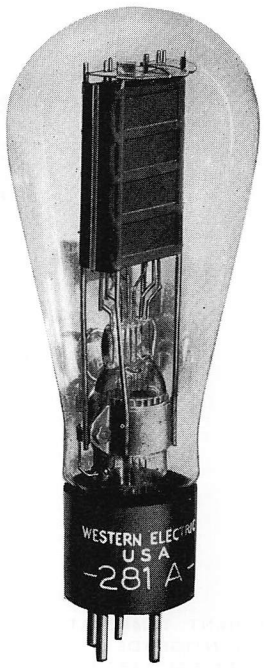
Western Electric

281A Vacuum Tube



Classification—Moderate-power, filamentary, coplanar-grid tetrode

Applications

Audio-frequency amplifier where moderate power outputs are required, especially where only relatively low plate voltages are available.

High-vacuum control element in automatically controlled equipment.

Dimensions—Dimensions, outline diagrams 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 type.

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

Mounting Positions—Either vertical or horizontal. If mounted in a horizontal position the plane of the filament, which is indicated in Figure 2, should be vertical.

Average Direct Interelectrode Capacitances

Control grid to plate	3.8 μμf
Control grid to filament and positive grid	18 μμf
Plate to filament and positive grid	9.4 μμf

Filament Rating

Filament voltage	5.0 volts, a.c. or d.c.
Nominal filament current	1.6 amperes

The filament of this tube is designed to operate on a voltage basis and should be operated at as near the rated voltage as is practicable. When alternating current is used for heating the filament, the grid and plate returns should be connected to a center tap on the secondary of the filament transformer.

Characteristics—Plate current and positive-grid current characteristics of a typical 281A tube are shown in Figure 3 as functions of control-grid voltage for a positive-grid voltage of 70 volts and several values of plate voltage. Corresponding amplification factor and plate resistance characteristics are shown in Figures 4 and 5, respectively. For any other value of positive-grid voltage, the plate current characteristics are approximately the same as those of Figure 3 except that the numerical value of each control-grid voltage must be changed by the same amount as the change made in the positive-grid voltage. For example, for a positive-grid voltage of 60 volts, the plate current characteristics of Figure 3 can be applied by subtracting 10 from the numerical value of each abscissa. The extent to which this rule is accurate is shown in Figure 6. This gives the relation between the positive-grid voltage and the control-grid voltage for constant plate current at each of three values of plate voltage. The corresponding values of positive-grid current, amplification factor, and plate resistance are shown in Figures 7, 8 and 9, respectively. The small variations in the amplification factor and plate resistance values are indicative of the small differences to be expected in the shapes of the plate current characteristics for different positive-grid voltages.

Limiting Conditions for Safe Operation

Maximum plate voltage	250 volts
Maximum plate current	45 milliamperes
Maximum potential difference between positive and control grids	150 volts
Maximum instantaneous control-grid potential on positive swing of input voltage	+10 volts

Operating Conditions and Output—Amplification factor, plate resistance, and performance data are given in the table below for a number of typical operating conditions. 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 for the indicated values of load resistance and input voltage, and the maximum second and third harmonic levels for input voltages no greater than the indicated values. The input voltage is given in peak volts, the power output in watts, and the harmonic levels in decibels below the fundamental.

Plate Voltage	Positive-Grid Voltage	Control-Grid Bias	Plate Current	Positive-Grid Current	Amplification Factor	Plate Resistance	Input Voltage	Load Resistance	Power Output	Second Harmonic	Third Harmonic
Volts	Volts	Volts	Milliamperes	Milliamperes		Ohms	Peak Volts	Ohms	Watts	db	db
130	43	−40	25	0.2	5.1	3700	40	5000	1.1	29	30
130	63	−60	25	0.4	5.0	4000	60	3000	2.0	21	20
130	53	−40	35	0.4	5.0	3200	40	4000	1.2	33	30
130	72	−60	35	0.7	5.0	3400	60	2000	2.2	21	23
130	59	−40	45	0.9	5.1	2900	40	2800	1.4	30	30
180	55	−50	40	0.3	5.2	3400	50	5000	2.1	30	30
180	70	−65	40	0.4	5.2	3600	65	3500	3.3	26	24
*250	65	−70	45	0.2	5.2	3600	70	5000	4.2	26	29

*Maximum operating conditions.

