

# 7189-A PENTODE

## FOR AF POWER AMPLIFIER APPLICATIONS

### DESCRIPTION AND RATING

The 7189-A is a power-amplifier pentode designed for use in the audio-frequency power output stage of television and radio receivers and high-fidelity amplifiers.

The 7189-A is unilaterally interchangeable, both electrically and mechanically, with the 7189. It differs from the 7189 in having a higher screen-voltage rating and in specifying the internal connections to pins 1 and 6.

### GENERAL

#### ELECTRICAL

Cathode - Coated Unipotential

Heater Characteristics and Ratings

Heater Voltage, AC or DC\* . . . 6.3±0.6 Volts

Heater Current† . . . . . 0.76 Amperes

Direct Interelectrode Capacitances‡

Grid-Number 1 to Plate:

(g1 to p) . . . . . 0.5 pf

Input: g1 to (h + k + g2 + g3) . 10.8 pf

Output: p to (h + k + g2 + g3) . 6.5 pf

#### MECHANICAL

Operating Position - Any

Envelope - T-6 1/2, Glass

Base - E9-1, Small Button 9-Pin

Outline Drawing - EIA 6-4

Maximum Diameter . . . . . 0.875 Inches

Maximum Over-all Length. . . . 3.063 Inches

Maximum Seated Height . . . . . 2.813 Inches

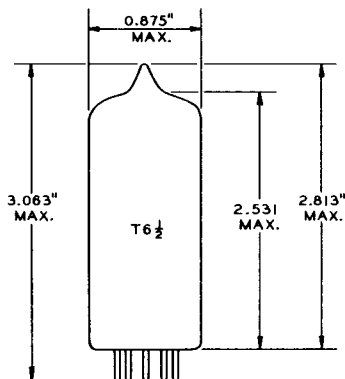
### MAXIMUM RATINGS

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.

#### PHYSICAL DIMENSIONS

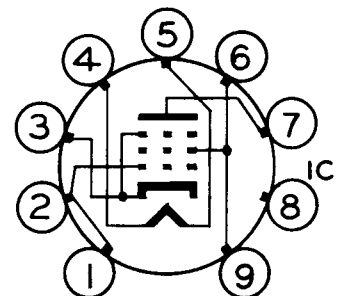


EIA 6-4

#### TERMINAL CONNECTIONS

- Pin 1 - Grid Number 1
- Pin 2 - Grid Number 1
- Pin 3 - Cathode and Grid Number 3 (Suppressor)
- Pin 4 - Heater
- Pin 5 - Heater
- Pin 6 - Grid Number 2 (Screen)
- Pin 7 - Plate
- Pin 8 - Internal Connection-Do Not Use
- Pin 9 - Grid Number 2 (Screen)

#### BASING DIAGRAM



EIA 9LE

**MAXIMUM RATINGS (Cont'd)**

**DESIGN-MAXIMUM VALUES**

Plate Voltage . . . . .	. 440	Volts
Screen Voltage . . . . .	. 400 <sup>†</sup>	Volts
Plate Dissipation . . . . .	13.2	Watts
Screen Dissipation . . . . .	. 2.2 <sup>#</sup>	Watts
DC Cathode Current . . . . .	. 72	Milliamperes
Heater-Cathode Voltage		
Heater Positive with Respect to Cathode . . . . .	. 100	Volts
Heater Negative with Respect to Cathode . . . . .	. 100	Volts
Grid-Number 1 Circuit Resistance		
With Fixed Bias . . . . .	. 0.3	Megohms
With Cathode Bias . . . . .	. 1.0	Megohms

**CHARACTERISTICS AND TYPICAL OPERATION**

**AVERAGE CHARACTERISTICS**

Plate Voltage . . . . .	. 250	Volts
Screen Voltage . . . . .	. 250	Volts
Grid-Number 1 Voltage . . . . .	-7.3	Volts
Plate Resistance, approximate . . . . .	40000	Ohms
Transconductance . . . . .	11300	Micromhos
Plate Current . . . . .	. 48	Milliamperes
Screen Current . . . . .	. 5.5	Milliamperes
Amplification Factor (Grid-Number 1 to Grid-Number 2) . . . . .	19.5	

