



### COMPACTRON BEAM PENTODE FOR RADIO-FREQUENCY POWER AMPLIFIER APPLICATIONS

#### DESCRIPTION AND RATING

The 8156 is a compactron beam pentode designed for use as a radio-frequency power amplifier in mobile equipment.

#### GENERAL

##### ELECTRICAL

Cathode - Coated Unipotential	
Heater Characteristics and Ratings	
Heater Voltage, AC or DC* . . .	13.5±1.5 Volts
Heater Current† . . . . .	0.3 Amperes
Direct Interelectrode Capacitances§	
Grid-Number 1 to Plate:	
(g1 to p) . . . . .	0.07 pf
Input: g1 to (h + k +	
g2 + b.p.) . . . . .	. 11 pf
Output: p to (h + k +	
g2 + b.p.) . . . . .	5.0 pf

##### MECHANICAL

Operating Position - Any	
Envelope - T-9, Glass	
Base - E12-70, Button 12-Pin	
Outline Drawing	
Maximum Diameter . . . . .	1.188 Inches
Maximum Over-all Length. . . . .	2.313 Inches
Maximum Seated Height . . . . .	1.938 Inches

#### MAXIMUM RATINGS

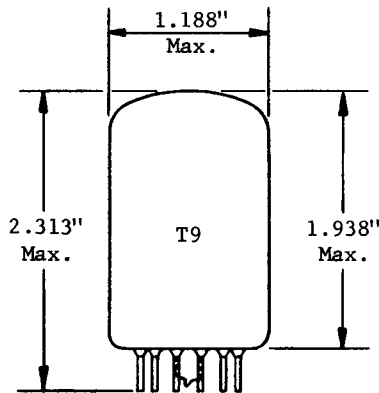
Absolute-Maximum ratings are limiting values of operating and environmental conditions applicable to any electron tube of a specified type as defined by its published data and should not be exceeded under the worst probable conditions.

The tube manufacturer chooses these values to provide acceptable serviceability of the tube, making no allowance for equipment variations, environmental variations, and the effects of changes in operating conditions due to variations in the characteristics of the tube under consideration and of

all other electron devices in the equipment.

The equipment manufacturer should design so that initially and throughout life no absolute-maximum value for the intended service is exceeded with any 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 the tube under consideration and of all other electron devices in the equipment.

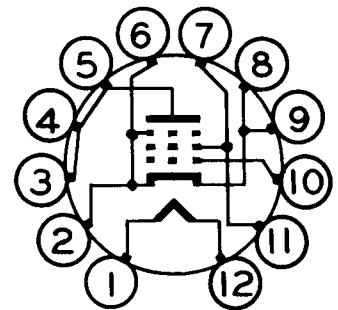
##### PHYSICAL DIMENSIONS



##### TERMINAL CONNECTIONS

- Pin 1 - Heater
- Pin 2 - Cathode and Beam Plates
- \*\*Pin 3 - Plate
- \*\*Pin 4 - Plate
- \*\*Pin 5 - Plate
- Pin 6 - Cathode and Beam Plates
- Pin 7 - Grid Number 2 (Screen)
- Pin 8 - Cathode and Beam Plates
- Pin 9 - Cathode and Beam Plates
- Pin 10 - Grid Number 1
- Pin 11 - Grid Number 2 (Screen)
- Pin 12 - Heater

##### BASING DIAGRAM



EIA 12EU

**MAXIMUM RATINGS (Cont'd)****RADIO-FREQUENCY POWER AMPLIFIER AND OSCILLATOR—CLASS C TELEGRAPHY AND  
RADIO-FREQUENCY POWER AMPLIFIER—CLASS C FM TELEPHONY****ABSOLUTE-MAXIMUM VALUES**

