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BEAM POWER TUBE

DATA

Electrical:

Filament, Thoriated Tungsten:

Voltage. 10.0 $\pm$ 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 mhos

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

for plate volts = 2000, grid-No.2

volts = 400, and plate current = 50 ma

8.5

Direct Interelectrode Capacitances:⁰Grid No.1 to plate 0.25 max. μ mf

Grid No.1 to filament, grid No.2,

and grid No.3. 16.3 μ mf

Plate to filament, grid No.2,

and grid No.3. 14 μ mf

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" $\pm$ 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

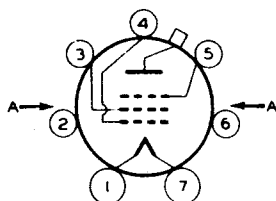
Pin 1-Filament

Pin 2-No

Connection

Pin 3-Grid No.2

Pin 4-Grid No.1



Pin 5-Grid No.3,

Int. Shield

Pin 6-No

Connection

Pin 7-Filament

Cap-Plate

AA=PLANE OF ELECTRODES

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

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



BEAM POWER TUBE

→ 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 Resistance (Plate to plate)	9300	16000	20000	19000	ohms
Max.-Signal Driving Power (Approx.) . . .	0	0	0	0	watts
Max.-Signal Power Output (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
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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.

•, ••, †, •, ★, □□, ••: See next page.

← indicates a change.

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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.

→ Indicates a change.



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BEAM POWER TUBE

RF POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

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
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^{●●} 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) ^{oo}	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.

^{oo} 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
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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.

↵ Indicates a change.

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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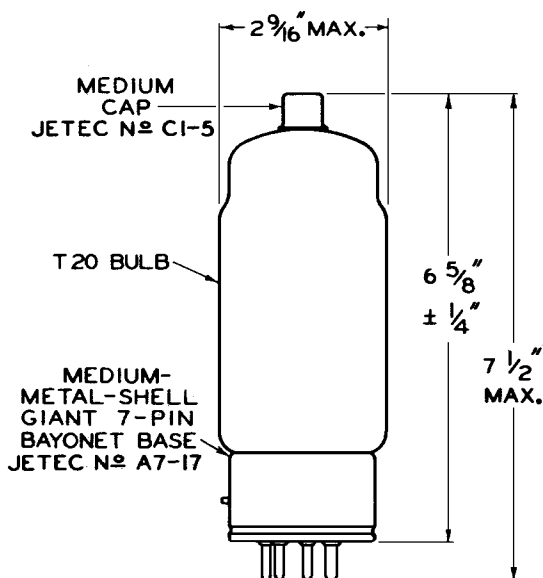


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- ⚡ Obtained from a grid-No.1 resistor of the value shown or from a combination of grid-No.1 resistor and cathode resistor. Fixed-bias operation is not recommended. The bias resistors should not be bypassed for the plate and grid-No.2 voltage supply 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



