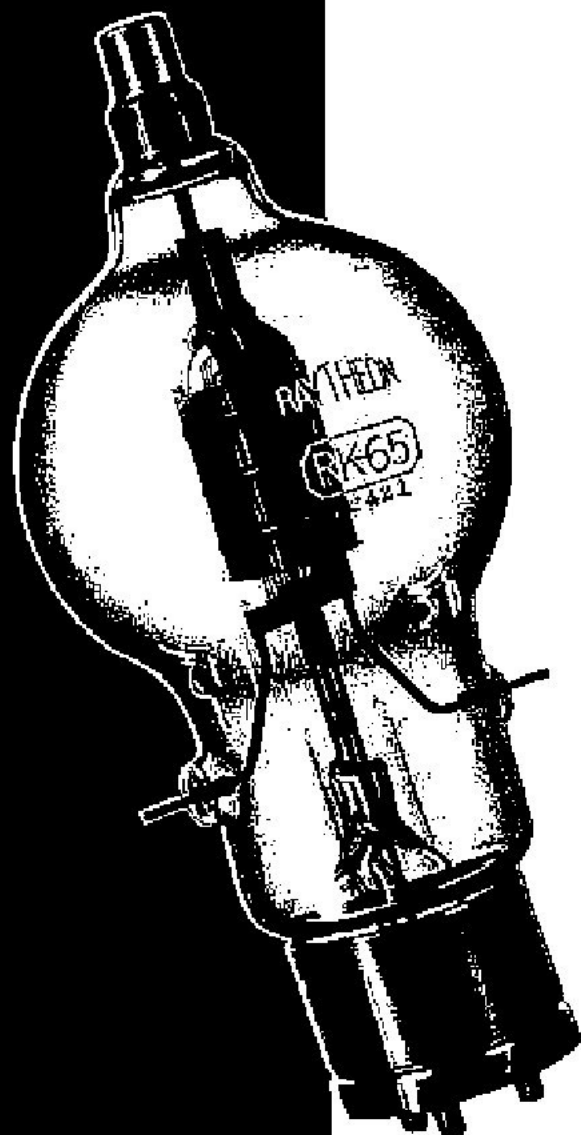


RAYTHEON

5D23/RK-65

TRANSMITTING TETRODE



- ★ 565 Watts R-F Power Output with 3000 volt plate supply.
- ★ 15 Watts Grid Drive. Saves on equipment costs.
- ★ 215 Watts Plate Dissipation.
- ★ 650 Watts Audio Power. (Pair, Class B)

Excellence in Electronics

RAYTHEON

Raytheon Manufacturing Company

POWER TUBE DIVISION

WALTHAM, MASS.

TETRODE POWER AMPLIFIER OSCILLATOR

The 5D23/RK-65 is a power amplifier tetrode having a thoriated tungsten filament, tantalum plate, grids, and shield, and a hard glass bulb. Short heavy grid leads brought directly through the bulb improve high frequency characteristics by reducing lead inductance and losses. It has a plate dissipation rating of 215 watts and will provide 565 watts of unmodulated R-F output up to 60 megacycles.

The tube may be used triode connected as a Class B₁ push-pull, zero bias audio amplifier, or as a single ended R-F Class B linear amplifier. In either case the screen grid should be connected to the control grid. Use of the tube as a triode with the screen grid connected to the plate is not recommended. Two tubes in a Class B audio amplifier will readily deliver 650 watts of undistorted audio output.

FILAMENT RATINGS

Filament Voltage (A.C. or D.C.)	5.0 volts
Filament Current	14.0 amps.