**CLASS A<sub>1</sub> AMPLIFIER**

Plate Voltage . . . . .	. 250	250	250	250	Volts
Screen Voltage . . . . .	. 250	250	250	210	Volts
Grid-Number 1 Voltage . . . . .	-7.3	-7.3	-8.4	-6.4	Volts
Peak AF Grid-Number 1 Voltage . . . . .	. 6.1	6.2	4.95	4.8	Volts
Zero-Signal Plate Current . . . . .	. 48	48	36	36	Milliamperes
Maximum-Signal Plate Current . . . . .	. 49.5	50.6	36.8	36.6	Milliamperes
Zero-Signal Screen Current . . . . .	. 5.5	5.5	4.1	3.9	Milliamperes
Maximum-Signal Screen Current . . . . .	. 10.8	10	8.5	7.3	Milliamperes
Load Resistance . . . . .	5200	4500	7000	7000	Ohms
Total Harmonic Distortion, approximate . . . . .	. 10	10	10	10	Percent
Maximum-Signal Power Output . . . . .	. 5.7	5.7	4.2	4.3	Watts

**PUSH-PULL CLASS AB<sub>1</sub> AMPLIFIER, VALUES FOR TWO TUBES**

Plate Voltage . . . . .	. 250	300	400	Volts
Screen Voltage . . . . .	. 250	300	300	Volts
Cathode-Bias Resistor . . . . .	. 130	130	---	Ohms
Grid-Number 1 Voltage . . . . .	---	---	-15	Volts
Peak AF Grid-to-Grid Voltage . . . . .	. 22.6	28.2	30	Volts
Zero-Signal Plate Current . . . . .	. 62	72	15	Milliamperes
Maximum-Signal Plate Current . . . . .	. 75	92	105	Milliamperes
Zero-Signal Screen Current . . . . .	. 7.0	8.0	1.6	Milliamperes
Maximum-Signal Screen Current . . . . .	. 15	22	25	Milliamperes
Effective Load Resistance, Plate-to-Plate . . . . .	. 8000	8000	8000	Ohms
Total Harmonic Distortion . . . . .	. 3	4	4	Percent
Maximum-Signal Power Output . . . . .	. 11	17	24	Watts

**PUSH-PULL CLASS B AMPLIFIER, VALUES FOR TWO TUBES**

Plate Voltage . . . . .	. 250	300	Volts
Screen Voltage . . . . .	. 250	300	Volts
Grid-Number 1 Voltage . . . . .	-11.6	-14.7	Volts
Peak AF Grid-to-Grid Voltage . . . . .	. 22.6	28.2	Volts
Zero-Signal Plate Current . . . . .	. 20	15	Milliamperes
Maximum-Signal Plate Current . . . . .	. 75	92	Milliamperes
Zero-Signal Screen Current . . . . .	. 2.2	1.6	Milliamperes
Maximum-Signal Screen Current . . . . .	. 15	22	Milliamperes
Effective Load Resistance, Plate-to-Plate . . . . .	. 8000	8000	Ohms
Total Harmonic Distortion . . . . .	. 3	4	Percent
Maximum-Signal Power Output . . . . .	. 11	17	Watts

## CHARACTERISTICS AND TYPICAL OPERATION (Cont'd)

### CLASS A<sub>1</sub> AMPLIFIER, TRIODE CONNECTION <sup>Δ</sup>

Plate Voltage . . . . .	250	Volts
Cathode-Bias Resistor . . . . .	270	Ohms
Peak AF Grid-Number 1 Voltage . . . . .	9.5	Volts
Zero-Signal Plate Current . . . . .	34	Milliamperes
Maximum-Signal Plate Current . . . . .	36	Milliamperes
Load Resistance . . . . .	3500	Ohms
Total Harmonic Distortion, approximate . . . . .	9	Percent
Maximum-Signal Power Output . . . . .	1.95	Watts

