

23Z9

Compactron Dissimilar-Double-Triode Pentode

• VERTICAL OUTPUT PENTODE • 140 VOLTS B+ • VERTICAL OSCILLATOR • SYNC CLIPPER

The 23Z9 is a compactron containing a medium-mu triode, a high-mu triode, and a high-perveance beam pentode. The pentode is intended for vertical output service in monochrome television receivers operating from 140 volts B+. The two triodes are intended for vertical oscillator and sync clipper functions.

GENERAL

ELECTRICAL

Cathode - Coated Unipotential

Heater Characteristics and Ratings

Heater Voltage, AC or DC* 23 Volts

Heater Current† 0.45±0.03 Amperes

Heater Warm-up Time, Average§ 11 Seconds

Direct Interelectrode Capacitances¶

Triode (Section 1)

Grid to Plate: (T1g to T1p) 3.0 pf

Input: T1g to (h + k + Pb.p.) 3.0 pf

Output: T1p to (h + k + Pb.p.) 0.4 pf

Triode (Section 2)

Grid to Plate: (T2g to T2p) 3.8 pf

Input: T2g to (h + k + Pb.p.) 2.0 pf

Output: T2p to (h + k + Pb.p.) 0.44 pf

Pentode Section

Grid-Number 1 to Plate:

(Pg1 to Pp) 0.24 pf

Input: Pg1 to (h + k +

Pg2 + Pb.p.) 12 pf

Output: Pp to (h + k +

Pg2 + Pb.p.) 7.0 pf

MECHANICAL

Operating Position - Any

Envelope - T-9, Glass

Base - E12-70, Button 12-Pin

Outline Drawing - EIA 9-58

Maximum Diameter 1.188 Inches

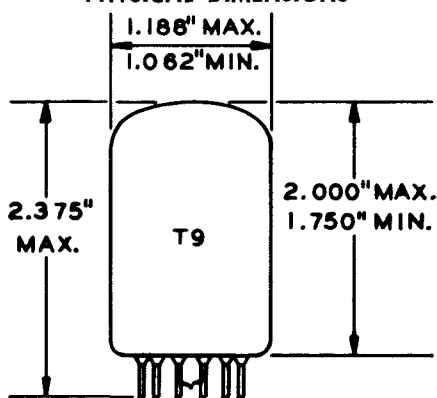
Minimum Diameter 1.062 Inches

Maximum Over-all Length 2.375 Inches

Maximum Seated Height 2.000 Inches

Minimum Seated Height 1.750 Inches

PHYSICAL DIMENSIONS

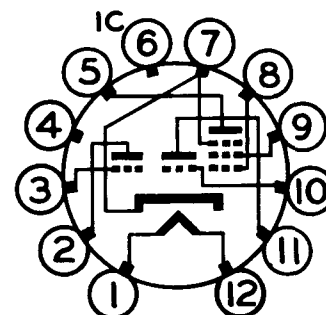


EIA 9-58

TERMINAL CONNECTIONS

- Pin 1 - Heater
- Pin 2 - Triode Plate (Section 2)
- Pin 3 - Triode Grid (Section 2)
- Pin 4 - No Connection
- Pin 5 - Pentode Plate
- Pin 6 - Internal Connection - Do Not Use
- Pin 7 - Cathode and Pentode Beam Plates
- Pin 8 - Pentode Grid Number 1
- Pin 9 - Pentode Grid Number 2 (Screen)
- Pin 10 - Triode Grid (Section 1)
- Pin 11 - Triode Plate (Section 1)
- Pin 12 - Heater

BASING DIAGRAM



EIA 12GZ

The tubes and arrangements disclosed herein may be covered by patents of General Electric Company or others. Neither the disclosure of any information herein nor the sale of tubes by General Electric Company conveys any license under patent claims covering combinations of tubes with other devices or elements. In the absence of an

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MAXIMUM RATINGS

DESIGN-MAXIMUM VALUES

PENTODE SECTION—VERTICAL-DEFLECTION AMPLIFIER SERVICE^Δ

DC Plate Voltage	. 250	Volts
Peak Pulse Plate Voltage	2000	Volts
Screen Voltage.	. 200	Volts
Peak Negative Grid-Number 1 Voltage.	. 150	Volts
Plate Dissipation.	. 7.0	Watts
Screen Dissipation	. 1.8	Watts
Total DC Plate and Screen Current	. 70	Milliamperes
Total Peak Plate and Screen Current.	. 245	Milliamperes
Heater-Cathode Voltage		
Heater Positive with Respect to Cathode		
DC Component	. 100	Volts
Total DC and Peak.	. 200	Volts
Heater Negative with Respect to Cathode		
Total DC and Peak.	. 200	Volts
Grid-Number 1 Circuit Resistance		
With Fixed Bias	. 1.0	Megohms