Curves showing the variation of power output and second and third harmonic levels with input voltage for several values of load resistance are given in Figures 10, 11 and 12, respectively, for a typical operating condition. Figure 13 gives fundamental power output as a function of harmonic level for equal second and third harmonics at another typical operating condition. The corresponding values of input voltage and load resistance are shown in Figures 14 and 15, respectively.

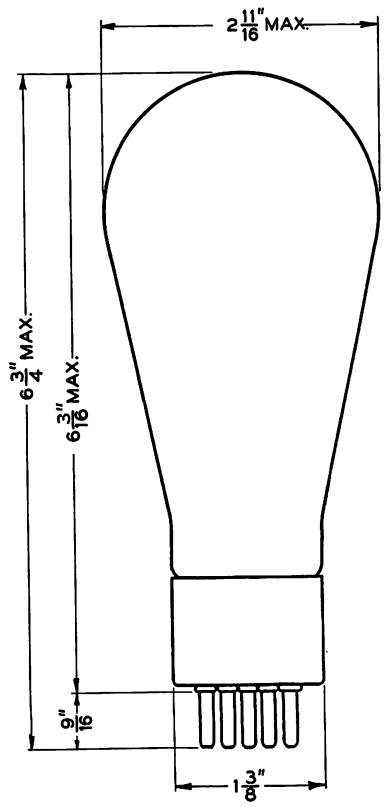


FIG. 1

