



827-R

BEAM POWER TUBE

FORCED-AIR COOLED

Useful with full input up to 110 Mc

827-R

GENERAL DATA

Electrical:

Filament, Thoriated Tungsten:

Voltage. 7.5 $\pm$ 0.4 . . . ac or dc volts

Current at 7.5 volts . . . 25 amp

Starting current: The filament current must never exceed 50 amperes, even momentarily

Cold resistance. 0.033 ohm

Mu-Factor, Grid No.2 to Grid

No.1 for plate volts = 2000,

grid-No.2 volts = 1100, and

plate ma. = 350. 16

Direct Interelectrode Capacitances:

Grid No.1 to plate (With

external shield) $\diamond$ 0.19 $\mu\mu\text{f}$

Grid No.1 to filament and

grid No.2. 18.5 $\mu\mu\text{f}$

Plate to filament and

grid No.2. 11 $\mu\mu\text{f}$

Mechanical:

Operating Position Vertical, filament end up

Maximum Overall Length (Excluding flexible leads). . . 6-3/8"

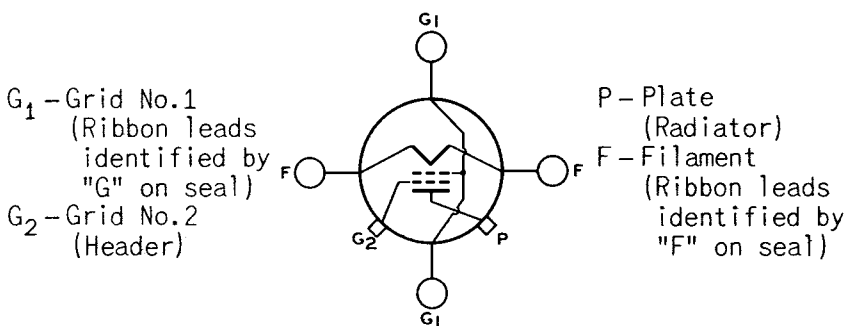
Maximum Diameter 4-11/16"

Weight (Approx.) 4-1/2 lbs

Radiator Integral part of tube

Terminal Connections (See Dimensional Outline):

TOP VIEW



Air Flow:

Through Radiator--The specified flow of incoming air at a maximum temperature of 45° C for various plate dissipations, as indicated in the following tabulation, should be delivered by a blower through the radiator before and during the application of any voltages. Filament power, plate power, and air flow may be removed simultaneously.

 $\diamond$: See next page.

← Indicates a change.

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Percentage of maximum-rated plate dissipation for each class of service.	100	80	%
Minimum air flow.	65	45	cfm
Static pressure.	0.2	0.1	in. of water

To Header, Grid-No.1 Seals,

and Filament Seals. 10 min. cfm

The specified air flow from a 1"-diameter nozzle should be directed into the header and onto the grid-No.1 seals and filament seals before and during the application of any voltages in order to limit the temperature of the filament and the grid-No.1 seals to their maximum value.

Incoming-Air Temperature. 45 max. °C

Radiator Temperature (Measured on the core at end away from incoming air) 150 max. °C

Bulb Temperature (At hottest part). 150 max. °C

Seal Temperature, Filament and Grid No.1 175 max. °C

RF POWER AMPLIFIER — Class B Telephony

Carrier conditions per tube for use
with a maximum modulation factor of 1

Maximum CCS[•] Ratings, Absolute Values:

DC PLATE VOLTAGE.	3500 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE.	1000 max.	volts
DC PLATE CURRENT.	400 max.	ma
PLATE INPUT	1200 max.	watts
GRID-No.2 INPUT	100 max.	watts
PLATE DISSIPATION	800 max.	watts

Typical Operation:

DC Plate Voltage.	3000	3500	volts
DC Grid-No.2 Voltage.	800	800	volts
DC Grid-No.1 (Control-Grid) Voltage [#]	-75	-75	volts
Peak RF Grid-No.1 Voltage	165	150	volts
DC Plate Current.	320	340	ma
DC Grid-No.2 Current.	10	12	ma
DC Grid-No.1 Current (Approx.)	30	25	ma
Driving Power (Approx.) [■]	50	38	watts
Power Output (Approx.)	350	400	watts

♦, •, #, ■: See next page.



