



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-milliampere 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-milliampere 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	5X8	6X8
Heater Voltage, AC or DC	4.7	6.3 Volts
Heater Current	0.6	0.45 Amperes
Heater Warm-up Time*	11	.. Seconds

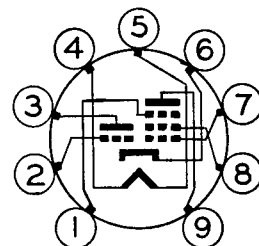
Direct Interelectrode Capacitances

	With Shield †	Without Shield
Pentode Section		
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 $\mu\mu\text{f}$
Triode Section		
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 $\mu\mu\text{f}$
Pentode Section, Triode Connection ‡		
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 $\mu\mu\text{f}$
Pentode Grid-Number 1 to Triode		
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

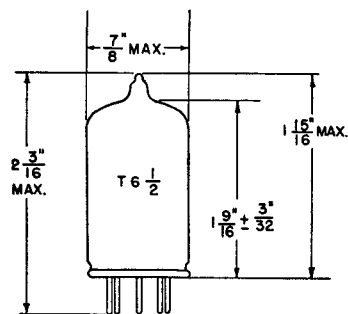


RETMA 9AK

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 ‡
PENTODE SECTION AS MIXER		
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
 TRIODE SECTION AS OSCILLATOR		
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

AVERAGE CHARACTERISTICS—PENTODE SECTION	Pentode Connection	Triode Connection ‡
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

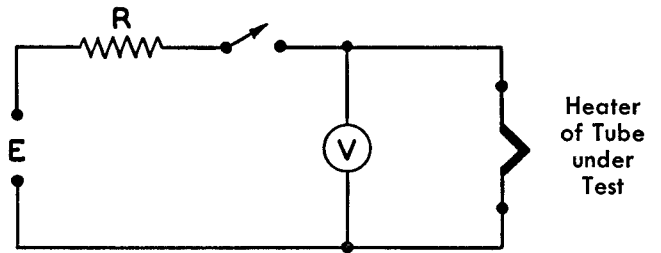
AVERAGE CHARACTERISTICS—TRIODE SECTION	
Plate Voltage	100 Volts
Cathode-Bias Resistor	100 Ohms
Amplification Factor	40
Plate Resistance, approximate	6900 Ohms
Transconductance	5800 Micromhos
Plate Current	8.5 Milliamperes
Grid Voltage, approximate $i_b = 10$ Microamperes	-10 Volts

CONVERTER SERVICE

PENTODE SECTION AS MIXER WITH SEPARATE EXCITATION	Pentode Connection	Triode Connection ‡
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

TRIODE SECTION AS 250 MEGACYCLE OSCILLATORπ	
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.

