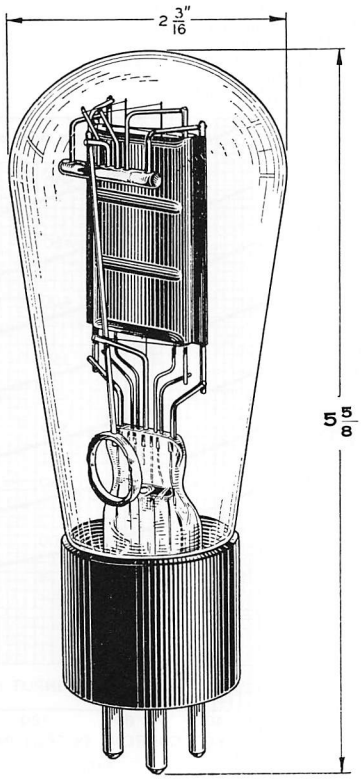
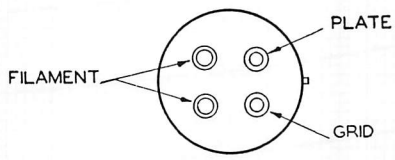
275A Vacuum Tube





Classification

The No. 275A Vacuum Tube is a three-element filament type tube for use as a low-voltage power tube for output stages in audio-frequency amplifiers.

Base and Socket

The No. 275A Vacuum Tube employs a standard four-prong, thrust-type base suitable for use in a Western Electric No. 130B (rigid) or No. 131A (cushion) Socket or similar type socket. The arrangement of electrode connections to the base terminals is shown above.

Rating and Characteristic Data

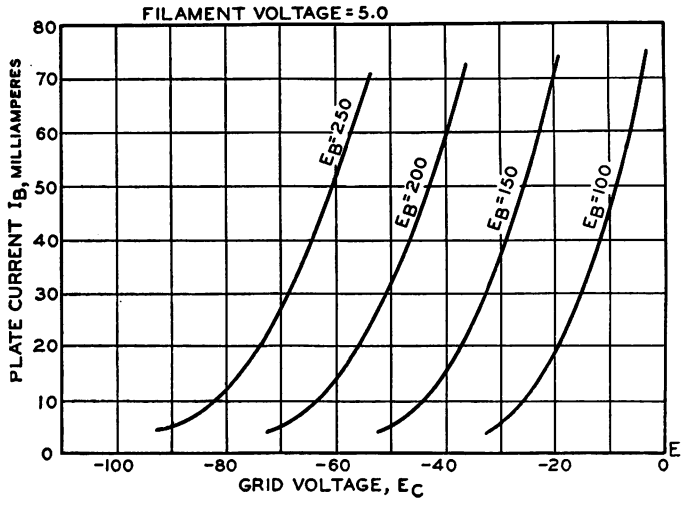
Filament Voltage		5 Volts, AC or DC
Average Filament Current		1.2 Amperes
Plate Voltage	200	250 Volts Maximum
Grid Voltage	—45	—60 Volts
Average Plate Current	45	52 Milliamperes
Average Plate Resistance	1,000	1,000 Ohms
Average Amplification Factor	2.9	2.85

Approximate Direct Interelectrode Capacities

Plate to Grid	12 MMF
Plate to Filament	3.2 MMF
Grid to Filament	6.8 MMF

Average Static Characteristics

The accompanying curves give the average static characteristics of the No. 275A Vacuum Tube.



General Features

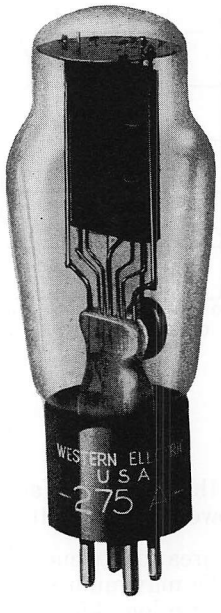
The electrical characteristics of the No. 275A Vacuum Tube make it particularly adaptable in applications requiring an output power tube operated at relatively low plate voltage.