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GRID-MODULATED RF POWER AMPLIFIER — Class C Telephony

*Carrier conditions per tube for use
with a maximum modulation factor of 1*

Maximum CCS® Ratings, Absolute Values:

DC PLATE VOLTAGE	3500 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE . . .	1000 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE. . .	-500 max.	volts
DC PLATE CURRENT	400 max.	ma
PLATE INPUT.	1200 max.	watts
GRID-No.2 INPUT.	100 max.	watts
PLATE DISSIPATION.	800 max.	watts

Typical Operation:

DC Plate Voltage	3000	3500	volts
DC Grid-No.2 Voltage	800	800	volts
DC Grid-No.1 Voltage	-300	-300	volts
Peak RF Grid-No.1 Voltage.	410	410	volts
Peak AF Grid-No.1 Voltage.	235	260	volts
DC Plate Current	333	320	ma
DC Grid-No.2 Current	15	13	ma
DC Grid-No.1 Current (Approx.)	45	40	ma
Driving Power (Approx.) [■]	82	74	watts
Power Output (Approx.)	350	400	watts

PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony

*Carrier conditions per tube for use
with a maximum modulation factor of 1*

Maximum CCS® Ratings, Absolute Values:

DC PLATE VOLTAGE	3000 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE . . .	800 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE. . .	-500 max.	volts
DC PLATE CURRENT	400 max.	ma
DC GRID-No.1 CURRENT	125 max.	ma
PLATE INPUT.	1200 max.	watts
GRID-No.2 INPUT.	100 max.	watts
PLATE DISSIPATION.	550 max.	watts

Typical Operation:

DC Plate Voltage	2500	3000	volts
DC Grid-No.2 Voltage*	700	750	volts
DC Grid-No.1 Voltage [▲]	-350	-325	volts
Peak RF Grid-No.1 Voltage.	640	600	volts
DC Plate Current	400	400	ma
DC Grid-No.2 Current	140	125	ma
DC Grid-No.1 Current (Approx.)	125	125	ma
Driving Power (Approx.)	72	68	watts
Power Output (Approx.)	670	825	watts

◆, ●, *, ■, ▲: See next page.

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RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy[†]
and

RF POWER AMPLIFIER — Class C FM Telephony

Maximum CCS[•] Ratings, Absolute Values:

DC PLATE VOLTAGE.	3500 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE.	1000 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE	-500 max.	volts
DC PLATE CURRENT.	500 max.	ma
DC GRID-No.1 CURRENT.	150 max.	ma
PLATE INPUT	1500 max.	watts
GRID-No.2 INPUT	150 max.	watts
PLATE DISSIPATION	800 max.	watts

Typical Operation:

DC Plate Voltage.	3000	3500	volts
DC Grid-No.2 Voltage [•]	900	700	volts
DC Grid-No.1 Voltage [□]	-350	-300	volts
Peak RF Grid-No.1 Voltage	590	520	volts
DC Plate Current.	500	428	ma
DC Grid-No.2 Current.	165	185	ma
DC Grid-No.1 Current (Approx.).	125	100	ma
Driving Power (Approx.)	66	50	watts
Power Output (Approx.)	1000	1050	watts

♦ With external, flat metal shield 10" by 12" having a 3-inch-diameter hole whose center is located on major axis 5" from one of the 10" sides. Shield is located in plane of the grid-No.2 terminal, perpendicular to the tube axis, and is connected to grid No.2.

• Continuous Commercial Service.

* Grid-No.1 voltage is given with respect to midpoint of filament operated on ac. If dc is used, each stated value of grid-No.1 voltage should be decreased by one-half the filament voltage and the circuit returns made to the negative end of the filament.