AVERAGE STATIC CHARACTERISTICS

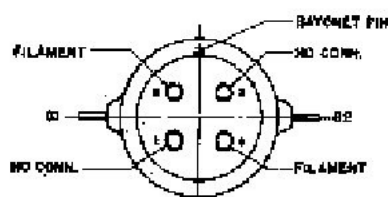
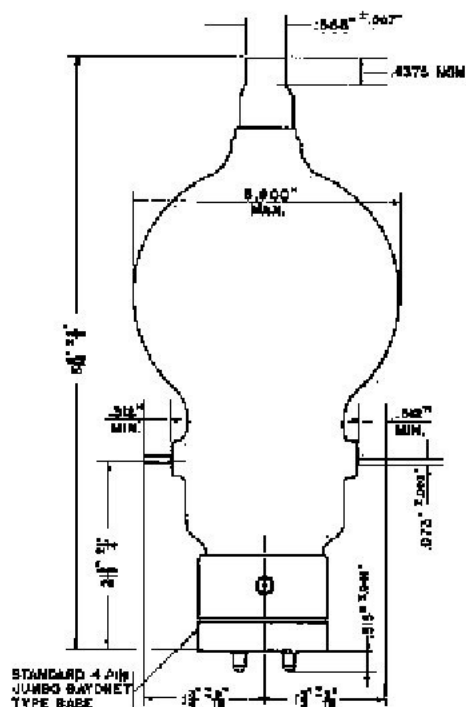
Measured at $E_b = 2250V$, $E_{c1} = 500V$, $E_{c2} = -30V$, $E_f = 5.0 Vac$.	
Average I_b	100 ma
Average G_m	3,000 μ hos

DIRECT INTERELECTRODE CAPACITANCES

Grid to Plate (no external shield)	0.42 μ f (max.)
Input	10.0 μ f (max.)
Output	5.0 μ f (max.)

MECHANICAL

RMA No. A4-29
Vertical only
Freely circulating air. Forced air directed on grid and plate seals is required at operating frequencies above 60 Mc.



BOTTOM VIEW OF BASE

R-F POWER AMPLIFIER OR OSCILLATOR — CLASS C

TETRODE CONNECTED

MAXIMUM C.C.S. RATINGS

	Telephony* Plate and Screen Modulation	Telephony or Frequency Modulated Telephony	
D.C. Plate Voltage	2,500	3,000	Volts
D.C. Grid Voltage	-250	-250	Volts
D.C. Screen Voltage	500	500	Volts
D.C. Plate Current	200	250	Ma
D.C. Grid Current	30	40	Ma
D.C. Screen Current	70	80	Ma
Plate Input Power	500	750	Watts
Plate Dissipation	140	215	Watts
Screen Dissipation	30	35	Watts
Grid Dissipation	12	12	Watts
Highest Freq. for Max. Ratings	60	60	Megacycles

* Carrier conditions per tube for use with maximum modulation factor of 1.0.

R-F POWER AMPLIFIER OR OSCILLATOR — CLASS C

TETRODE CONNECTED

TYPICAL OPERATION

	Telephony* Plate and Screen Modulation	Telegraphy or Frequency Modulated Telephony	Telegraphy or Frequency Modulated Telephony	
D.C. Plate Voltage	2,500	2,000	3,000	Volts
D.C. Screen Voltage	300†	300	350	Volts
D.C. Control Grid Voltage	- 150	- 150	- 150	Volts
D.C. Plate Current	200	200	250	Ma
D.C. Screen Current	56	78	72	Ma
D.C. Control Grid Current (approx.)	30	40	40	Ma
Peak R-F Grid Voltage	335	354	368	Volts
R-F Driving Power (approx.)	10	14	15	Watts
Carrier Power Output (approx.)	380	320	565	Watts
Plate Input Power	500	400	750	Watts
Plate Efficiency	76	80	75	Per Cent

* Carrier conditions per tube for use with a maximum modulation factor of 1.0.

† Screen voltage preferably obtained from a fixed supply through a separate source of modulation voltage.