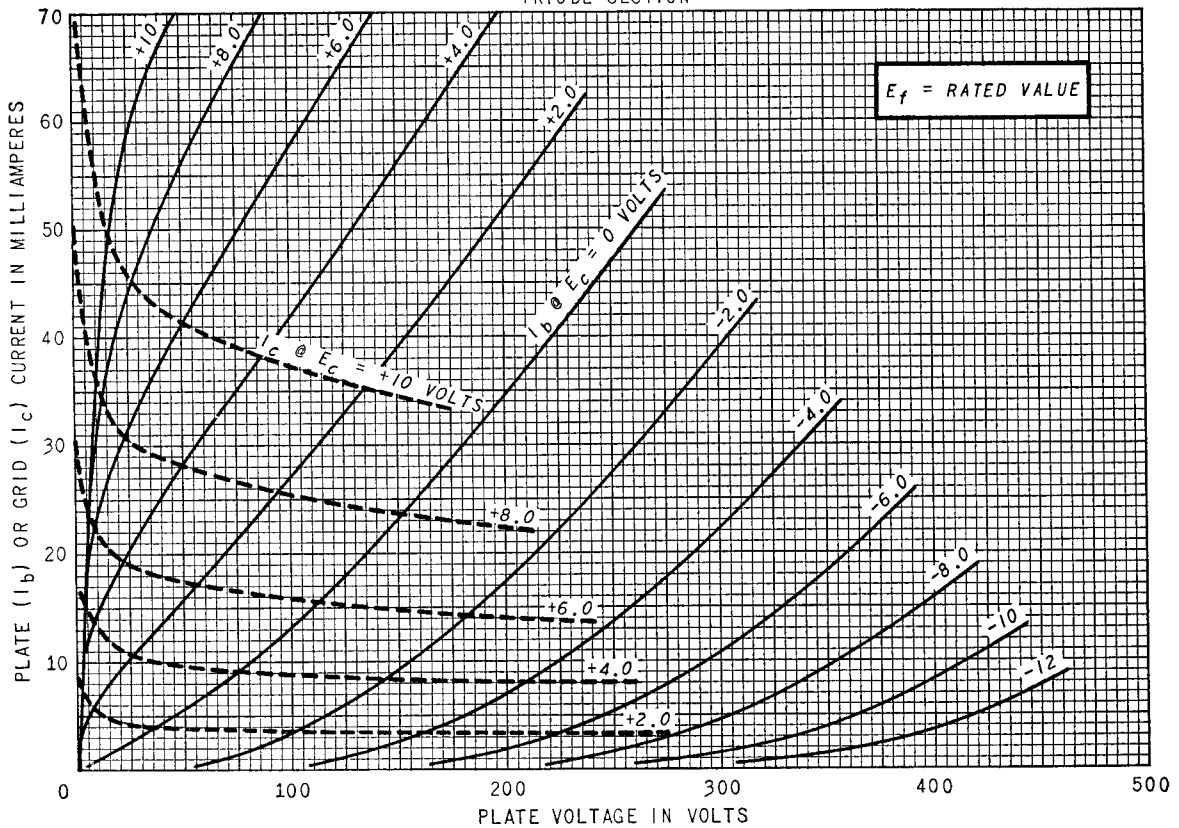
‡With screen connected to plate and suppressor connected to cathode.

§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.

