



8000

8000

POWER TRIODE

Useful with full input up to 30 Mc
and with reduced input up to 100 Mc

GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:
 Voltage 10 ± 5% ac or dc volts
 Current at 10 volts 4.5 amp

Amplification Factor, for
 grid volts = -95 and
 plate ma. = 54 16.5

Direct Interelectrode Capacitances:
 Grid to plate 6.4 μmf
 Grid to filament 5 μmf
 Plate to filament 3.3 μmf

Mechanical:

Mounting Position Vertical, base down,
 or Horizontal with pins 1 & 2 in vertical plane

Overall Length 8-1/2" ± 1/4"

Maximum Radius (including side cap) 2-1/8" ± 1/8"

Weight (Approx.) 8 oz

Bulb T-20

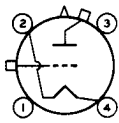
Top Cap Skirted Medium (JETEC No. C1-14)

Side Cap Medium (JETEC No. C1-5)

Base Medium-Metal-Shell Jumbo 4-Pin
 with Bayonet (JETEC No. A4-29)

Basing Designation for BOTTOM VIEW. 2N

Pin 1 - No Connection
 Pin 2 - Filament
 Pin 3 - Same as Pin 1



Pin 4 - Filament
 Top Cap - Plate
 Side Cap - Grid

AF POWER AMPLIFIER & MODULATOR - Class B

CCS* ICAS**

Maximum Ratings, Absolute Values:

DC PLATE VOLTAGE	2500 max.	2750 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	250 max.	250 max.	ma
MAX.-SIGNAL PLATE INPUT*	425 max.	510 max.	watts
PLATE DISSIPATION*	125 max.	175 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	2000	2250	volts
DC Grid Voltage	-120	-130	volts
Peak AF Grid-to-Grid Voltage	520	560	volts
Zero-Signal DC Plate Current	60	65	ma

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

•, ••: See next page.

← Indicates a change.

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	CCS [•]	ICAS ^{••}	
Max.—Signal DC Plate Current	425	450	ma
Effective Load Resistance (Plate to plate).	10800	12000	ohms
Max.—Signal Driving Power (Approx.)	6.5	7.9	watts
Max.—Signal Power Output (Approx.)	600	725	watts

RF POWER AMPLIFIER - Class B Telephony

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

	CCS [•]	ICAS ^{••}	
Maximum Ratings, Absolute Values:			
DC PLATE VOLTAGE.	2000 max.	2500 max.	volts
DC PLATE CURRENT.	185 max.	185 max.	ma
PLATE INPUT	190 max.	225 max.	watts
PLATE DISSIPATION	125 max.	175 max.	watts

Typical Operation:

DC Plate Voltage.	2000	2250	volts
DC Grid Voltage	-130	-145	volts
Peak RF Grid Voltage.	140	150	volts
DC Plate Current.	95	100	ma
DC Grid Current (Approx.)	0.5	0	ma
Driving Power (Approx.)	4.8	5.4	watts
Power Output (Approx.)	65	75	watts

GRID-MODULATED RF POWER AMPLIFIER -- Class C Telephony

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

	CCS [•]	ICAS ^{••}	
Maximum Ratings, Absolute Values:			
DC PLATE VOLTAGE.	2000 max.	2500 max.	volts
DC GRID VOLTAGE	-500 max.	-500 max.	volts
DC PLATE CURRENT.	185 max.	185 max.	ma
PLATE INPUT	190 max.	225 max.	watts
PLATE DISSIPATION	125 max.	175 max.	watts

Typical Operation:

DC Plate Voltage.	2000	2250	volts
DC Grid Voltage	-250	-265	volts
Peak RF Grid Voltage.	265	270	volts
Peak AF Grid Voltage.	120	115	volts
DC Plate Current.	95	100	ma
DC Grid Current (Approx.)	0	0	ma
Driving Power (Approx.) [▲]	4.3	2.5	watts
Power Output (Approx.)	65	75	watts

▲ At crest of audio-frequency cycle with modulation factor of 1.0.

•, ••: See next page.

→ indicates a change.



