



# 6X8 — 5X8

## TRIODE-PENTODE

FOR VHF CONVERTER APPLICATIONS

**6X8**  
**5X8**  
ET-T972  
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### DESCRIPTION AND RATING

The 6X8 is a miniature tube incorporating a medium-mu triode and a sharp-cutoff pentode in one envelope. It is designed primarily for use as a combined triode oscillator and pentode mixer in television and FM receivers. Its performance in this application is comparable to that obtainable with a 6AG5 mixer and an oscillator which consists of a single section of a 6J6.

Except for heater ratings and heater-cathode voltage ratings, the 5X8 is identical to the 6X8. The 5X8, as the result of its 600-milliamper heater rating and its controlled heater warm-up characteristic, is particularly suited for use in television receivers which employ series-connected heaters. When the 5X8 is used in conjunction with other 600-milliamper types which exhibit essentially the same heater warm-up characteristic, heater voltage surges across the individual tubes are minimized during the warm-up period.

### GENERAL

#### ELECTRICAL

Cathode—Coated Unipotential	<b>5X8</b>	<b>6X8</b>
Heater Voltage, AC or DC	4.7	6.3 Volts
Heater Current	0.6	0.45 Amperes
Heater Warm-up Time*	11	.. Seconds

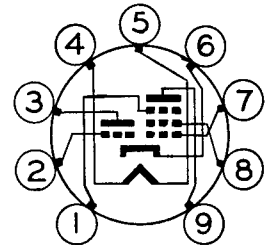
#### Direct Interelectrode Capacitances

	With Shield †	Without Shield
<b>Pentode Section</b>		
Grid-Number 1 to Plate, maximum	0.06	0.09 $\mu\mu\text{f}$
Input	4.5	4.3 $\mu\mu\text{f}$
Output	1.4	0.7 $\mu\mu\text{f}$
<b>Triode Section</b>		
Grid to Plate	1.4	1.4 $\mu\mu\text{f}$
Input	2.6	2.0 $\mu\mu\text{f}$
Output	1.0	0.5 $\mu\mu\text{f}$
<b>Pentode Section, Triode Connection ‡</b>		
Grid-Number 1 to Plate	1.3	1.4 $\mu\mu\text{f}$
Input	3.2	3.0 $\mu\mu\text{f}$
Output	2.0	1.6 $\mu\mu\text{f}$
<b>Pentode Grid-Number 1 to Triode</b>		
Plate, maximum	0.035	0.045 $\mu\mu\text{f}$
Pentode Plate to Triode Plate, maximum	0.008	0.040 $\mu\mu\text{f}$
Heater to Cathode	5.2	5.2 $\mu\mu\text{f}$

#### MECHANICAL

Mounting Position—Any  
Envelope—T-6½, Glass  
Base—E9-1, Small Button 9-Pin

### BASING DIAGRAM

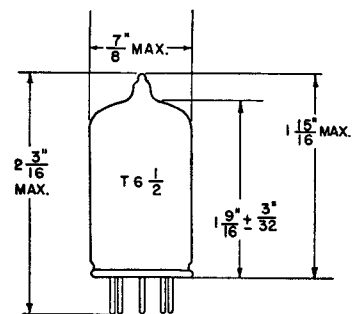


RETMA 9AK

### TERMINAL CONNECTIONS

- Pin 1—Pentode Grid Number 3 (Suppressor)
- Pin 2—Triode Grid
- Pin 3—Triode Plate
- Pin 4—Heater
- Pin 5—Heater
- Pin 6—Cathode
- Pin 7—Pentode Grid Number 1
- Pin 8—Pentode Grid Number 2 (Screen)
- Pin 9—Pentode Plate

### PHYSICAL DIMENSIONS



RETMA 6-2



Supersedes ET-T854, dated 4-54

## MAXIMUM RATINGS

### CONVERTER SERVICE—DESIGN-CENTER VALUES

	Pentode Connection	Triode Connection ‡
<b>PENTODE SECTION AS MIXER</b>		
Plate Voltage .....	250	250 Volts
Suppressor Voltage .....	0	... Volts
Screen-Supply Voltage .....	250	... Volts
Screen Voltage—See Screen Rating Chart		
Positive DC Grid-Number 1 Voltage .....	0	0 Volts
Negative DC Grid-Number 1 Voltage .....	40	40 Volts
Plate Dissipation .....	2.0	2.4 Watts
Screen Dissipation .....	0.4	... Watts
Heater-Cathode Voltage		
Heater Positive with Respect to Cathode .....	100	100 Volts
Heater Negative with Respect to Cathode .....	100	100 Volts
Grid-Number 1 Circuit Resistance		
With Fixed Bias .....	0.1	0.1 Megohms
With Cathode Bias .....	0.5	0.5 Megohms
 <b>TRIODE SECTION AS OSCILLATOR</b>		
Plate Voltage .....		250 Volts
Positive DC Grid Voltage .....		0 Volts
Negative DC Grid Voltage .....		40 Volts
Plate Dissipation .....		1.5 Watts
Grid Input .....		0.5 Watts
Heater-Cathode Voltage		
Heater Positive with Respect to Cathode .....		100 Volts
Heater Negative with Respect to Cathode .....		100 Volts
Grid Circuit Resistance		
With Fixed Bias .....		0.1 Megohms
With Cathode Bias .....		0.5 Megohms