▲ At crest of audio-frequency cycle with modulation factor of 1.

* Obtained preferably from fixed supply modulated simultaneously with the plate voltage. Series voltage-dropping resistor connected to modulated plate-voltage supply may also be used.

▲ Obtained by grid-No.1 resistor or by combination of grid-No.1 resistor with either fixed supply or cathode resistor.

† 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.

• Obtained preferably from fixed supply or voltage divider. Grid-No.2 voltage must not exceed twice the maximum grid-No.2-voltage rating under key-up conditions.

□ Obtained from fixed supply, cathode resistor, or grid-No.1 resistor. If a preceding stage is keyed, sufficient bias must be applied to maintain plate current at a low value under key-up conditions.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current.	1	23.1	26.9	amp

→ Indicates a change.



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	Note	Min.	Max.	
Direct Interelectrode Capacitances:				
Grid No.1 to plate	2	0.16	0.22	μf
Grid No.1 to filament and grid No.2.	-	14.5	22.5	μf
Plate to filament and grid No.2.	-	7.5	14.5	μf
Mu-Factor, Grid No.2 to Grid No.1.	1,3	13.9	18.1	
Plate Current.	1,4	200	340	ma
Plate-Current Cutoff	1,5	-55	-95	volts
Grid-No.2 Current.	1,4	-	23	ma
Power Output	1,6	900	-	watts

Note 1: With 7.5 volts ac on filament.

Note 2: With external, flat metal shield 10" by 12" having a 3-inch diameter hole whose center is located on major axis 5" from one of the 10" sides. Shield is located in plane of the grid-No.2 terminal, perpendicular to the tube axis, and is connected to grid No.2.

Note 3: With dc plate volts = 2000, dc grid-No.2 volts = 1100, and dc grid-No.1 voltage adjusted to give dc plate current of 350 ma.

Note 4: With dc plate volts = 3000, dc grid-No.2 volts = 1000, and dc grid-No.1 volts = -20.

Note 5: With dc plate volts = 3000, dc grid-No.2 volts = 1000, and dc grid-No.1 voltage adjusted to give dc plate current of 10 ma.

Note 6: In self-excited oscillator circuit, and with dc plate volts = 3500, dc grid-No.2 volts = 900, dc plate ma. = 430, dc grid-No.1 ma. = 80 to 120, grid-No.1 resistor (ohms) = 5000, and frequency (Mc) = 8.

OPERATING CONSIDERATIONS

The *mounting* for the 827-R requires a clamp support for the radiator (plate connection), a connector for the grid-No.2 terminal, a connector for the grid-No.1 leads tied together, and two connectors for the filament leads. The tube should be supported in a vertical position with the grid-No.1 and filament leads up. If the 827-R is subjected to considerable vibration in service, it is advisable to support the mounting by means of a spring suspension. The installation of all wires and connections must be made so that they will not be close to or touch the glass parts. This precaution is necessary to prevent almost certain puncture of the glass.

Connections to the grid-No.1 and filament leads must have some degree of flexibility in order not to put strain on the glass-to-metal seals. Particular caution must be exercised in making connection to the grid-No.2 terminal (header) in order to avoid placing strain on the seal between the header and the glass bulb. It is suggested that the connector for the grid-No.2 terminal consist of a flat yoke having spring contacts which will engage the inside and the outside of the rim of the header with firm but moderate pressure. Do not

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use any form of clamp on the header as it will crack the glass-to-metal seal. The support for the yoke must not place any pressure on the seal. None of the connectors should be used to support circuits parts.

