Electronic TUBES

6005
BEAM PENTODE

Five-Star Tube

★ ★ ★ ★ ★

FOR AF POWER AMPLIFIER APPLICATIONS

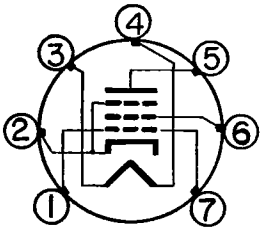
7-PIN MINIATURE
HEATER-CYCLING RATING
SHOCK, VIBRATION RATINGS
POWER OUTPUT—4.5 WATTS

DESCRIPTION AND RATING

The 6005 is a miniature beam-power pentode for use as an audio-frequency power amplifier. In this application the tube is capable of delivering an output of approximately 4.5 watts.

The 6005 is a special-quality tube for use in critical industrial and military applications in which operational dependability is of primary importance. Features of the tube include a high degree of mechanical strength and a heater-cathode construction capable of withstanding many-thousand cycles of intermittent operation. When used in on-off control applications, the tube will maintain its emission capabilities after long periods of operation under cutoff conditions.

BASING DIAGRAM

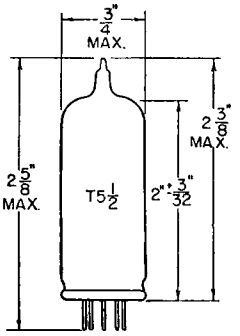


RETMA 7BZ

TERMINAL CONNECTIONS

Pin 1—Grid Number 1
Pin 2—Cathode and Beam Plates
Pin 3—Heater
Pin 4—Heater
Pin 5—Plate
Pin 6—Grid Number 2 (Screen)
Pin 7—Grid Number 1

PHYSICAL DIMENSIONS



RETMA 5-3

GENERAL

ELECTRICAL

Cathode—Coated Unipotential		
Heater Voltage, AC or DC	6.3 ± 10%	Volts
Heater Current	0.45	Amperes
Direct Interelectrode Capacitances*		
Grid-Number 1 to Plate	0.54	μμf
Input	8.3	μμf
Output	7.5	μμf

* Without external shield.

MECHANICAL

Mounting Position—Any
Envelope—T-5½, Glass
Base—E7-1, Miniature Button 7-Pin

GENERAL ELECTRIC

Supersedes ET-T1100 dated 8-54

MAXIMUM RATINGS

DESIGN-MAXIMUM VALUES†

Plate Voltage	275	Volts
Screen Voltage	275	Volts
Plate Dissipation	11	Watts
Screen Dissipation	2.2	Watts
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	0.1	Megohms
With Cathode Bias	0.5	Megohms
Bulb Temperature at Hottest Point	225	C

† Design-Maximum Ratings are the limiting values expressed with respect to bogie tubes at which satisfactory tube life can be expected to occur for the types of service for which the tube is rated. Therefore, the equipment designer must establish the circuit design so that initially and throughout equipment life no design-maximum value is exceeded with a bogie tube under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation, and environmental conditions.

CHARACTERISTICS AND TYPICAL OPERATION

CLASS A_1 AMPLIFIER

Plate Voltage	180	250	Volts
Screen Voltage	180	250	Volts
Grid-Number 1 Voltage	−8.5	−12.5	Volts
Peak AF Grid-Number 1 Voltage	8.5	12.5	Volts
Plate Resistance, approximate	58,000	52,000	Ohms
Transconductance	3700	4100	Micromhos
Zero-Signal Plate Current	29	45	Milliamperes
Maximum-Signal Plate Current	30	47	Milliamperes
Zero-Signal Screen Current	3	4.5	Milliamperes
Maximum-Signal Screen Current	4	7	Milliamperes
Load Resistance	5500	5000	Ohms
Total Harmonic Distortion, approximate	8	8	Percent
Maximum-Signal Power Output	2.0	4.5	Watts

