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TWIN BEAM POWER TUBE

Useful at Frequencies up to 500 Mc

Unless Otherwise Specified, Values are on a Per-Tube Basis

GENERAL DATA

Electrical:

Heater for Unipotential Cathode:

Heater arrangement	Series	Parallel	
Voltage	12.6 $\pm$ 10%	6.3 $\pm$ 10%	ac or dc volts
Current	0.9	1.8	amp

Mu-Factor, Grid No.2 to
(Grid No.1 (Each Unit)

for dc plate volts = 600	
dc grid-No.2 volts = 250,	8.2
and dc plate ma = 40	

Direct Interelectrode Capacitances (Each Unit):^o

Grid No.1 to plate.	0.8 max.	μmf
Grid No.1 to cathode & grid No.3 & internal shield, grid No.2, and heater.	11	μmf
Plate to cathode & grid No.3 & internal shield, grid No.2, and heater.	3.4	μmf

Mechanical:

Mounting Position:

Vertical	Base up or down
Horizontal	Plate terminals in horizontal plane

Maximum Overall Length 4-5/16"

Seated Length. 3-11/16" $\pm$ 3/16"

Maximum Diameter 1-15/16"

Bulb T-14

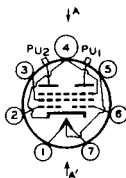
Bulb Terminals (Two) See Dimensional Outline

Weight (Approx.) 2.3 oz

Base Small-Wafer Septar 7-Pin (JETEC No.E7-21)

BOTTOM VIEW

- Pin 1 - Heater
Pin 2 - Grid No.1 of
Unit No.2
Pin 3 - Grid No.2
Pin 4 - Cathode,
Grid No.3,
Internal
Shield



- Pin 5 - Heater
Mid-Tap
Pin 6 - Grid No.1 of
Unit No.1
Pin 7 - Heater
PU1 - Plate of
Unit No.1
PU2 - Plate of
Unit No.2

PLANE OF ELECTRODES OF EACH UNIT IS
PARALLEL TO PLANE THROUGH AXIS OF
TUBE AND AA'

Plate-Seal Temperature 200 max. ^oC^o without external shield.

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TENTATIVE DATA 1

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



TWIN BEAM POWER TUBE

Base-Seal Temperature. 180 max. °C

Cooling: free circulation of air around the tube is required. In addition, some forced-air cooling will generally be required to prevent exceeding the specified maximum bulb temperature.

AF POWER AMPLIFIER & MODULATOR - Class B

Maximum CCS* Ratings, Absolute Values:

DC PLATE VOLTAGE	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE.	-175 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*.	200 max.	ma
MAX.-SIGNAL PLATE INPUT*.	120 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT*.	7 max.	watts
PLATE DISSIPATION*.	40 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode.	100 max.	volts
Heater positive with respect to cathode.	100 max.	volts

Typical CCS* Operation:

DC Plate Voltage	450	600	volts
DC Grid-No.2 Voltage [▲]	250	250	volts
DC Grid-No.1 Voltage:			
From fixed-bias source	-23	-25	volts
Peak AF Grid-No.1-to-Grid-No.1 Voltage.	53	53	volts
DC Plate Current:			
Zero-signal value.	67	35	ma
Max.-signal value.	200	168	ma
DC Grid-No.2 Current:			
Zero-signal value.	8	4	ma
Max.-signal value.	26	27	ma
DC Grid-No.1 Current:			
Max.-signal value.	2.3	1.6	ma
Effective Load Resistance (Plate to plate)	4400	8000	ohms
Max.-Signal Driving Power (Approx.) [◆]	0.2	0.2	watt
Max.-Signal Power Output (Approx.) [◆]	60	70	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance: [▲]		
With fixed bias.	50000 max.	ohms
With cathode bias.	Not recommended	

* Averaged over any audio-frequency cycle of sine-wave form.

▲ Preferably obtained from a separate source or from the plate-voltage supply with a voltage divider.