TRIODE SECTION 1

Plate Voltage	. 330	Volts
Positive DC Grid Voltage	. 0	Volts
Plate Dissipation.	. 1.25	Watts
Heater-Cathode Voltage		
Heater Positive with Respect to Cathode		
DC Component	. 100	Volts
Total DC and Peak.	. 200	Volts
Heater Negative with Respect to Cathode		
Total DC and Peak.	. 200	Volts
Grid-Circuit Resistance		
With Fixed Bias	. 0.5	Megohms

TRIODE SECTION 2—VERTICAL OSCILLATOR SERVICE^Δ

DC Plate Voltage	. 250	Volts
Peak Negative Grid Voltage.	. 400	Volts
Plate Dissipation.	. 1.0	Watts
DC Plate Current	. 20	Milliamperes
Peak Plate Current	. 70	Milliamperes
Heater-Cathode Voltage		
Heater Positive with Respect to Cathode		
DC Component	. 100	Volts
Total DC and Peak.	. 200	Volts
Heater Negative with Respect to Cathode		
Total DC and Peak.	. 200	Volts
Grid-Circuit Resistance		
With Fixed Bias	. 1.0	Megohms

Design-Maximum ratings are limiting values of operating and environmental conditions applicable to a bogey electron tube of a specified type as defined by its published data and should not be exceeded under the worst probable conditions.

The tube manufacturer chooses these values to provide acceptable serviceability of the tube, making allowance for the effects of changes in operating conditions due to variations in the characteristics of the tube under consideration.

The equipment manufacturer should design so that initially and throughout life no design-maximum value for the intended service is exceeded with a bogey tube under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in the characteristics of all other electron devices in the equipment.

CHARACTERISTICS AND TYPICAL OPERATION**AVERAGE CHARACTERISTICS****PENTODE SECTION**

Plate Voltage.	45	120	Volts
Screen Voltage	110	110	Volts
Grid-Number 1 Voltage	0#	-8.0	Volts
Plate Resistance, approximate		11700	Ohms
Transconductance.	---	7100	Micromhos
Plate Current.	122	46	Milliamperes
Screen Current	16.5	3.5	Milliamperes
Grid-Number 1 Voltage, approximate Ib = 100 Microamperes	---	-25	Volts

TRIODE SECTION 1

Plate Voltage.	150	Volts
Grid Voltage	-2.0	Volts
Amplification Factor	43	
Plate Resistance, approximate	11000	Ohms
Transconductance.	3900	Micromhos
Plate Current.	5.4	Milliamperes
Grid Voltage, approximate Ib = 10 Microamperes	-5.7	Volts