It has an unusually large plate area for its energy dissipation. The total electron emission of the filament is large compared to the maximum space current drain. Both factors insure the delivery of full output power throughout a long life.

The rugged structure insures against breakage in shipment and in service and makes possible the maintenance of uniform electrical characteristics.

Western Electric

275A Vacuum Tube



Classification—Moderate-power, filamentary triode

The 275A tube is designed for a maximum plate voltage of 300 volts.

Application—Audio-frequency amplifier where power outputs of about 3 watts per tube are required.

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, four-pin, thrust type with bayonet pin.

Socket—Standard, four-contact type, such as the Western Electric 143B 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

Grid to plate	12.0 $\mu\mu$f.
Grid to filament	6.8 $\mu\mu$f.
Plate to filament	3.2 $\mu\mu$f.

Filament Rating

Filament voltage	5.0 volts, a.c. or d.c.
Nominal filament current	1.2 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 the filament is heated by alternating current, the grid and plate returns should be connected to a center tap on the secondary of the filament transformer.

Characteristics—Plate current characteristics of a typical 275A tube are shown in Figure 3 as functions of grid bias for several values of plate voltage. Similar characteristics as functions of plate voltage for several values of grid bias are given in Figure 4. Amplification factor, plate resistance, and transconductance characteristics corresponding to the plate current characteristics of Figure 3 are given in Figures 5, 6 and 7, respectively. All of these characteristics are for direct-current filament supply with the grid and plate returns connected to the negative end of the filament. For alternating-current filament supply, the same characteristics are applicable if approximately 3.5 is added to the numerical value of each grid bias.

Limiting Conditions for Safe Operation

Maximum plate voltage	300 volts
Maximum plate dissipation	17 watts
Maximum plate current of average tube for fixed grid bias	70 milliamperes
Maximum plate current for manually adjusted grid bias or self-biasing circuit	80 milliamperes

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

Where it is necessary to operate a 275A tube at or near its maximum operating plate current of 80 milliamperes or plate dissipation of 17 watts, provision should be made for adjusting the grid bias of each tube independently, so that the maximum safe plate current and dissipation will not be exceeded in any tube. Alternatively, a self-biasing circuit may be used, in which the grid bias for each tube is obtained from the voltage drop produced by the plate current flowing through a resistance. Where it is necessary to use a fixed grid bias, the plate current of the average tube should be limited to 70 milliamperes and its plate dissipation to 15 watts so that tubes having plate currents higher than the average will not exceed the maximum ratings.

The performance data include the fundamental power output and the second and third harmonic levels for the indicated values of load resistance and input voltage. The power output, P_m, is given in watts and the second and third harmonic levels, F_{2m} and F_{3m}, are given in decibels below the fundamental in each case. The peak value of the sinusoidal input voltage, E_{gm}, is numerically equal to the grid bias for each operating condition. For a smaller input voltage, E_g, the output and 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 variations of power output and harmonic levels with load resistance for several values of operating plate current are shown in Figures 8, 9 and 10 for a plate voltage of 250 volts. The sharp minima which appear in the third harmonic curves are characteristic of the 275A tube, but their positions may be different for different tubes. For this reason, the third harmonic level in any individual tube may be widely different from the value given in the table, where the operating condition under consideration is near one of these minima. Near these points, also, the expression given above for third harmonic level is not reliable.