## CHARACTERISTICS AND TYPICAL OPERATION

<b>AVERAGE CHARACTERISTICS—PENTODE SECTION</b>	<b>Pentode Connection</b>	<b>Triode Connection ‡</b>
Plate Voltage . . . . .	250	150 Volts
Suppressor, Connected to Cathode at Socket . . . . .		
Screen Voltage . . . . .	150	. . . Volts
Cathode-Bias Resistor . . . . .	200	250 Ohms
Amplification Factor . . . . .	. . .	42
Plate Resistance, approximate . . . . .	750000	7900 Ohms
Transconductance . . . . .	4600	4000 Micromhos
Plate Current . . . . .	7.7	7.8 Milliamperes
Screen Current . . . . .	1.6	. . . Milliamperes
Grid-Number 1 Voltage, approximate $i_b = 10$ Microamperes . . . . .	-10	-10 Volts

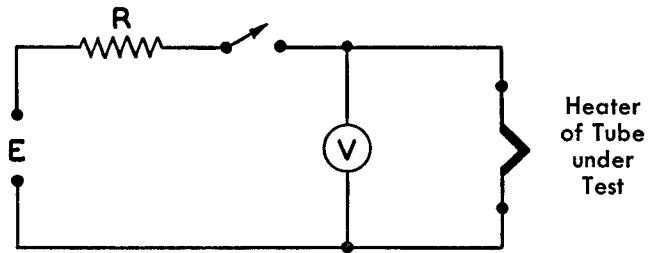
<b>AVERAGE CHARACTERISTICS—TRIODE SECTION</b>	
Plate Voltage . . . . .	100 Volts
Cathode-Bias Resistor . . . . .	100 Ohms
Amplification Factor . . . . .	40
Plate Resistance, approximate . . . . .	6900 Ohms
Transconductance . . . . .	5800 Micromhos
Plate Current . . . . .	8.5 Milliamperes
Grid Voltage, approximate $i_b = 10$ Microamperes . . . . .	-10 Volts

### CONVERTER SERVICE

<b>PENTODE SECTION AS MIXER WITH SEPARATE EXCITATION</b>	<b>Pentode Connection</b>	<b>Triode Connection ‡</b>
Plate Voltage . . . . .	150	150 Volts
Suppressor, Connected to Cathode at Socket . . . . .		
Screen Voltage . . . . .	150	. . . Volts
Grid-Number 1 Supply Voltage . . . . .	-3.5	-3.5 Volts
Grid-Number 1 Circuit Resistance . . . . .	120000	120000 Ohms
Oscillator Voltage at Grid-Number 1, RMS . . . . .	2.6	2.6 Volts
Plate Current . . . . .	6.2	7.8 Milliamperes
Screen Current . . . . .	1.8	. . . Milliamperes
Grid-Number 1 Current . . . . .	2.0	2.0 Microamperes
Conversion Transconductance . . . . .	2100	2800 Micromhos

<b>TRIODE SECTION AS 250 MEGACYCLE OSCILLATOR <math>\pi</math></b>	
Plate Voltage . . . . .	150 Volts
Grid Resistor . . . . .	2700 Ohms
Plate Current . . . . .	13 Milliamperes
Grid Current . . . . .	3.6 Milliamperes
Power Output, approximate . . . . .	0.5 Watts

\*Heater warm-up time is defined as the time required in the circuit shown at the right for the voltage across the heater terminals (V) to increase from zero to the heater test voltage ( $V_1$ ). For this type,  $E=18.7$  volts (RMS or DC),  $V_1=3.73$  volts (RMS or DC), and  $R=23.5$  ohms.



†With external shield (RETMA 315) connected to cathode unless otherwise indicated.