PUSH-PULL CLASS AB_1 AMPLIFIER, VALUES FOR TWO TUBES

Plate Voltage	250	Volts
Screen Voltage	250	Volts
Grid-Number 1 Voltage	−15	Volts
Peak AF Grid-to-Grid Voltage	30	Volts
Zero-Signal Plate Current	70	Milliamperes
Maximum-Signal Plate Current	79	Milliamperes
Zero-Signal Screen Current	5	Milliamperes
Maximum-Signal Screen Current	13	Milliamperes
Effective Load Resistance, Plate-to-Plate	10,000	Ohms
Total Harmonic Distortion	5	Percent
Maximum-Signal Power Output	10	Watts

CHARACTERISTICS LIMITS

		Minimum	Maximum	
Heater Current				
Ef = 6.3 volts	Initial	410	490	Milliamperes
	500-Hr	410	500	Milliamperes
	1000-Hr	410	510	Milliamperes
Plate Current				
Ef = 6.3 volts, Eb = 250 volts, Ec2 = 250 volts, Ec1 = −12.5 volts	Initial	33	57	Milliamperes
Screen Current				
Ef = 6.3 volts, Eb = 250 volts, Ec2 = 250 volts, Ec1 = −12.5 volts	Initial	...	7.5	Milliamperes
Transconductance				
Ef = 6.3 volts, Eb = 250 volts, Ec2 = 250 volts, Ec1 = −12.5 volts	Initial	3000	5200	Micromhos
Power Output (1)				
Ef = 6.3 volts, Eb = 250 volts, Ec2 = 250 volts, Ec1 = −12.5 volts, R_L = 5000 ohms, Esig = 8.8 volts RMS	Initial	3.6	...	Watts
Power Output Change with Heater Voltage				
Difference between Power Output (1) and Power Output at Ef = 5.7 volts (other conditions the same) expressed as a percentage of Power Output (1)	Initial	...	15	Percent
	500-Hr	...	15	Percent
Power Output Change with Operation				
Difference between Power Output (1) initially and after operation expressed as a percentage of initial value	500-Hr	...	15	Percent
	1000-Hr	...	20	Percent
Average Power Output Change with Operation				
Average of values for "Power Output Change with Operation"	500-Hr	...	10	Percent
Plate Current Cutoff				
Ef = 6.3 volts, Eb = 250 volts, Ec2 = 250 volts, Ec1 = −60 volts	Initial	...	200	Microamperes
Interelectrode Capacitances				
Grid-Number 1 to Plate (g1 to p)	Initial	...	0.8	μμf
Input (g1 to h, k, g2)	Initial	6.4	9.6	μμf
Output (p to h, k, g2)	Initial	6.0	11.0	μμf
Measured without external shield.				
Negative Grid-Number 1 Current				
Ef = 6.3 volts, Eb = 250 volts, Ec2 = 250 volts, Ecc1 = −12.5 volts, Rg1 = 0.5 meg	Initial	...	1.0	Microamperes
	500-Hr	...	1.0	Microamperes
	1000-Hr	...	1.0	Microamperes
Heater-Cathode Leakage Current				
Ef = 6.3 volts, Ehk = 100 volts				
Heater Positive with Respect to Cathode	Initial	...	20	Microamperes
	500-Hr	...	20	Microamperes
	1000-Hr	...	20	Microamperes
Heater Negative with Respect to Cathode	Initial	...	20	Microamperes
	500-Hr	...	20	Microamperes
	1000-Hr	...	20	Microamperes

CHARACTERISTICS LIMITS CONTINUED ON PAGE 4

CHARACTERISTICS LIMITS (Continued)

		Minimum	Maximum	
Interelectrode Leakage Resistance				
Ef = 6.3 volts, Polarity of applied d-c interelectrode voltage is such that no cathode emission results.				
Grid-Number 1 to All at 100 Volts DC	Initial	100	...	Megohms
	500-Hr	50	...	Megohms
Plate to All at 300 Volts DC	Initial	100	...	Megohms
	500-Hr	50	...	Megohms
Vibrational Noise Output Voltage, RMS				
Ef = 6.3 volts, Ebb = 250 volts, Ec2 = 250 volts, Ec1 = −25 volts, R_L = 2000 ohms, Vibrational acceleration = 2.5 G at 25 cps	Initial	...	150	Millivolts
Grid-Number 1 Emission Current				
Ef = 7.5 volts, Eb = 250 volts, Ec2 = 250 volts, Ecc1 = −50 volts, Rg1 = 0.5 meg	Initial	...	4.0	Microamperes
Primary Screen Grid Emission Current				
Ef = 6.3 volts, Eb = 0 volts, Ec2 = 50 volts RMS 60 Cycles, Ec1 adjusted for Ic2 = 16.1 ma d-c on positive half cycles, Screen Grid Emission read on negative half cycles	Initial	...	750	Microamperes