### PUSH-PULL CLASS AB<sub>1</sub> AMPLIFIER, TRIODE CONNECTION, VALUES FOR TWO TUBES <sup>Δ</sup>

Plate Voltage . . . . .	250	300	Volts
Cathode-Bias Resistor . . . . .	270	270	Ohms
Peak AF Grid-to-Grid Voltage . . . . .	23.4	28.2	Volts
Zero-Signal Plate Current . . . . .	40	48	Milliamperes
Maximum-Signal Plate Current . . . . .	43.4	52	Milliamperes
Effective Load Resistance, Plate-to-Plate . . . . .	10000	10000	Ohms
Total Harmonic Distortion . . . . .	2.5	2.5	Percent
Maximum-Signal Power Output . . . . .	3.4	5.2	Watts

## NOTES

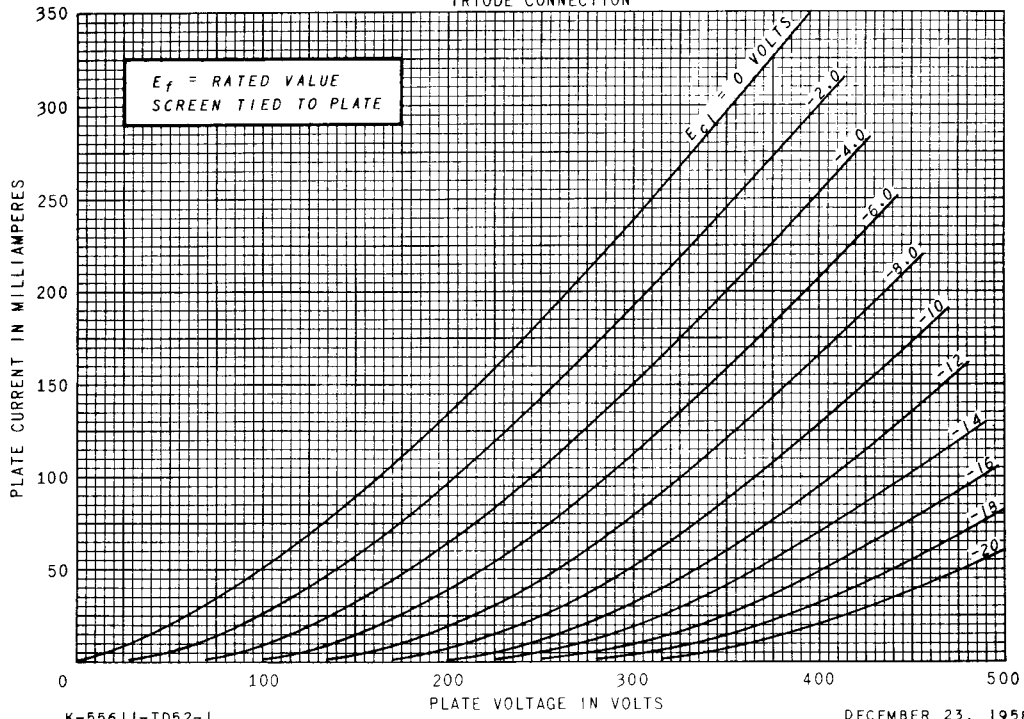
- \* The equipment designer should design the equipment so that heater voltage is centered at the specified bogey value, with heater supply variations restricted to maintain heater voltage within the specified tolerance.
- ‡ Heater current of a bogey tube at  $E_f = 6.3$  volts.
- § Without external shield.
- ¶ The Design-Maximum screen voltage rating is 415 volts in push-pull circuits where the screen of each tube is connected to a tap on the plate winding of the output transformer.
- # Screen dissipation may reach 4.4 watts during periods of maximum input of speech and music signals, under worst probable operating conditions as specified for the Design-Maximum rating system.
- Δ With screen tied to plate.

