BELL SYSTEM PRACTICES
Transmission Engineering and Data
Vacuum Tube Data

SECTION AB46.024
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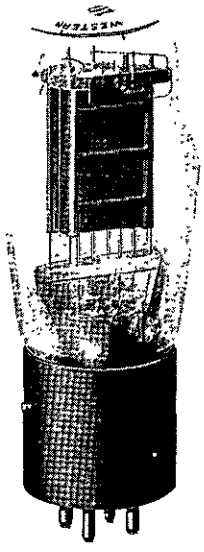
Western Electric

101F Vacuum Tube
(Dome)



Classification—Low-power, filamentary triode

This tube replaces the old design 101F tube. It includes an improved filament, a new mechanical design using transverse mica supports and is mounted in a dome type bulb. The electrical characteristics are practically identical with the previous 101F tube. Due to the improved insulation between elements, it is suitable for use in place of the 101J tube.

Applications—Voice frequency and carrier-frequency amplifier for telephone repeater equipment and other applications where small power outputs are required.

Modulator and demodulator in carrier-systems.

Oscillator in voice and carrier frequency applications.

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 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	5.9 $\mu\mu f$
Grid to filament	4.2 $\mu\mu f$
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	Grid Bias	Plate Current	Amplification Factor	Plate Resistance	Load Resistance	Power Output	Second Harmonic	Third Harmonic
	Volts	Volts	Milliamperes		Ohms	Ohms	Milliwatts	db	db
Recommended Operating Conditions	100	−4	6.2	6.5	5900	5900	15	35	60
						12000	13	42	65
	130	−10	4.8	6.5	6600	6600	79	24	38
						12000	75	30	46
	130	−8	6.8	6.5	5800	5800	60	30	48
						12000	53	37	60
	130	−4	11.7	6.6	4700	4700	18	41	70
						12000	15	50	75
	160	−14	5.4	6.5	6300	6300	155	21	32
						12000	145	27	41
	160	−10	10.0	6.5	5000	5000	100	30	48
						12000	90	40	60
Maximum Operating Conditions	160	−8	12.5	6.5	4600	4600	70	34	55
						12000	65	44	70
	190	−18	6.1	6.5	6100	6100	250	19	30
						12000	245	26	39
	190	−16	8.4	6.5	5300	5300	240	23	40
						12000	220	32	48
	190	−14	10.9	6.5	4900	4900	205	27	43
						12000	180	37	55