A-F POWER AMPLIFIER — CLASS B

TRIODE CONNECTED

(Grid No. 1 connected to Grid No. 2)

MAXIMUM C.O.S. RATINGS

D.C. Plate Voltage	3,000	Volts
D.C. Plate Current (max. signal per tube)	250	Ma
Plate Dissipation (per tube)	215	Watts

TYPICAL OPERATION‡

D.C. Plate Voltage	2,000	3,000	Volts
D.C. Grid Voltage	0	0	Volts
Peak A-F Input Voltage (grid to grid)	300	250	Volts
D.C. Grid Current (max. signal)	125	100	Ma
D.C. Plate Current (zero signal)	15	20	Ma
D.C. Plate Current (max. signal)	400	330	Ma
Effective Load Resistance (plate to plate)	10,200	20,000	Ohms
Max. Signal Grid Driving Power (approx.)	15	10	Watts
Max. Signal Power Output (approx.)	500	650	Watts
Max. Signal Plate Dissipation (per tube)	147	170	Watts

‡ Unless otherwise specified, values are for two tubes.

OPERATING NOTES

FILAMENT VOLTAGE. The filament voltage at the socket terminals should be maintained at $\pm 5\%$ of the rated voltage for maximum tube life.

R-F AMPLIFIER

FREQUENCY RANGE. The RK-65 may be operated at the maximum ratings for frequencies up to 60 megacycles. At frequencies above 60 megacycles, the input should be reduced to prevent excessive plate dissipation. The tube is not recommended for frequencies above 140 megacycles..

BIAS. At least 30 volts of fixed or cathode resistor bias should be used to protect the tube in case of excitation failure.

SHIELDING. Shielding the grid input circuit from the plate circuit is desirable to avoid regenerative effects and oscillation. This may be accomplished by locating the base, grid, and screen terminals below the chassis level through a $2\frac{1}{4}$ inch diameter hole. The hole should have additional cutouts to allow clearance for the grid and screen grid terminals. The chassis or shield should clear the glass bulb by at least $1/16$ inch.

COOLING. Ample circulation of air must be provided when the tube is operated near maximum ratings. Forced air cooling directed at the external seals and bulb is recommended for operating frequencies above 60 megacycles.

PLATE TEMPERATURE. The plate of the 5D23/RK-65 will show a light yellowish-red color when operated at maximum rated plate dissipation. Dissipations above the rated values should be avoided.