	CCS <sup>¶</sup>	ICAS <sup>#</sup>	IMS <sup>Δ</sup>	
DC Plate Voltage . . . . .	500	600	600	Volts
DC Screen Voltage . . . . .	250	250	250	Volts
DC Grid-Number 1 Voltage . . . . .	-100	-100	-150	Volts
DC Grid-Number 1 Current . . . . .	5.0	5.0	5.0	Milliamperes
DC Plate Current . . . . .	100	100	100	Milliamperes
Plate Dissipation . . . . .	11	13	15	Watts
Screen Dissipation . . . . .	2.5	2.5	2.5	Watts
Peak Heater-Cathode Voltage				
Heater Positive with Respect to Cathode . . . . .	100	100	100	Volts
Heater Negative with Respect to Cathode . . . . .	100	100	100	Volts
Bulb Temperature at Hottest Point . . . . .	220	220	220	C

**CHARACTERISTICS AND TYPICAL OPERATION****AVERAGE CHARACTERISTICS**

Plate Voltage . . . . .	200	Volts
Screen Voltage . . . . .	125	Volts
Grid-Number 1 Voltage . . . . .	-9.0	Volts
Plate Current . . . . .	75	Milliamperes
Screen Current . . . . .	3.5	Milliamperes
Transconductance . . . . .	7600	Micromhos
Grid-Number 1 Voltage, approximate		
I <sub>b</sub> = 100 Microamperes . . . . .	-45	Volts

**TYPICAL OPERATION AS CLASS C AMPLIFIER**

	CCS <sup>¶</sup>	ICAS <sup>#</sup>	IMS <sup>Δ</sup>	
Frequency . . . . .	175	175	175	Megacycles
DC Plate Voltage . . . . .	250	300	400	Volts
DC Screen Voltage . . . . .	185	180	170	Volts
DC Grid-Number 1 Voltage, approximate . . . . .	-70	-80	-60	Volts
Grid-Number 1 Resistor . . . . .	20000	20000	20000	Ohms
DC Plate Current . . . . .	100	95	90	Milliamperes
DC Screen Current . . . . .	11	10	10	Milliamperes
DC Grid-Number 1 Current, approximate . . . . .	3.5	4	3	Milliamperes
Driving Power, approximate . . . . .	1	1	1	Watts
Useful Power Output, approximate . . . . .	14	15.5	21	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<sub>f</sub> = 13.5 volts.

§ Without external shield

¶ Continuous Commercial Service (CCS) is defined as that type of service in which normal tube life and reliability of performance under continuous operating conditions are the prime consideration.

# Intermittent Commercial and Amateur Service (ICAS) is defined to include the many applications where the transmitter design factors of minimum size, light weight, and considerably increased power output are more important than long tube life. In this service, life expectancy may be one-half that obtained in Continuous Commercial Service.

Under the ICAS classification are such applications as the use of tubes in amateur transmitters, and the use of tubes in equipment where transmissions are of an intermittent nature. The term "intermittent" is used to identify operation conditions in all applications other than amateur in which no operating or "on" period exceeds 5 minutes and every "on" period is followed by an "off" or standby period of at least the same or greater duration.

### NOTES (Cont'd)

Δ Intermittent Mobile Service (IMS) is defined to include those applications, such as aircraft, where the transmitter design factors of minimum size, light weight, and exceedingly high power output for short intervals are the primary requirements even though the average life expectancy of tubes used in such transmitters is reduced. Tube ratings for IMS service are established on the basis that the transmissions have maximum "on" periods of 15 seconds followed by "off" periods of at least 60 seconds, except that it is permissible to make equipment tests with maximum "on" periods of 5 minutes followed by "off" periods of at least 5 minutes provided the total "on" time of such periods does not exceed 10 hours during the life of any tube.