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### AVERAGE PLATE CHARACTERISTICS

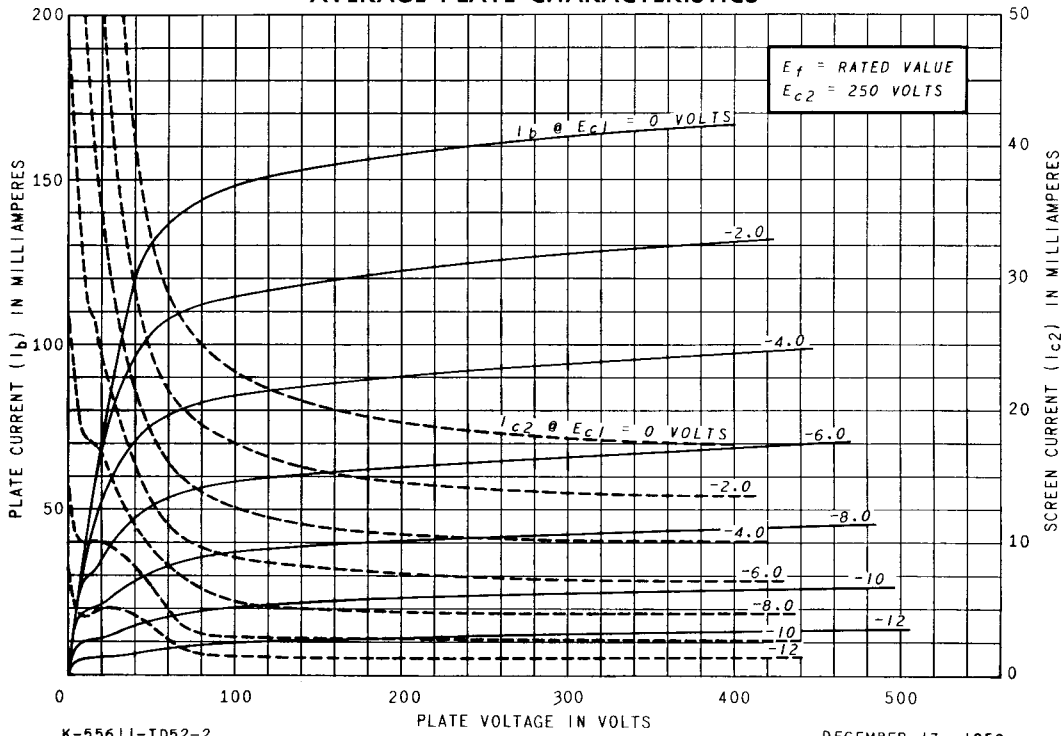
TRIODE CONNECTION



K-55611-TD52-1

DECEMBER 23, 1958

