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BEAM POWER TUBE

DATA

Electrical:

Filament, Thoriated Tungsten:

Voltage 10.0 ± 5% ac or dc volts

Current at 10.0 volts. 5.0 amp

Transconductance (Approx.), for plate.

volts = 2000, grid-No.2 volts = 400,
and plate current = 50 ma 3750 μ hos

Mu-Factor, grid No.2 to grid No.1,

for plate volts = 2000, grid-No.2
volts = 400, and plate current = 50 ma 8.5Direct Interelectrode Capacitances:⁰Grid No.1 to plate 0.25 max. μ fGrid No.1 to filament, grid No.2,
and grid No.3. 16.3 μ fPlate to filament, grid No.2,
and grid No.3. 14 μ f

Mechanical:

Mounting Position:

Vertical Base up or down

Horizontal Pins 2 and 6 in vertical plane

Maximum Overall Length 7-1/2"

Seated Length. 6-5/8" ± 1/4"

Maximum Diameter 2-9/16"

Weight (Approx.) 8 oz

Bulb T-20

Cap. Medium (JETEC No.C1-5)

Base Medium-Metal-Shell Giant 7-Pin
with Bayonet (JETEC No.A7-17)

Basing Designation for BOTTOM VIEW 5BA

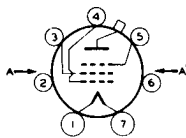
Pin 1-Filament

Pin 2-No

Connection

Pin 3-Grid No.2

Pin 4-Grid No.1



AA=PLANE OF ELECTRODES

Pin 5-Grid No.3,

Int. Shield

Pin 6-No

Connection

Pin 7-Filament

Cap-Plate

AF POWER AMPLIFIER & MODULATOR - Class AB₁[#]

Maximum Ratings, Absolute Values:

	CCS [•]	ICAS ^{••}	
DC PLATE VOLTAGE	2250 max.	2500 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	1100 max.	1100 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	180 max.	225 max.	ma
MAX.-SIGNAL PLATE INPUT*	360 max.	450 max.	watts
MAX.-SIGNAL GRID-No.2 INPUT*	22 max.	22 max.	watts
PLATE DISSIPATION*	100 max.	125 max.	watts

⁰ without external shield and with base shell floating.

#, •, ••, * : See next page.

← Indicates a change.

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TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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Typical Operation:	CCS [•]			ICAS ^{••}	
	Values are for 2 tubes				
DC Plate Voltage	1500	2000	2250	2500	volts
DC Grid-No.3 (Suppressor) Voltage†	0	0	0	0	volts
DC Grid-No.2 Voltage**	750	750	750	750	volts
DC Grid-No.1 (Control- Grid) Voltage:•					
From fixed-bias source	-85	-90	-95	-95	volts
Peak AF Grid-No.1-to- Grid-No.1 Voltage♦	160	160	170	180	volts
Zero-Signal DC Plate Current	50	50	50	50	ma
Max.-Signal DC Plate Current	305	265	255	290	ma
Zero-Signal DC Grid- No.2 Current	2	2	2	2	ma
Max.-Signal DC Grid- No.2 Current	45	43	53	54	ma
Effective Load Resist- ance (Plate to plate)	9300	16000	20000	19000	ohms
Max.-Signal Driving Power (Approx.)	0	0	0	0	watts
Max.-Signal Power Out- put (Approx.)	260	335	380	490	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance:##	
With fixed bias	30000 max. ohms
With cathode bias	Not recommended

RF POWER AMPLIFIER - Class B Telephony

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

Maximum Ratings, Absolute Values:

	CCS [•]	ICAS ^{••}	
DC PLATE VOLTAGE	2000 max.	2250 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	400 max.	400 max.	volts
DC PLATE CURRENT	100 max.	125 max.	ma
PLATE INPUT.	150 max.	200 max.	watts
GRID-No.2 INPUT.	15 max.	20 max.	watts
PLATE DISSIPATION.	100 max.	125 max.	watts

• Subscript 1 indicates that grid-no.1 current does not flow during any part of the input cycle.