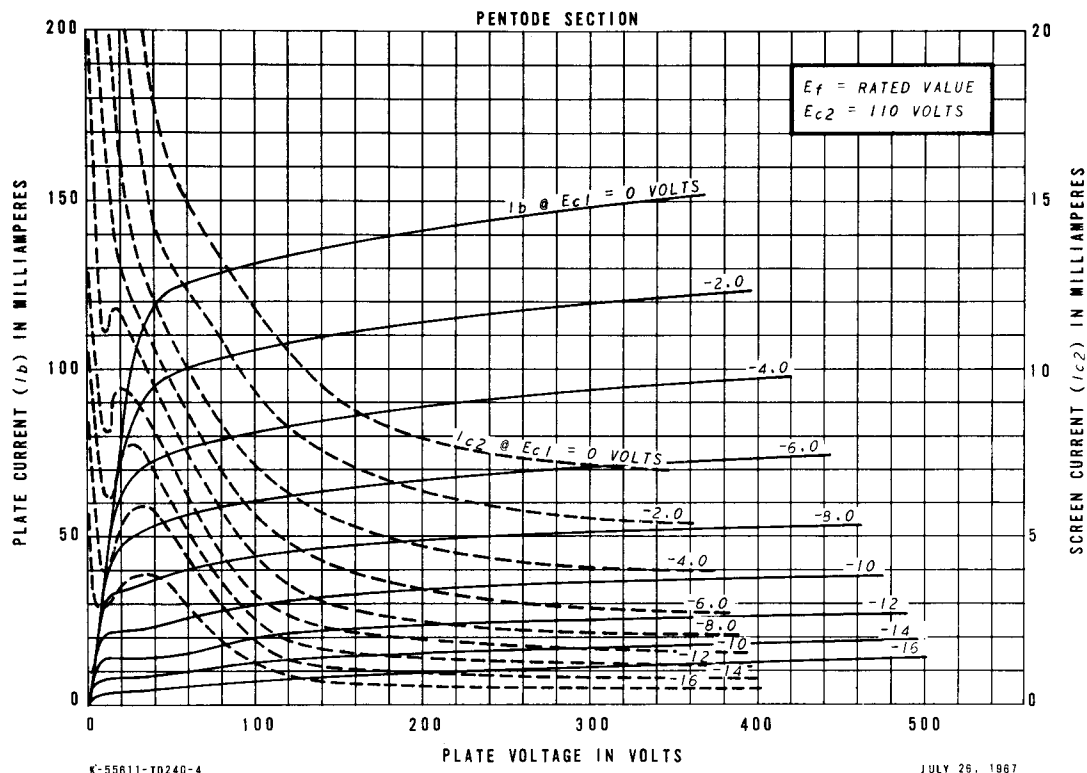
TRIODE SECTION 2

Plate Voltage.	150	Volts
Grid Voltage	-5.0	Volts
Amplification Factor	20	
Plate Resistance, approximate	8500	Ohms
Transconductance.	2350	Micromhos
Plate Current.	5.5	Milliamperes
Grid Voltage, approximate Ib = 10 Microamperes	-11	Volts

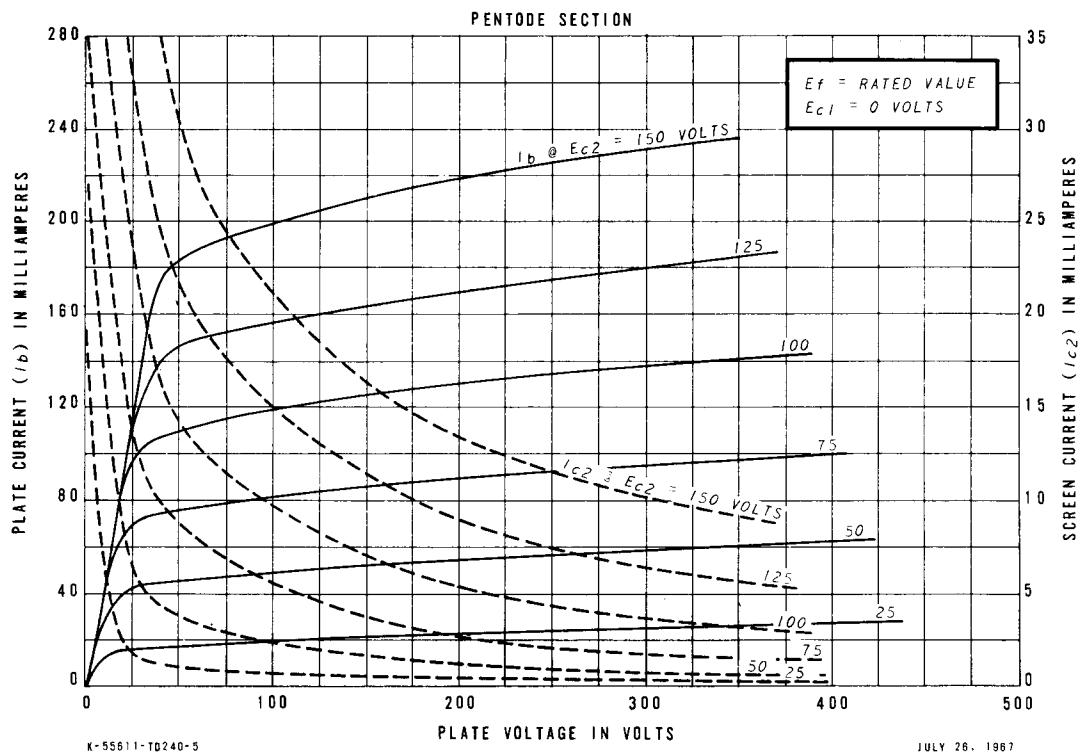
NOTES

- * Heater voltage for a bogey tube at $I_f = 0.45$ amperes.
- ‡ The equipment designer should design the equipment so that heater current is centered at the specified bogey value, with heater supply variations restricted to maintain heater current within the specified tolerance.
- § The time required for the voltage across the heater to reach 80 percent of the bogey value after applying 4 times the bogey heater voltage to a circuit consisting of the tube heater in series with a resistance equal to 3 times the bogey heater voltage divided by the bogey heater current.
- ¶ Without external shield.
- Δ For operation in a 525-line, 30-frame television system as described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations", Federal Communications Commission. The duty cycle of the voltage pulse must not exceed 15 percent of one scanning cycle.
- # Applied for short interval (two seconds maximum) so as not to damage tube.