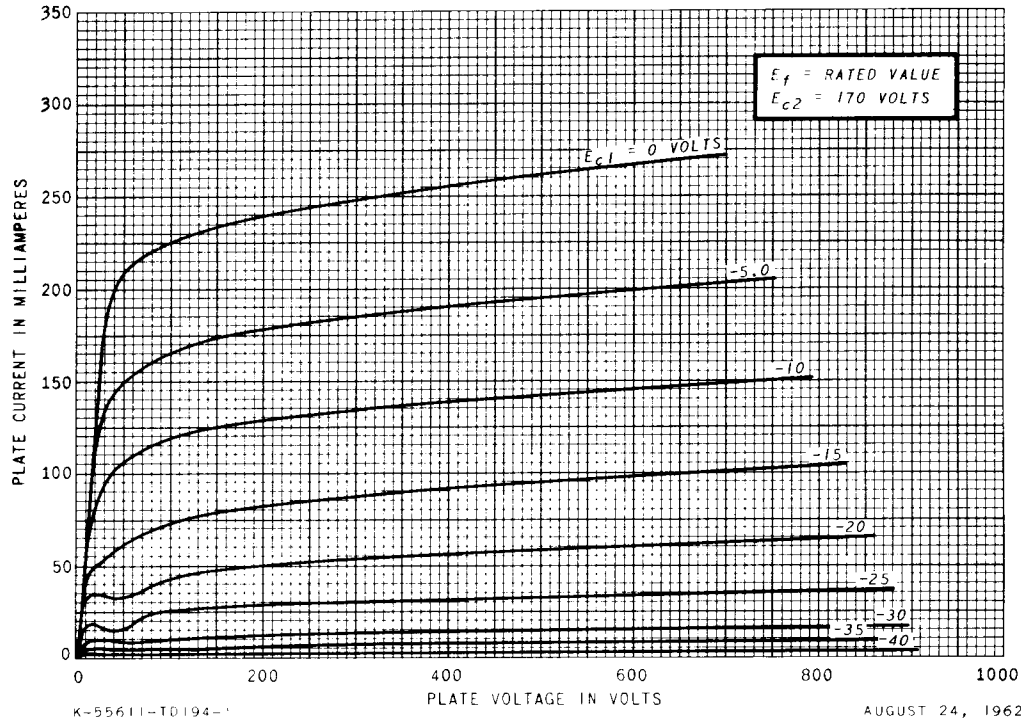
Although the use of tubes under IMS ratings involve great reduction in tube life, such use can be justified as economical practice in applications where high power is intermittently desired from small tubes.

\*\* Socket contacts for these three pins should be connected together.

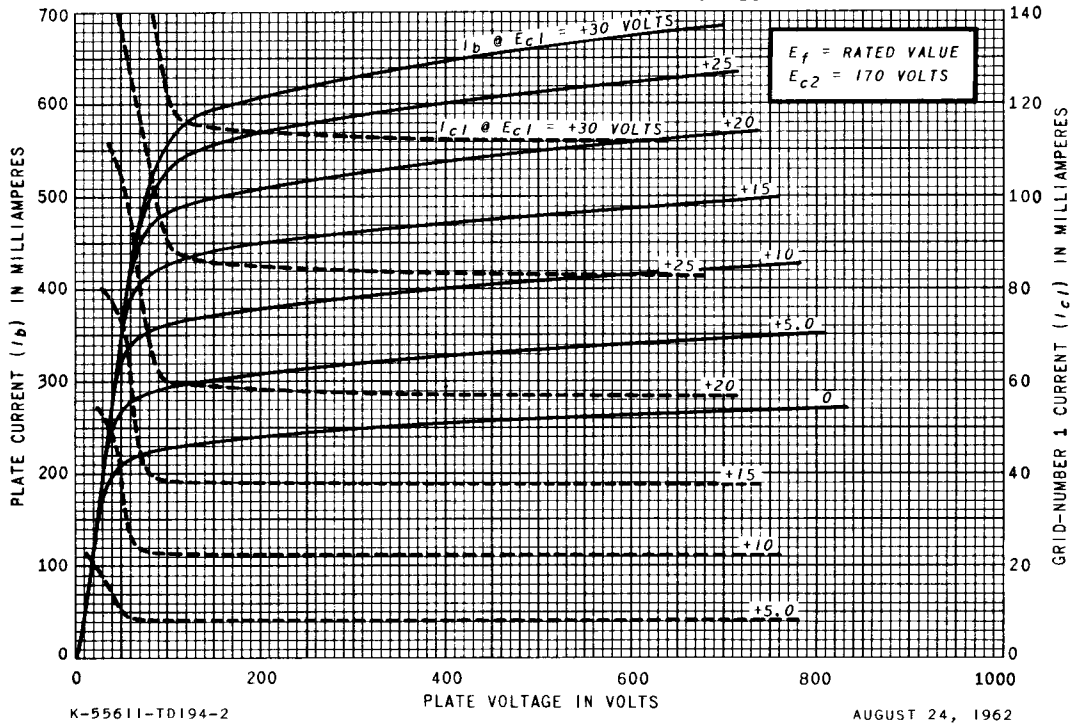
The tubes and arrangements disclosed herein may be covered by patents of General Electric Company or others. Neither the disclosure of any information herein nor the sale of tubes by General Electric Company conveys any license under patent claims covering combinations of tubes with other devices or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