• 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.

♦ The driver stage should be capable of supplying the No.1 grids of the class AB₁ stage with the specified driving voltage at low distortion.

•, ••, †, •, ##: See next page.

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Typical Operation:	CCS [•]		ICAS ^{••}	
DC Plate Voltage	1500	2000	2250	volts
DC Grid-No.3 (Suppressor) Voltage†.	0	0	0	volts
DC Grid-No.2 Voltage	400	400	400	volts
DC Grid-No.1 (Control- Grid) Voltage ^{••}	-60	-75	-60	volts
Peak RF Grid-No.1 Voltage.	70	80	70	volts
DC Plate Current	100	75	85	ma
DC Grid-No.2 Current	4	3	3	ma
DC Grid-No.1 Current	★	★	★	ma
Driving Power ^{•••}	▲	▲	▲	watts
Power Output (Approx.)	50	50	70	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance 30000 max. ohms

GRID-MODULATED RF POWER AMPLIFIER - Class C Telephony*Carrier conditions per tube with a max. modulation factor of 1.0***Maximum Ratings, Absolute Values:**

	CCS [•]		ICAS ^{••}	
DC PLATE VOLTAGE	2000 max.		2250 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	400 max.		400 max.	volts
DC GRID-No.1 (CONTROL- GRID) VOLTAGE	-200 max.		-200 max.	volts
DC PLATE CURRENT	100 max.		125 max.	ma
PLATE INPUT.	150 max.		200 max.	watts
GRID-No.2 INPUT.	15 max.		20 max.	watts
PLATE DISSIPATION.	100 max.		125 max.	watts

Typical Operation:

DC Plate Voltage	1500	2000	2250	volts
DC Grid-No.3 (Suppressor) Voltage†.	0	0	0	volts
DC Grid-No.2 Voltage	400	400	400	volts
DC Grid-No.1 Voltage ^{••}	-140	-120	-110	volts
Peak RF Grid-No.1 Voltage.	145	120	135	volts
Peak AF Grid-No.1 Voltage.	60	60	55	volts
DC Plate Current	70	75	85	ma
DC Grid-No.2 Current	3	3	2.5	ma
DC Grid-No.1 Current	★	★	★	ma
Driving Power ^{••}	□□	□□	□□	watts
Power Output (Approx.)	40	50	75	watts

•• The type of input coupling network used should not introduce too much resistance in the grid-No.1 circuit. Transformer or impedance coupling devices are recommended. When the 813 is operated in class AB₁ service, only fixed bias should be used.

• Use of a fixed supply or bypassed cathode resistor is recommended.

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

▲ never more than 2 watts.

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Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance:

With fixed bias.	30000 max. ohms
With cathode bias.	Not recommended

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

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

Maximum Ratings, Absolute Values:

	CCS*	ICAS**	
DC PLATE VOLTAGE	1600 max.	2000 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	400 max.	400 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE.	-300 max.	-300 max.	volts
DC PLATE CURRENT	150 max.	200 max.	ma
DC GRID-No.1 CURRENT	25 max.	30 max.	ma
PLATE INPUT.	240 max.	400 max.	watts
GRID-No.2 INPUT.	15 max.	20 max.	watts
PLATE DISSIPATION.	67 max.	100 max.	watts

Typical Operation:

DC Plate Voltage	1250	1600	2000	volts
DC Grid-No.3 (Suppressor) Voltage†	0	0	0	volts
DC Grid-No.2 Voltage▲	300	300	350	volts
From a series resistor of.	27000	43000	41000	ohms
DC Grid-No.1 Voltage††	-160	-160	-175	volts
From a grid resistor of.	12500	13500	11000	ohms
Peak RF Grid-No.1 Voltage.	250	250	300	volts
DC Plate Current	150	150	200	ma
DC Grid-No.2 Current	35	30	40	ma
DC Grid-No.1 Current (Approx.)	13	12	16	ma
Driving Power (Approx.)‡	2.9	2.7	4.3	watts
Power Output (Approx.)	140	180	300	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance 30000 max. ohms

* Usually negligible.