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	Micromhos	Peak Volts	Ohms	Watts	db	db
150	−40	17	2.6	1630	1600	40	3260	0.81	19	39
							6520	0.58	23	50
150	−30	38	2.8	1065	2700	30	1065	0.86	19	40
							2130	0.77	24	50
							4260	0.56	29	65
150	−20	70	3.0	810	3700	20	810	0.55	26	55
							1620	0.49	30	80
							3240	0.36	34	60
200	−55	24	2.6	1530	1750	55	1530	2.0	15	35
							3060	1.6	19	39
							6120	1.2	23	50
200	−50	34	2.7	1230	2250	50	1230	2.0	16	35
							2460	1.8	20	41
							4920	1.3	25	55
200	−45	47	2.8	1030	2770	45	1030	1.9	18	37
							2060	1.7	22	43
							4120	1.3	27	60
200	−40	61	2.9	885	3270	40	885	1.8	20	40
							1770	1.6	25	49
							3540	1.2	29	75
250	−70	30	2.6	1400	1880	70	3000	2.8	18	39
							6000	2.0	23	50
							10000	1.4	26	70
250	−65	41	2.7	1170	2330	65	2000	3.2	19	37
							4000	2.5	23	47
							8000	1.5	28	75
250	−60	53	2.8	1000	2780	60	2000	3.1	21	41
							3000	2.6	23	47
							4000	2.3	25	55
							6000	1.7	28	80
							8000	1.4	29	60
							10000	1.2	30	60
*200	−35	78	2.9	780	3750	35	1560	1.5	27	55
							3120	1.1	31	60
*250	−55	68	2.8	870	3220	55	1000	3.3	19	38
							3000	2.4	26	55
							6000	1.6	30	60
							8000	1.2	31	55
*300	−100	18	2.4	2420	1000	100	9680	2.3	20	50
*300	−95	23	2.5	1910	1280	95	7640	2.6	21	49
*300	−90	30	2.6	1560	1630	90	6240	3.0	22	48
*300	−85	41	2.6	1300	2030	85	2600	4.7	18	38
							5200	3.3	23	49
*300	−80	51	2.7	1100	2450	80	2200	4.9	19	39
							4400	3.5	24	50

*Maximum operating conditions.

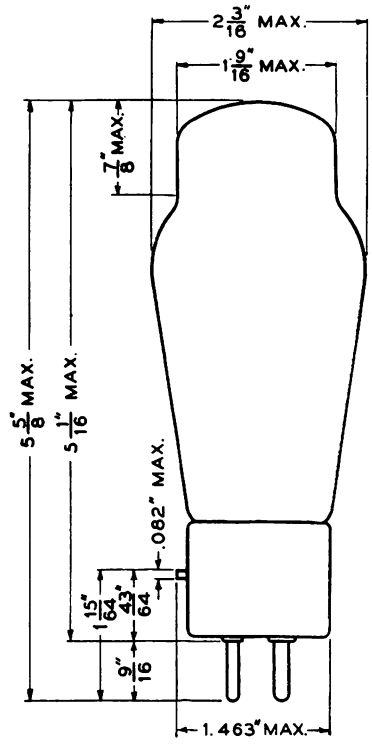

2 3/16" MAX.
1 9/16" MAX.
7/8" MAX.
5 5/8" MAX.
5 1/16" MAX.
.082" MAX.
15/64"
43/64"
9/16"
1.463" MAX.

FIG. 1

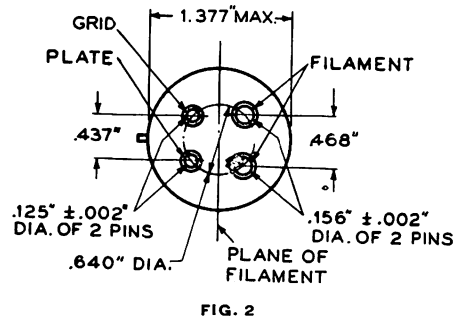

GRID
1.377" MAX.
PLATE
FILAMENT
.437"
.468"
.125" ±.002"
DIA. OF 2 PINS
.640" DIA.
PLANE OF
FILAMENT
.156" ±.002"
DIA. OF 2 PINS