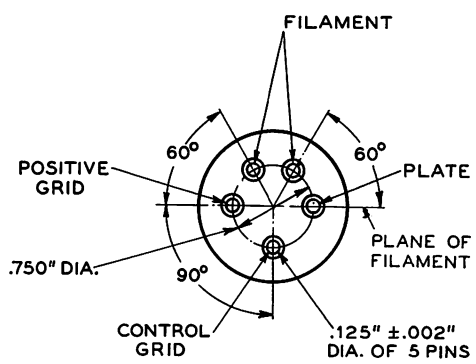


FIG. 2

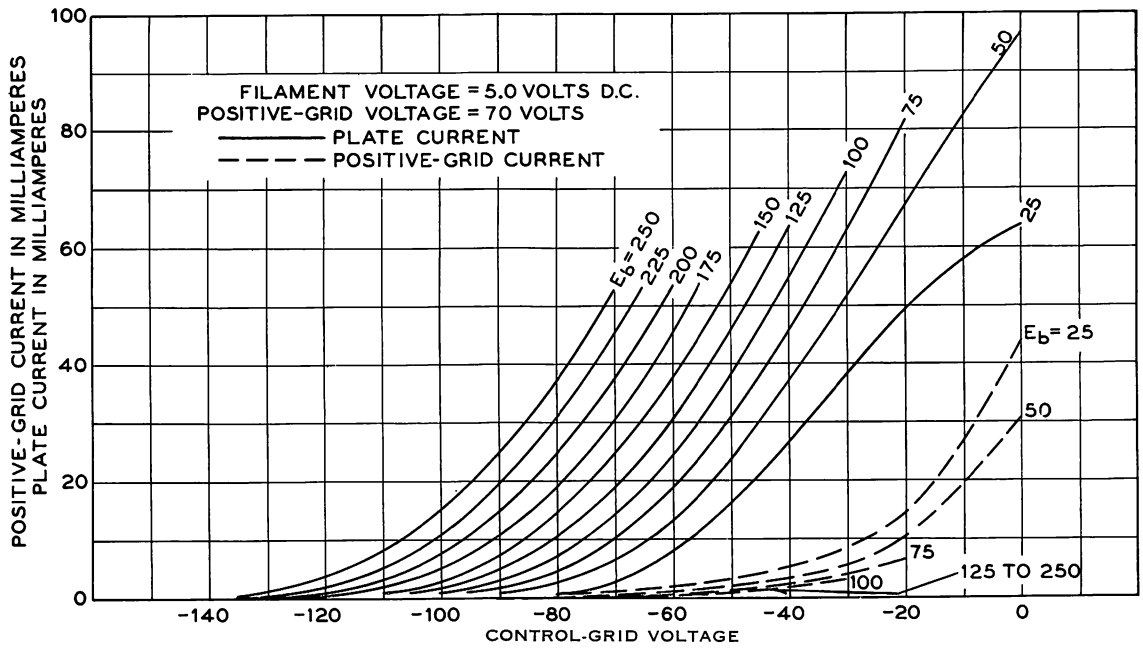


FIG. 3

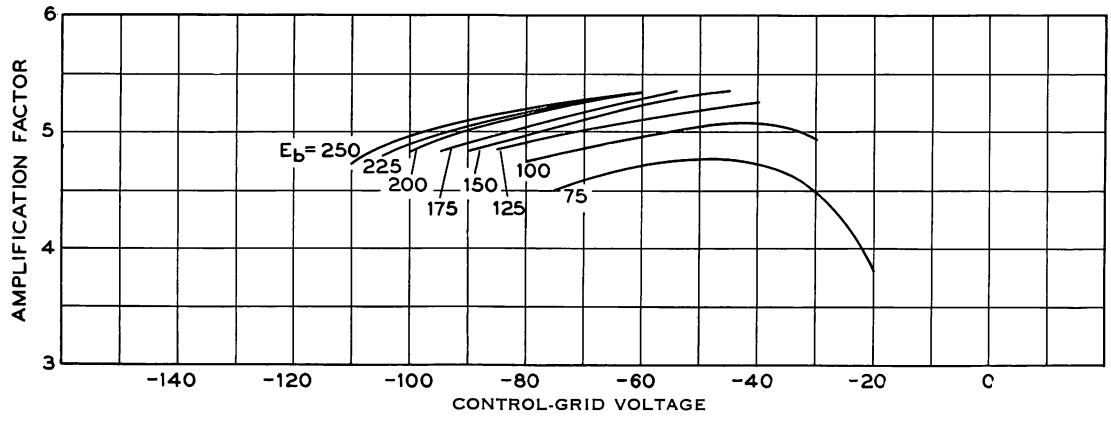


FIG. 4

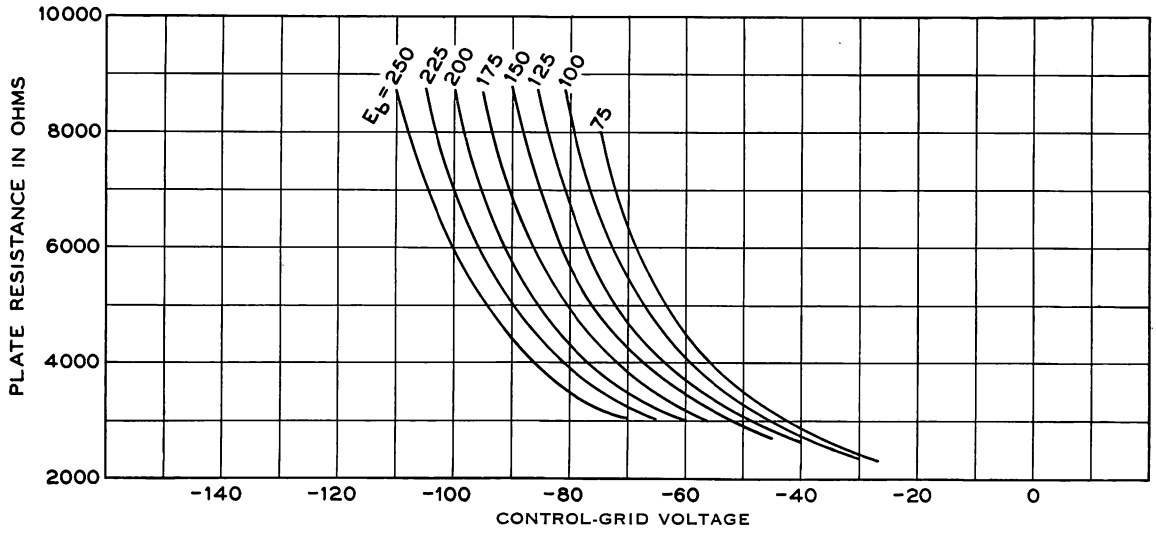