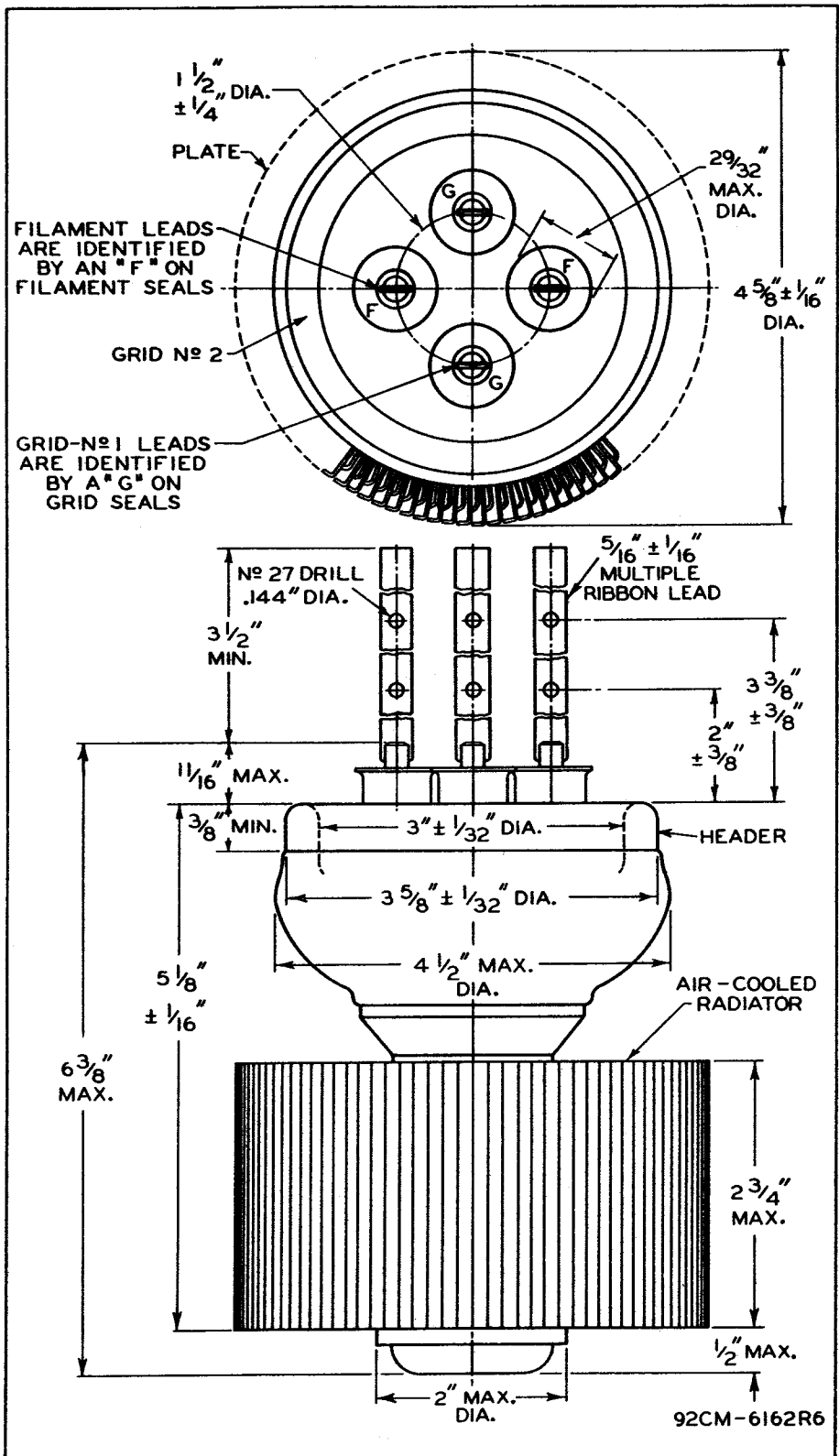
Cooling of the 827-R is accomplished by passing a stream of clean air through the radiator toward the filament end, and by directing another stream of air into the entrant metal header and around the grid-No.1 and filament seals. A suitable air filter is required in the air supply for the radiator.