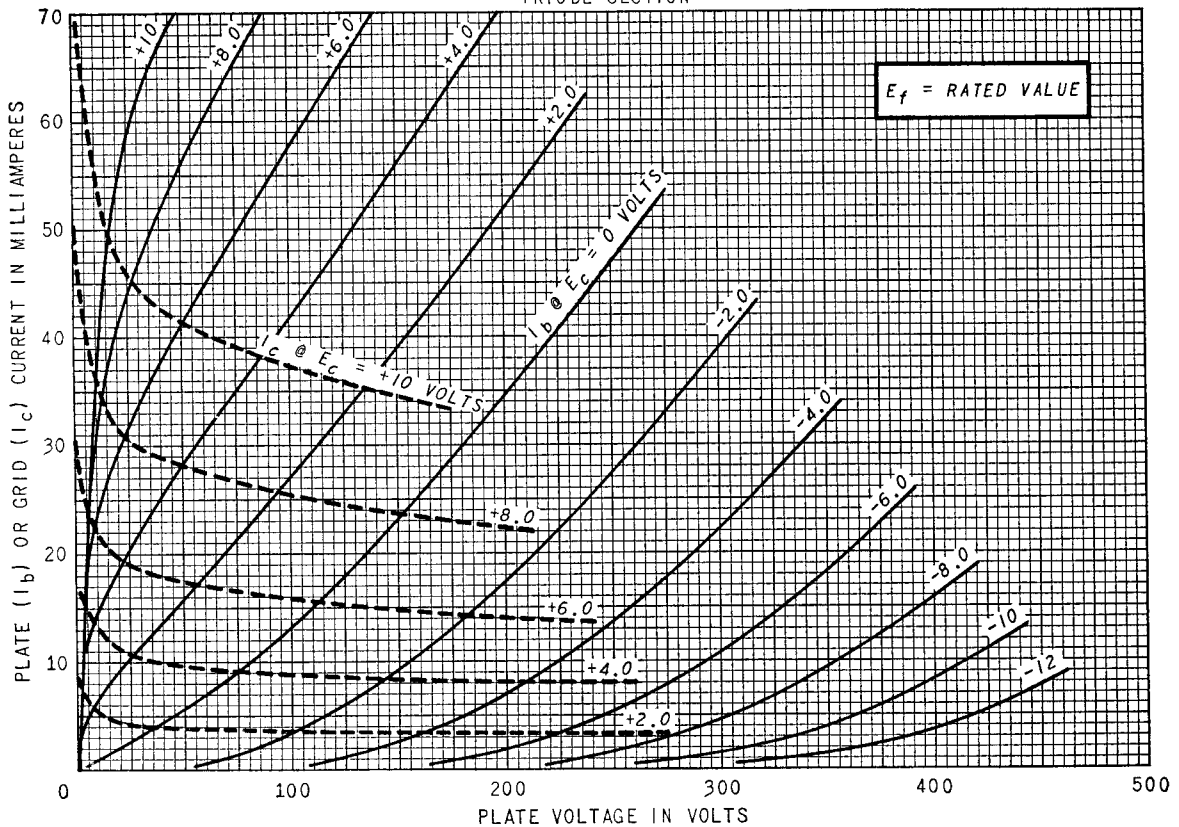
‡With screen connected to plate and suppressor connected to cathode.

§With external shield (RETMA 315) connected to ground.

¶In TV or FM receivers, the oscillator should generally be operated with less power input than shown in the data in order to avoid over-excitation and excessive oscillator radiation.