◆, ◆: See next page.



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TWIN BEAM POWER TUBE

PLATE-MODULATED PUSH-PULL RF POWER AMPLIFIER - Class C Telephony

Carrier conditions per tube with a max. modulation factor of 1.0

Maximum CCS* Ratings, Absolute Values:

For max. plate voltage and max. plate input above 250 Mc,
see Rating Chart I

DC PLATE VOLTAGE	450 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE.	-175 max.	volts
DC PLATE CURRENT	160 max.	ma
DC GRID-No.1 CURRENT	10 max.	ma
PLATE INPUT.	72 max.	watts
GRID-No.2 INPUT.	4.5 max.	watts
PLATE DISSIPATION.	27 max.	watts

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode. . .	100 max.	volts
Heater positive with respect to cathode. . .	100 max.	volts

Typical CCS* Operation:

	Up to 250 Mc	At 470 Mc	
DC Plate Voltage	450	380	volts
DC Grid-No.2 Voltage (Approx.) ¹	250	250	volts
<i>From an adjustable series resistor having a max. value of</i>			
	20000	30000	ohms
DC Grid-No.1 Voltage ²	-100	-60	volts
<i>From a grid-No.1 resistor of.</i>			
	20000	15000	ohms
Peak RF Grid-No.1-to-Grid-No.1 Voltage.	120	-	volts
DC Plate Current	150	160	ma
DC Grid-No.2 Current (Approx.)	16	8	ma
DC Grid-No.1 Current (Approx.)	5	4	ma

¹ Driver stage should be capable of supplying the specified driving power at low distortion to the No.1 grids of the class B stage. To minimize distortion, the effective resistance per grid-No.1 circuit of the class B stage should be held at a low value. For this purpose, the use of transformer coupling is recommended. In no case, however, should the total dc grid-No.1-circuit resistance exceed 50000 ohms.

² Obtained preferable from a separate source modulated along with the plate supply, or from the modulated plate supply through a series resistor. It is recommended that this resistor be adjustable to permit obtaining the desired operating plate current after initial tuning adjustments are completed.

³ Obtained from a grid-No.1 resistor of value shown or by partial self-bias method. A combination of grid-No.1 resistor and fixed supply has the advantage not only of protecting the tube from damage through loss of excitation but also of minimizing distortion by bias-supply compensation.

* See next page.

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TENTATIVE DATA 2

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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TWIN BEAM POWER TUBE

	Up to 250 Mc	At 470 Mc	
Driver Power			
Output (Approx.)	0.6	13	watts
Useful Power			
Output (Approx.)**	50	35	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance†.	50000 max.	ohms
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PUSH-PULL RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy[□]
and
PUSH-PULL RF POWER AMPLIFIER - Class C FM Telephony

Maximum CCS[•] Ratings, Absolute Values:

For max. plate voltage and max. plate input above 250 Mc,
 see Rating Chart II

DC PLATE VOLTAGE	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE.	-175 max.	volts
DC PLATE CURRENT	220 max.	ma
DC GRID-No.1 CURRENT	10 max.	ma
PLATE INPUT.	120 max.	watts
GRID-No.2 INPUT.	7 max.	watts
PLATE DISSIPATION.	40 max.	watts

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode. .	100 max.	volts
Heater positive with respect to cathode. .	100 max.	volts

Typical CCS[•] Operation:

	Up to 250 Mc	At 470 Mc	
DC Plate Voltage	600	400 500	volts
DC Grid-No.2			
Voltage (Approx.)* . . .	250	250 250	volts
From an adjustable			
series resistor having			
a max. value of.	33000	22000 47000	ohms
DC Grid-No.1 Voltage* . . .	-80	-38 -60	volts
From a grid-No.1			
resistor of.	39000	24000 30000	ohms
From cathode			
resistor of.	360	180 300	ohms
Peak RF Grid-No.1-to-			
Grid-No.1 Voltage.	200	- -	volts
DC Plate Current	200	220 200	ma

[□] Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

•, ••, †, •, ■: See next page.