FIG. 5

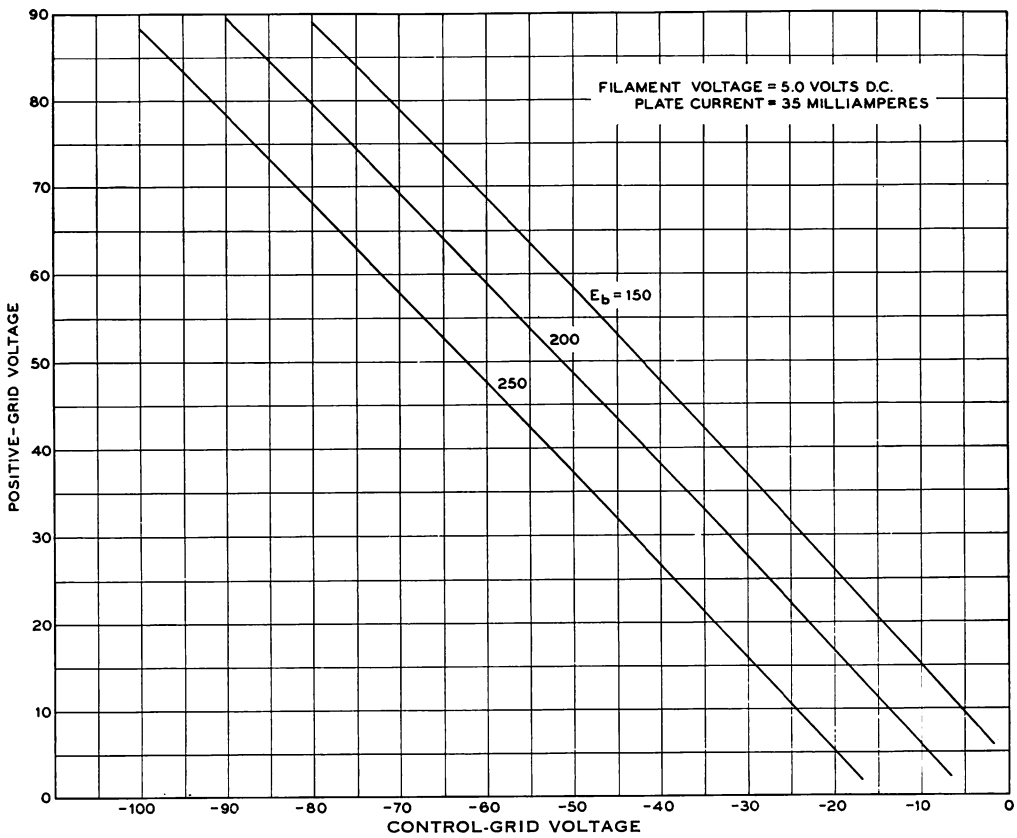


FIG. 6

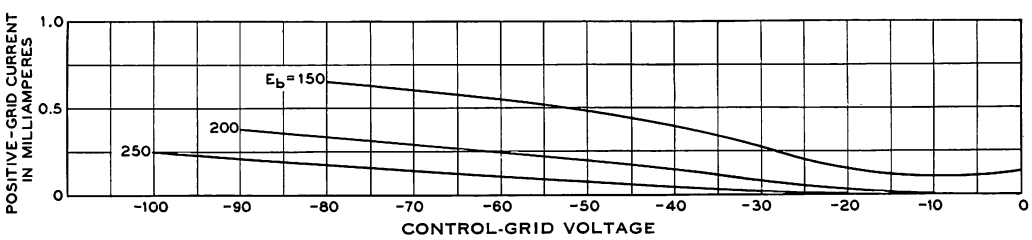


FIG. 7

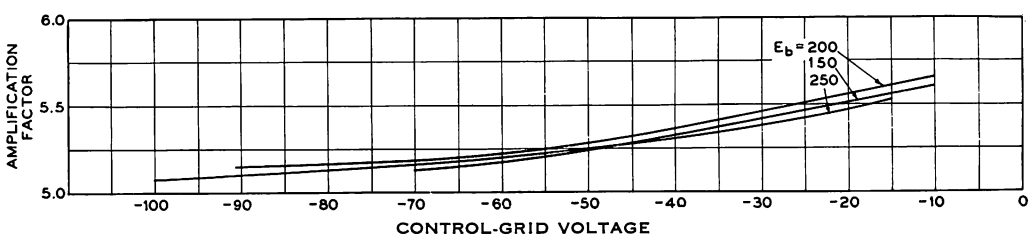


FIG. 8