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POWER TRIODE

PLATE-MODULATED RF POWER AMPLIFIER -- Class C Telephony

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

CCS[•]ICAS^{••}

Maximum Ratings, Absolute Values:

DC PLATE VOLTAGE.	1600 max.	2000 max.	volts
DC GRID VOLTAGE	-500 max.	-500 max.	volts
DC PLATE CURRENT.	210 max.	250 max.	ma
DC GRID CURRENT	40 max.	45 max.	ma
PLATE INPUT	335 max.	500 max.	watts
PLATE DISSIPATION	85 max.	125 max.	watts

Typical Operation:

DC Plate Voltage.	1600	2000	volts
DC Grid Voltage [⊕]	-300	-370	volts
From grid resistor of . . .	15000	10000	ohms
Peak RF Grid Voltage. . . .	470	630	volts
DC Plate Current.	210	250	ma
DC Grid Current (Approx.) .	20	37	ma
Driving Power (Approx.) . .	8.5	20	watts
Power Output (Approx.) . . .	250	380	watts

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy[⊠]
and
RF POWER AMPLIFIER - Class C FM TelephonyCCS[•]ICAS^{••}

Maximum Ratings, Absolute Values:

DC PLATE VOLTAGE.	2000 max.	2500 max.	volts
DC GRID VOLTAGE	-500 max.	-500 max.	volts
DC PLATE CURRENT.	250 max.	300 max.	ma
DC GRID CURRENT	40 max.	45 max.	ma
PLATE INPUT	500 max.	750 max.	watts
PLATE DISSIPATION	125 max.	175 max.	watts

Typical Operation:

DC Plate Voltage.	2000	2500	volts
DC Grid Voltage:			
From fixed supply of. . . .	-195	-240	volts
From grid resistor of . . .	8200	6200	ohms ←
From cathode resistor of. .	680	680	ohms ←
Peak RF Grid Voltage. . . .	370	480	volts
DC Plate Current.	250	300	ma
DC Grid Current (Approx.) .	24	40	ma
Driving Power (Approx.) . .	8	18	watts
Power Output (Approx.) . . .	375	575	watts

•• Intermittent Commercial and Amateur Service.

⊕ obtained from fixed supply, by grid resistor, by cathode resistor, or by combination methods.

•, ⊠: See next page.

← Indicates a change.

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POWER TRIODE

NOTE: When the 8000 is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed-bias must be used to maintain the plate current at a safe value. With a plate voltage of 2500 volts a fixed bias of at least -140 volts should be used.

OSCILLATOR - Class C

Operation with Unfiltered Plate Supply

	Supply 1 [■]	Supply 2 [♦]	
Maximum CCS[®] Ratings, Absolute Values:			
RMS PLATE VOLTAGE	2500 max.	-	volts
DC PLATE VOLTAGE	-	1800 max.	volts
DC GRID VOLTAGE	-200 max.	-300 max.	volts
DC PLATE CURRENT	160 max.	225 max.	ma
DC GRID CURRENT	25 max.	35 max.	ma
PLATE INPUT	450 max.	500 max.	watts
PLATE DISSIPATION	125 max.	125 max.	watts

Typical Push-Pull Operation at 30 Mc:

Values are for 2 tubes

RMS Plate Voltage	2500	-	volts
DC Plate Voltage	-	1800	volts
Grid Resistor [§]	3300	4700	ohms
DC Plate Current	320	450	ma
DC Grid Current	30	35	ma
Power Output (Approx.)	650	700	watts
Output-Circuit Efficiency (Approx.)	85	85	%
Useful Power Output (Approx.)	550 [♣]	600 [♣]	watts

• Continuous commercial service.

□ 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.

■ Self-rectified ac supply.

♦ Separate rectified (no filter), single-phase, full-wave plate supply.

§ The 8000 can be biased by any convenient method, but the use of a grid resistor is preferred because the bias is automatically varied as the load on the circuit varies. In those applications where grid current and grid voltage may vary widely because of fluctuating loads, it is important to design equipment so that the maximum grid-current and grid-voltage ratings are never exceeded for any load. An approximate rule is to adjust the grid-current and grid-voltage values at full load to one-half of the corresponding maximum values. This operating condition permits grid-voltage values to rise from zero load to twice their full-load values, and usually provides adequate leeway.