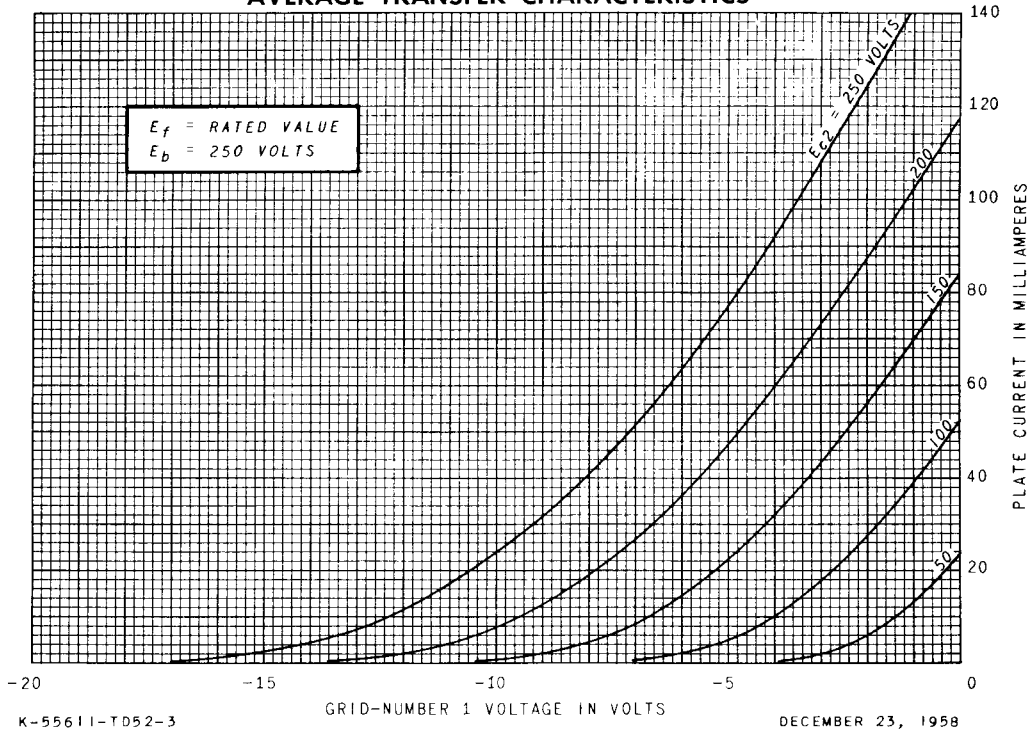
### AVERAGE PLATE CHARACTERISTICS



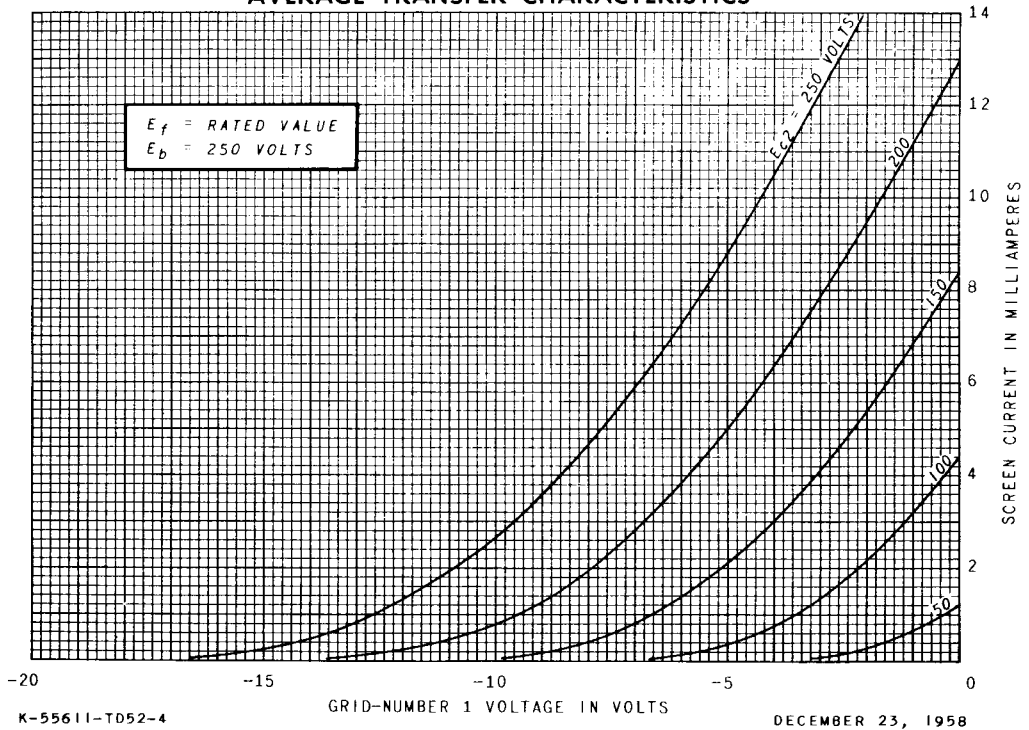
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DECEMBER 17, 1958