express written agreement to the contrary, General Electric Company assumes no liability for patent infringement arising out of any use of the tubes with other devices or elements by any purchaser of tubes or others.

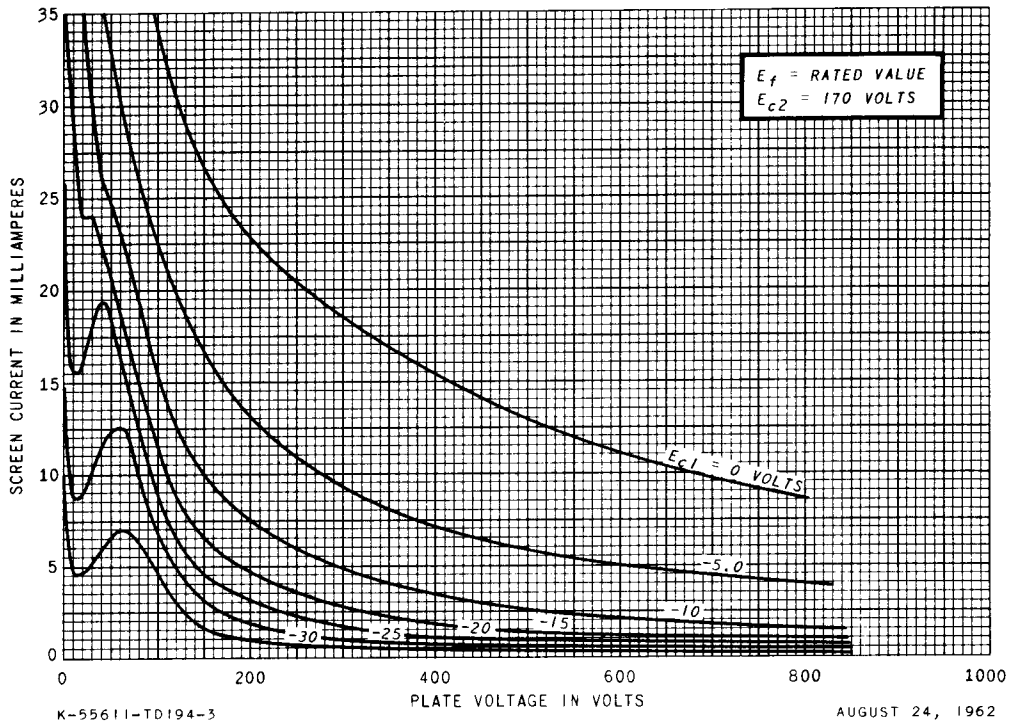
### AVERAGE PLATE CHARACTERISTICS



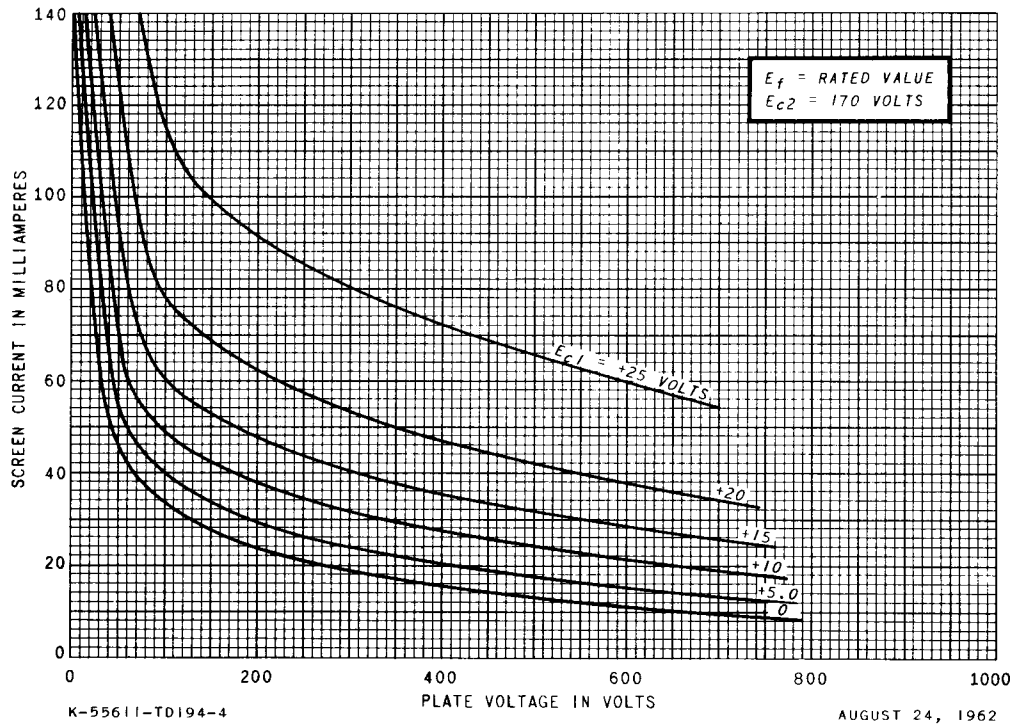
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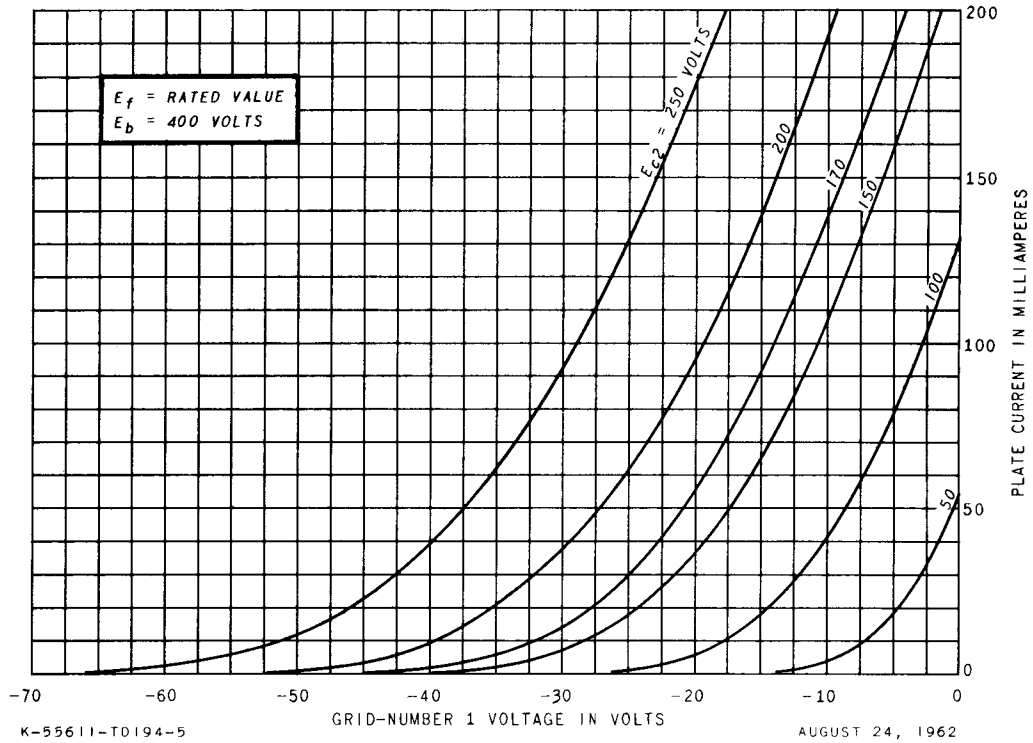