The indicated 500 and 1000-hour values are life-test end points for the following conditions of operation: Ef = 6.3 volts, Eb = 250 volts, Ec2 = 250 volts, Rk = 250 ohms, Rg1 = 0.5 meg, Ehk = 135 volts with heater positive with respect to cathode, and bulb temperature = 225 C minimum.

SPECIAL TESTS AND RATINGS

Stability Life Test
Statistical sample operated for one hour to evaluate and control initial variations in power output.

Survival Rate Life Test
Statistical sample operated for one hundred hours to evaluate and control early-life electrical and mechanical inoperatives.

Heater-Cycling Life Test
Statistical sample operated for 2000 cycles minimum to evaluate and control heater-cathode defects. Conditions of test include Ef = 7.5 volts cycled for one minute on and one minute off, Eb = Ec2 = Ec1 = 0 volts, and Ehk = 135 volts with heater positive with respect to cathode.

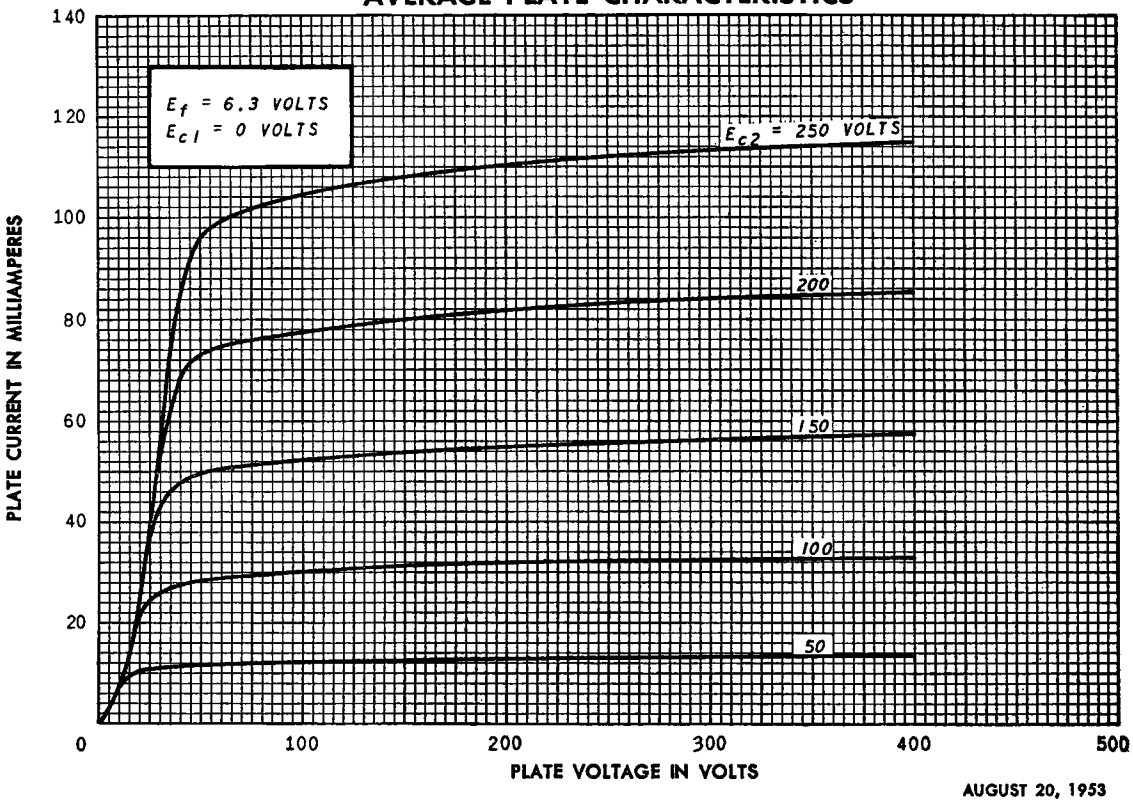
Shock Rating—450 G
Statistical sample subjected to five impact accelerations of 450 G in each of four different positions. The accelerating forces are applied by the Navy-type, High Impact (flyweight) Shock Machine for Electronic Devices or its equivalent.