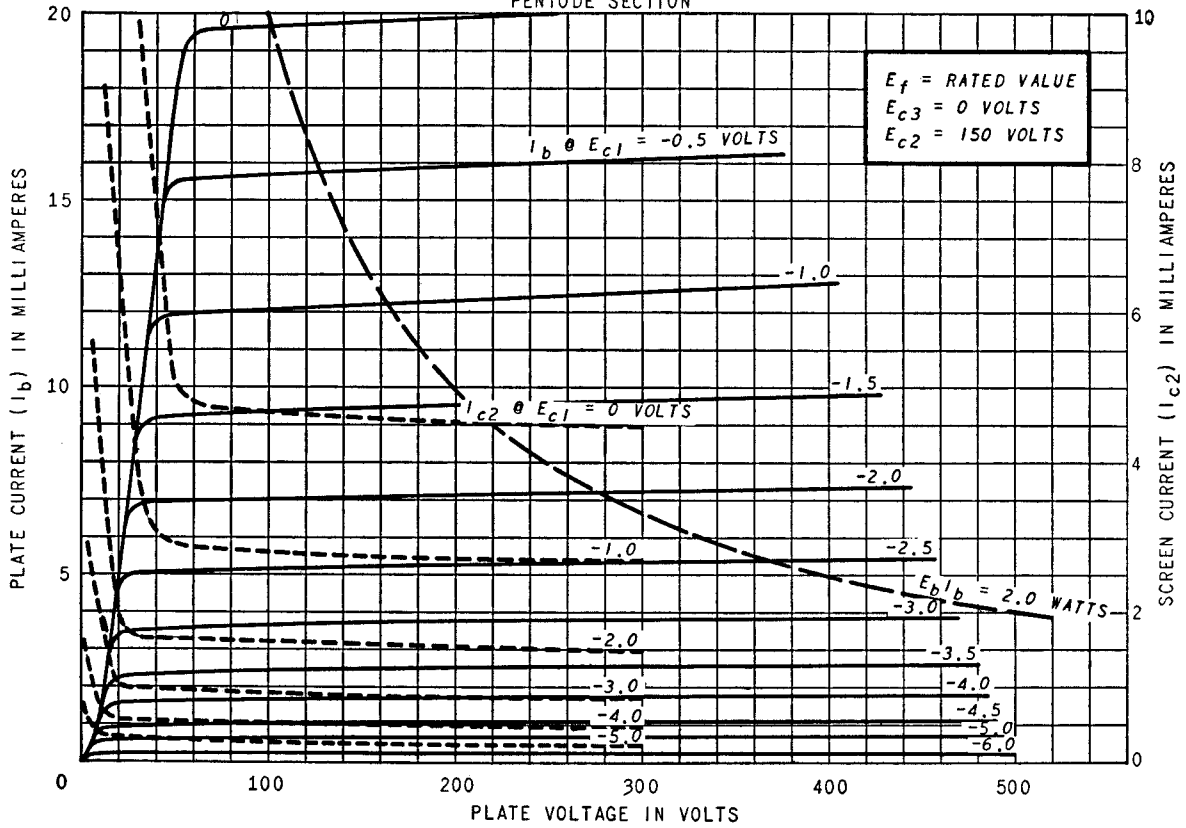
### AVERAGE PLATE CHARACTERISTICS

TRIODE SECTION



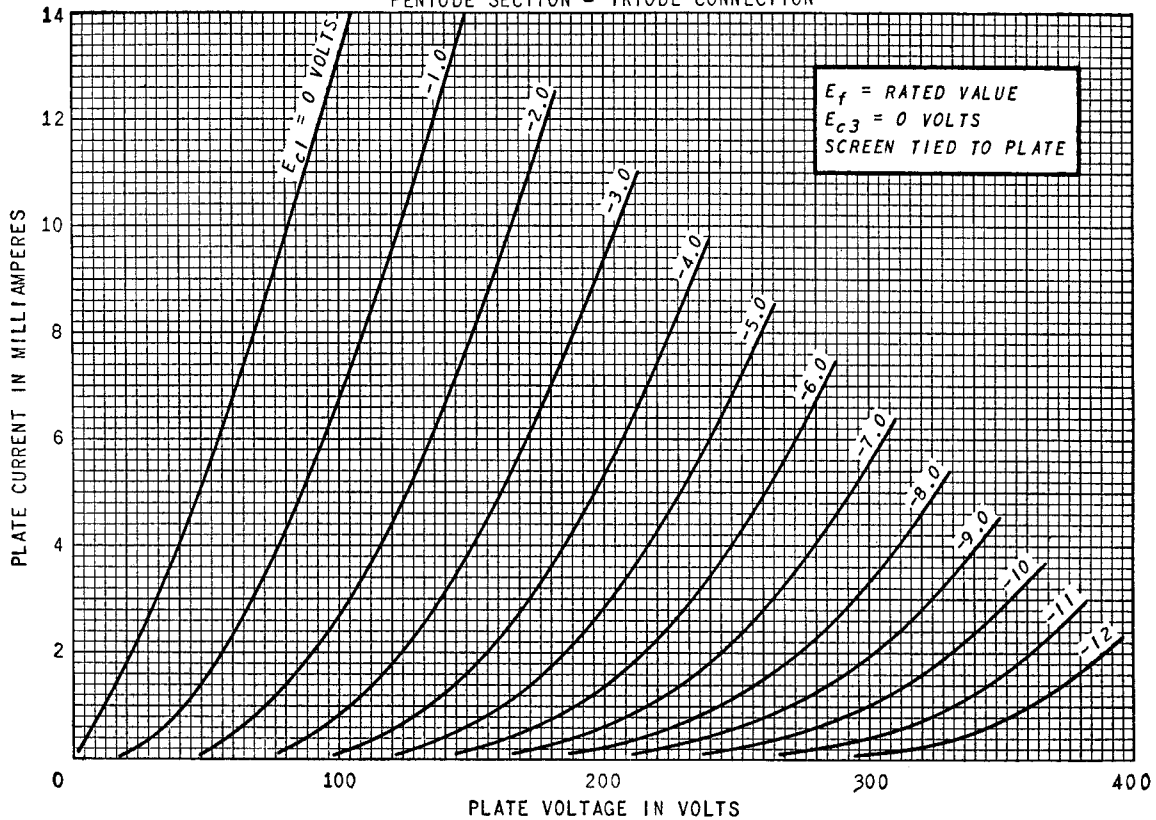
### AVERAGE PLATE CHARACTERISTICS

PENTODE SECTION