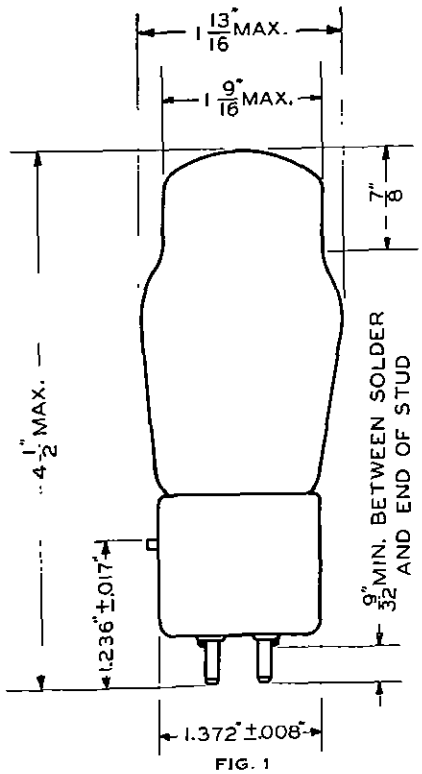


FIG. 1

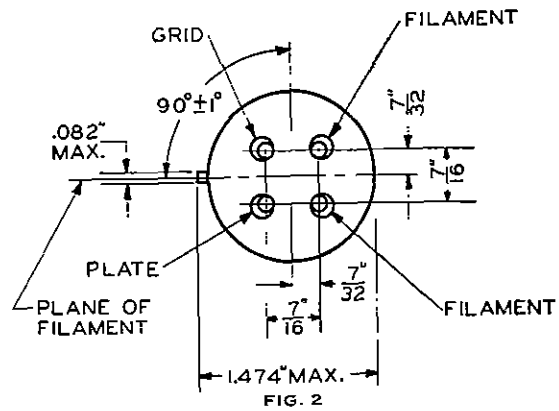


FIG. 2

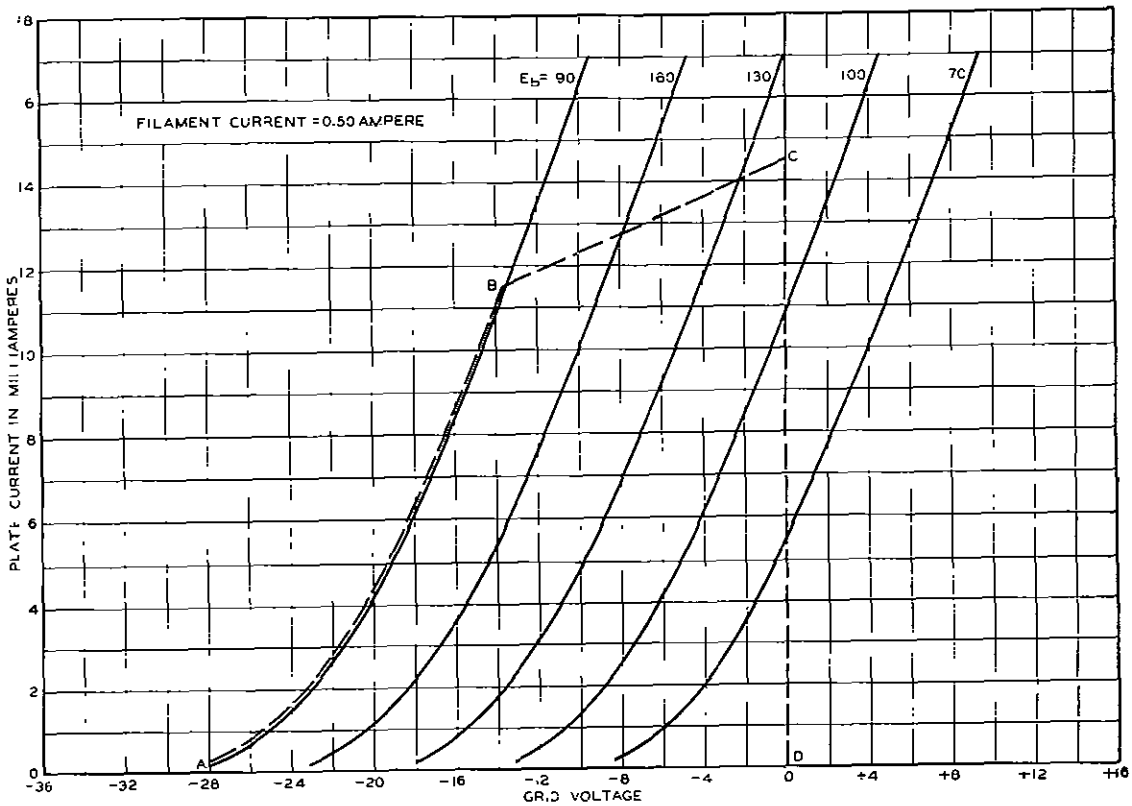


