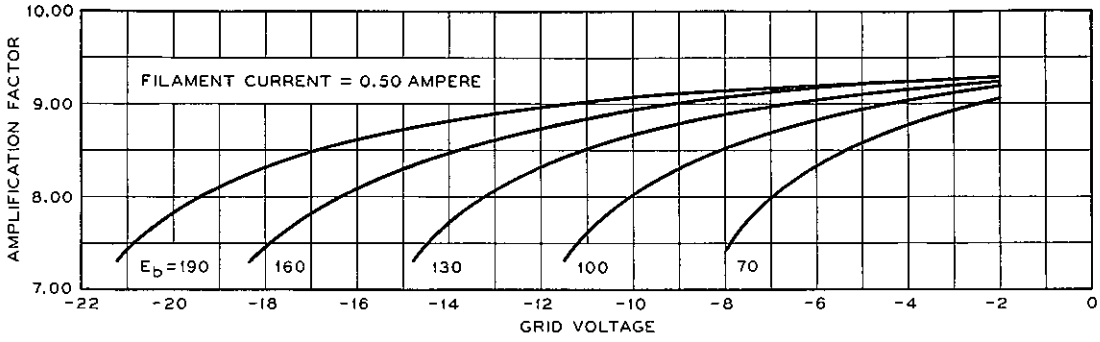


FIG. 4

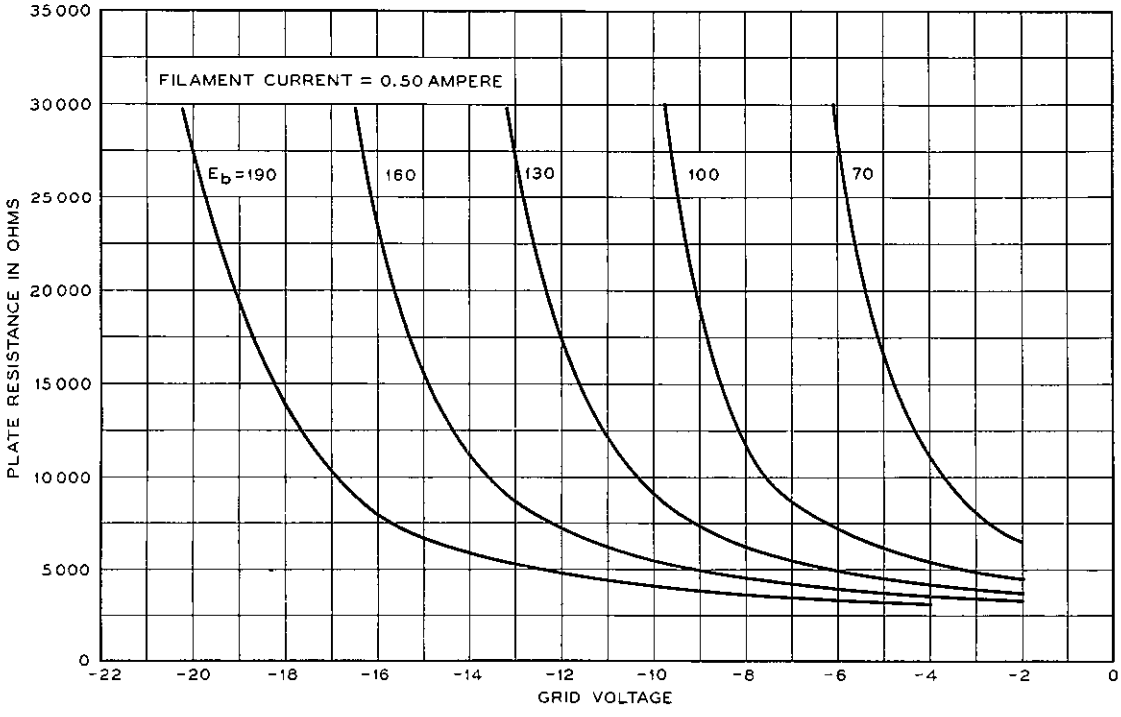


FIG. 5

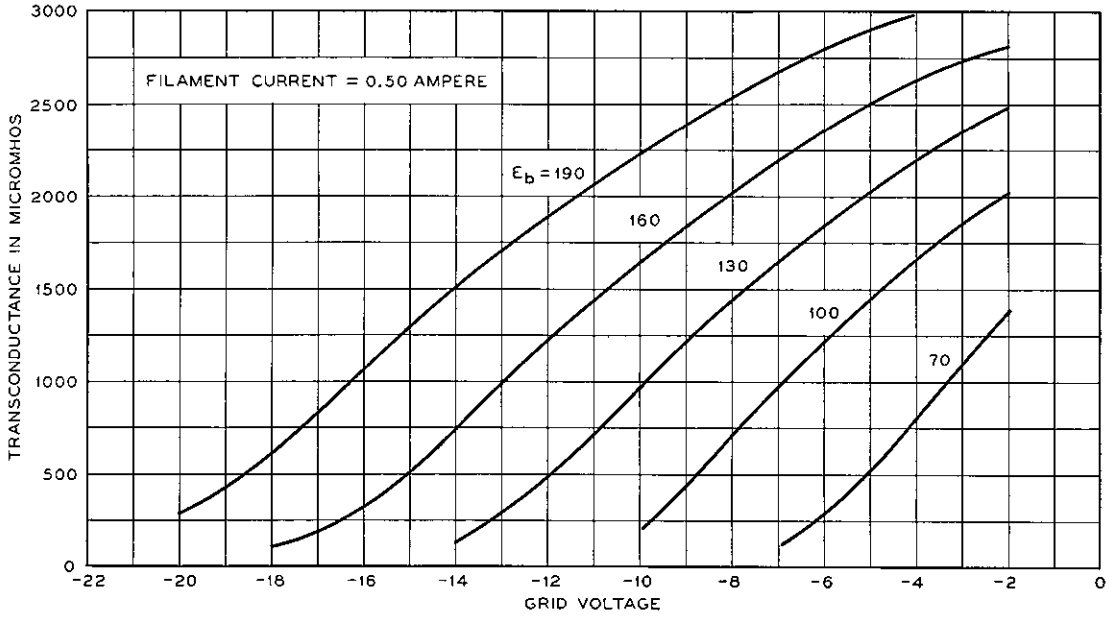