AVERAGE CHARACTERISTICS
CLASS C R-F POWER AMPLIFIER
TETRODE CONNECTED

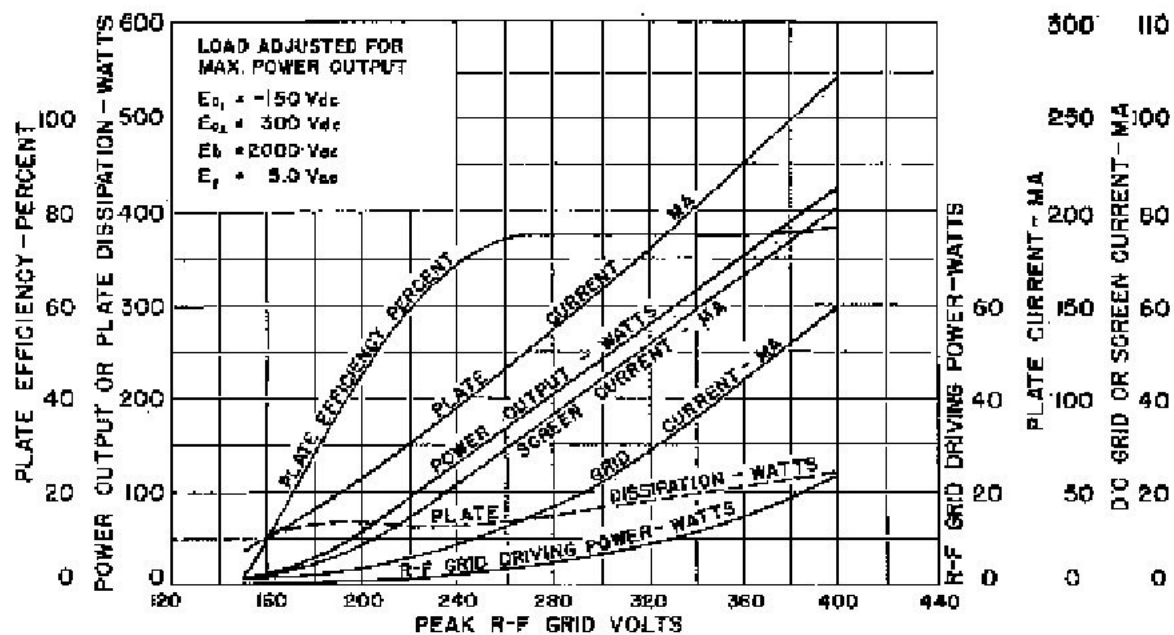


FIGURE 1

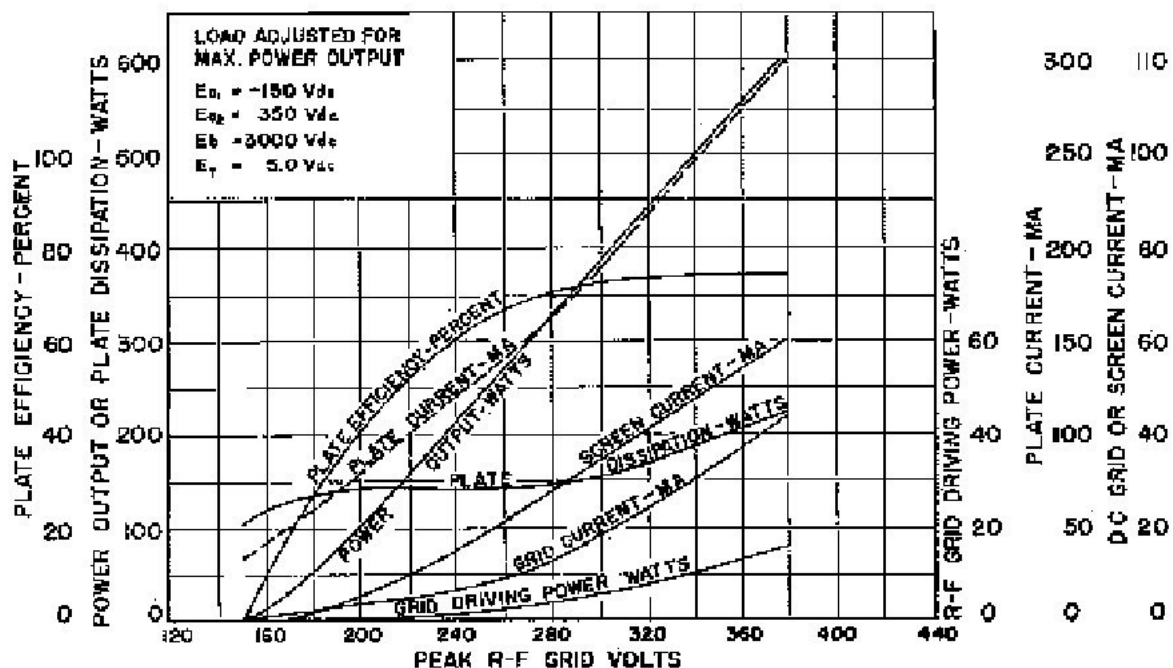