Fatigue Rating—2.5 G
Statistical sample subjected to vibrational acceleration of 2.5 G for 32 hours minimum in each of three different positions. The sinusoidal vibration is applied at a fixed frequency between 25 and 60 cycles per second.

Altitude Rating—60,000 Feet
Statistical sample subjected to pressure of 55 millimeters of mercury to evaluate and control arcing and corona.

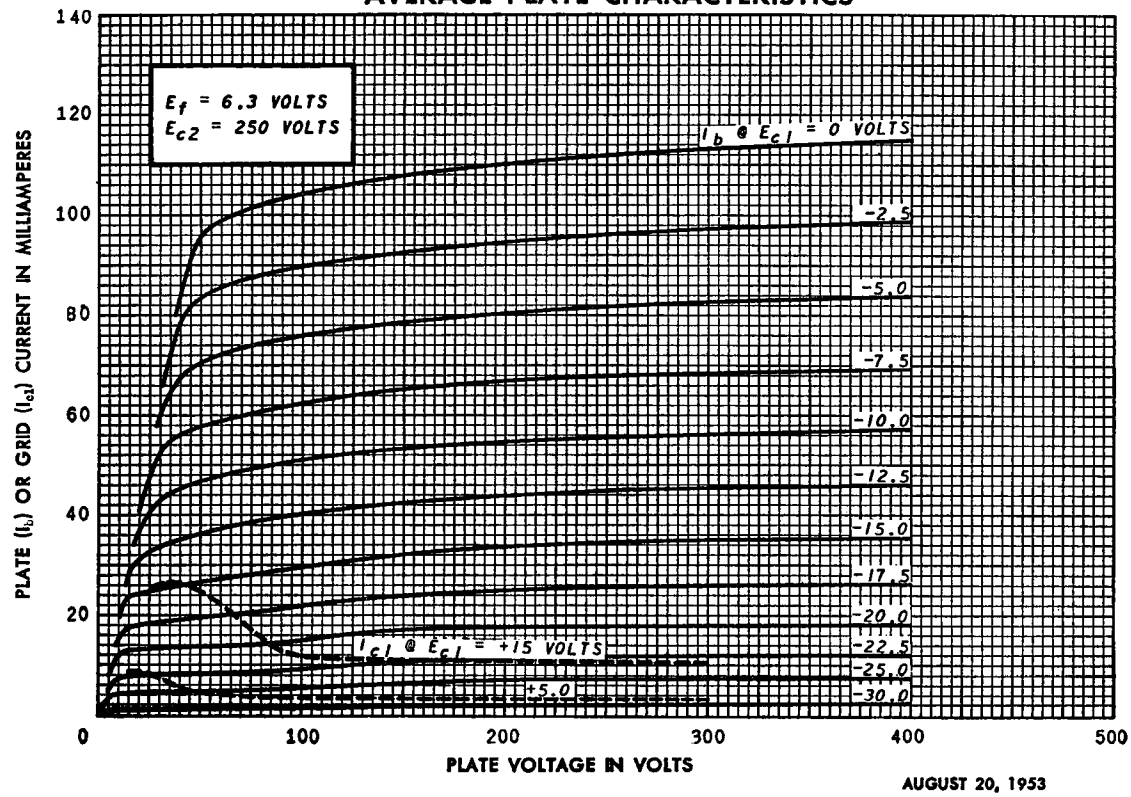
Note: The conditions for some of the indicated tests have deliberately been selected to aggravate tube failures for test and evaluation purposes. In no sense should these conditions be interpreted as suitable circuit operating conditions.
In the design of military equipment employing this tube, reference should be made to the appropriate MIL-E-1C specification.