FIG. 2

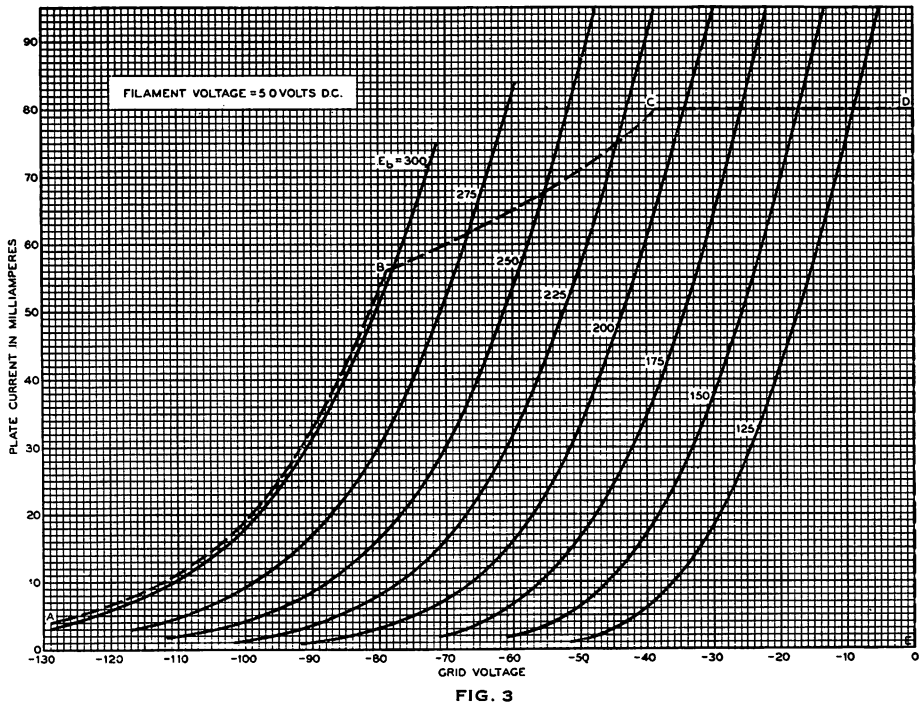

FILAMENT VOLTAGE = 5.0 VOLTS D.C.
E_b = 300
275
250
225
200
175
150
125
A
B
C
D
E
PLATE CURRENT IN MILLIAMPERES
GRID VOLTAGE
90
80
70
60
50
40
30
20
10
0
-130
-120
-110
-100
-90
-80
-70
-60
-50
-40
-30
-20
-10
0