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TUBE DIVISION

TENTATIVE DATA 2.

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



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TWIN BEAM POWER TUBE

	Up to 250 Mc	At 470 Mc	
DC Grid-No.2			
Current (Approx.)	16	12	8 ma
DC Grid-No.1			
Current (Approx.)	2	3	4 ma
Driver Power			
Output (Approx.)	4	5	13 watts
Useful Power			
Output (Approx.)**	85	43	55 watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance†. 50000 max. ohms

FREQUENCY TRIPLER - Class C

Maximum CCS* Ratings, Absolute Values:

For max. plate voltage and max. plate input above 250 Mc,
see Rating Chart III

DC PLATE VOLTAGE	600 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE	250 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-175 max.	volts
DC PLATE CURRENT	160 max.	ma
DC GRID-No.1 CURRENT	10 max.	ma
PLATE INPUT	80 max.	watts
GRID-No.2 INPUT	7 max.	watts
PLATE DISSIPATION	40 max.	watts

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with		
respect to cathode	100 max.	volts
Heater positive with		
respect to cathode	100 max.	volts

Typical CCS* Operation as Tripler:

	Up to 150 Mc	To 225 Mc	To 462 Mc	
DC Plate Voltage	400	500	400	400 volts
DC Grid-No.2 Voltage (Approx.)*	250	250	250	220 220 volts
From an adjustable series resistor having max. value of	16000	39000	20000	56000 56000 ohms

* Continuous Commercial Service.

• Obtained preferably from a separate source, or from the plate-supply voltage with a voltage divider, or through a series resistor. A series grid-No.2 resistor should be used only when the 5894 is used in a circuit which is not keyed. It is recommended that this resistor be adjustable to permit obtaining the desired operating plate current after initial tuning adjustments are completed.

•, †, ■: See next page.

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TENTATIVE DATA 3

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



TWIN BEAM POWER TUBE

	Up to 150 Mc	To 225 Mc	To 462 Mc	
DC Grid-No.1 Voltage [†]	-150	-150	-150	-175 volts
From a grid-No.1 resistor of. . .	30000	24000	50000	36000 36000 ohms
Peak RF Grid-No.1-to-Grid-No.1 Voltage.	360	360	360	- - volts
DC Plate Current . .	146	120	130	130 140 ma
DC Grid-No.2 Current (Approx.).	16	10	20	5 5 ma
DC Grid-No.1 Current (Approx.).	5	6	3	4 5 ma
Driver Power Output (Approx.).	0.9	1	0.5	4 8 watts
Useful Power Output (Approx.) ^{••}	18	20	12	13 16 watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance[‡]. 50000 max. ohms

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.
Heater Current:			
Series connection	1	0.8	1 amp
Parallel connection	2	1.6	2 amp
Mu-Factor, Grid No.2 to Grid No.1 (Each Unit)	2,3	7	9.3
Direct Interelectrode Capacitances (Each Unit):			
Grid No.1 to plate.	4	-	0.08 μ f
Grid No.1 to cathode & grid No.3 & internal shield, grid No.2, and heater.	4	9.4	11.6 μ f
Plate to cathode & grid No.3 & internal shield, grid No.2, and heater	4	2.6	3.7 μ f

Note 1: With 12.6 volts ac on heater.

Note 2: With 6.3 volts ac on heater.

Note 3: With dc plate voltage of 600 volts, dc grid-no.2 voltage of 250 volts, and dc plate current of 40 ma.

Note 4: Without external shield.

•• This value of useful power output is measured at load of output circuit.

‡ When grid No.1 is driven positive, the total dc grid-no.1-circuit resistance should not exceed the specified value of 50000 ohms. If this value is insufficient to provide adequate bias, the additional required bias must be supplied by a cathode resistor or fixed supply.

• Obtained from a fixed supply, by grid-no.1 resistor, by cathode resistor, or by combination methods.