FIGURE 2

CONSTANT CURRENT CHARACTERISTICS

TETRODE CONNECTED

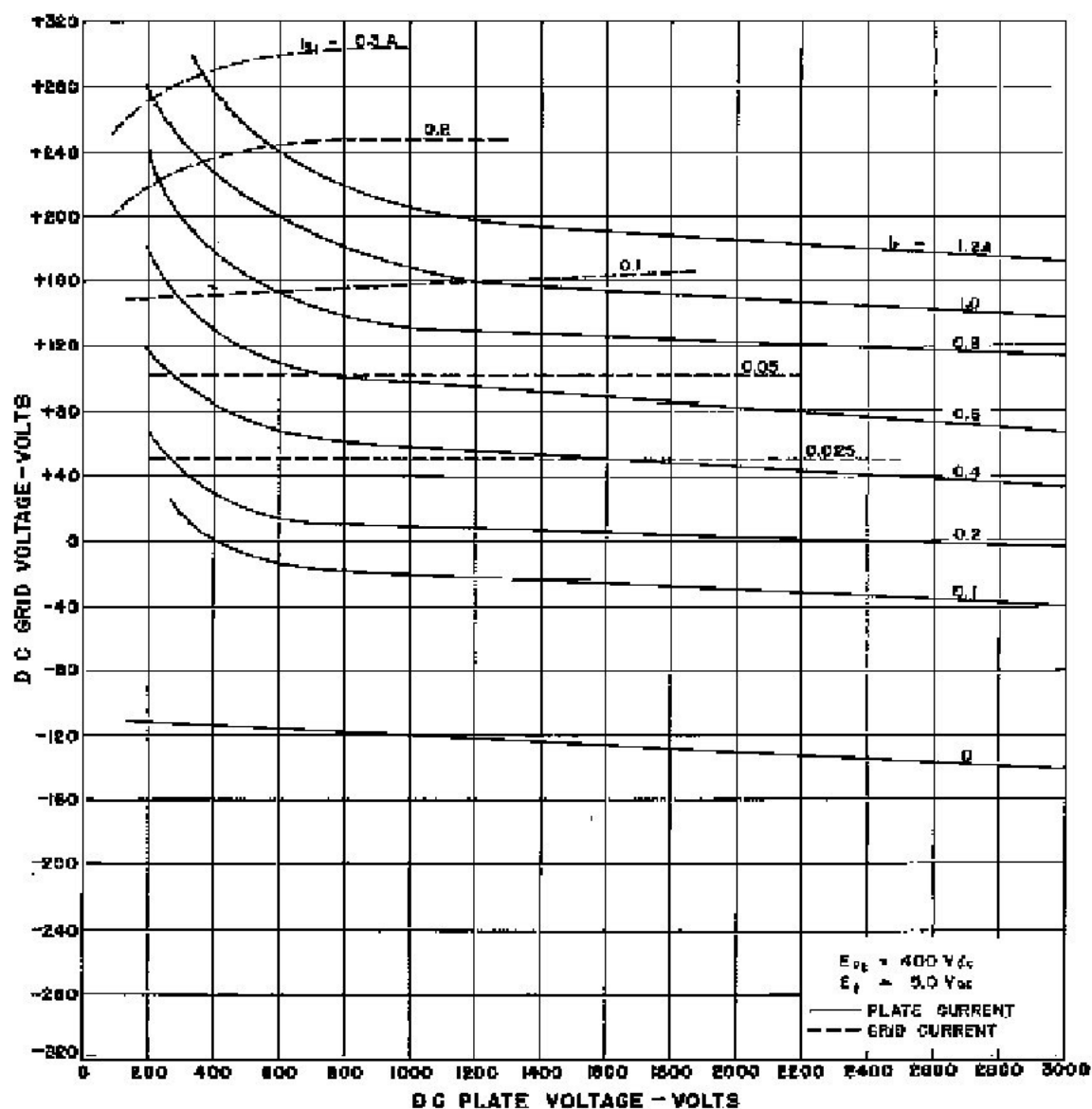


FIGURE 3

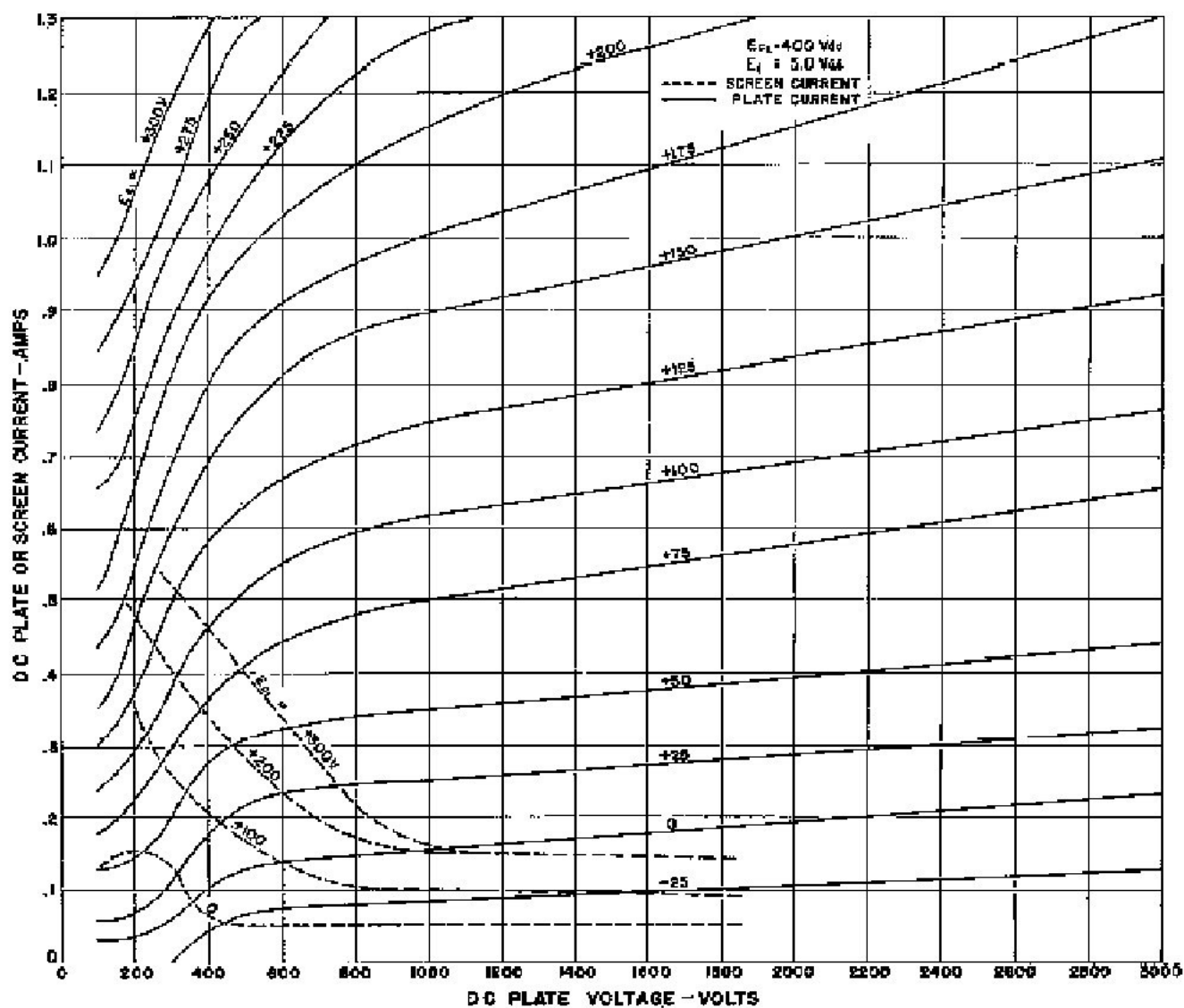
AVERAGE PLATE CHARACTERISTICS
TETRODE CONNECTED

FIGURE 4

AVERAGE CHARACTERISTICS

CLASS B AUDIO AMPLIFIER

TRIODE CONNECTED

(Grid No. 1 connected to Grid No. 2)