FIG. 3

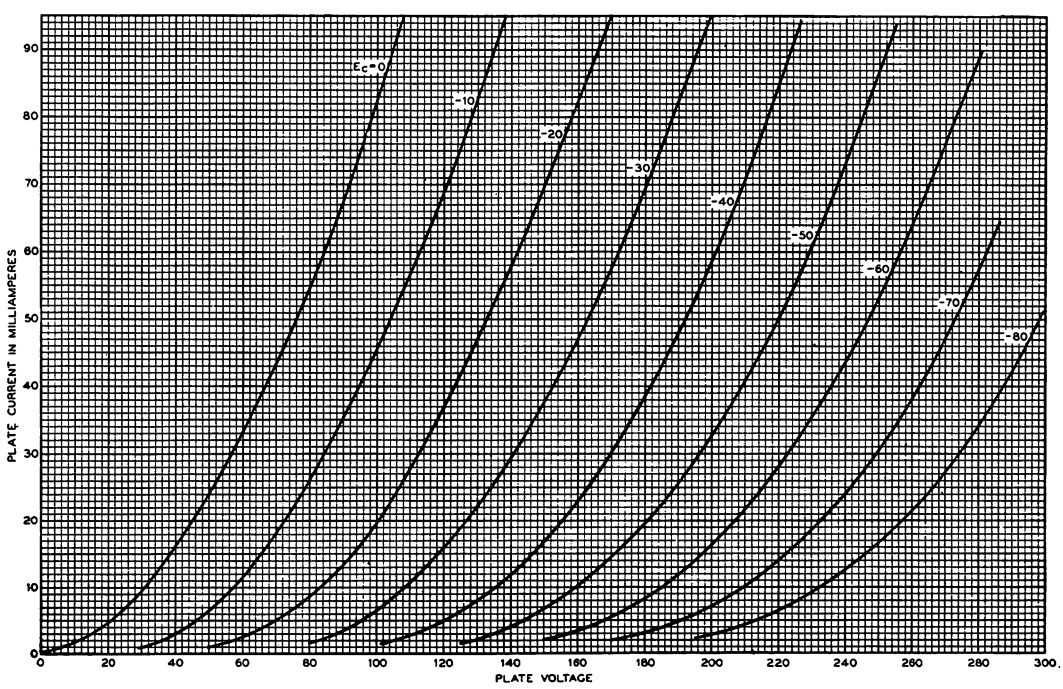

E_c = 0
-10
-20
-30
-40
-50
-60
-70
-80
PLATE CURRENT IN MILLIAMPERES
PLATE VOLTAGE
90
80
70
60
50
40
30
20
10
0
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300