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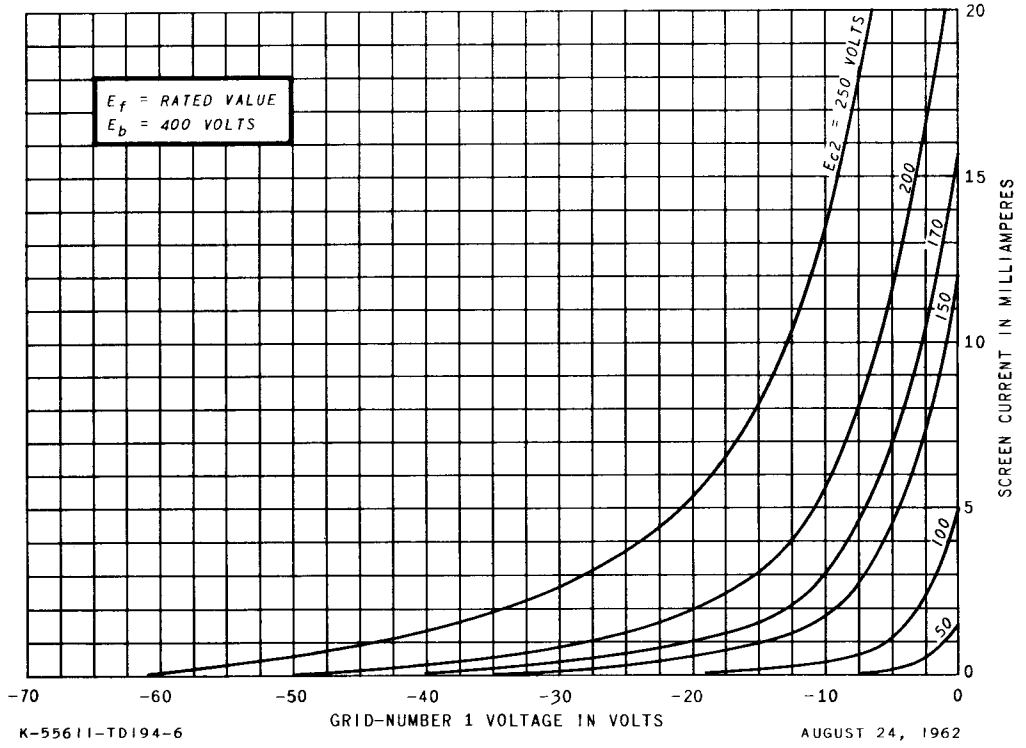
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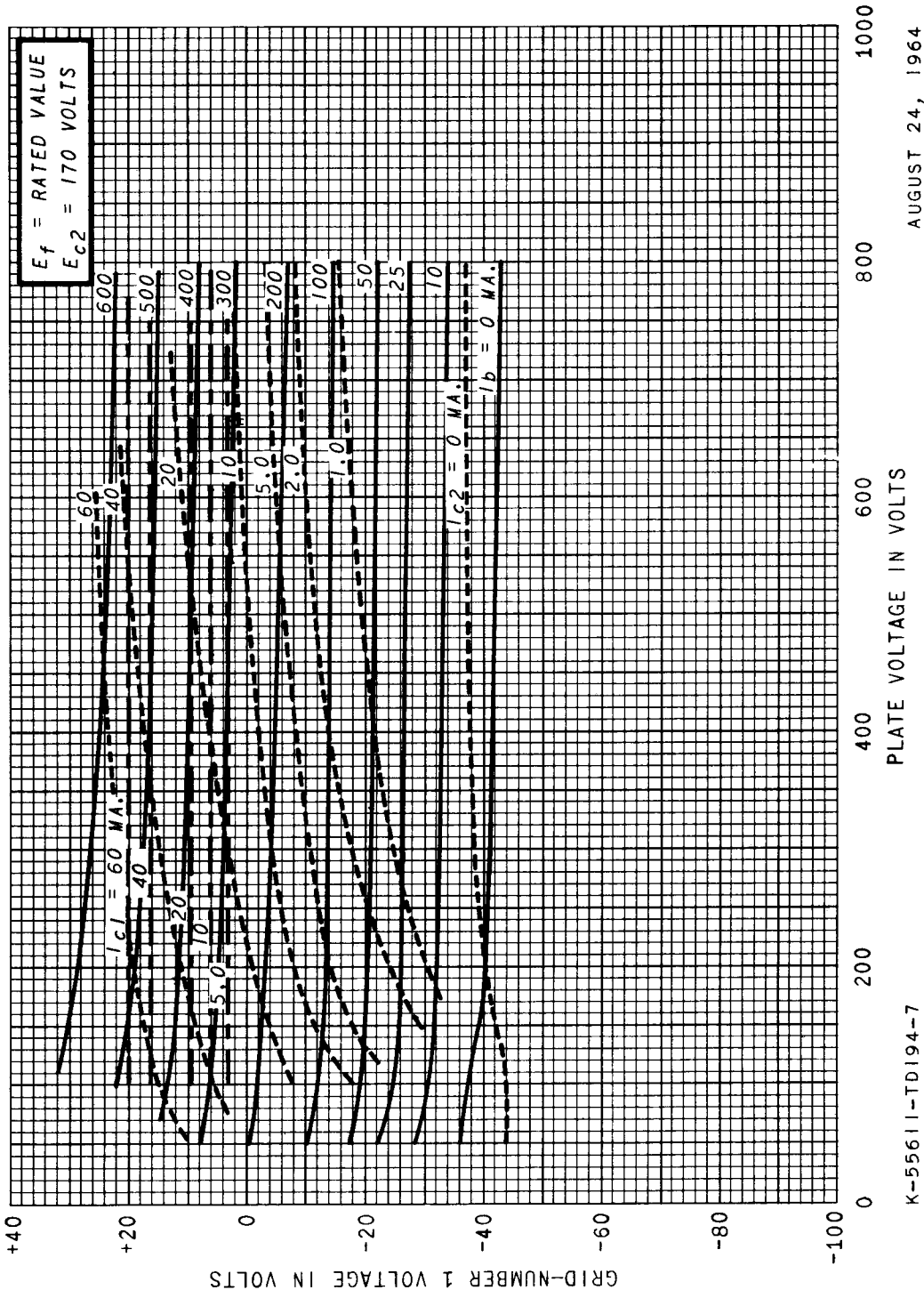
### AVERAGE TRANSFER CHARACTERISTICS



### AVERAGE TRANSFER CHARACTERISTICS



# AVERAGE CONSTANT-CURRENT CHARACTERISTICS



AUGUST 24, 1964

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TUBE DEPARTMENT  
**GENERAL**  **ELECTRIC**  
Owensboro, Kentucky