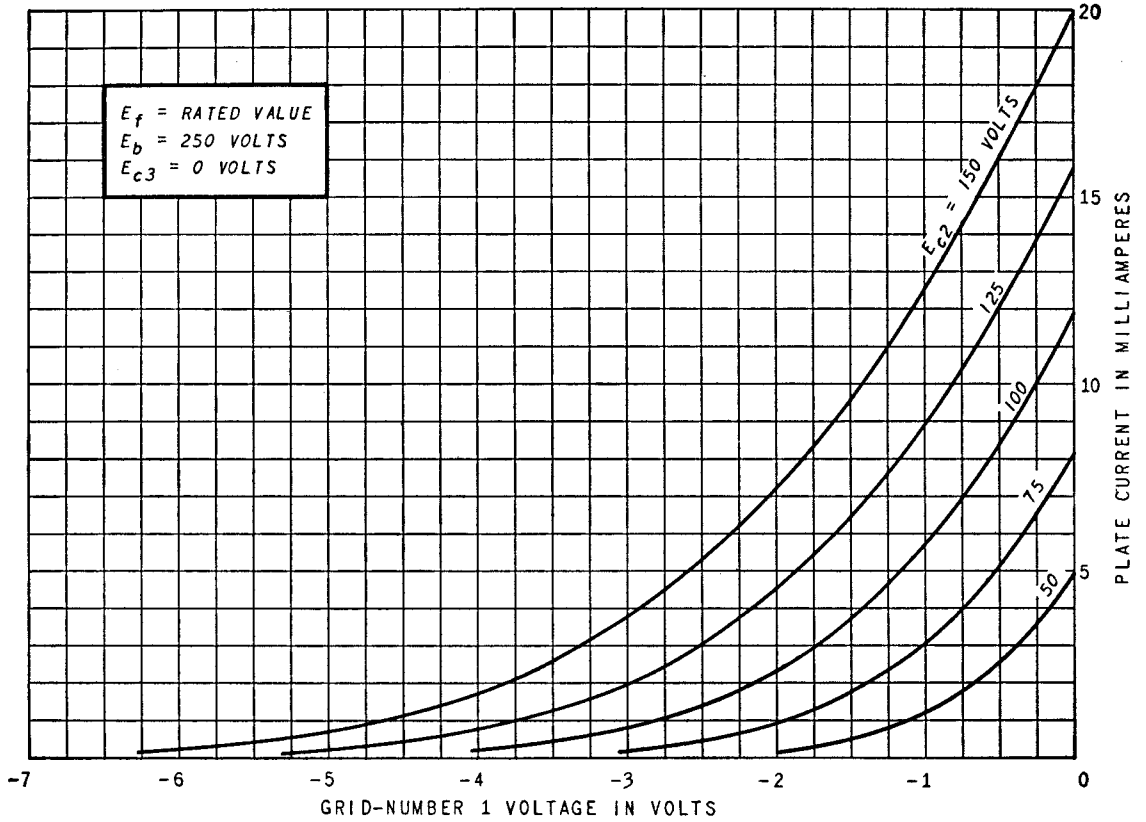


### AVERAGE PLATE CHARACTERISTICS

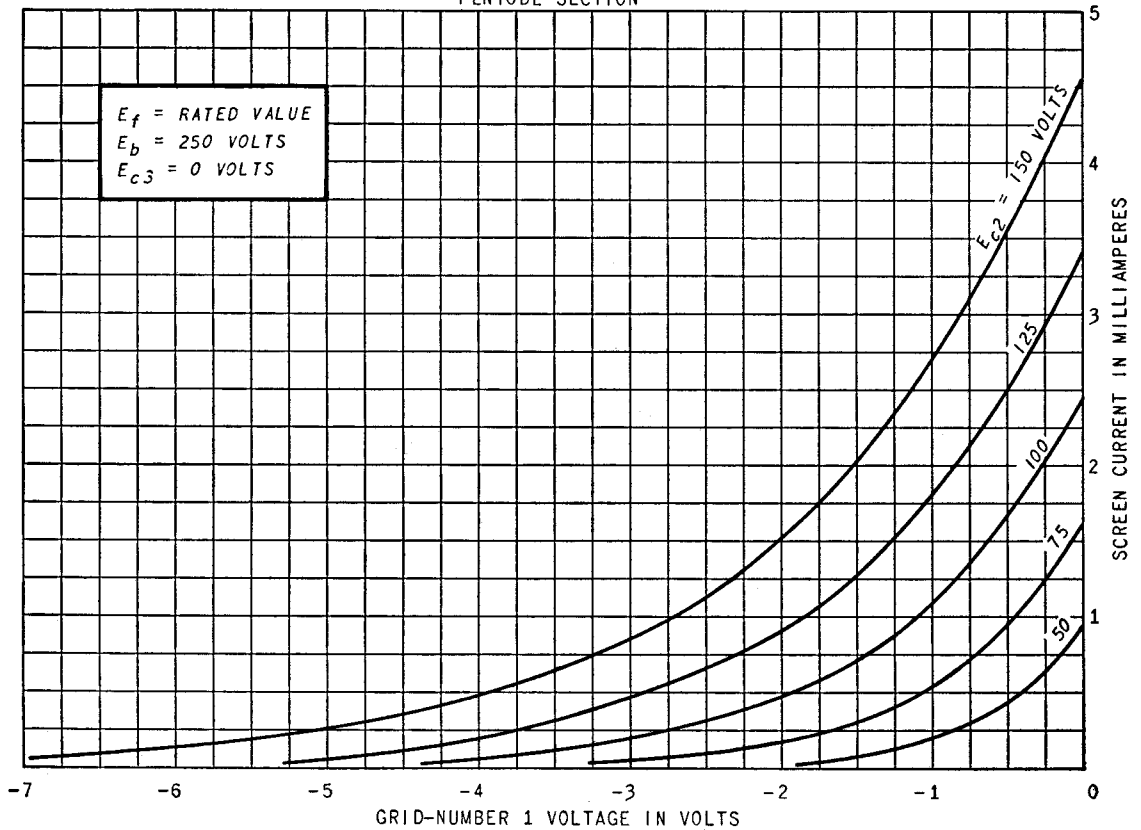
PENTODE SECTION - TRIODE CONNECTION