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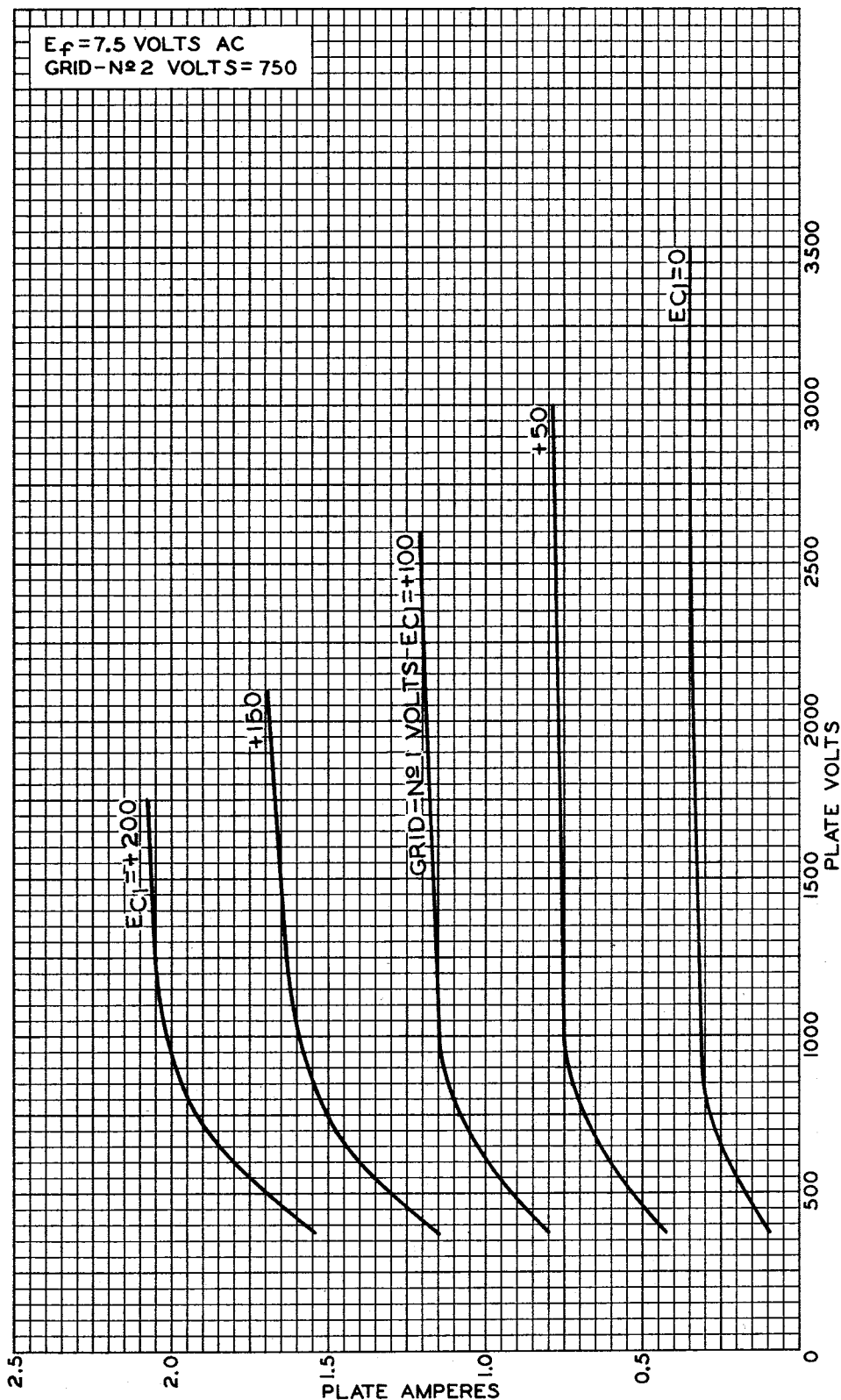


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TYPICAL PLATE CHARACTERISTICS