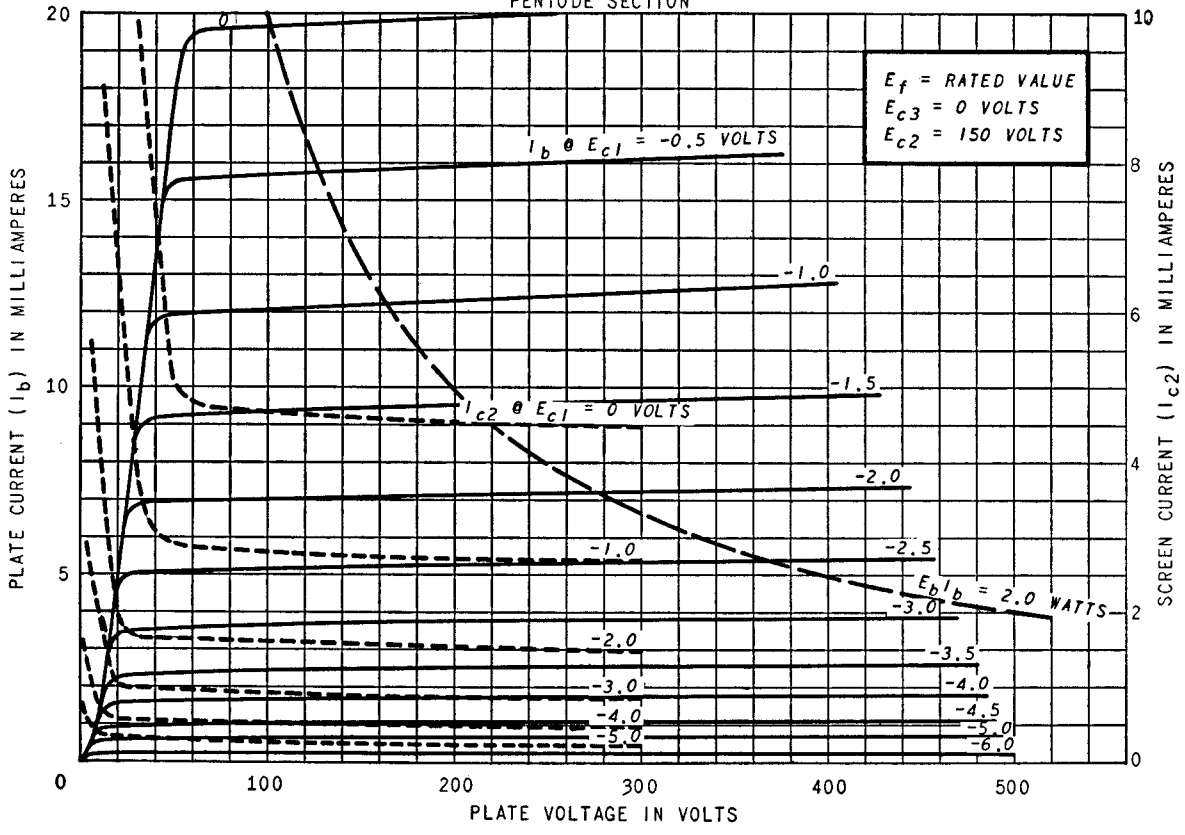
AVERAGE PLATE CHARACTERISTICS

TRIODE SECTION



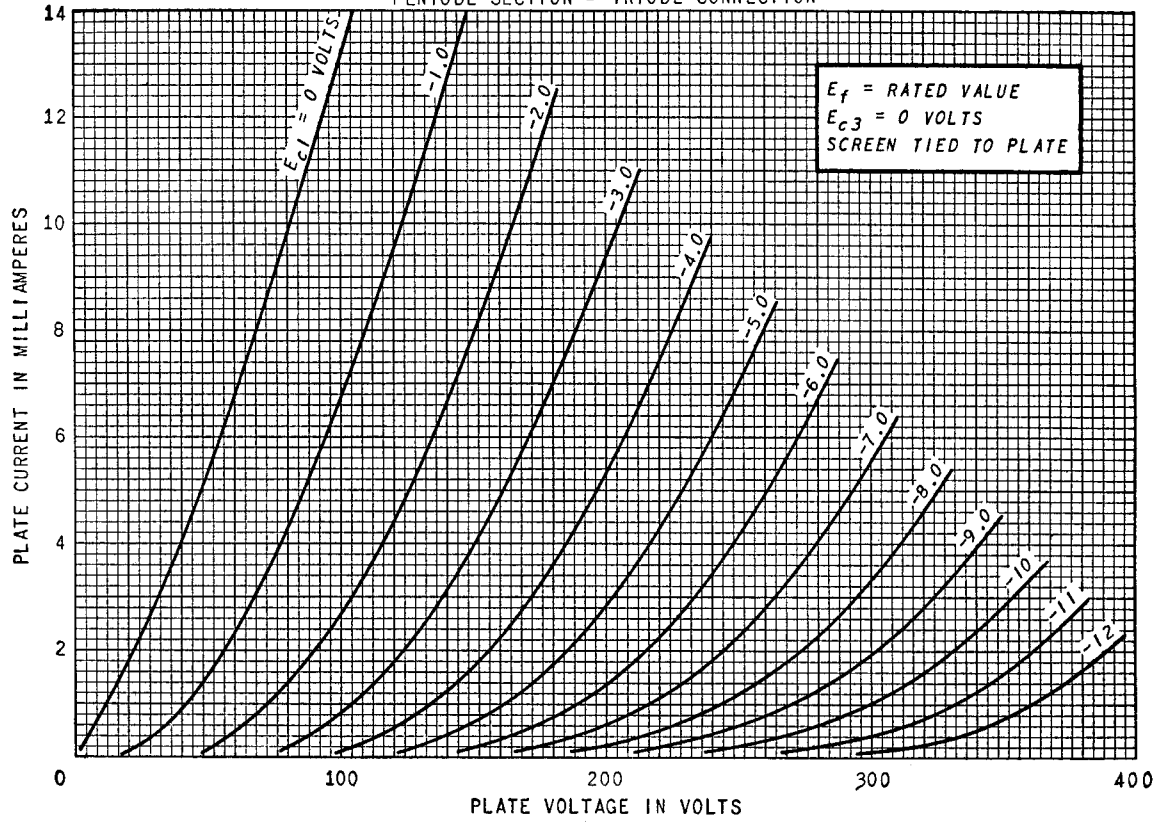
AVERAGE PLATE CHARACTERISTICS