FIG. 4

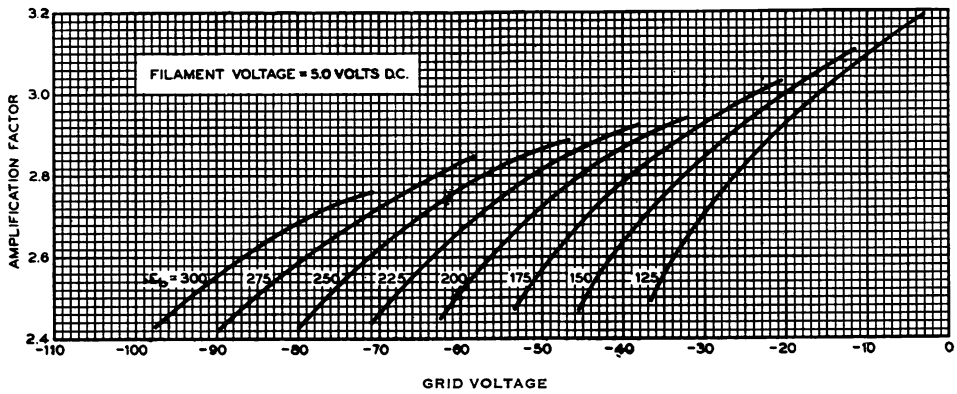


FIG. 5

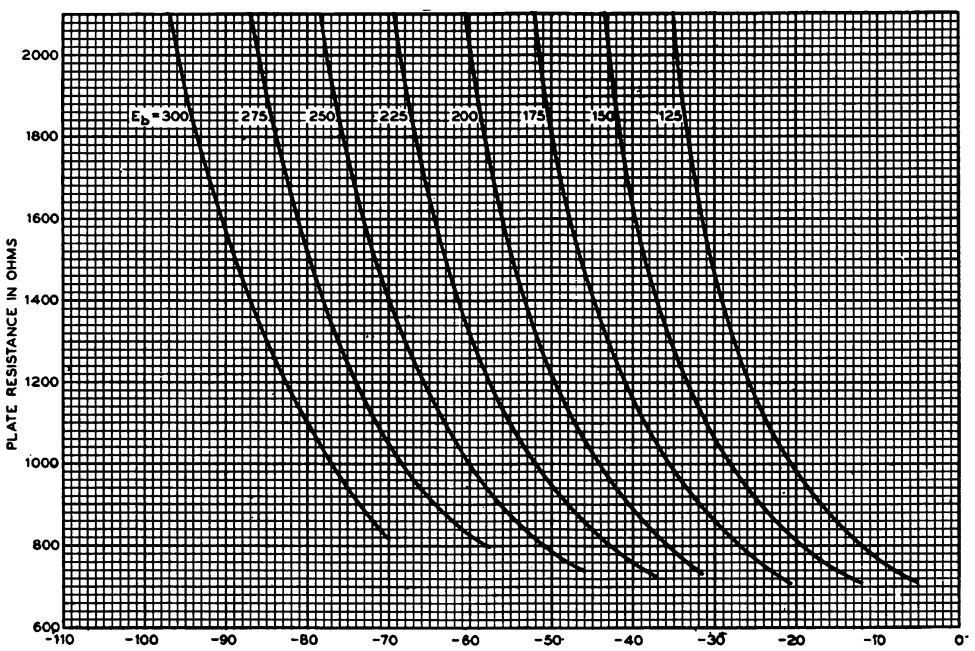


FIG. 6

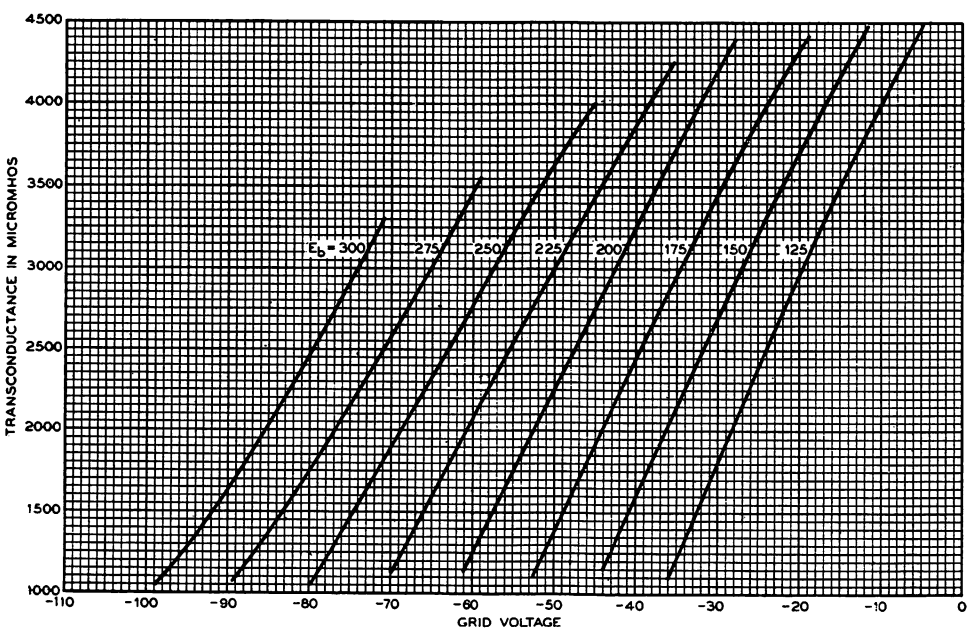


FIG. 7

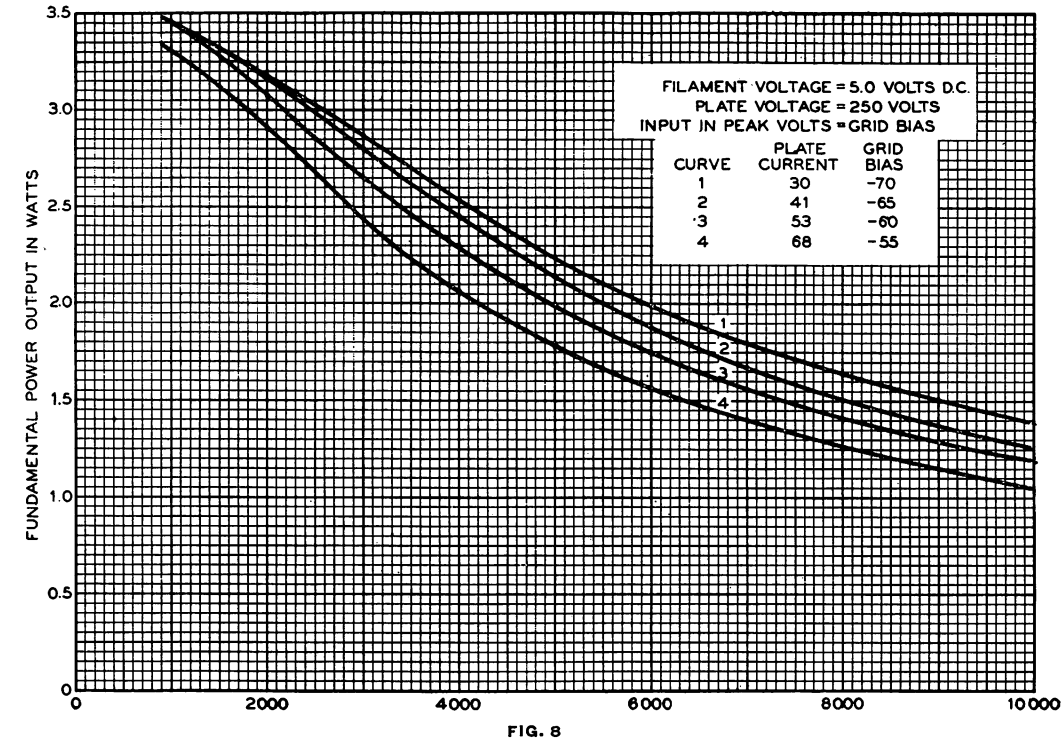