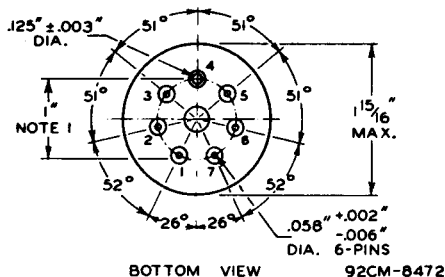
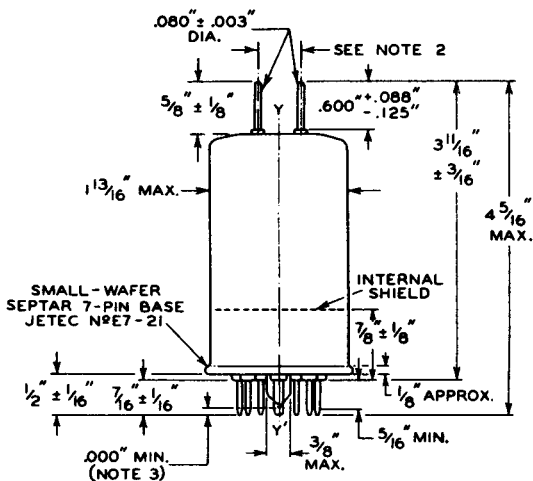
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TWIN BEAM POWER TUBE

OPERATING CONSIDERATIONS

Shielding of the 5894 in rf service is required for stable operation. A convenient method of shielding is to mount the socket approximately $7/8$ " beneath a hole in the chassis plate so that when the 5894 is inserted in the socket, the internal shield (see *Dimensional Outline*) of the tube will be close to the edge of the hole and in the same plane as the chassis plate. This arrangement provides an effective shield to isolate the grid-No. 1 circuits from the plate circuits.



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THE REFERENCE AXIS YY' IS DEFINED AS THE AXIS OF THE BASE-PIN GAUGE DESCRIBED IN NOTE 1.

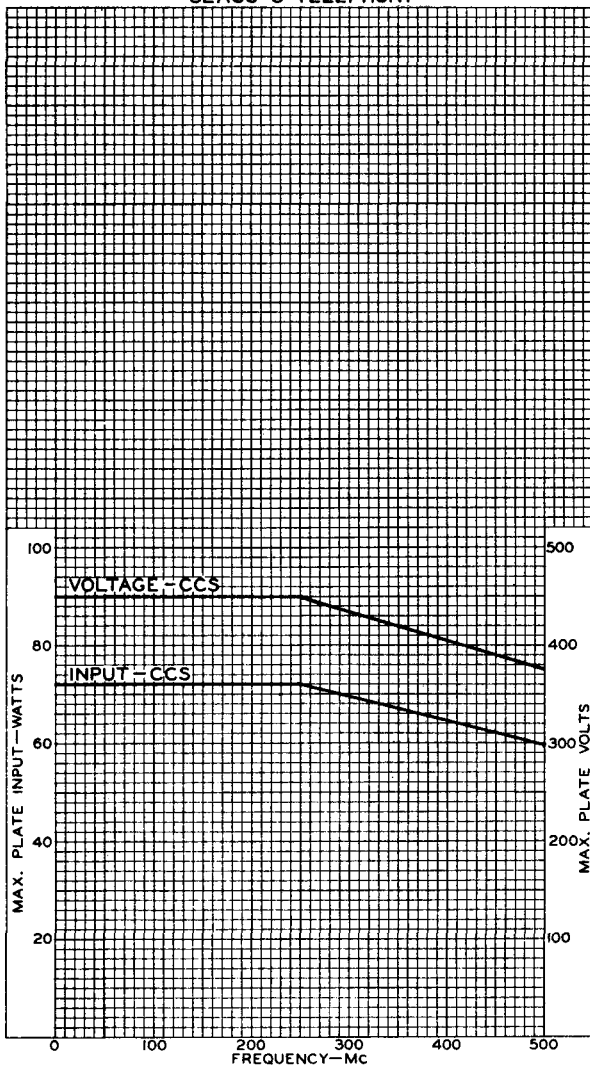
NOTE 1: ANGULAR VARIATIONS BETWEEN PINS AND VARIATION IN PIN-CIRCLE DIAMETER ARE HELD TO TOLERANCES SUCH THAT PINS WILL ENTER TO A DISTANCE OF $3/8"$ A FLAT-PLATE BASE-PIN GAUGE HAVING SIX HOLES $0.0800" \pm 0.0005"$ AND ONE HOLE $0.1450" \pm 0.0005"$ ARRANGED ON A $1.0000" \pm 0.0005"$ CIRCLE AT SPECIFIED ANGLES WITH TOLERANCE OF $\pm 5'$ FOR EACH ANGLE. GAUGE IS ALSO PROVIDED WITH A HOLE $0.500" \pm 0.010"$ CONCENTRIC WITH PIN CIRCLE WHOSE CENTER IS ON THE AXIS YY' .