ELECTRON TUBE DIVISION

92CM-6167R1

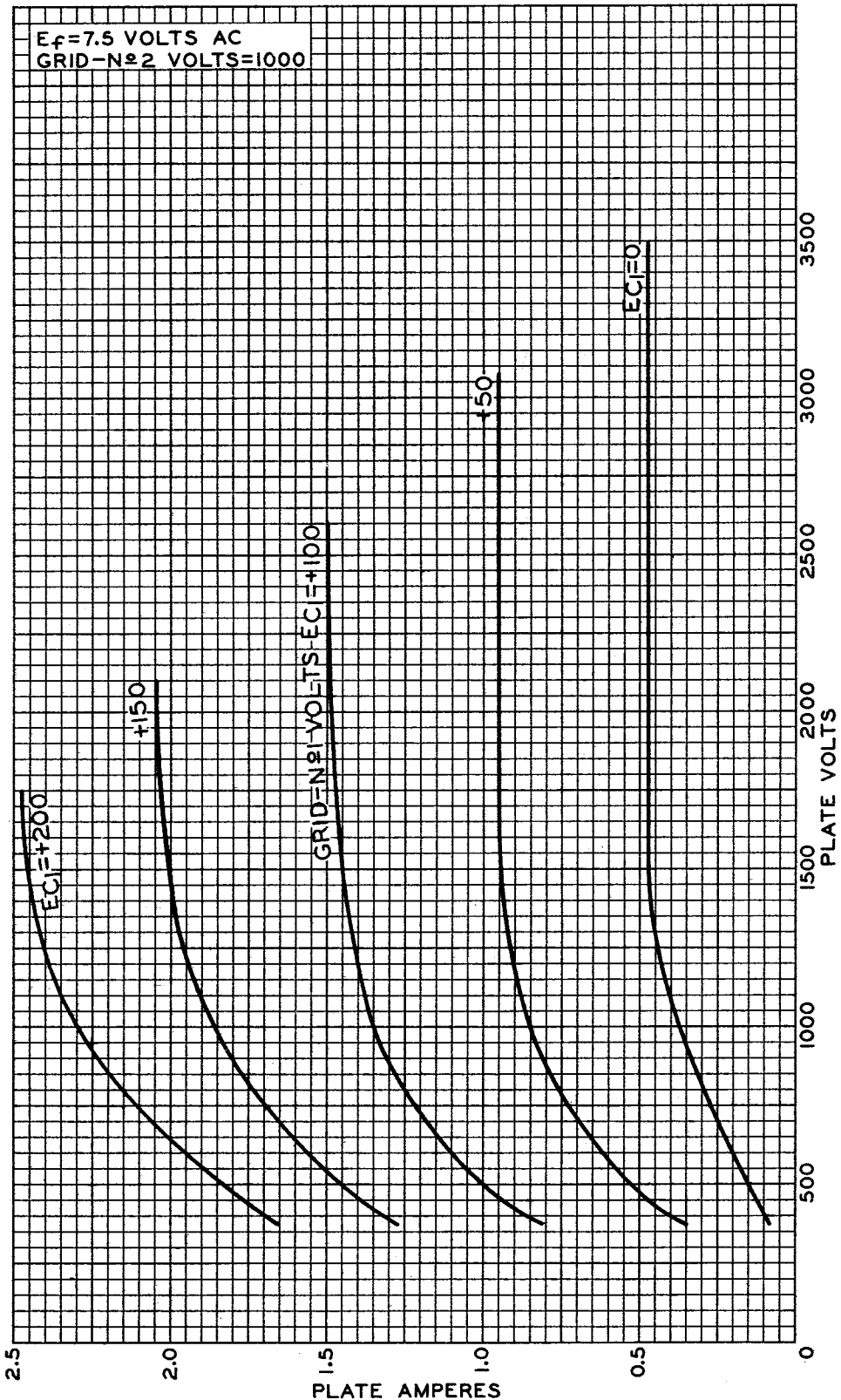
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TYPICAL PLATE CHARACTERISTICS