PENTODE SECTION

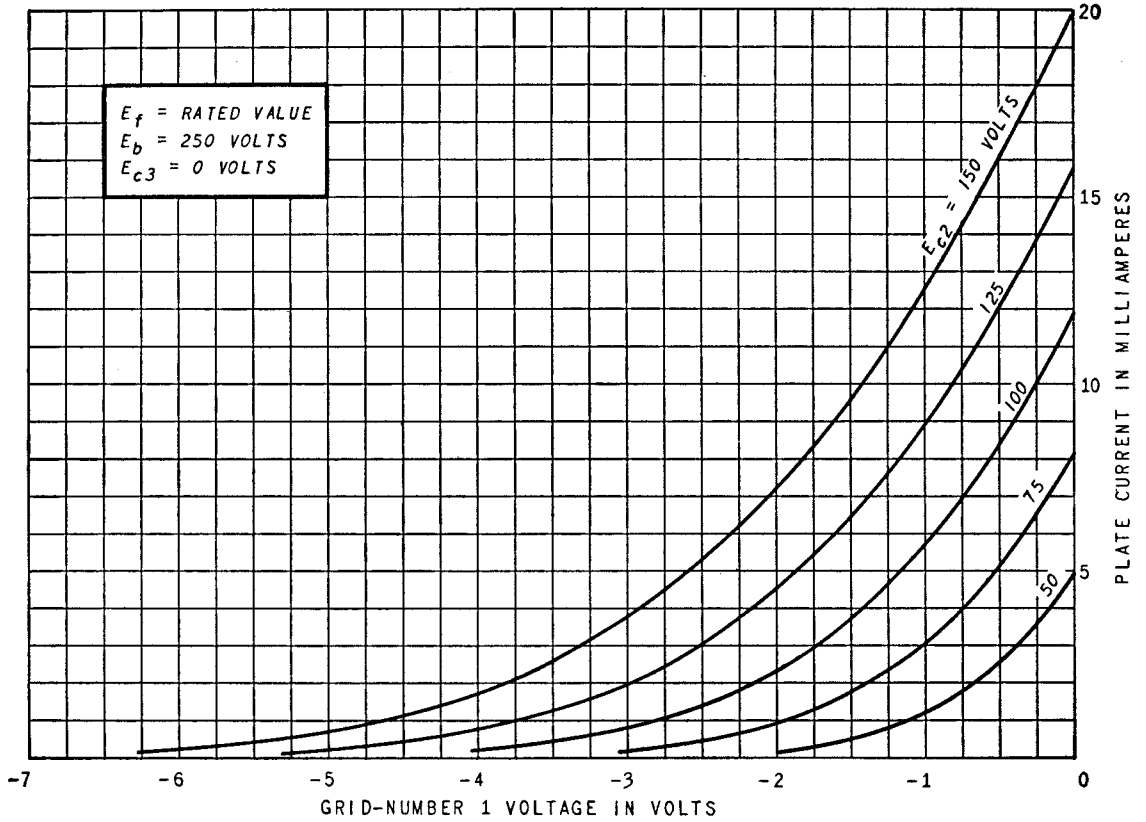


AVERAGE PLATE CHARACTERISTICS

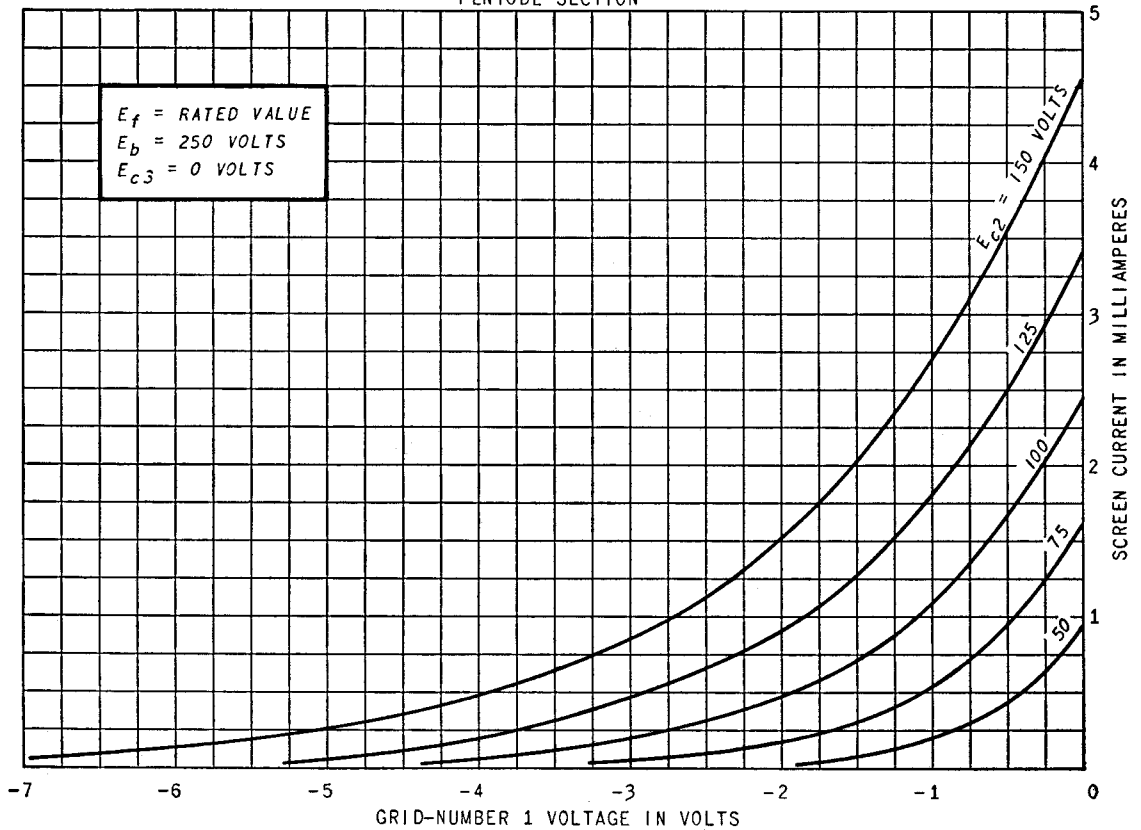