♣ This value of useful power is measured at load of output circuit having the indicated efficiency.

→ Indicates a change.



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POWER TRIODE

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current.	1	4.2	4.8	amp
Direct Interelectrode Capacitances:				
Grid to plate	2	5.6	7.2	$\mu\mu\text{f}$
Grid to filament.	2	4.1	5.9	$\mu\mu\text{f}$
Plate to filament	2	2.4	4.2	$\mu\mu\text{f}$
Amplification Factor.	1,3	14.8	18.2	
Grid Current.	1,4	55	95	ma
Plate Current (1)	1,4	300	500	ma
Plate Current (2)	1,5	33	75	ma
Power Output.	1,6	425	-	watts

Note 1: With 10 volts ac on filament.

Note 2: Without external shield.

Note 3: With grid volts = -95, and dc plate voltage adjusted to give dc plate current of 54 ma.

Note 4: With dc plate volts = 100, and dc grid volts = +100.

Note 5: With dc plate volts = 2000, and dc grid volts = -95.

Note 6: In self-excited oscillator circuit, and with dc plate volts = 2250, dc plate ma. = 275, dc grid ma. = 35 to 45, grid resistor (ohms) = 8200, and frequency (Mc) = 15.

MAXIMUM RATINGS vs OPERATING FREQUENCY

FREQUENCY	30	60	100	Mc
MAXIMUM PERMISSIBLE PERCENTAGE OF MAXIMUM RATED PLATE VOLTAGE AND PLATE INPUT:				
Class B Telephony	100	88	80	%
Class C Plate-Modulated Telephony	100	70	50	%
Class C Telegraphy	100	70	50	%

OPERATING CONSIDERATIONS

The *plate* of the 8000 shows a barely perceptible red color when the tube is operated at maximum CCS ratings and a cherry-red color at maximum ICAS ratings.

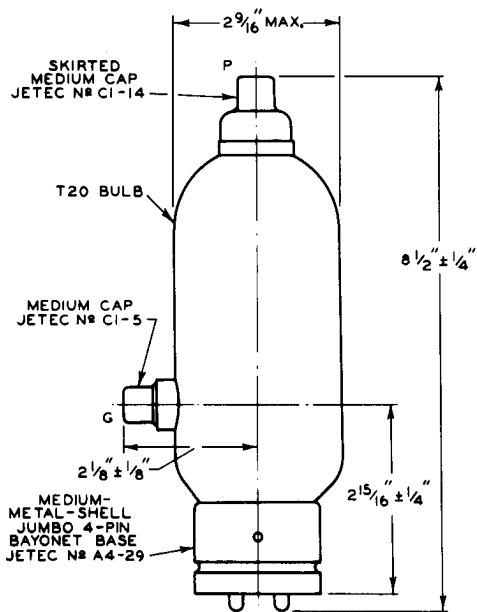
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POWER TRIODE



92CS-4965R2



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TRANSMITTING TRIODE

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GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:

Voltage 10 ac or dc volts

Current 4.5 amp

Amplification Factor 16.5

Direct Interelectrode Capacitances:

Grid to Plate 6.4 $\mu\mu\text{f}$

Grid to Filament 5.0 $\mu\mu\text{f}$

Plate to Filament 3.3 $\mu\mu\text{f}$

Mechanical:

Mounting Position Vertical, base down; or Horizontal,
pins 1 & 2 in vertical plane

Overall Length 8-1/2" \pm 1/4"

Seated Length 8-3/16" \pm 1/4"

Maximum Radius 2-1/8" \pm 1/8"

Bulb T-20

Cap (top) Skirted Medium

Cap (side) Medium

Base Medium Metal-Shell Jumbo 4-Pin, Bayonet

Basing Designation for BOTTOM VIEW ZC₁

Pin 1 - No Connection

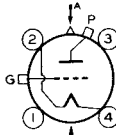
Pin 2 - Filament

Pin 3 - No Connection

Pin 4 - Filament

P - Plate (End Cap)

G - Grid (Side Cap)



AA'-PLANE OF ELECTRODES

AF POWER AMPLIFIER & MODULATOR - Class B

Maximum Ratings, Absolute Values:

	CCS [•]	ICAS ^{••}	
DC PLATE VOLTAGE	2500 max.	2750 max.	volts
MAX.-SIGNAL DC PLATE CUR. *	250 max.	250 max.	ma.
MAX.-SIGNAL PLATE INPUT*	425 max.	510 max.	watts
PLATE DISSIPATION*	125 max.	175 max.	watts

Typical Operation:

Unless otherwise specified, values are for 2 tubes

DC Plate Voltage	2000 . .	2250 . .	volts
DC Grid Voltage	-120 . .	-130 . .	volts
Peak AF Grid-to-Grid Voltage	520 . .	560 . .	volts
Zero-Signal DC Plate Current	60 . .	65 . .	ma.
Max.-Signal DC Plate Current	425 . .	450 . .	ma.
Effective Load Resistance (plate-to-plate)	10800 . .	12000 . .	ohms

* See next page.

◀ indicates a change.

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TRANSMITTING TRIODE

Max.-Signal Driving Power (Approx.)	6.5	7.9	watts
Max.-Signal Power Output (Approx.)	600	725	watts

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

RF POWER AMPLIFIER - Class B Telephony

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

Maximum Ratings, Absolute Values:

	CCS [●]	ICAS ^{●●}	
→ DC PLATE VOLTAGE	2000 max.	2500 max.	volts
DC PLATE CURRENT	185 max.	185 max.	ma.
PLATE INPUT	190 max.	225 max.	watts
→ PLATE DISSIPATION	125 max.	175 max.	watts

Typical Operation:

DC Plate Voltage	2000	2500	volts
DC Grid Voltage	-130	-145	volts
Peak RF Grid Voltage	140	150	volts
DC Plate Current	95	100	ma.
→ DC Grid Current (Approx.) [□]	0.5	0	ma.
Driving Power (Approx.) ^{□▲}	4.8	5.4	watts
Power Output (Approx.)	65	75	watts

GRID-MODULATED RF POWER AMPLIFIER - Class C Telephony

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

Maximum Ratings, Absolute Values:

	CCS [●]	ICAS ^{●●}	
→ DC PLATE VOLTAGE	2000 max.	2500 max.	volts
DC GRID VOLTAGE	-500 max.	-500 max.	volts
DC PLATE CURRENT	185 max.	185 max.	ma.
PLATE INPUT	190 max.	225 max.	watts
→ PLATE DISSIPATION	125 max.	175 max.	watts

Typical Operation:

DC Plate Voltage	2000	2250	volts
DC Grid Voltage	-250	-265	volts
Peak RF Grid Voltage	265	270	volts
Peak AF Grid Voltage	120	115	volts
DC Plate Current	95	100	ma.
DC Grid Current (Approx.) [□]	0	0	ma.
Driving Power (Approx.) ^{□▲}	4.3	2.5	watts
Power Output	65	75	watts

▲ At crest of audio-frequency cycle with modulation factor of 1.0.

●, ●●, □: See next page.

← Indicates a change.



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TRANSMITTING TRIODE

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PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

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

Maximum Ratings, Absolute Values:

	CCS [•]	ICAS ^{••}	
DC PLATE VOLTAGE	1600 max.	2000 max.	volts ←
DC GRID VOLTAGE.	-500 max.	-500 max.	volts ←
DC PLATE CURRENT	210 max.	250 max.	ma. ←
DC GRID CURRENT.	40 max.	45 max.	ma. ←
PLATE INPUT.	335 max.	500 max.	watts ←
PLATE DISSIPATION.	85 max.	125 max.	watts ←

Typical Operation:

DC Plate Voltage	1600 . .	2000 . .	volts
DC Grid Voltage [ⓐ]	{ -300 . .	-370 . .	volts
	{ 15000 . .	10000 . .	ohms
Peak RF Grid Voltage	470 . .	630 . .	volts
DC Plate Current	210 . .	250 . .	ma.
DC Grid Current (Approx.) [ⓐ] . .	20 . .	37 . .	ma.
Driving Power (Approx.) [ⓐ] . .	8.5 . .	20 . .	watts
Power Output (Approx.)	250 . .	380 . .	watts