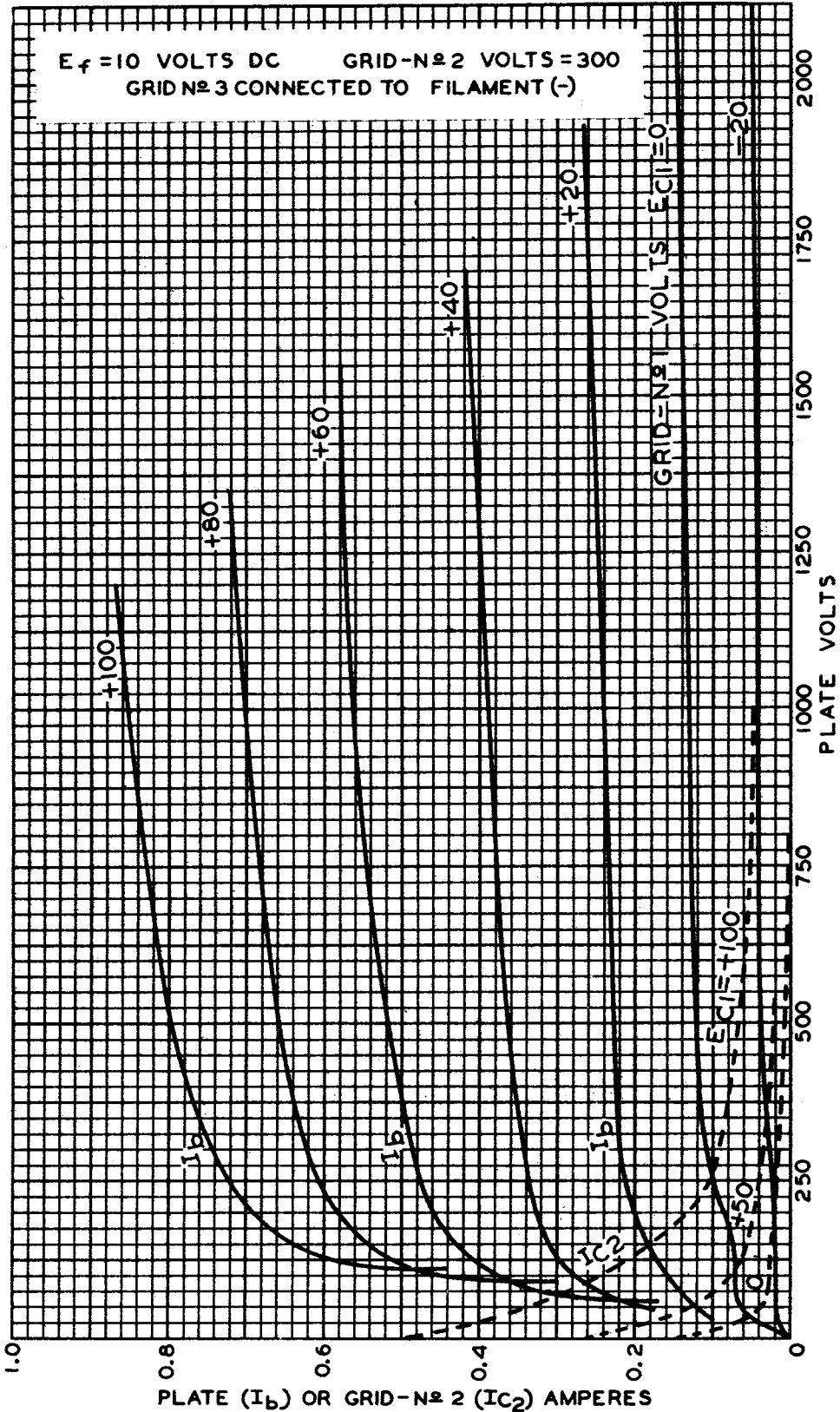
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AVERAGE CHARACTERISTICS