PENTODE SECTION - TRIODE CONNECTION



AVERAGE TRANSFER CHARACTERISTICS PENTODE SECTION

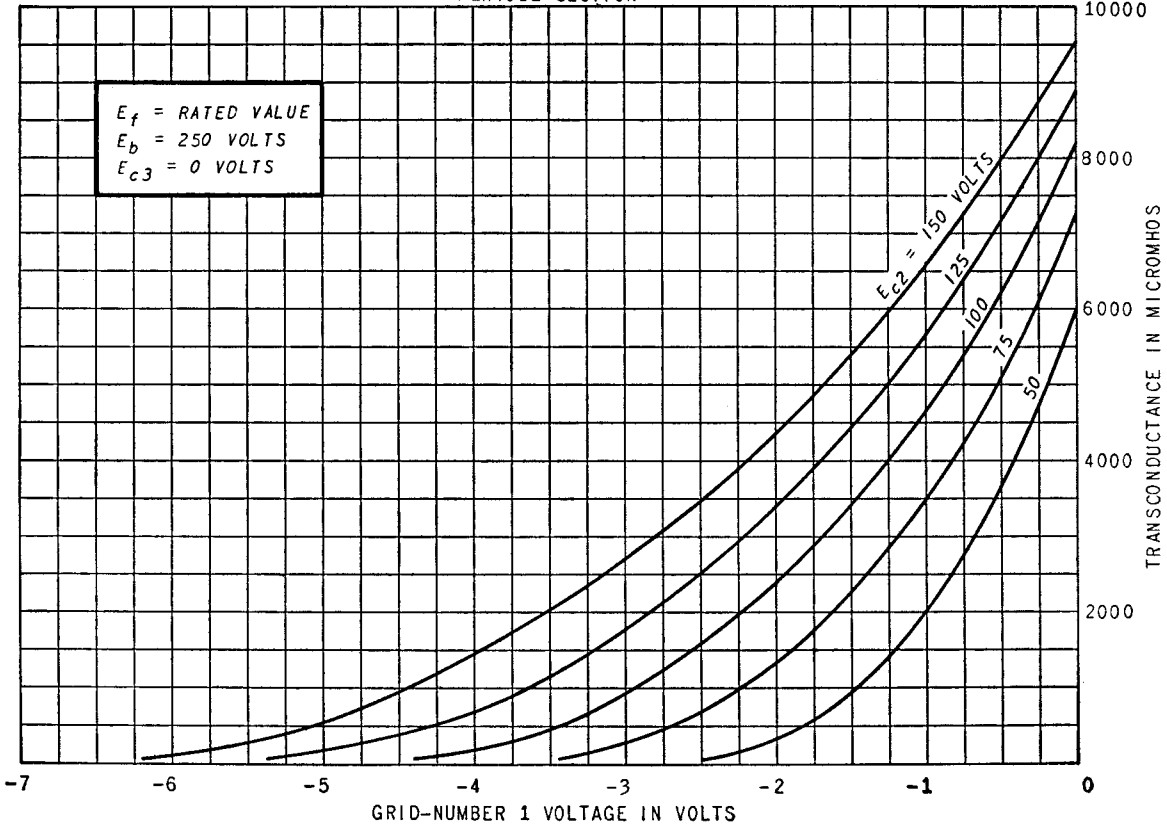