FIG. 3

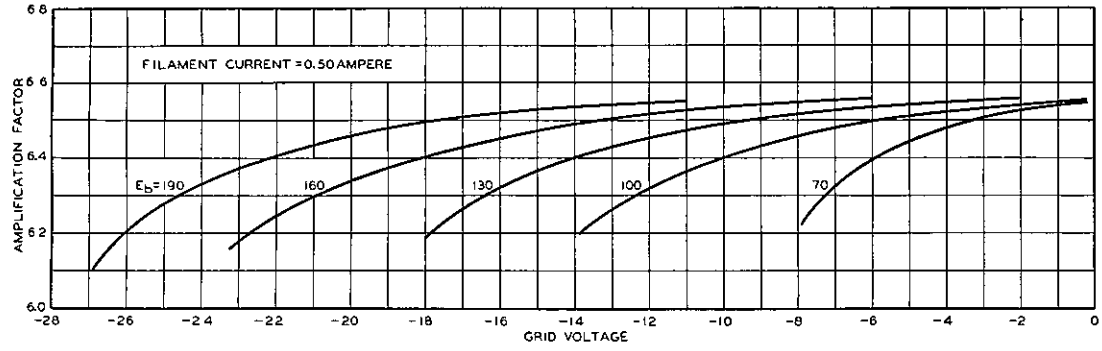


FIG. 4

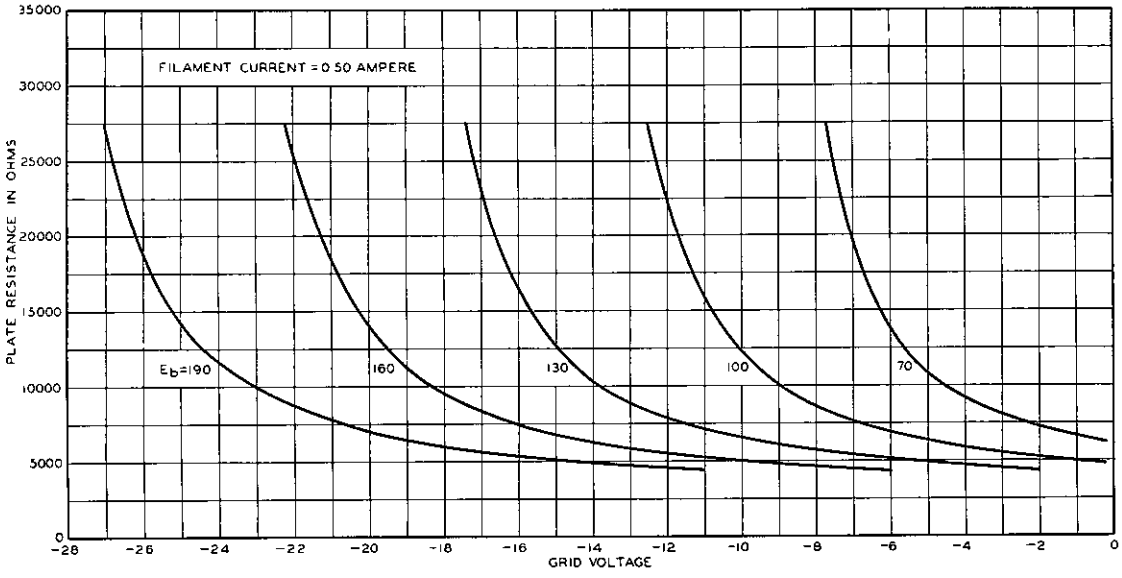


FIG. 5