NOTE 2: THE PLATE LEADS WILL ENTER A FLAT-PLATE PLATE-LEAD GAUGE HAVING THICKNESS OF $3/8"$ AND HAVING TWO HOLES $0.1400" \pm 0.0005"$ WHOSE CENTERS ARE LOCATED AT A DISTANCE OF $0.275" \pm 0.001"$ FROM THE AXIS YY' AND WHOSE AXES ARE PARALLEL TO YY' . THE PLANE THROUGH THESE AXES WILL BE $90^\circ \pm 5'$ FROM THE PLANE THROUGH YY' AND PIN No. 4.

NOTE 3: EXHAUST TIP WILL NOT EXTEND BEYOND THE PLANE WHICH PASSES THROUGH THE ENDS OF THE THREE LONGEST PINS.



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RATING CHART I
CLASS C TELEPHONY

NOV. 9, 1954

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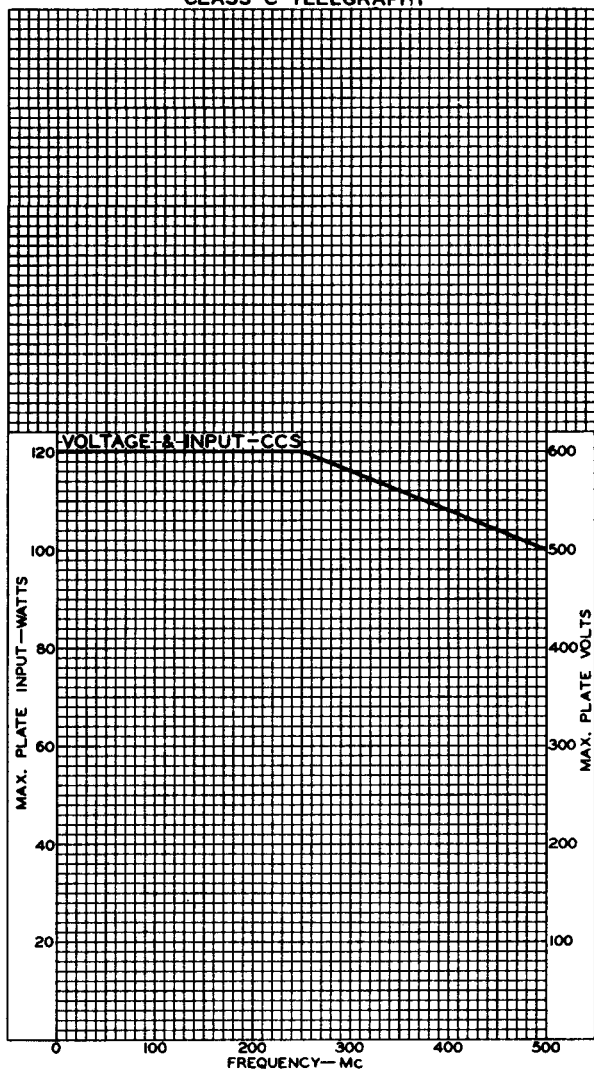
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RATING CHART II
CLASS C TELEGRAPHY