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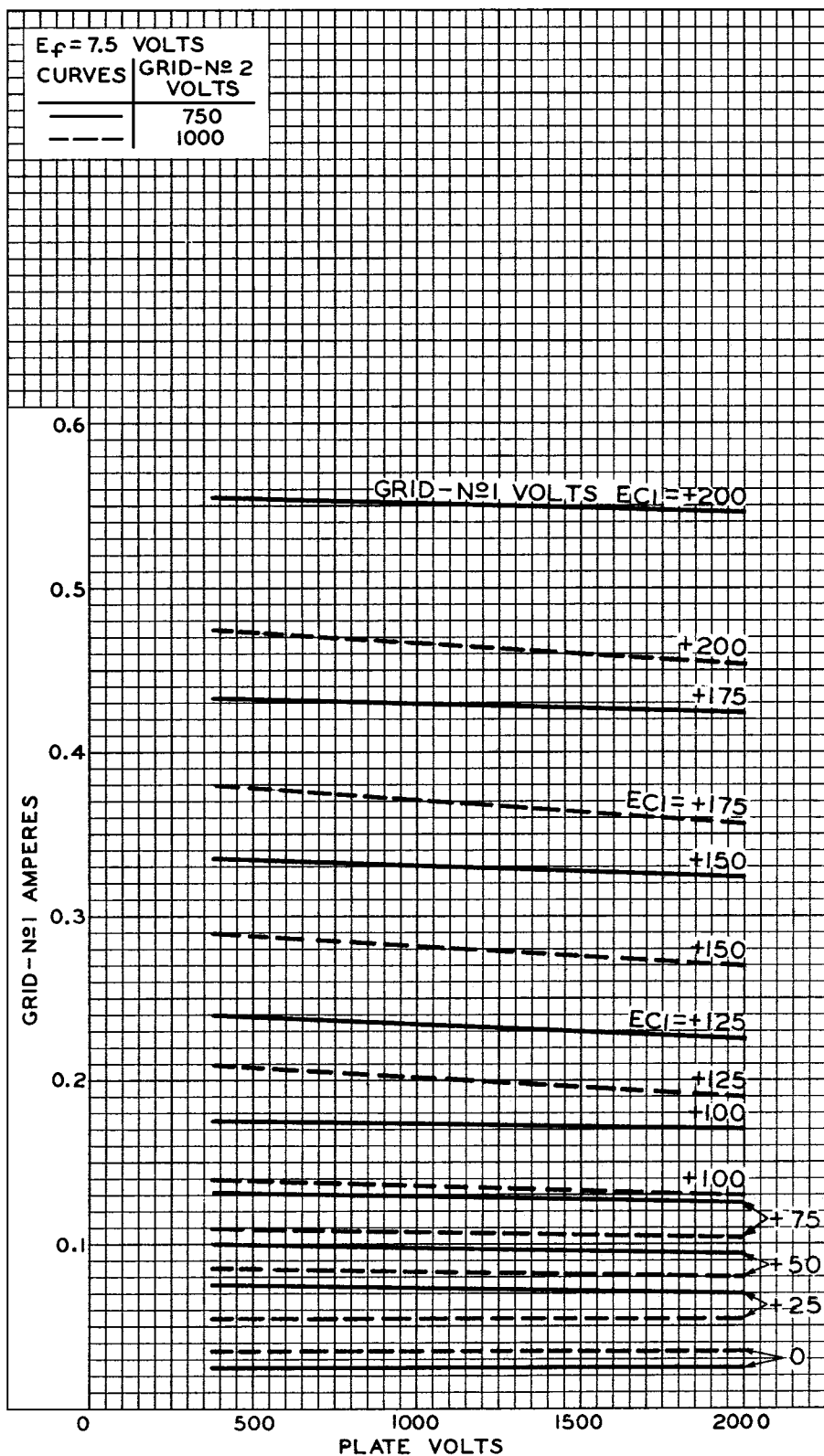
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TYPICAL CHARACTERISTICS