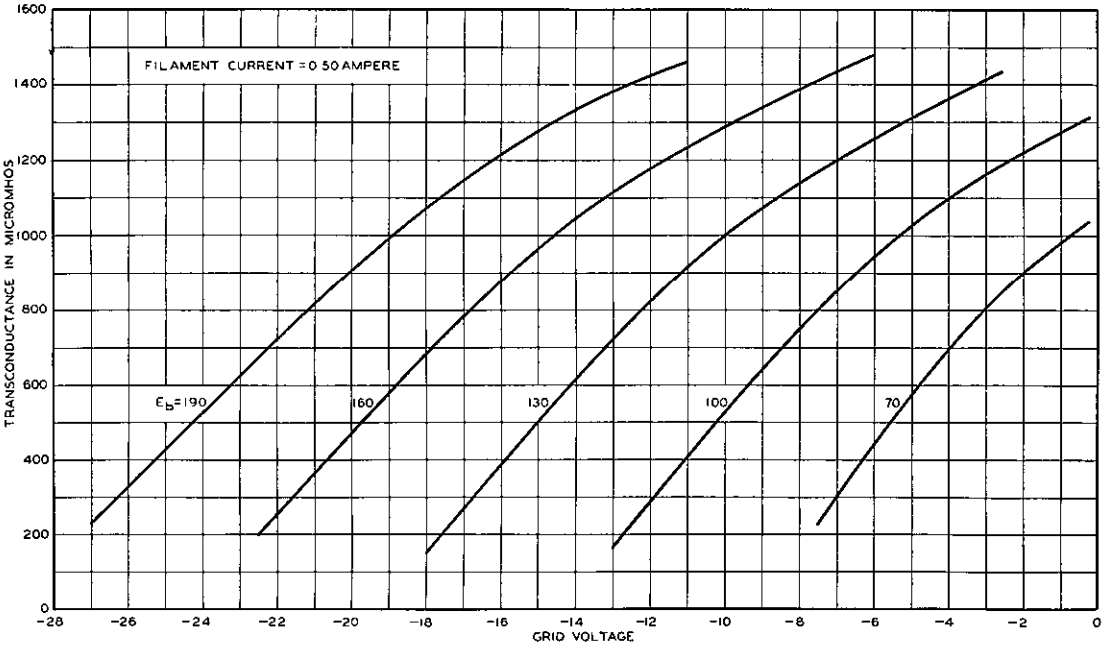


FIG. 6

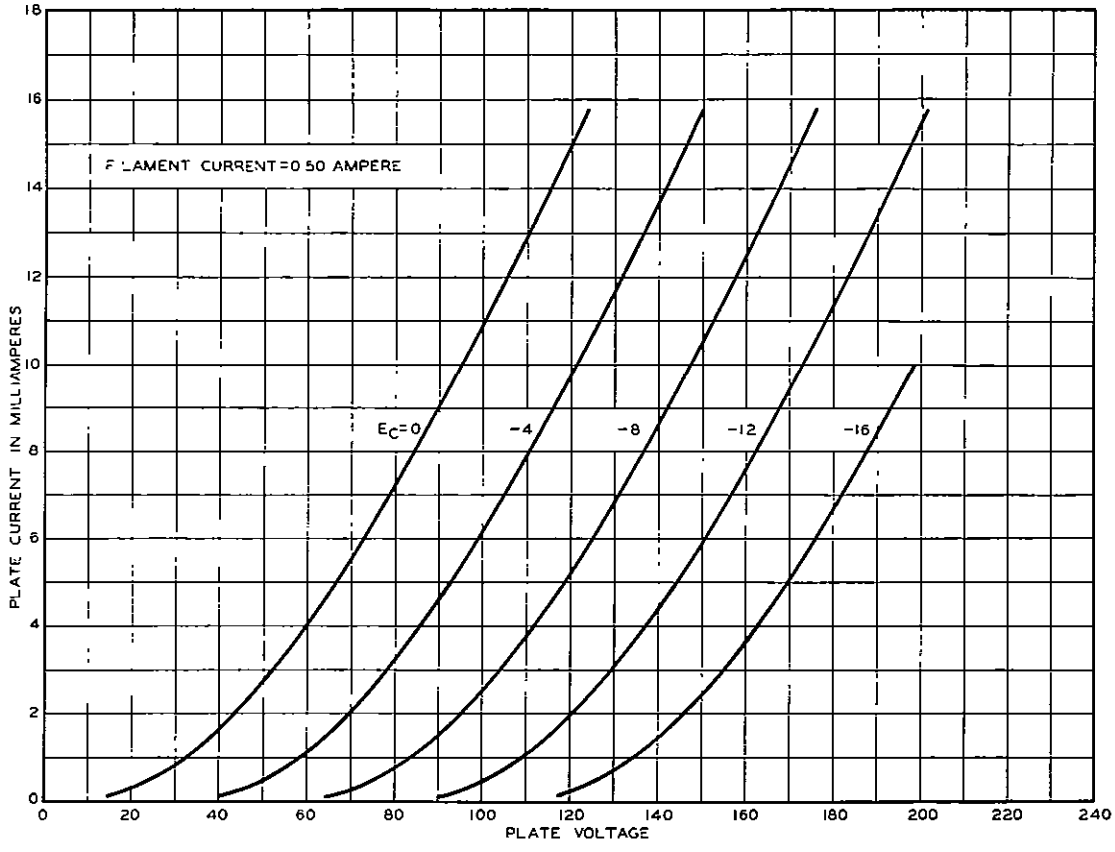


FIG. 7

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