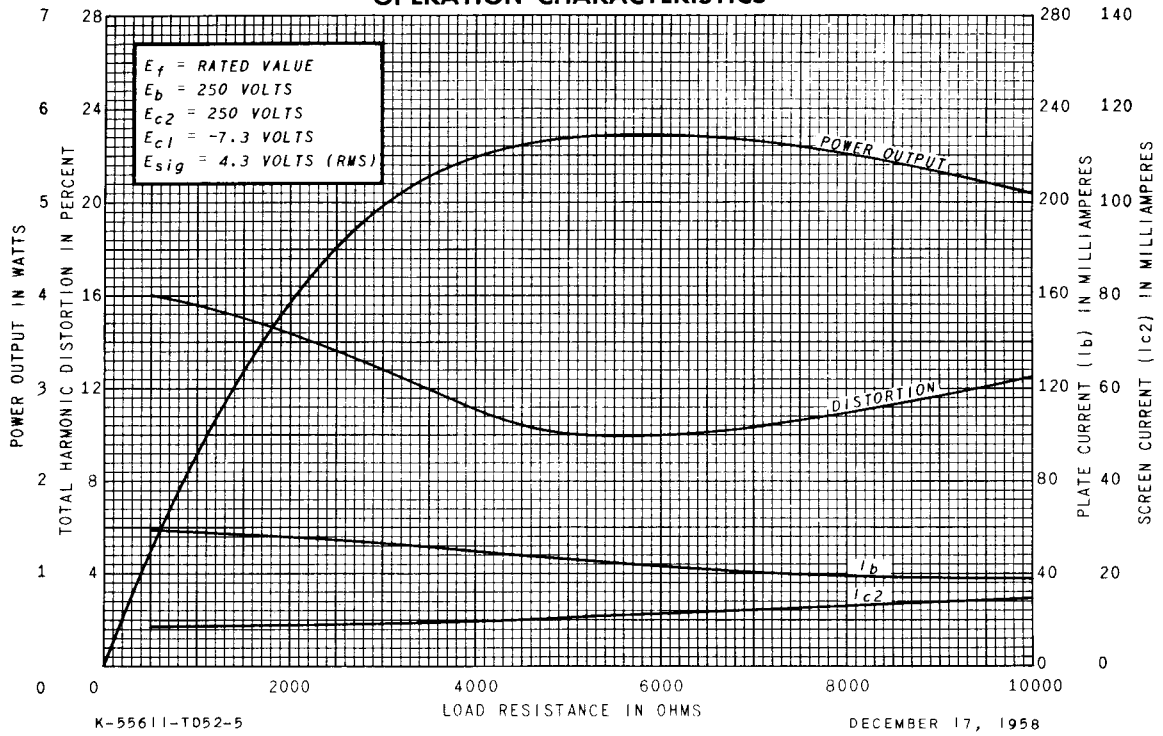
**AVERAGE TRANSFER CHARACTERISTICS**



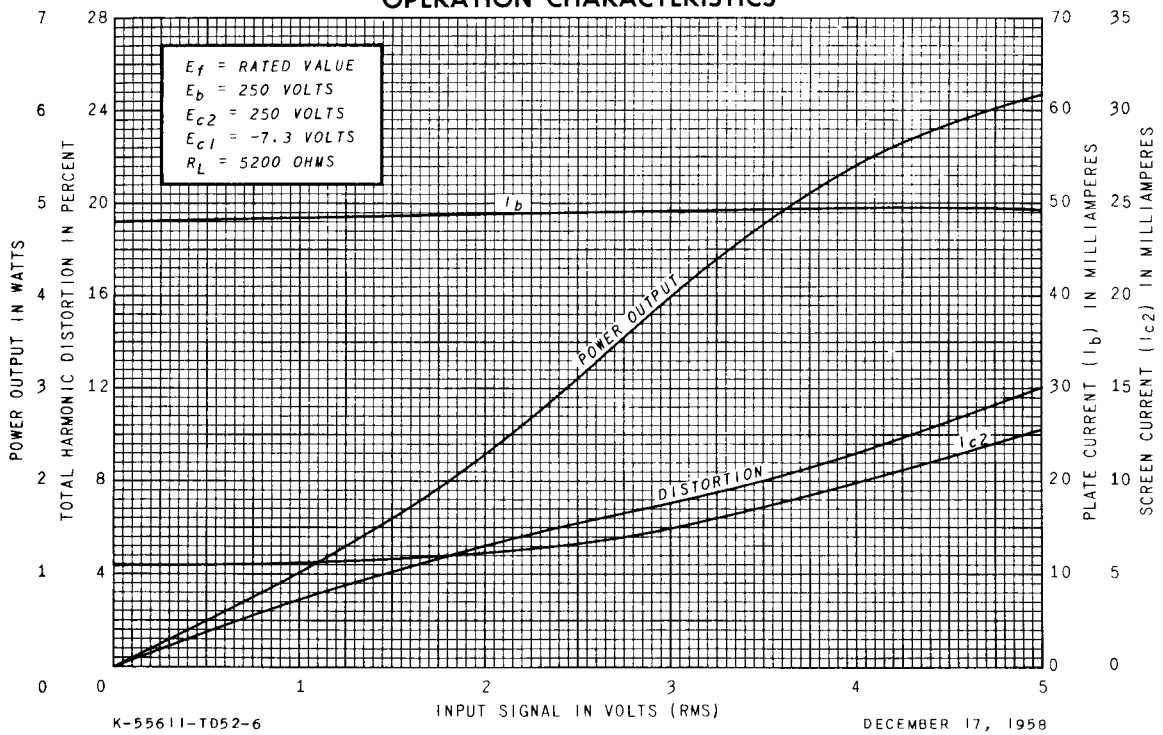
**AVERAGE TRANSFER