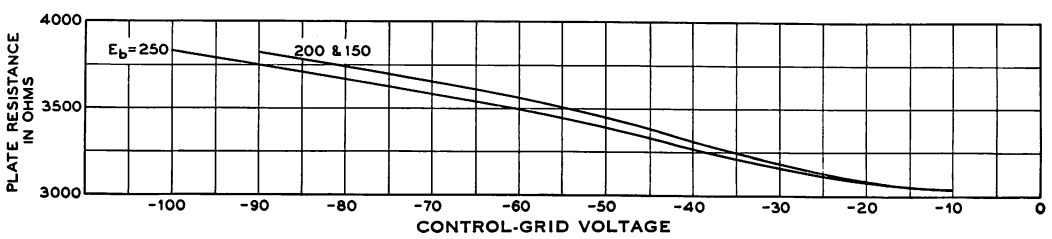


FIG. 9

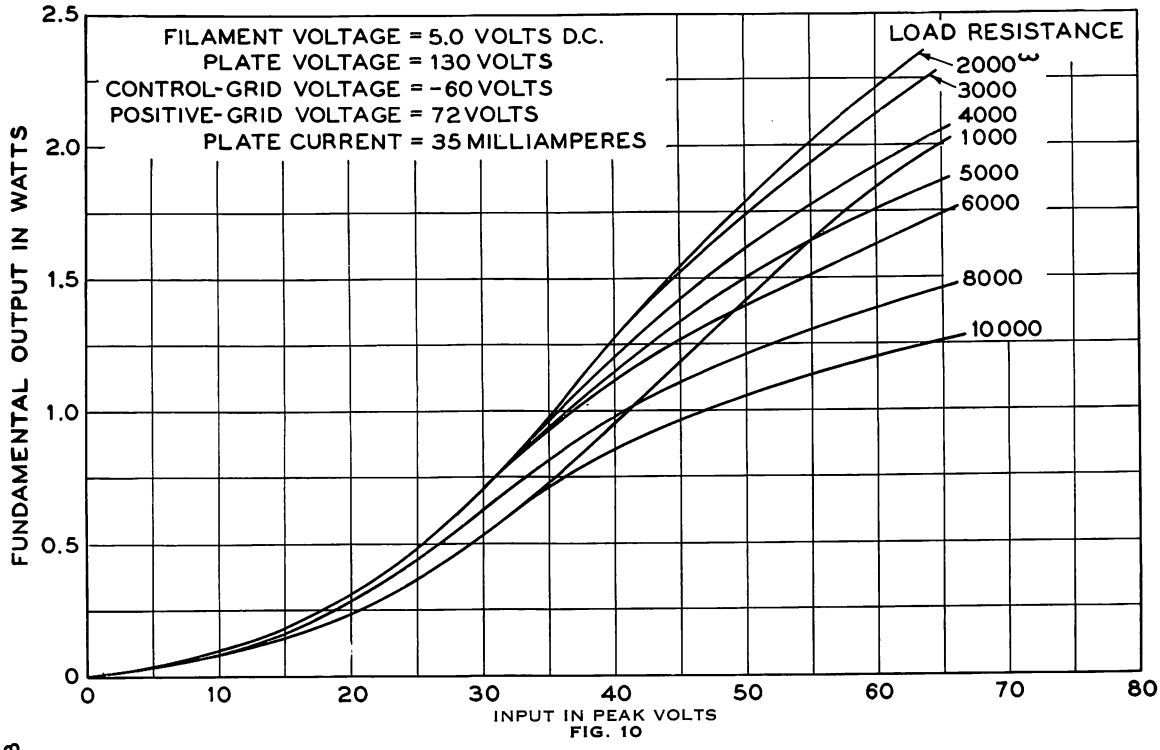


FIG. 10

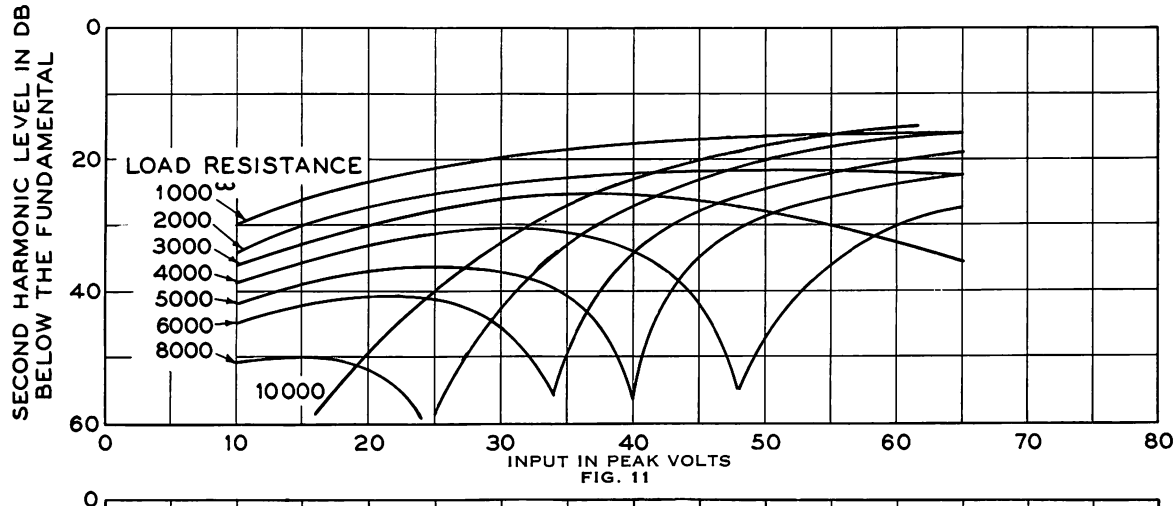


FIG. 11

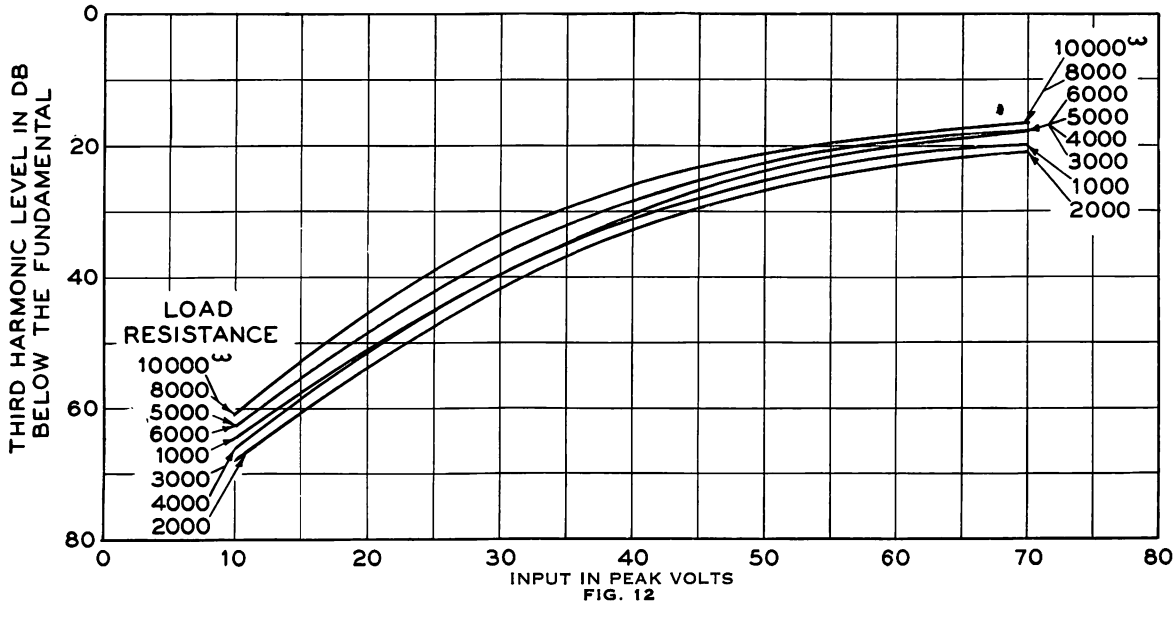