†† Obtained from fixed supply, or cathode resistor unbypassed for audio frequencies.

‡ RF driving power is never more than 2 watts. AF power is usually not more than 1 watt.

▲ Obtained from a separate source modulated along with the plate supply, or from the modulated plate supply through a series resistor of the value shown for each operating condition.

•, ••, †, ††, ‡, §, ¶, ††: See next page.

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BEAM POWER TUBE

RF POWER AMPLIFIER & OSCILLATOR - Class C Teleggraphy

Key-down conditions per tube without amplitude modulation

Maximum Ratings, Absolute Values:

	CCS*			ICAS**	
DC PLATE VOLTAGE	2000	max.		2250	max. volts
DC GRID-No.2 (SCREEN) VOLTAGE. .	400	max.		400	max. volts
DC GRID-No.1 (CONTROL- GRID) VOLTAGE.	-300	max.		-300	max. volts
DC PLATE CURRENT	180	max.		225	max. ma
DC GRID-No.1 CURRENT	25	max.		30	max. ma
PLATE INPUT.	360	max.		500	max. watts
GRID-No.2 INPUT.	22	max.		22	max. watts
PLATE DISSIPATION.	100	max.		125	max. watts

Typical Operation:

DC Plate Voltage	1250	1500	2000	2250	volts
DC Grid-No.3 (Suppressor) Voltage†	0	0	0	0	volts
DC Grid-No.2 Voltage** .	300	300	400	400	volts
From a series resistor of.	27000	40000	36000	46000	ohms
DC Grid-No.1 Voltage††* .	-75	-90	-120	-155	volts
From a grid resistor of	6000	7500	12000	10000	ohms
From a cathode resistor of.	330	400	520	565	ohms
Peak RF Grid-No.1 Voltage	160	175	205	275	volts
DC Plate Current	180	180	180	220	ma
DC Grid-No.2 Current . .	35	30	45	40	ma
DC Grid-No.1 Current (Approx.).	12	12	10	15	ma
Driving Power (Approx.)**	1.7	1.9	1.9	4.0	watts
Power Output (Approx.) .	170	210	275	375	watts

Maximum Circuit Values (CCS or ICAS):

Grid-No.1-Circuit Resistance 30000 max. ohms

** Intermittent Commercial and Amateur Service.

* For ac filament supply.

†† Obtained from a grid-no.1 resistor, from cathode resistor, or from a combination of grid-no.1 resistor with either fixed supply or cathode resistor.

■ 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 a separate source, from the plate-voltage supply with a voltage divider, or through a series resistor of the value shown for each operating condition. A series grid-no.2 resistor should be used only when the 813 is used in a circuit which is not keyed. Grid-No.2 voltage must not exceed 800 volts under key-up conditions.

* If preceding stage is keyed, the grid-no.1 bias must be obtained partially from a fixed supply in order to limit the plate current and, therefore, the plate dissipation to a safe value.

* , † , ** : See next page.

← Indicates a change.



BEAM POWER TUBE

SELF-RECTIFYING OSCILLATOR or AMPLIFIER - Class C

Maximum CCS[●] Ratings, Absolute Values:

AC PLATE VOLTAGE (RMS)	2800 max.	volts
AC GRID-No.2 (SCREEN) VOLTAGE (RMS).	550 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE.	-100 max.	volts
DC PLATE CURRENT	95 max.	ma
DC GRID-No.1 CURRENT	10 max.	ma
PLATE INPUT [★]	295 max.	watts
GRID-No.2 INPUT [★]	22 max.	watts
PLATE DISSIPATION.	100 max.	watts

Typical Operation:

AC Plate Voltage (RMS)	2800	volts
DC Grid-No.3 (Suppressor) Voltage†	0	volts
AC Grid-No.2 Voltage (RMS) ^{○○}	530	volts
DC Grid-No.1 Voltage [‡]	-37	volts
From a grid resistor of.	37000	ohms
DC Plate Current	95	ma
DC Grid-No.2 Current	12	ma
DC Grid-No.1 Current (Approx.)	1	ma
Driving Power (Approx.) ^{††}	1	watt
Output-Circuit Efficiency (Approx.).	75	per cent
Useful Power Output (Approx.).	170 [↔]	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	30000 max.	ohms
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AMPLIFIER or OSCILLATOR - Class C

With Separate, Rectified, Unfiltered, Single-Phase,
Full-Wave Plate and Grid-No.2 Supply

Maximum CCS[●] Ratings, Absolute Values:

DC PLATE VOLTAGE	1800 max.	volts
DC GRID-No.2 (SCREEN) VOLTAGE.	360 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE.	-200 max.	volts
DC PLATE CURRENT	190 max.	ma
DC GRID-No.1 CURRENT	22 max.	ma
PLATE INPUT ^{††}	360 max.	watts
GRID-No.2 INPUT ^{††}	22 max.	watts
PLATE DISSIPATION.	100 max.	watts

● Continuous Commercial Service.

★ Power input is 1.11 times the product of the ac voltage (rms) and the dc current.

† From a self-rectified driver.

○○ obtained from a separate ac supply in phase with the plate supply or from a low-voltage tap on the plate transformer. Use of a grid-No.2 series voltage-dropping resistor is not recommended.

†† Power input is 1.23 times the product of dc voltage and dc current.

†, ★, ‡, ††: See next page.

↔ indicates a change.



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Typical Operation:

DC Plate Voltage.	1800	volts
DC Grid-No.3 (Suppressor) Voltage†.	0	volts
DC Grid-No.2 Voltage‡.	250	volts
DC Grid-No.1 Voltage♦♦.	-120	volts
From a grid resistor of	10000	ohms
DC Plate Current.	160	ma
DC Grid-No.2 Current.	37	ma
DC Grid-No.1 Current (Approx.).	12	ma
Driving Power (Approx.)***.	2	watts
Output-Circuit Efficiency (Approx.)	75	per cent
Useful Power Output (Approx.)	210	watts

Maximum Circuit Values:

Grid-No.1-Circuit Resistance. 30000 max. ohms

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current.	1	4.7	5.3	amp
Direct Interelectrode Capacitances:				
Grid No.1 to plate.	2	-	0.25	μf
Grid No.1 to filament, grid No.2, and grid No.3.	2	13	19.6	μf
Plate to filament, grid No.2, and grid No.3	2	10.5	17.5	μf
Plate current (1)	1,3	35	65	ma
Plate current (2)	1,4	-	2	ma
Grid-No.2 current	1,3	-	4	ma
Useful power output	1,5	198	-	watts

Note 1: With 10 volts dc on filament.

Note 2: With no external shield and with base shell floating.

Note 3: With dc plate voltage of 2000 volts, grid No.3 connected to negative filament terminal, dc grid-No.2 voltage of 400 volts, and dc grid-No.1 voltage of -35 volts.

Note 4: With dc plate voltage of 2000 volts, grid No.3 connected to negative filament terminal, dc grid-No.2 voltage of 400 volts, and dc grid-No.1 voltage of -80 volts.

Note 5: In a self-excited oscillator with dc plate voltage of 2000 volts, grid No.3 connected to negative filament terminal, dc grid-No.2 voltage of 400 volts, dc grid-No.1 current of 9.6 to 14.4 ma, grid-No.1 resistor of 10000 ± 10% ohms, dc plate current of 180 ma, and frequency of 15 Mc.

† Grid No.3 should be connected to mid-tap on filament-transformer secondary winding or to negative end of filament operated on dc.

*** Value shown for each operating condition is power required by grid No.1 and biasing device when the 813 is operated at frequency sufficiently low to avoid high-frequency losses. At moderate frequencies, the driver stage should be capable of providing about twice the tabulated value; at higher frequencies, the driver stage may have to supply 3 to 10 times the value shown.