MARCH 27, 1947

TUBE DIVISION

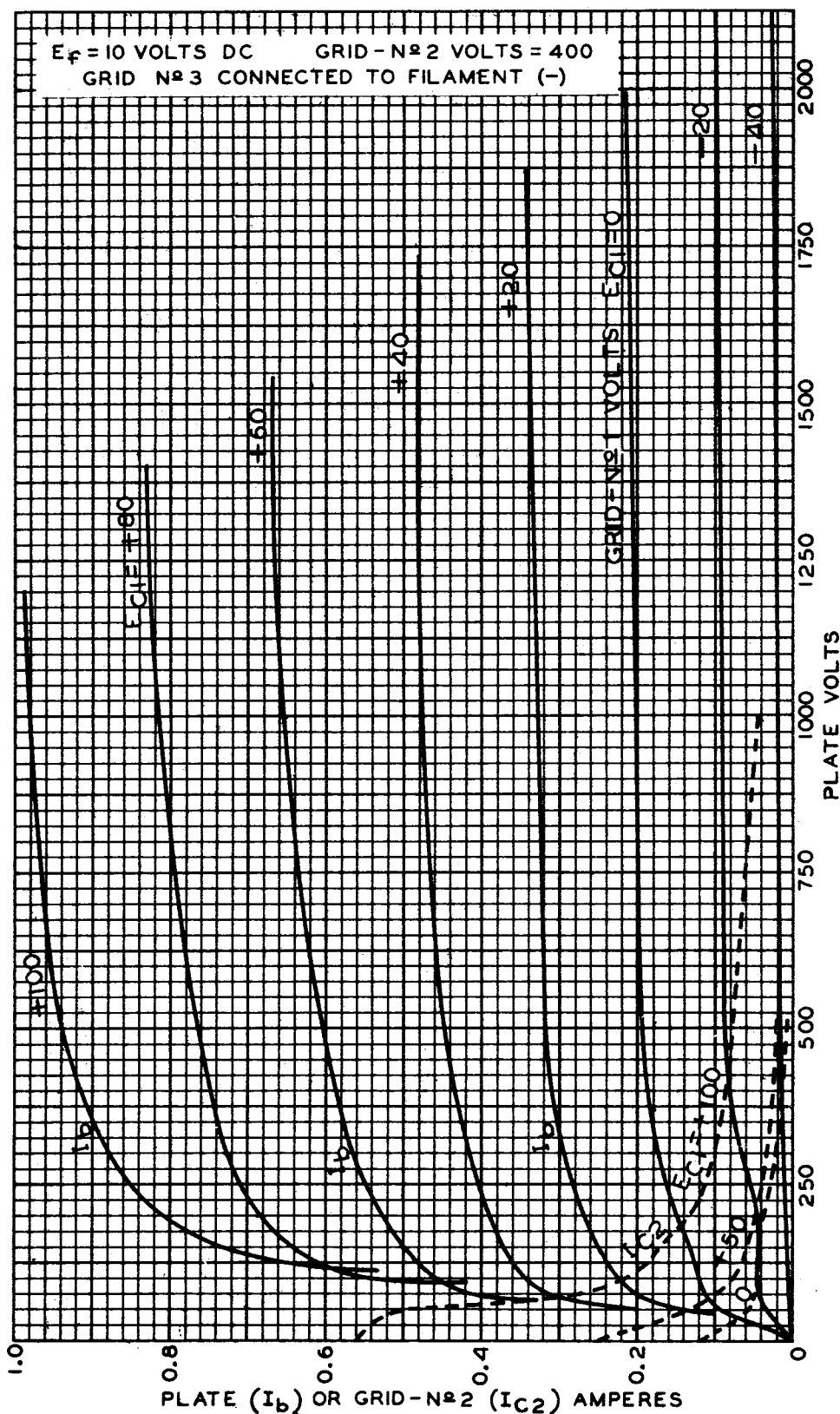
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AVERAGE CHARACTERISTICS