AVERAGE PLATE CHARACTERISTICS

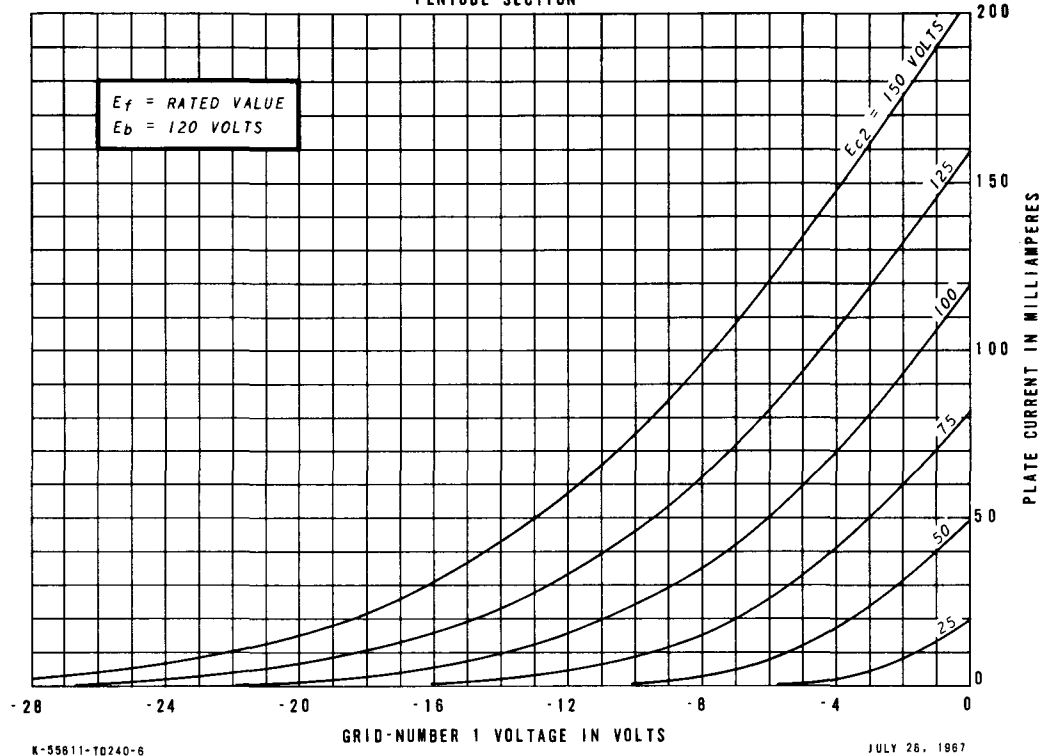


AVERAGE PLATE CHARACTERISTICS



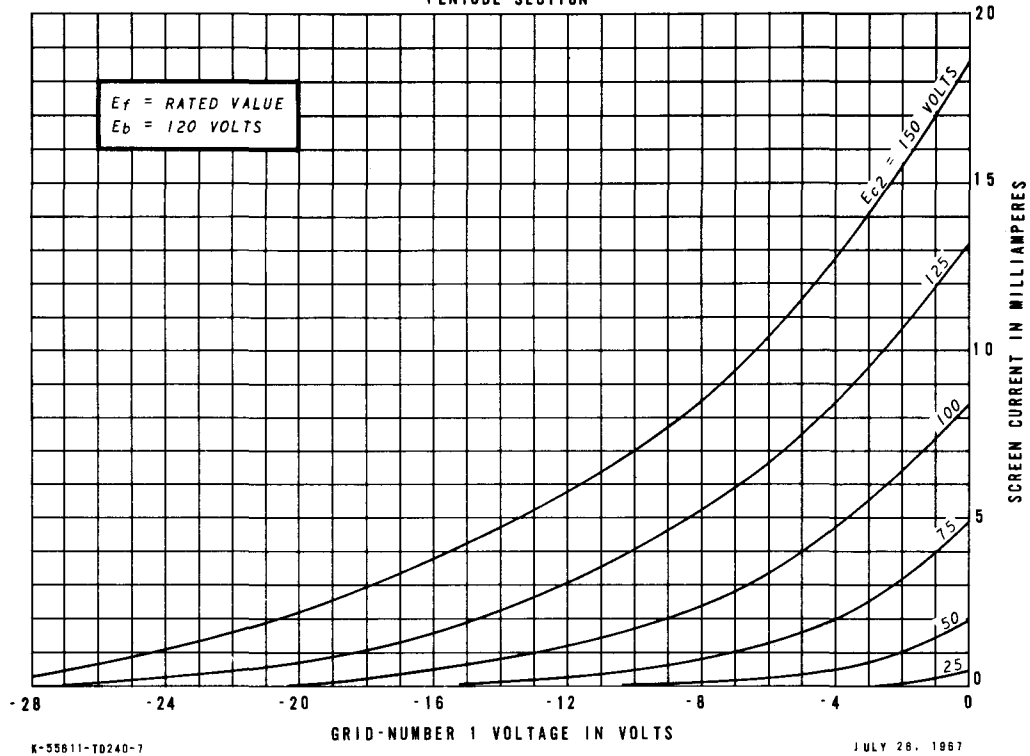
AVERAGE TRANSFER CHARACTERISTICS

PENTODE SECTION