AVERAGE TRANSFER CHARACTERISTICS PENTODE SECTION



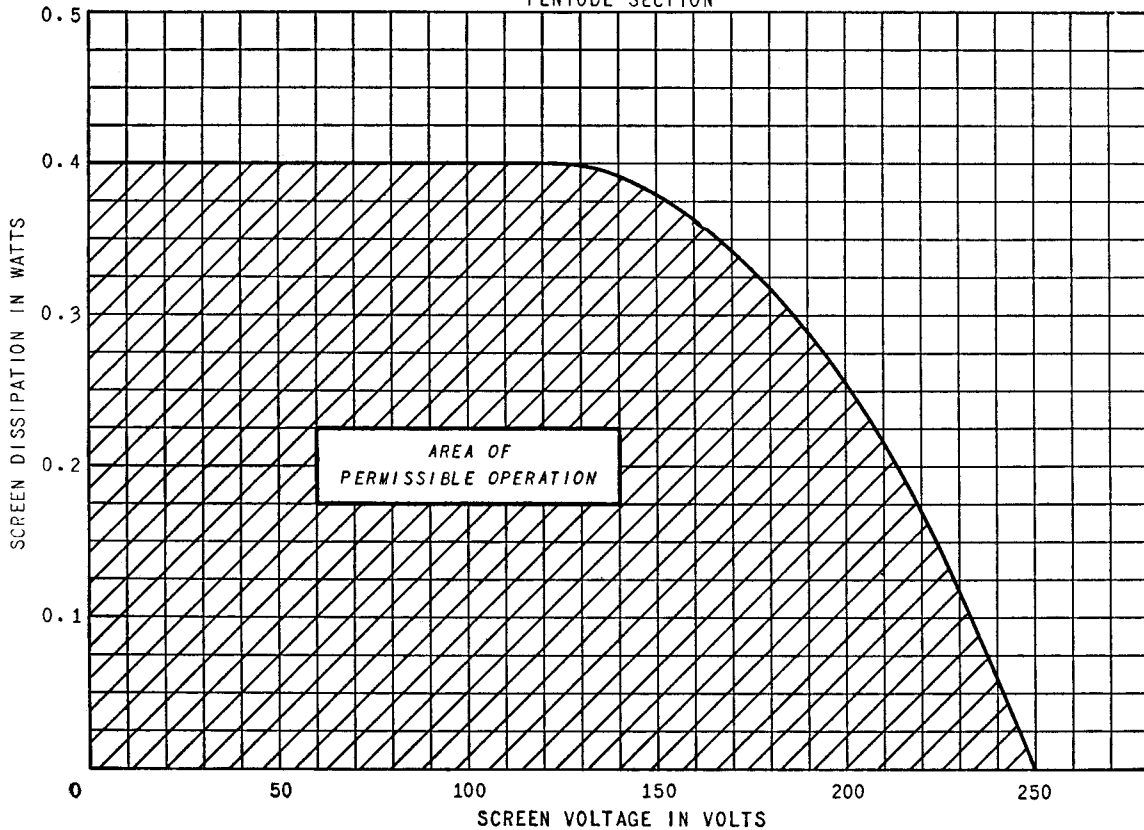
AVERAGE TRANSFER CHARACTERISTICS

PENTODE SECTION

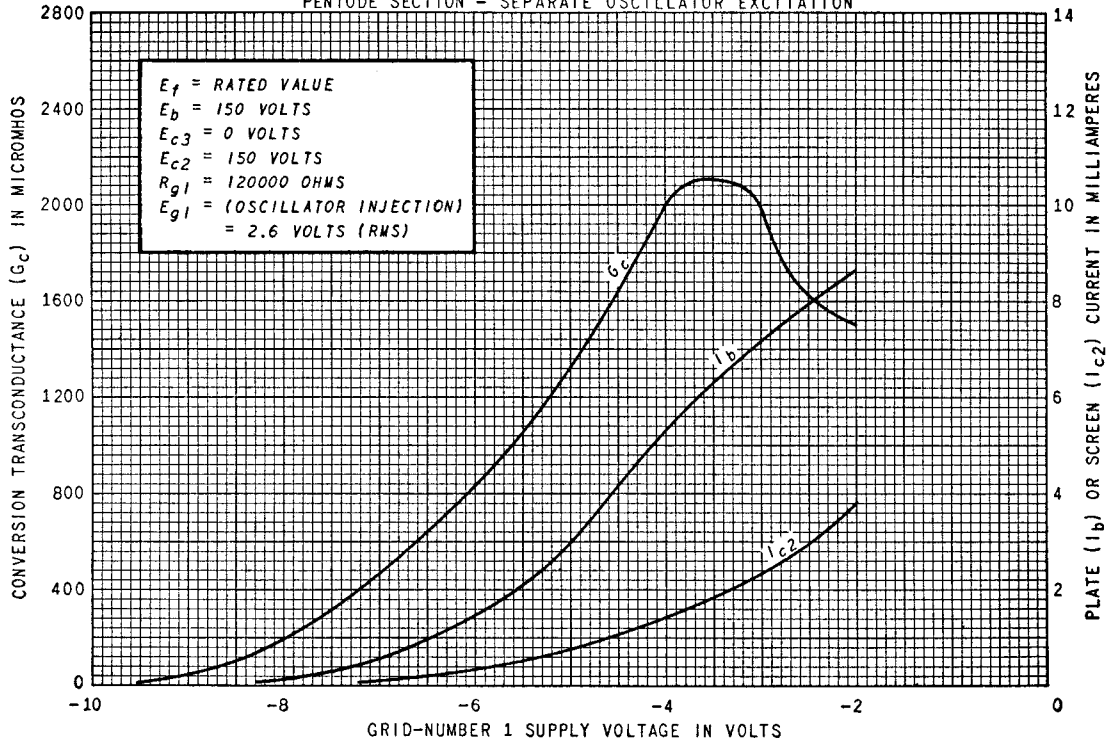