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation[ⓐ]

Maximum Ratings, Absolute Values:

	CCS [•]	ICAS ^{••}	
DC PLATE VOLTAGE	2000 max.	2500 max.	volts ←
DC GRID VOLTAGE.	-500 max.	-500 max.	volts ←
DC PLATE CURRENT	250 max.	300 max.	ma. ←
DC GRID CURRENT.	40 max.	45 max.	ma. ←
PLATE INPUT.	500 max.	750 max.	watts ←
PLATE DISSIPATION.	125 max.	175 max.	watts ←

Typical Operation:

DC Plate Voltage	2000 . .	2500 . .	volts
DC Grid Voltage ^{▲▲}	{ -195 . .	-240 . .	volts
	{ 8100 . .	6000 . .	ohms
	{ 710 . .	700 . .	ohms
Peak RF Grid Voltage	370 . .	480 . .	volts
DC Plate Current	250 . .	300 . .	ma.
DC Grid Current (Approx.) . .	24 . .	40 . .	ma.
Driving Power (Approx.) . . .	8 . .	18 . .	watts
Power Output (Approx.)	375 . .	575 . .	watts

• Continuous Commercial Service.

•• Intermittent Commercial and Amateur Service.

ⓐ obtained by grid resistor of value shown or by combination methods.

□, ⓐ, ▲▲: See next page.

← indicates a change.

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TRANSMITTING TRIODE

- Subject to wide variations as explained on sheet TUBE RATINGS in General Section.
- ◻ Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.
- ▲▲ obtained from fixed supply, by grid resistor (8100,6000) or by cathode resistor (710,700).

NOTE: When the 8000 is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed-bias must be used to maintain the plate current at a safe value. With a plate voltage of 2500 volts a fixed bias of at least -140 volts should be used.

CLASS C OSCILLATOR

Operation with Unfiltered Plate Supply

Maximum Ratings, Absolute Values:

	<u>Supply 1[†]</u>	<u>Supply 2[*]</u>	
RMS PLATE VOLTAGE	2500 max.	- -	volts
DC PLATE VOLTAGE	- -	1800 max.	volts
DC GRID VOLTAGE	-200 max.	-300 max.	volts
DC PLATE CURRENT	160 max.	225 max.	ma.
DC GRID CURRENT	25 max.	35 max.	ma.
PLATE INPUT	450 max.	500 max.	watts
PLATE DISSIPATION	125 max.	125 max.	watts

Typical Operation in Push-Pull Circuit at 30 Mc.:

Unless otherwise specified, values are for 2 tubes

RMS Plate Voltage	2500 . .	- . .	volts
DC Plate Voltage	- . .	1800 . .	volts
Grid Resistor	3500 . .	5000 . .	ohms
DC Plate Current	320 . .	450 . .	ma.
DC Grid Current	30 . .	35 . .	ma.
Power Output (Approx.) . . .	650 . .	700 . .	watts
Circuit Power Output (Approx.)-			
85% circuit efficiency . .	550 . .	600 . .	watts

[†] Self-rectified ac supply.

^{*} Separate rectified (no filter) single-phase, full-wave plate supply.

For applications where grid current and grid voltage may vary widely because of fluctuating loads, it is important to design equipment so that the maximum grid-current and grid-voltage ratings are never exceeded for any load. An approximate rule is to adjust the grid-current and grid-voltage values at full-load to one-half of the corresponding maximum values. This operating condition permits grid-current and grid voltage values to rise for zero-load to twice their full-load values, and usually provides adequate leeway.

Data on operating frequencies for the 8000 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY.