### AVERAGE TRANSFER CHARACTERISTICS PENTODE SECTION

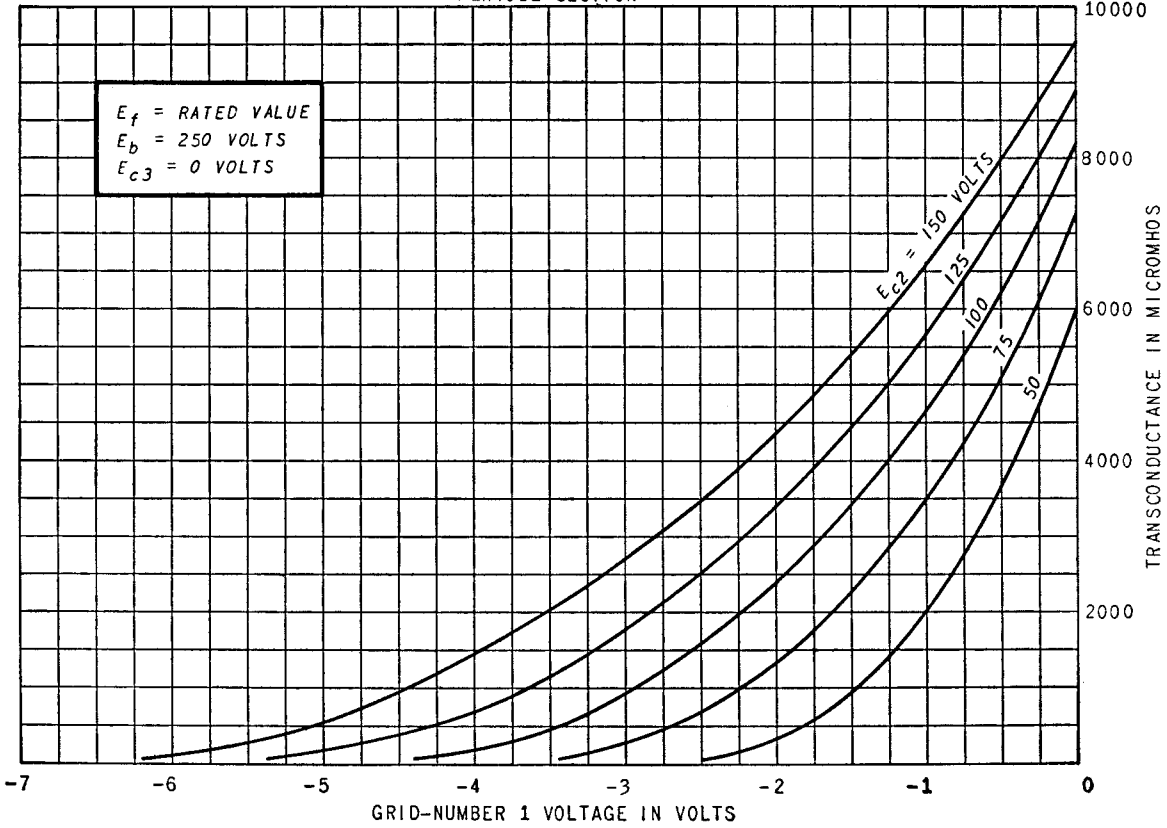


### AVERAGE TRANSFER CHARACTERISTICS PENTODE SECTION



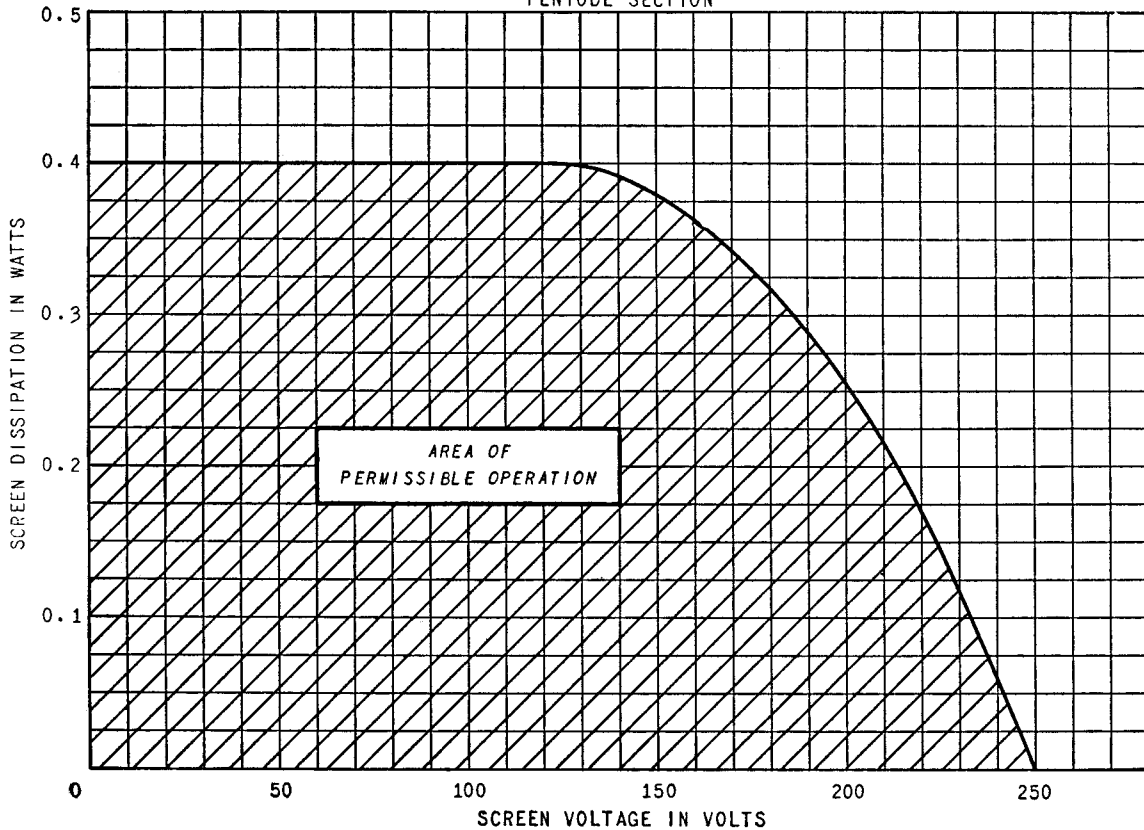