SCREEN RATING CHART

PENTODE SECTION

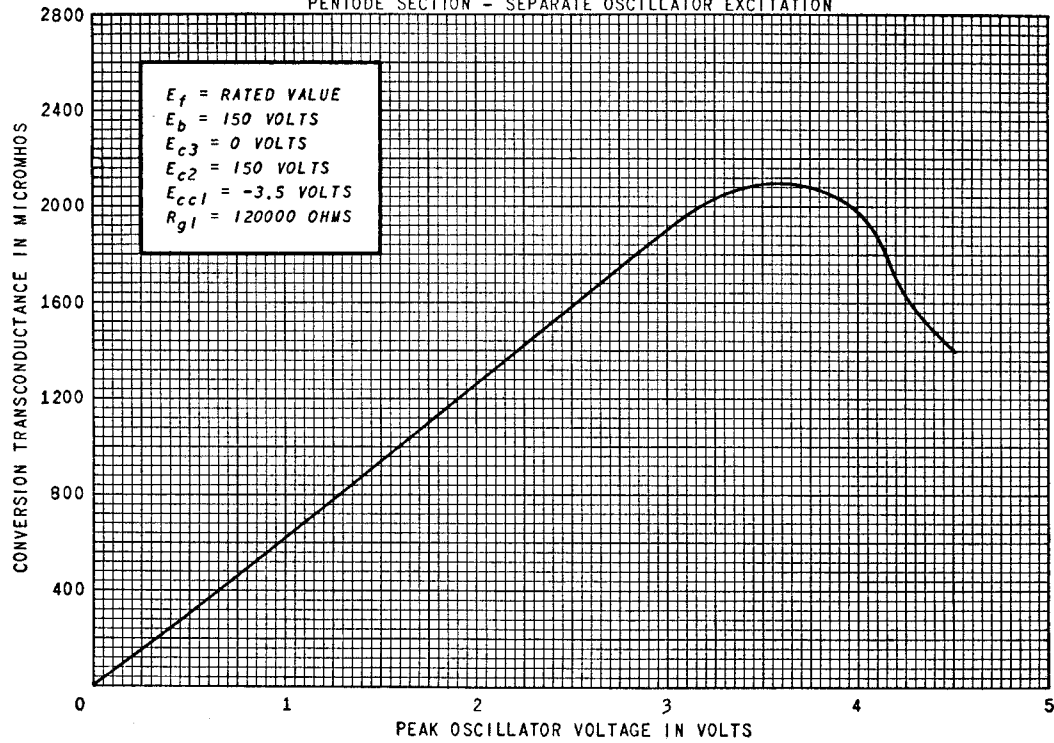


OPERATION CHARACTERISTICS
 PENTODE SECTION - SEPARATE OSCILLATOR EXCITATION



OPERATION CHARACTERISTICS

PENTODE SECTION - SEPARATE OSCILLATOR EXCITATION



TUBE DEPARTMENT



Schenectady 5, N. Y.