FIG. 6

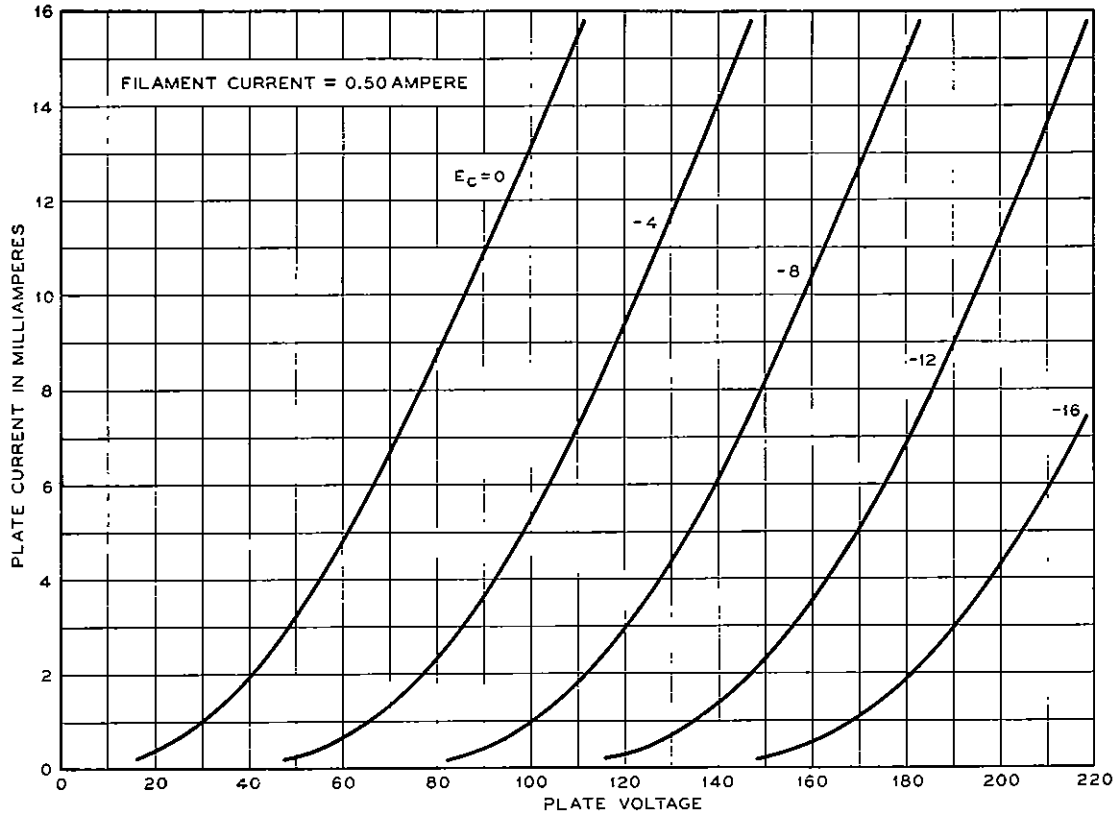


FIG. 7

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