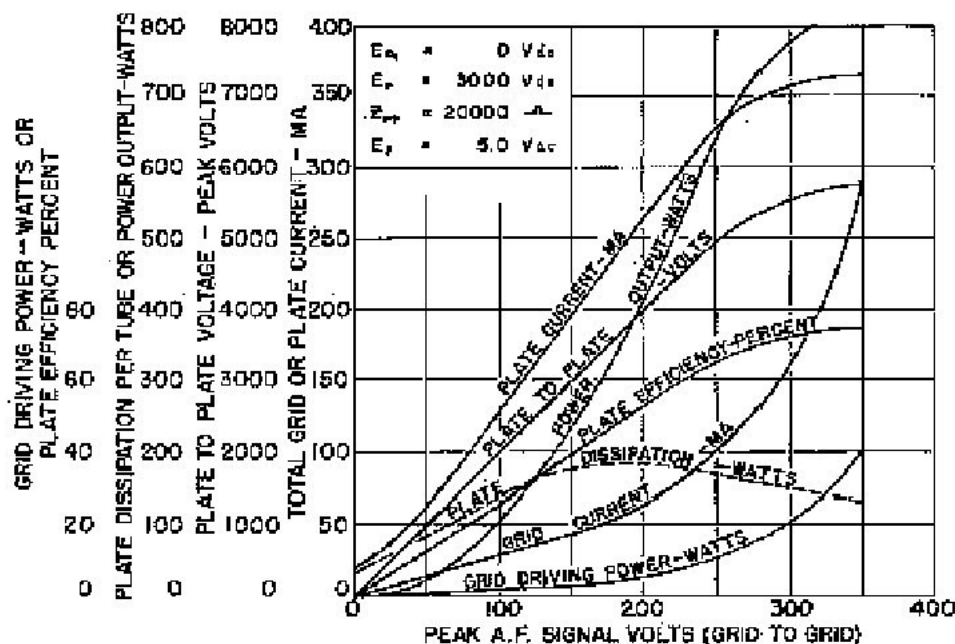


FIGURE 5

AVERAGE TRIODE PLATE CHARACTERISTICS

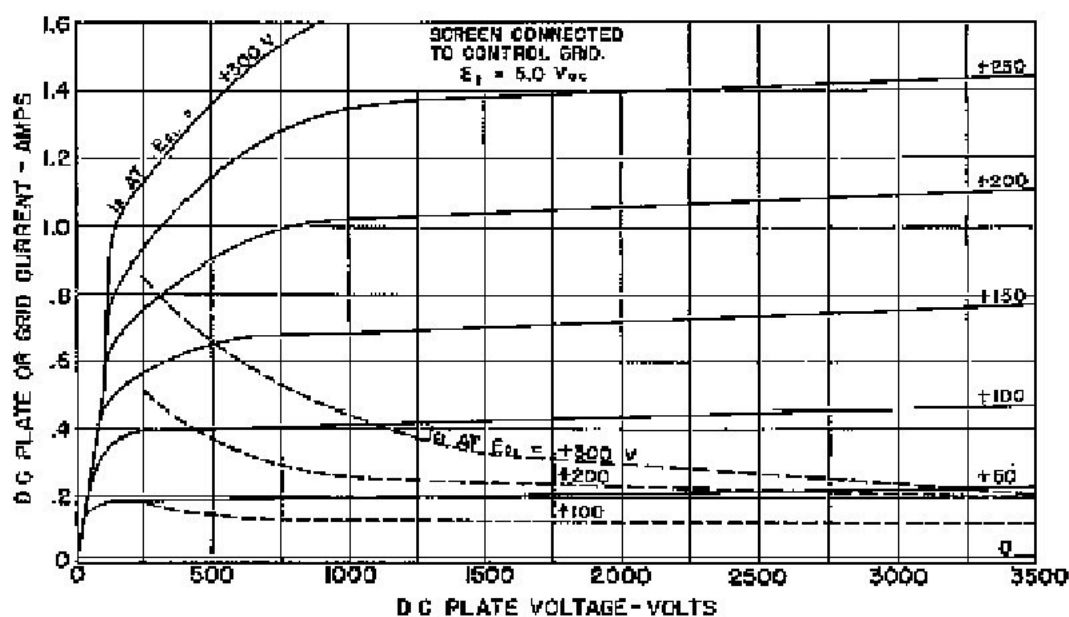


FIGURE 6

RAYTHEON MANUFACTURING COMPANY

WALTHAM, MASSACHUSETTS

POWER TUBE DIVISION