♦♦, ‡, †, ***: See next page.

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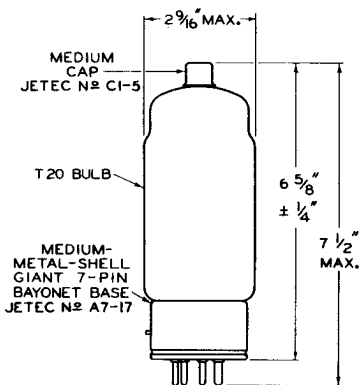


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- ⚡ obtained from a grid-No.1 resistor of the value shown or from a combination of grid-No.1 resistor and cathode resistor. Fixed-bias operation is not recommended. The bias resistors should not be bypassed for the plate and grid-No.2 voltage supply frequency.
- ⚡ This value of useful power is measured at load of output circuit having indicated efficiency.
- ⚡ obtained from a separate, rectified, unfiltered, single-phase, full-wave supply in phase with the plate supply, or from the rectified, unfiltered, single-phase, full-wave supply by means of taps on the plate transformer.
- ⚡ From a driver with a rectified, unfiltered, single-phase, full-wave plate supply.

Data on operating frequencies for the 813 are given on the sheet TRANS. TUBE RATINGS vs FREQUENCY



92CM-4963R3

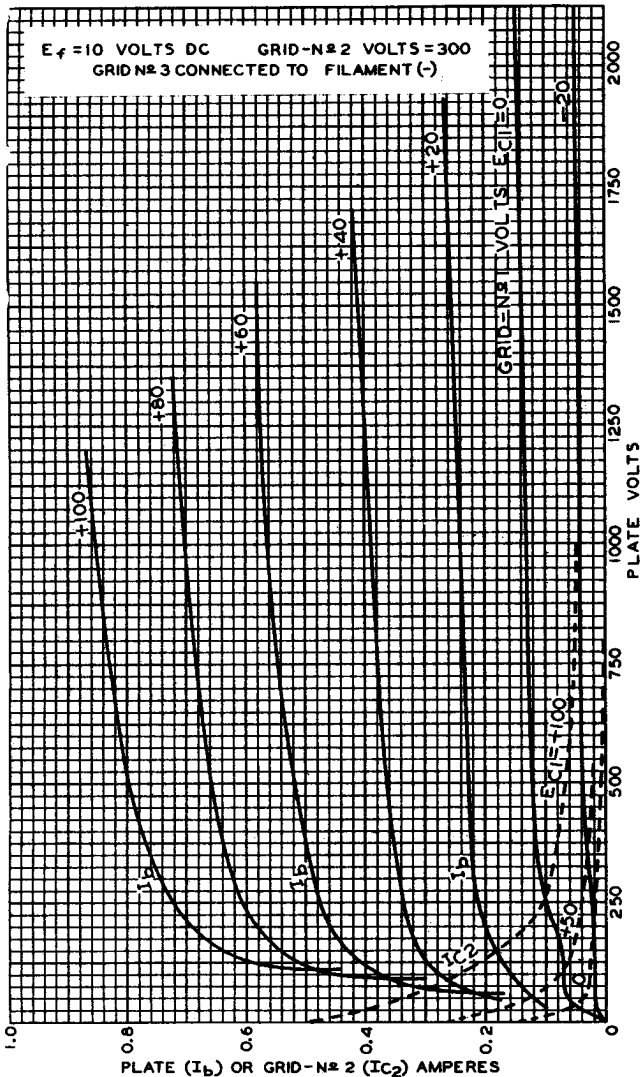


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AVERAGE CHARACTERISTICS

$E_f = 10$ VOLTS DC GRID-N#2 VOLTS = 300
GRID-N#3 CONNECTED TO FILAMENT (-)