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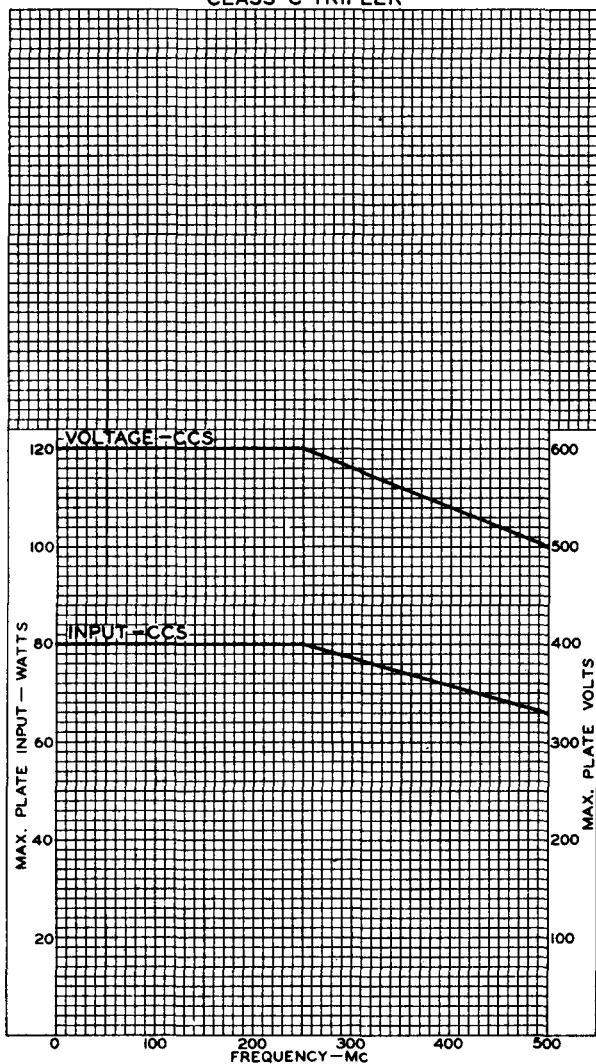
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RATING CHART III
CLASS C TRIPLER

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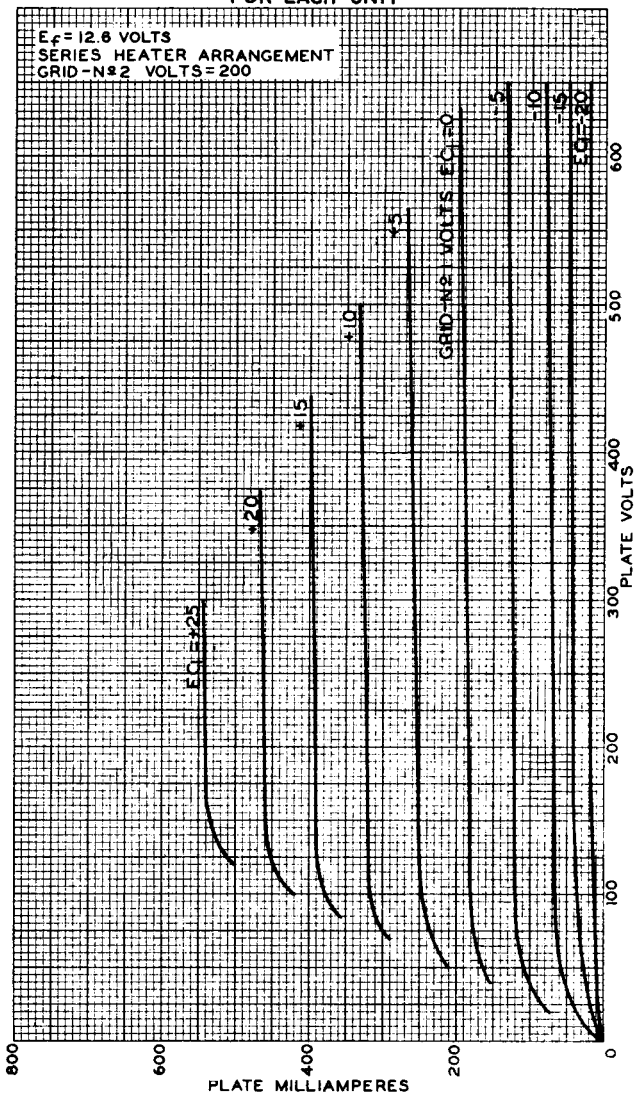
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AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT