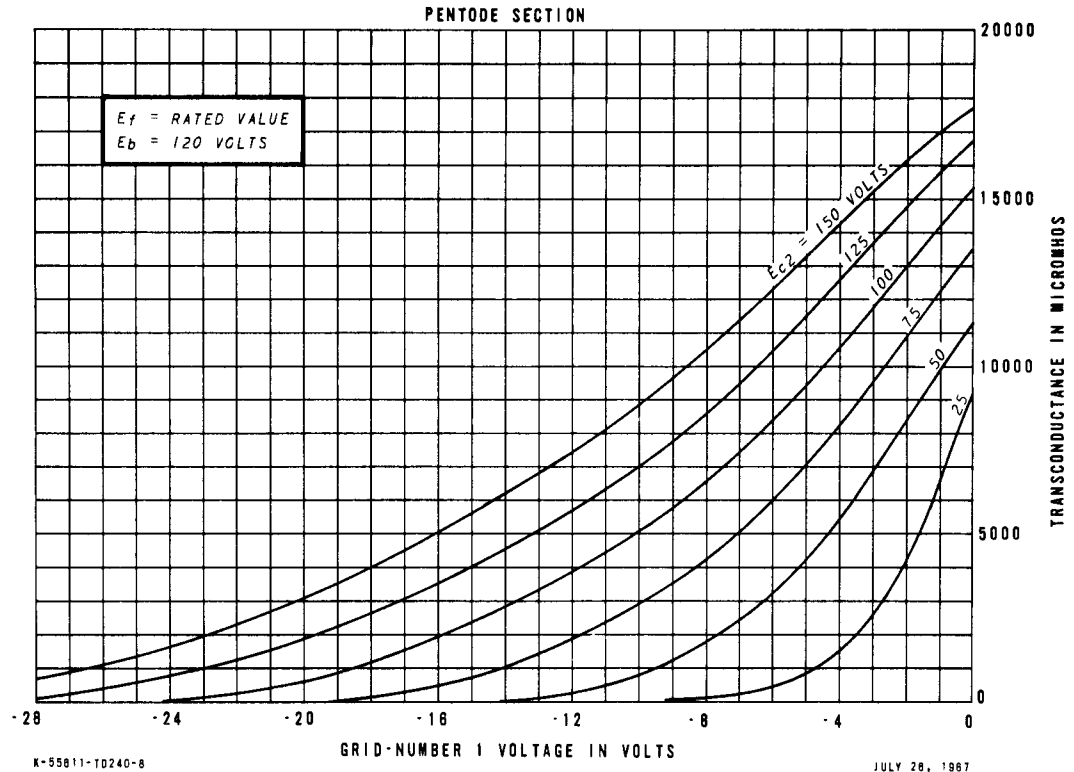


AVERAGE TRANSFER CHARACTERISTICS

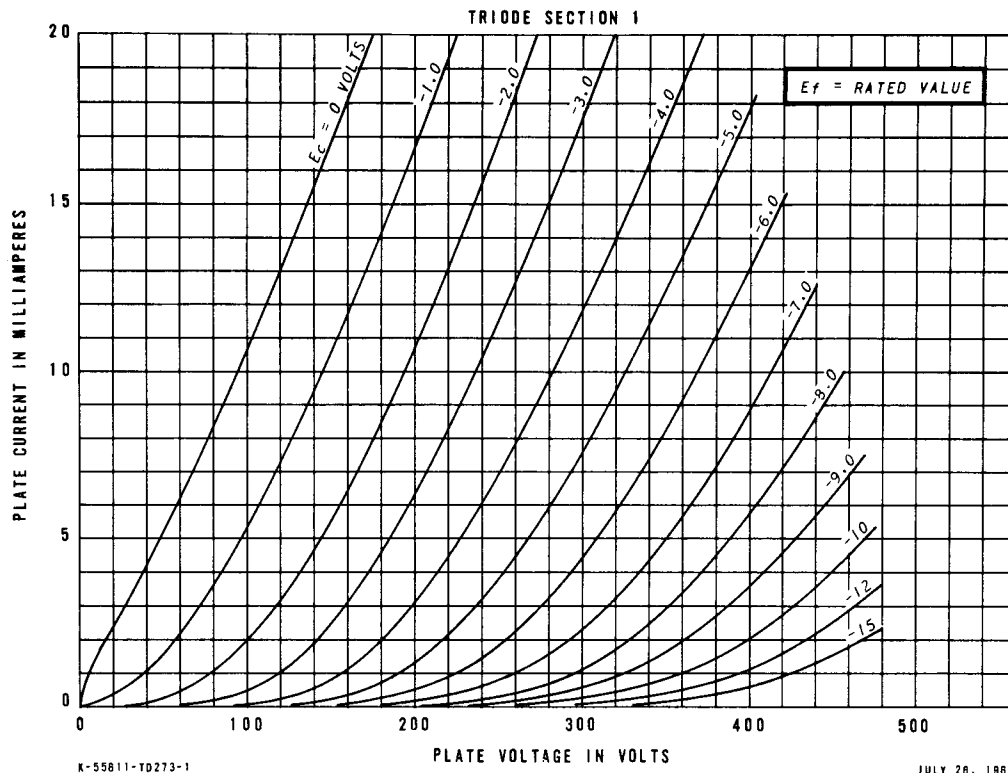
PENTODE SECTION



AVERAGE TRANSFER CHARACTERISTICS