AVERAGE PLATE CHARACTERISTICS



AUGUST 20, 1953

AVERAGE PLATE CHARACTERISTICS



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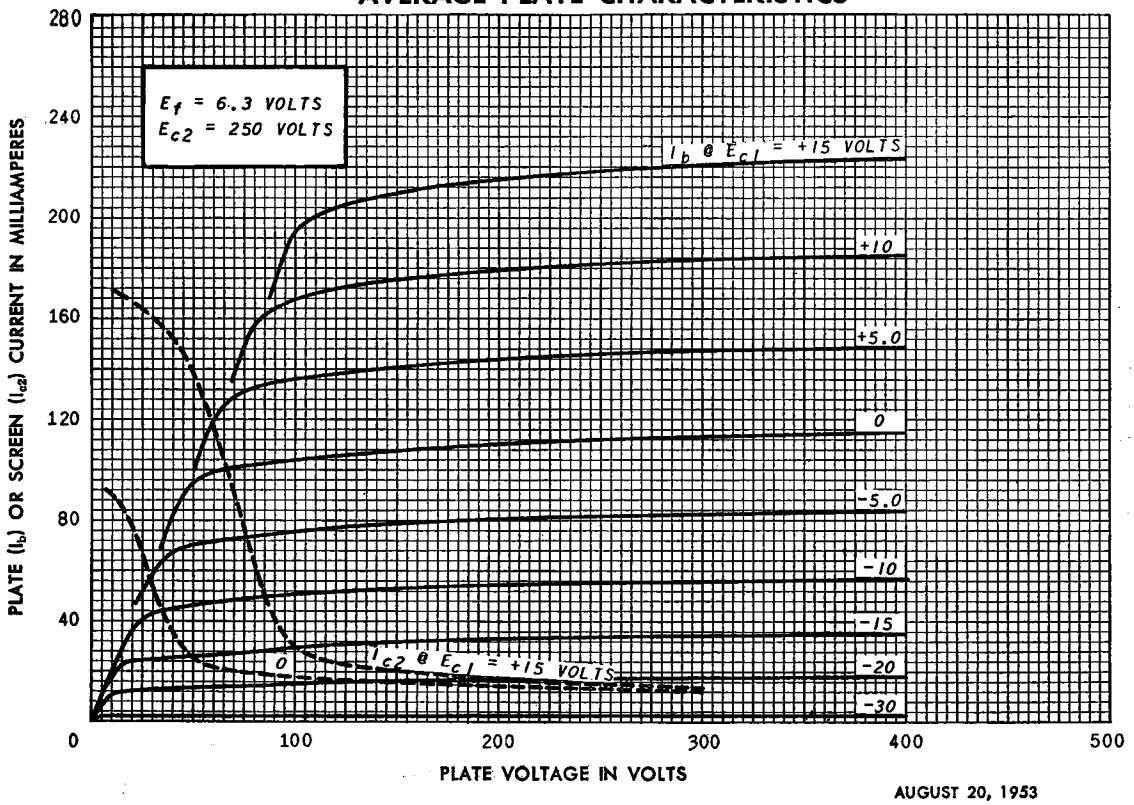