# AVERAGE TRANSFER CHARACTERISTICS

PENTODE SECTION

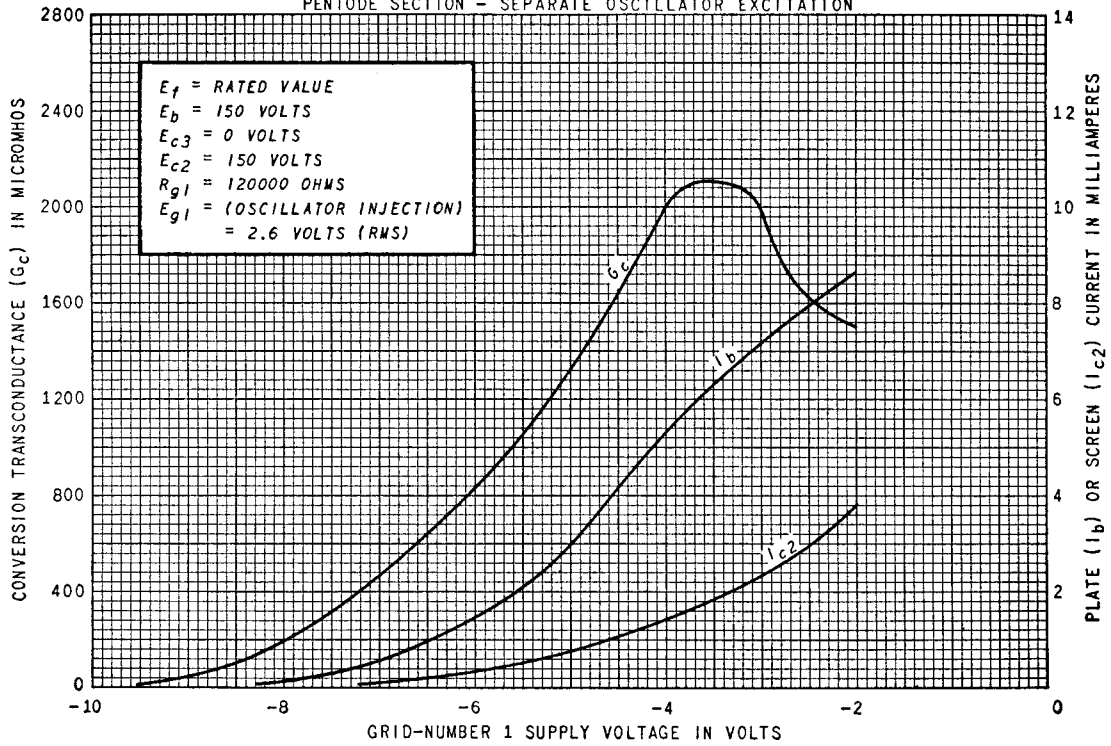


# SCREEN RATING CHART

PENTODE SECTION

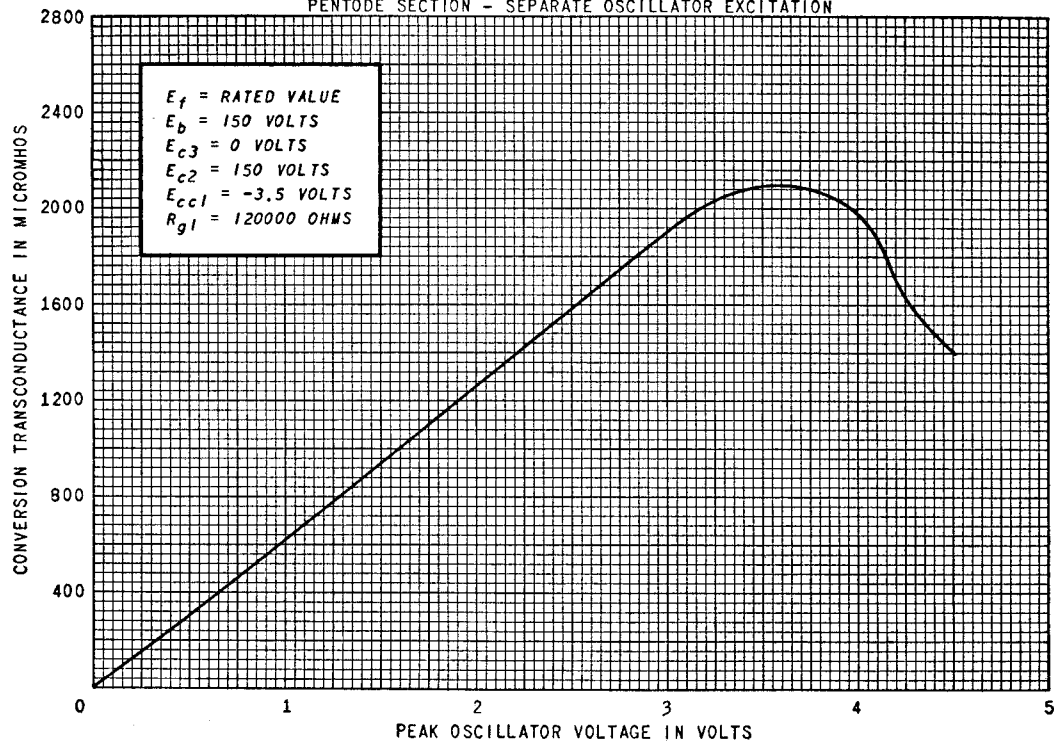


**OPERATION CHARACTERISTICS**  
 PENTODE SECTION - SEPARATE OSCILLATOR EXCITATION



**OPERATION CHARACTERISTICS**

PENTODE SECTION - SEPARATE OSCILLATOR EXCITATION



TUBE DEPARTMENT



Schenectady 5, N. Y.