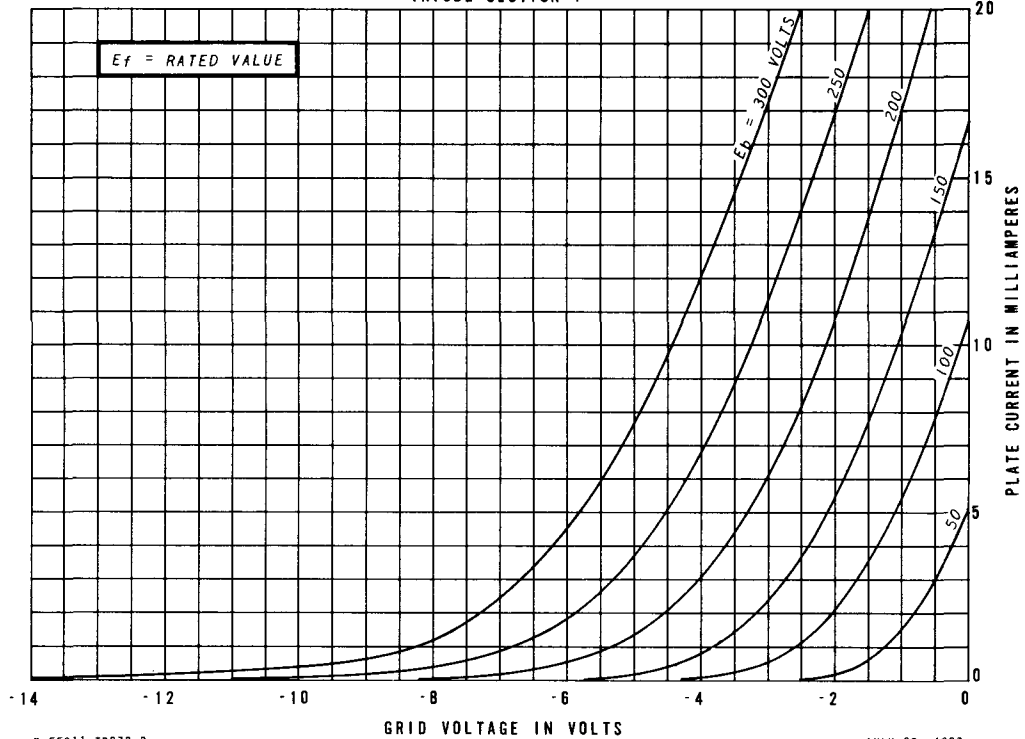


AVERAGE PLATE CHARACTERISTICS



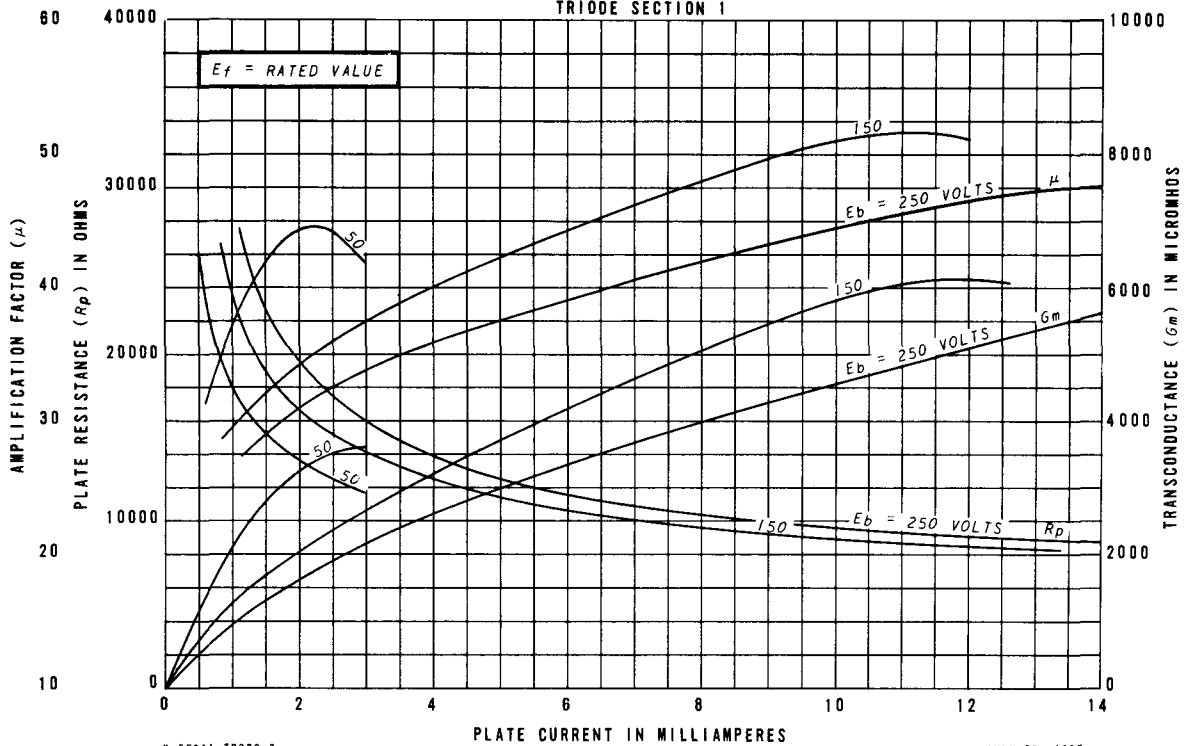
AVERAGE TRANSFER CHARACTERISTICS

TRIODE SECTION 1



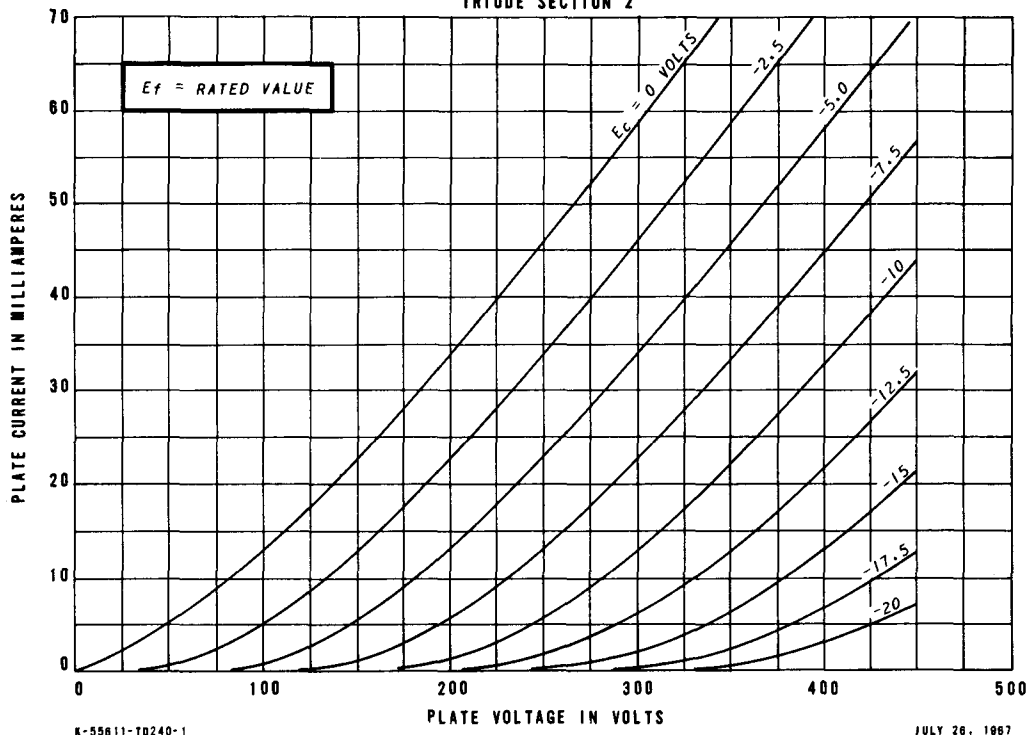