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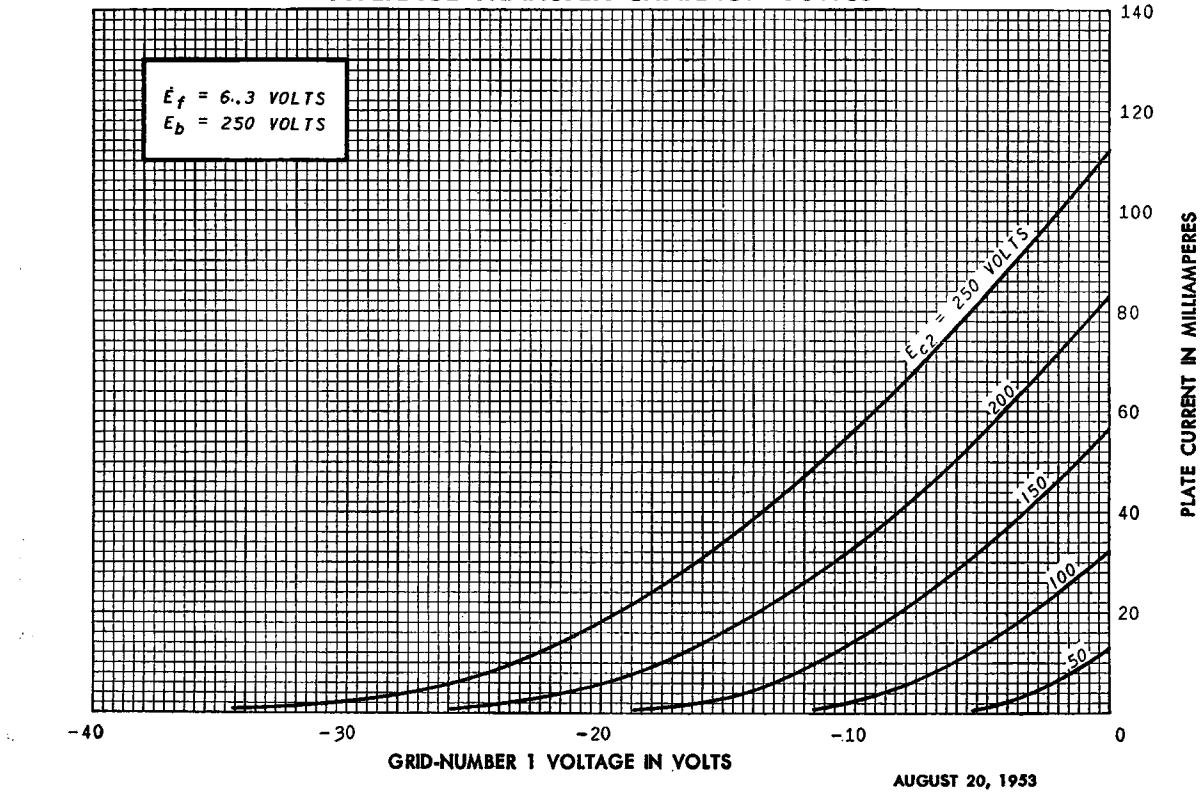
AVERAGE TRANSFER CHARACTERISTICS



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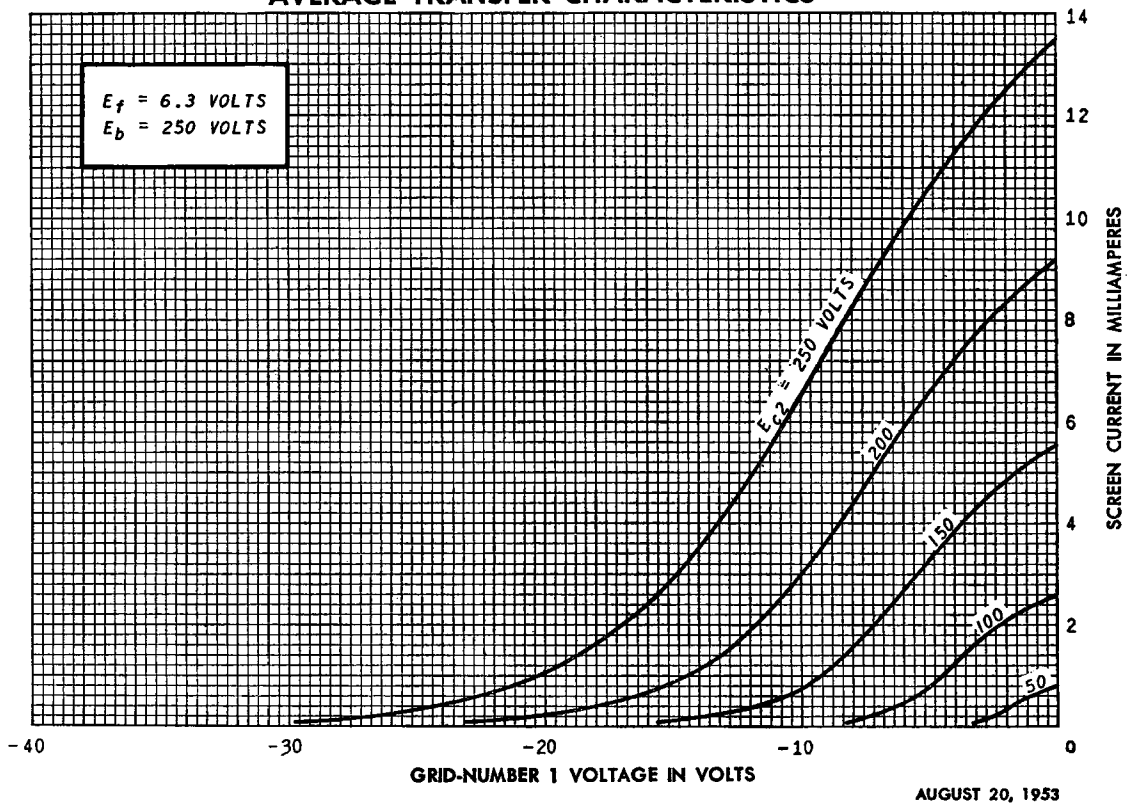