FIG. 12

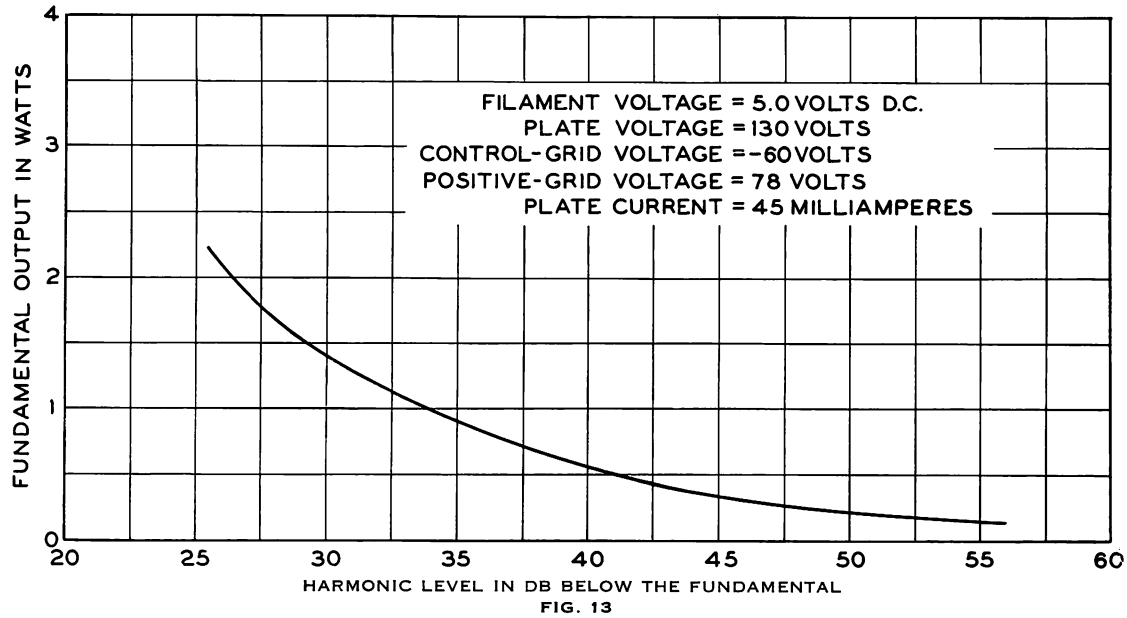


FIG. 13

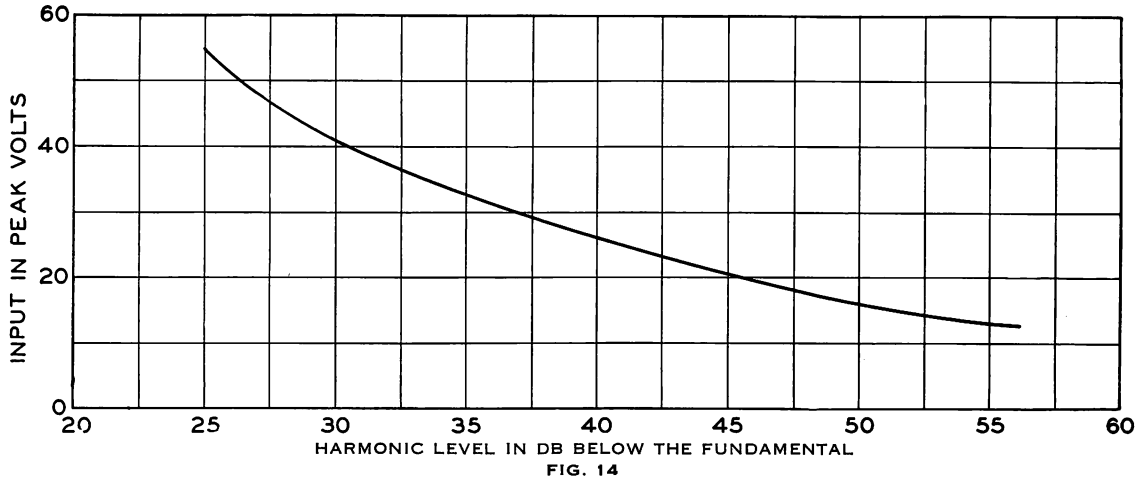


FIG. 14

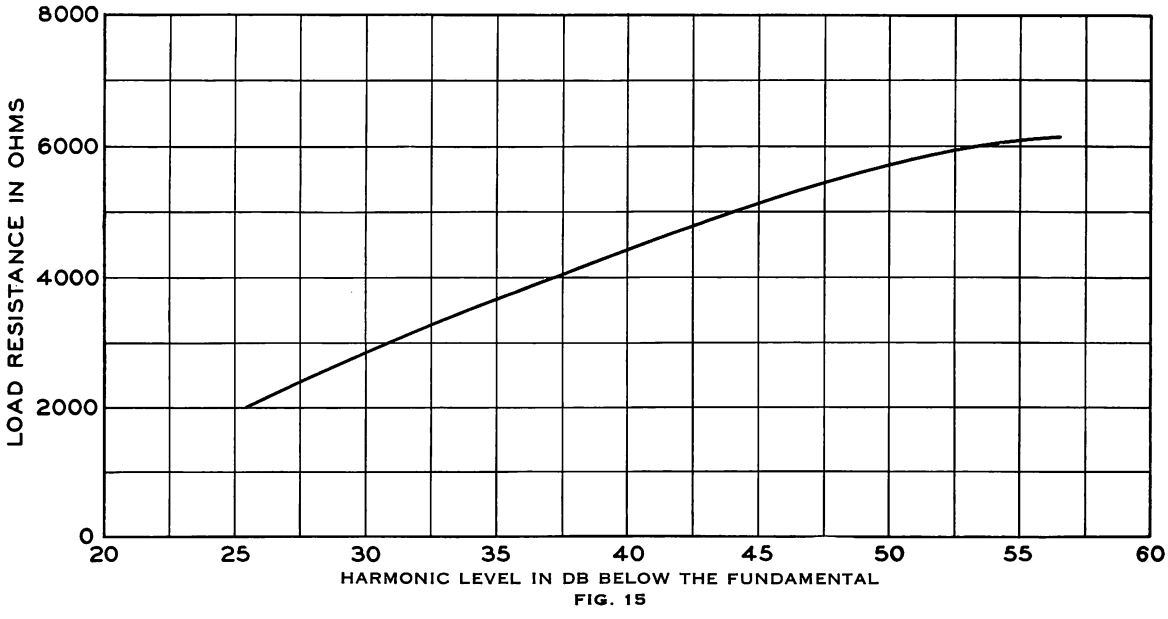


FIG. 15