AVERAGE CHARACTERISTICS

TRIODE SECTION 1



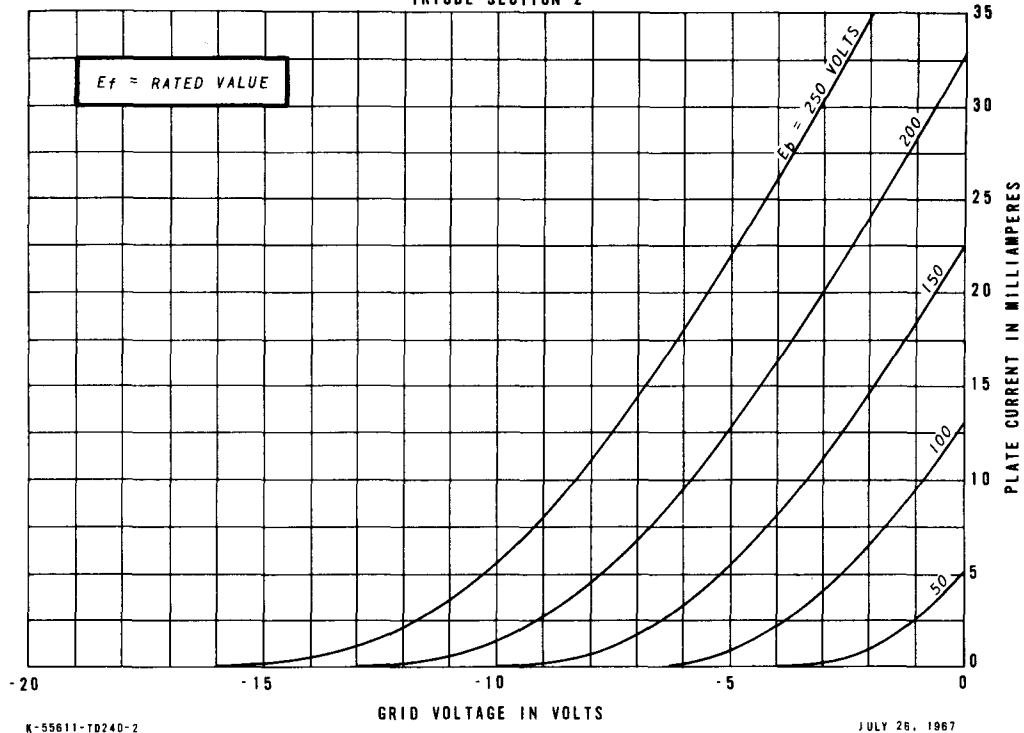
AVERAGE PLATE CHARACTERISTICS

TRIODE SECTION 2



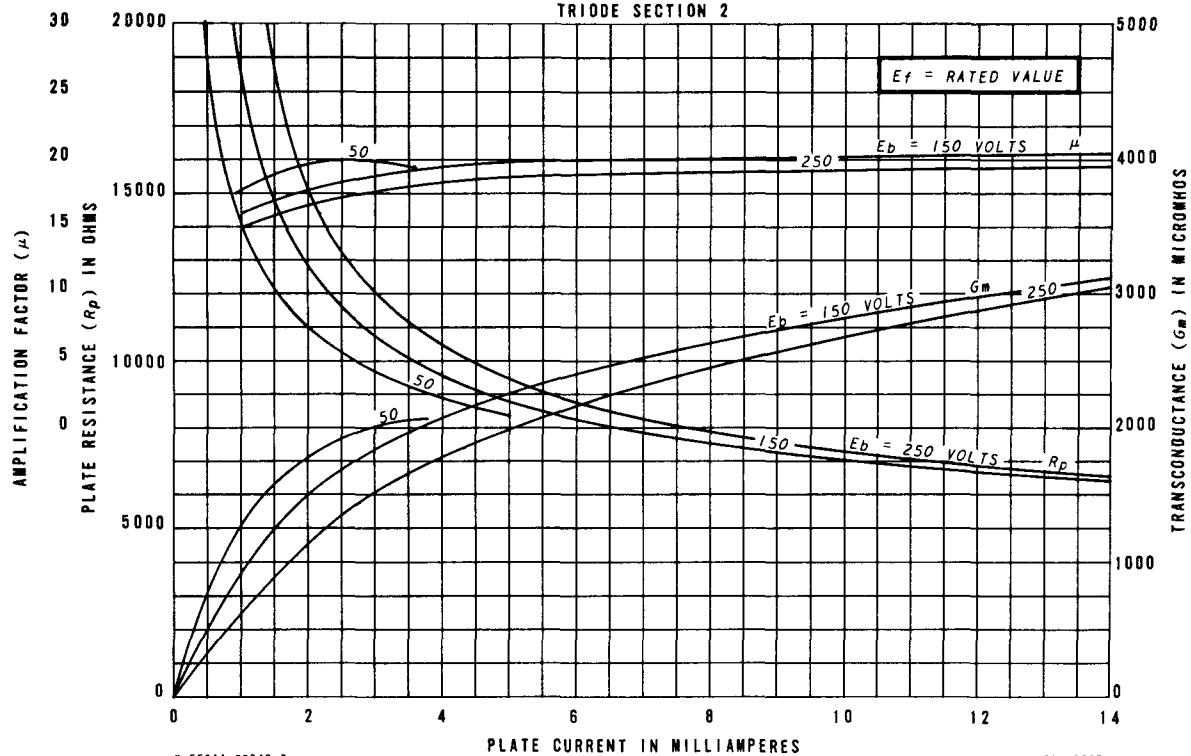
AVERAGE TRANSFER CHARACTERISTICS

TRIODE SECTION 2



AVERAGE CHARACTERISTICS

TRIODE SECTION 2



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TUBE DEPARTMENT
GENERAL  **ELECTRIC**
Owensboro, Kentucky