MARCH 27, 1947

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92CM-4968 R2

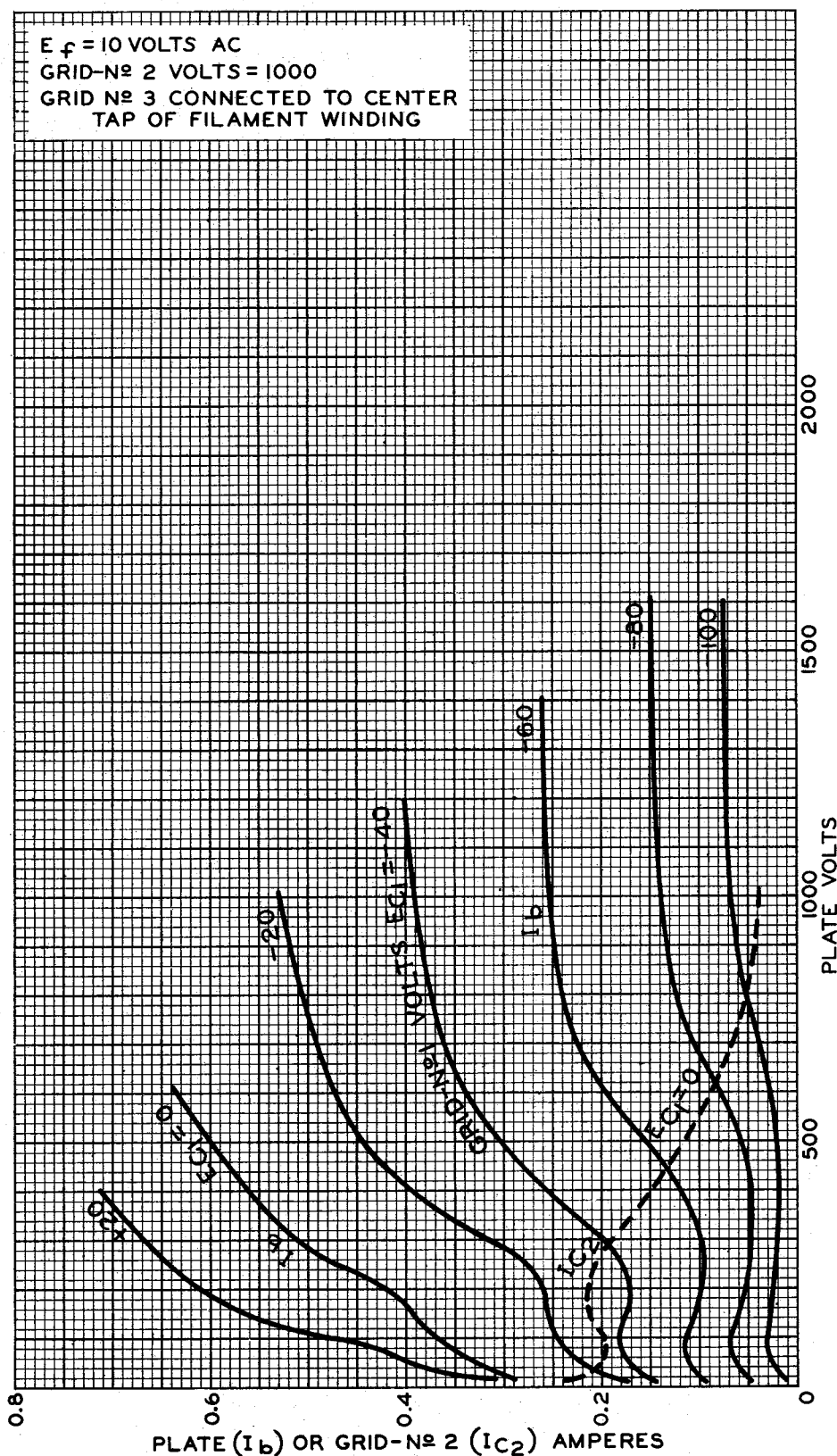
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AVERAGE CHARACTERISTICS



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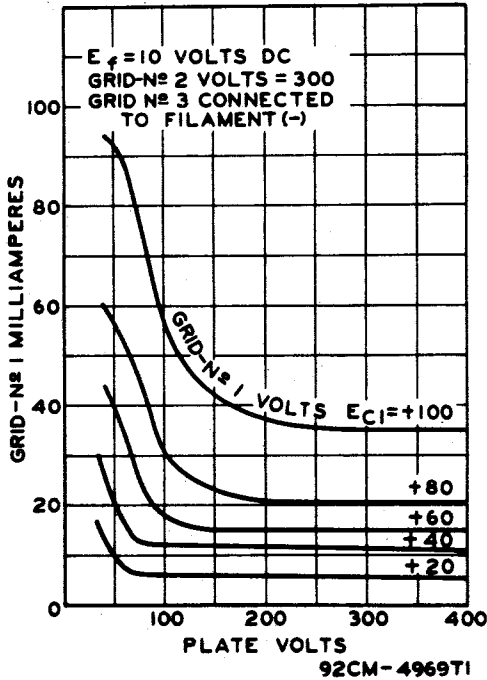


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AVERAGE CHARACTERISTICS



AVERAGE CHARACTERISTICS