MARCH 27, 1947

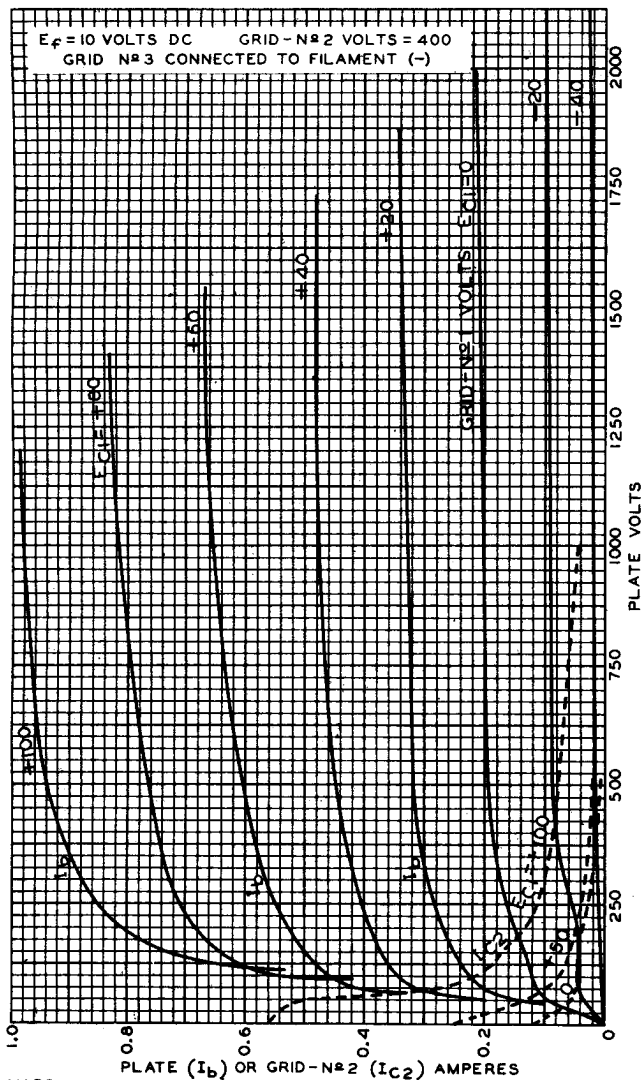
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92CM-4967R2

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AVERAGE CHARACTERISTICS



MARCH 27, 1947

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92CM-4968 R2

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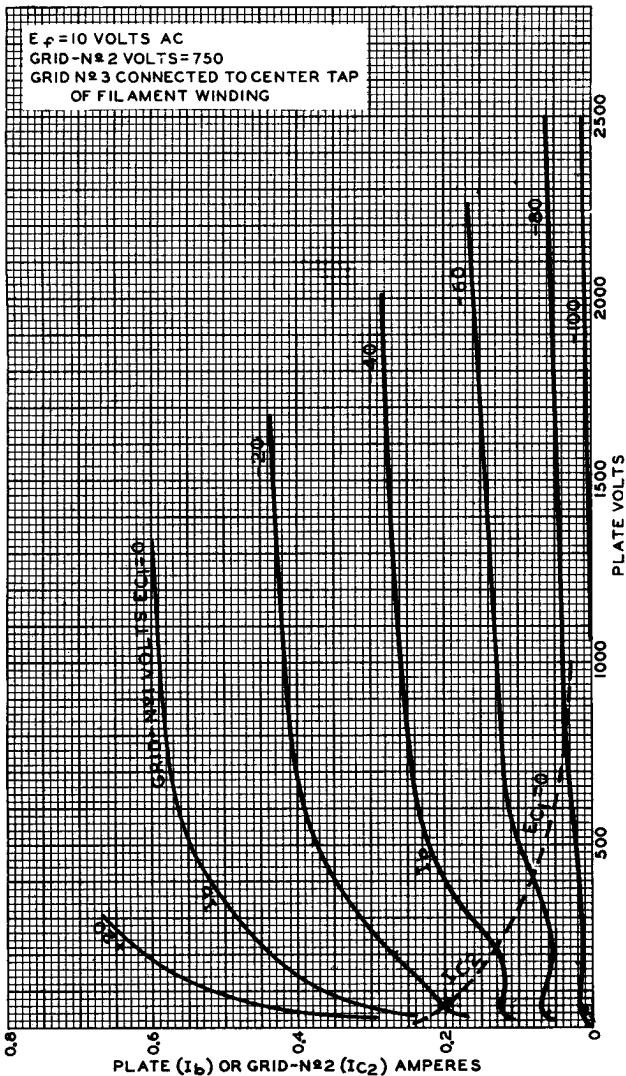