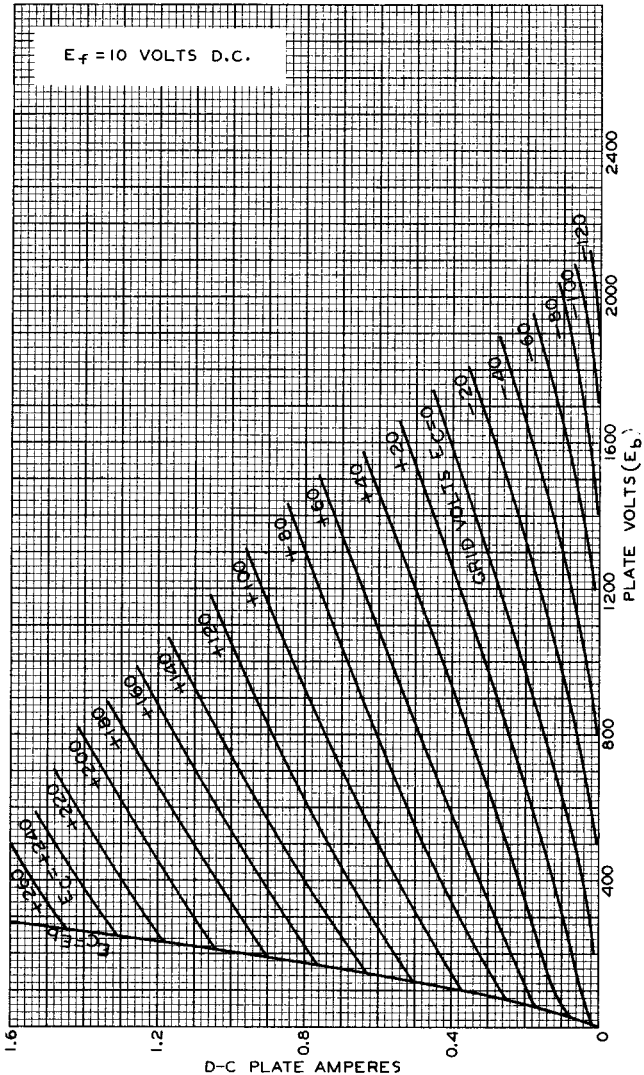
OUTLINE DIMENSIONS for the 8000 are the same as those for the 810



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AVERAGE PLATE CHARACTERISTICS



SEPT. 20, 1940

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

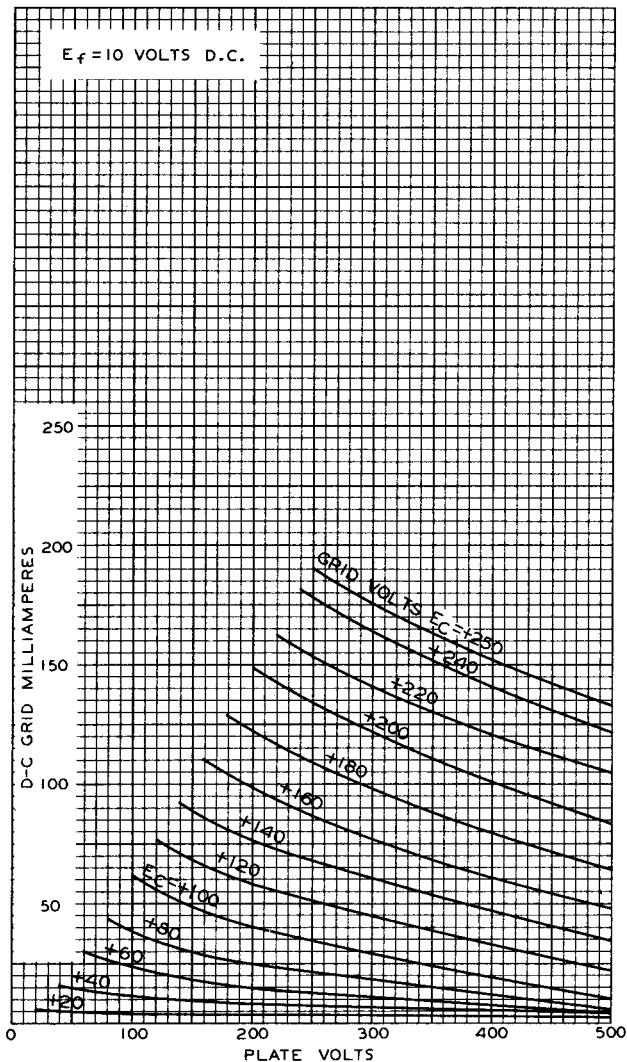
92CM-6212

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TYPICAL CHARACTERISTICS



FEB. 12, 1941

TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-6213