$E_f = 12.6$ VOLTS
SERIES HEATER ARRANGEMENT
GRID - N#2 VOLTS = 200



NOV. 5, 1954

PLATE MILLIAMPERES

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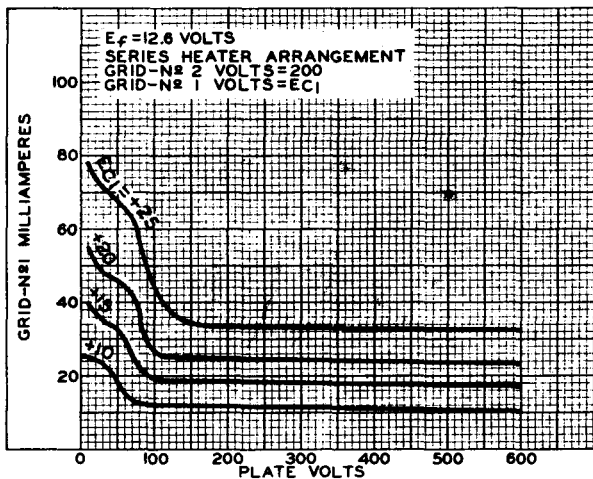
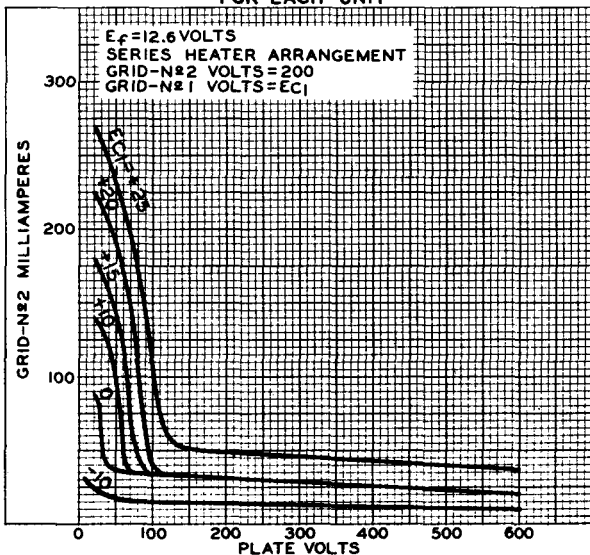
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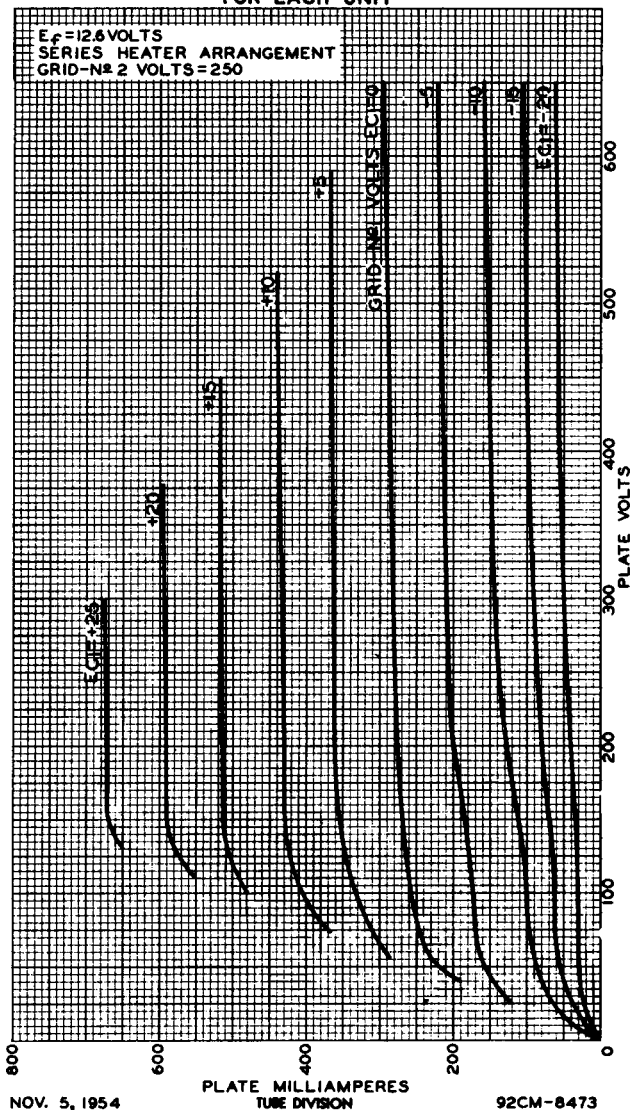
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AVERAGE CHARACTERISTICS
FOR EACH UNIT