FIG. 8

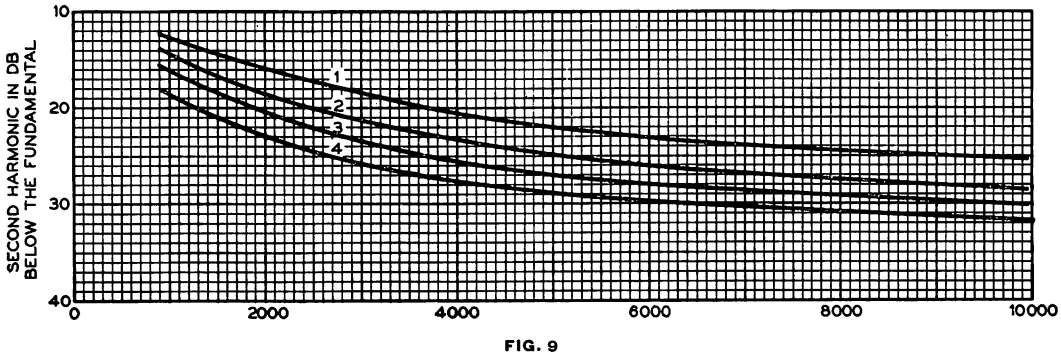


FIG. 9

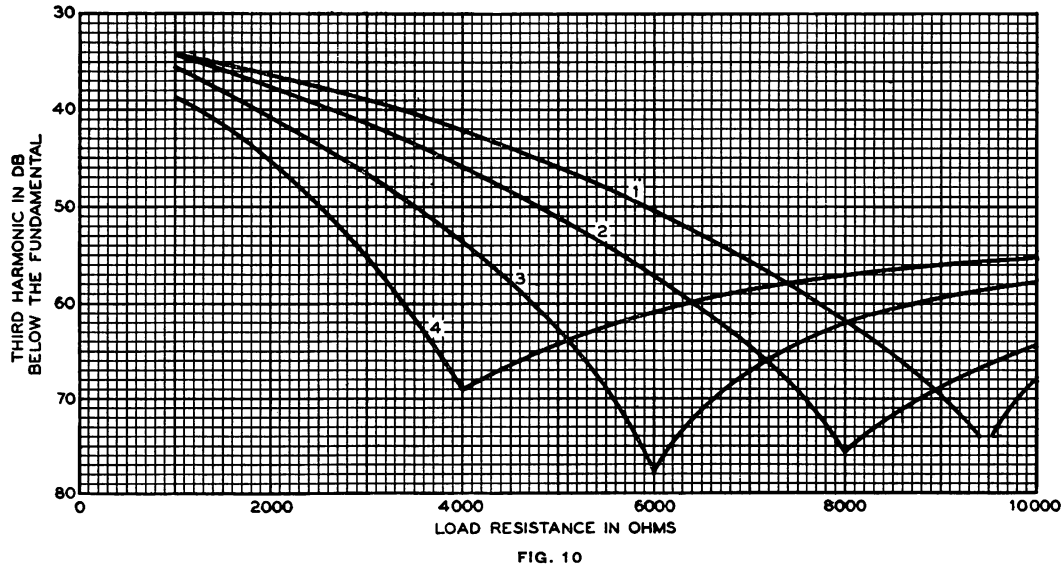


FIG. 10

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