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AVERAGE CHARACTERISTICS

$E_f = 10$ VOLTS AC
 GRID-N $\#$ 2 VOLTS = 750
 GRID-N $\#$ 3 CONNECTED TO CENTER TAP
 OF FILAMENT WINDING



JAN. 27, 1948

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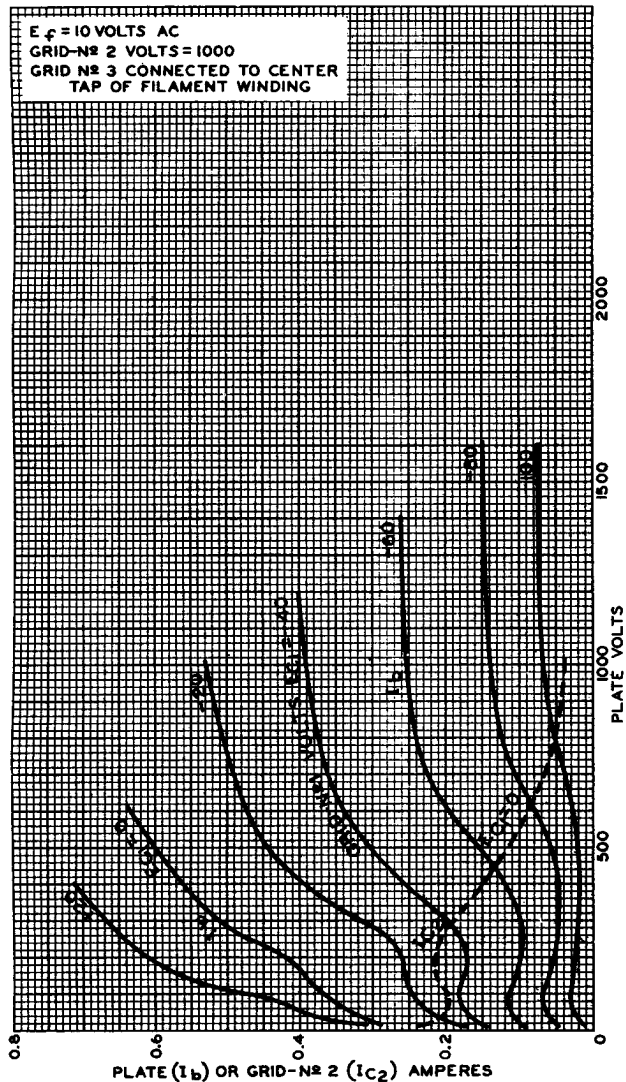
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AVERAGE CHARACTERISTICS

$E_f = 10$ VOLTS AC
 GRID-№ 2 VOLTS = 1000
 GRID № 3 CONNECTED TO CENTER
 TAP OF FILAMENT WINDING



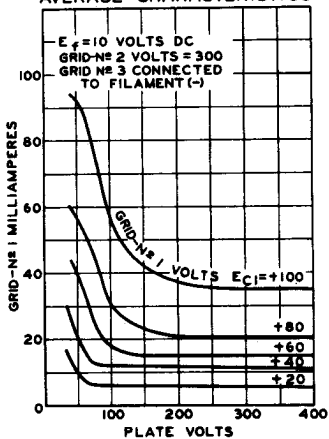


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AVERAGE CHARACTERISTICS



AVERAGE CHARACTERISTICS