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AVERAGE PLATE CHARACTERISTICS
FOR EACH UNIT

NOV. 5, 1954

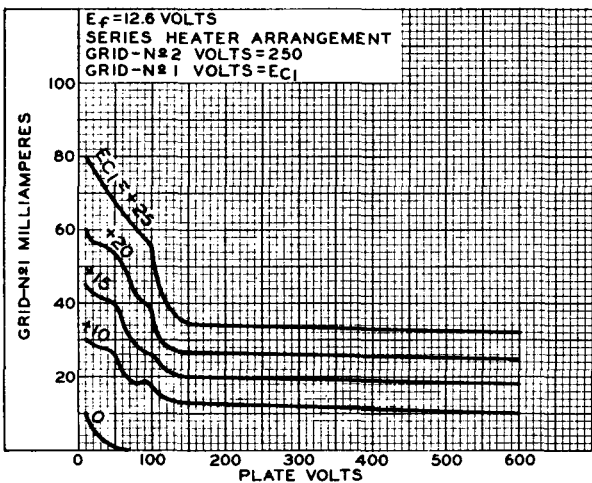
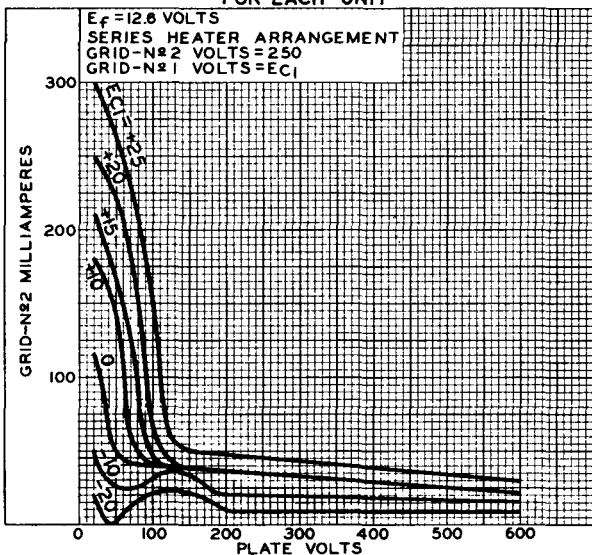
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AVERAGE CHARACTERISTICS
FOR EACH UNIT

NOV. 11, 1954

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