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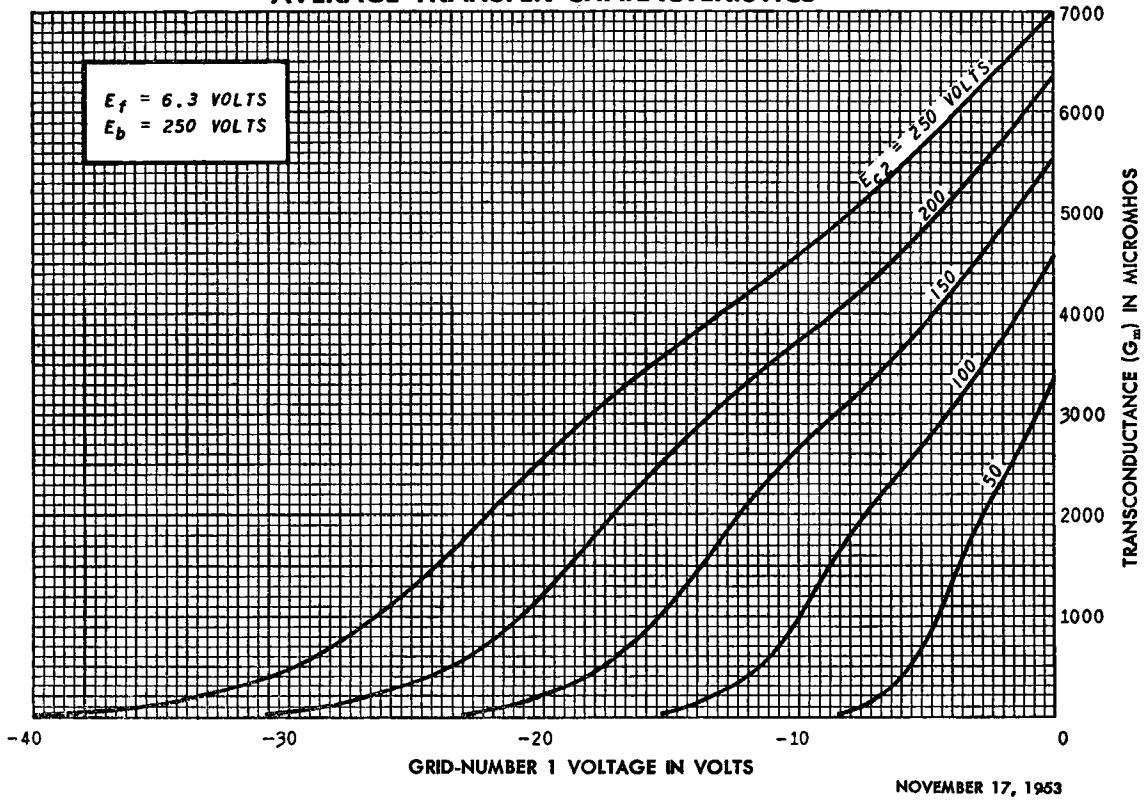
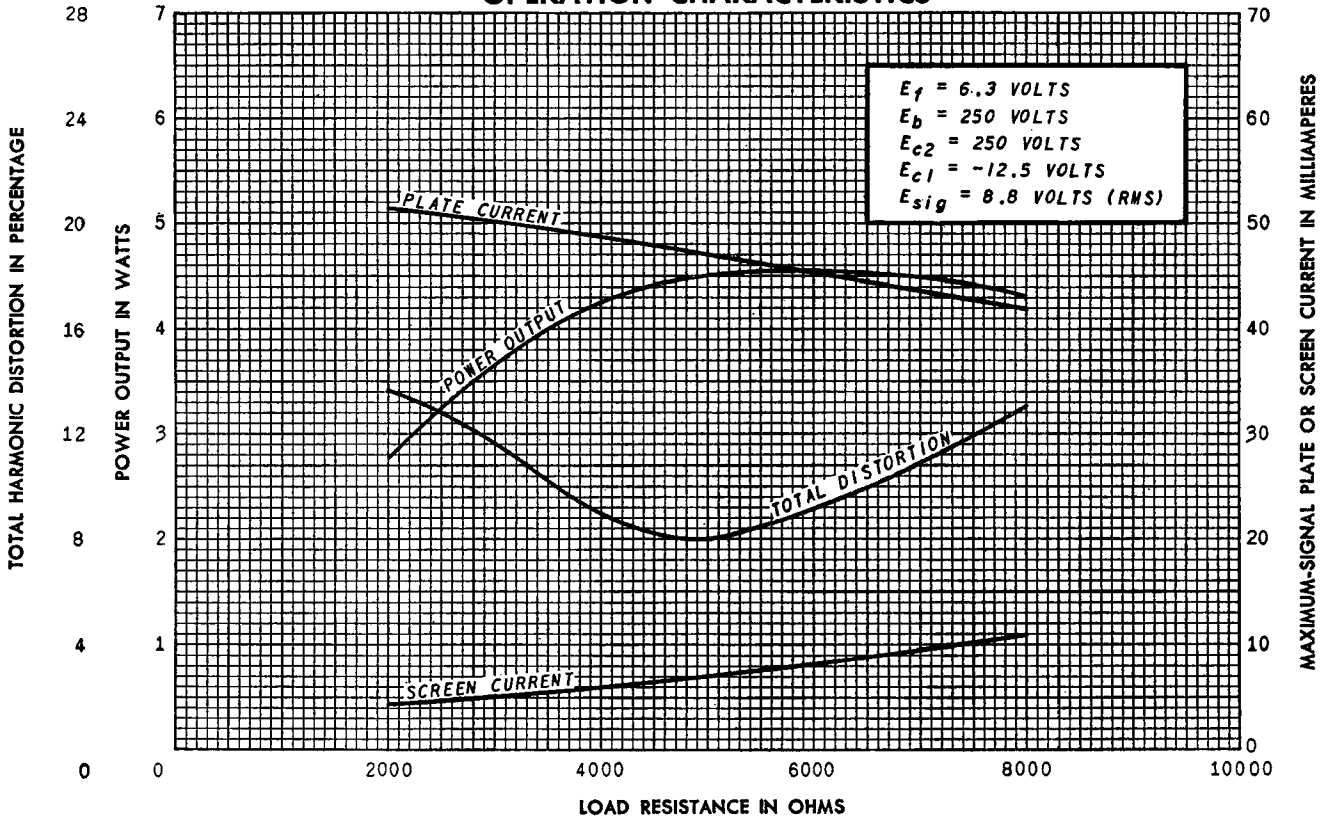


NOVEMBER 17, 1953

OPERATION CHARACTERISTICS



APRIL 23, 1954

ELECTRONIC COMPONENTS DIVISION

GENERAL ELECTRIC

Schenectady 5, N. Y.