CHARACTERISTICS**



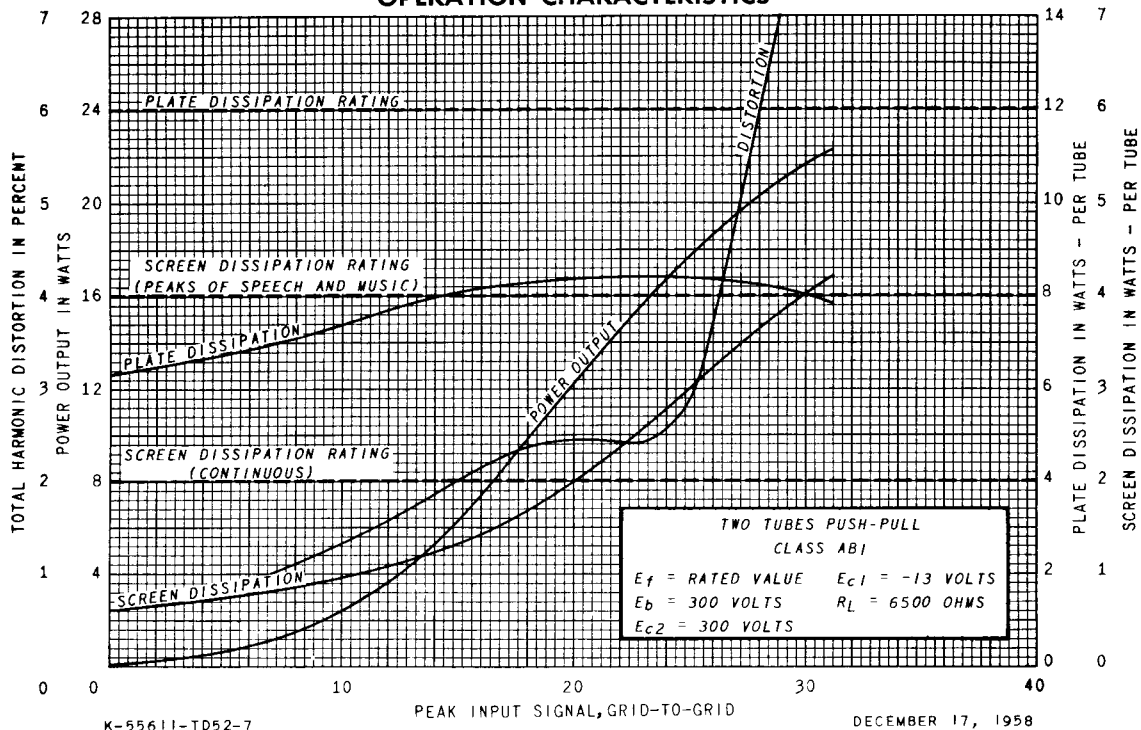
### OPERATION CHARACTERISTICS



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