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92CM-6169RI

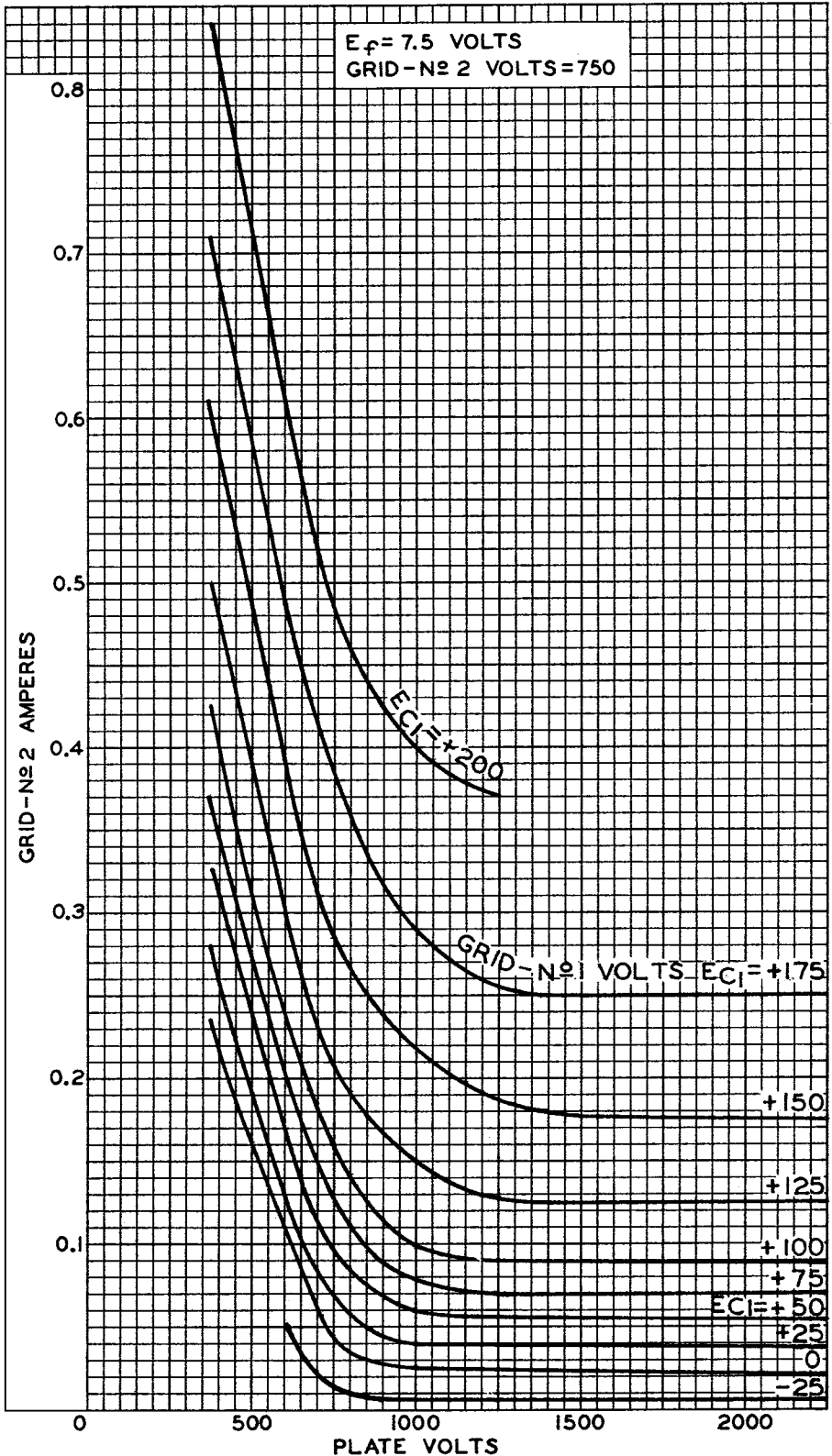
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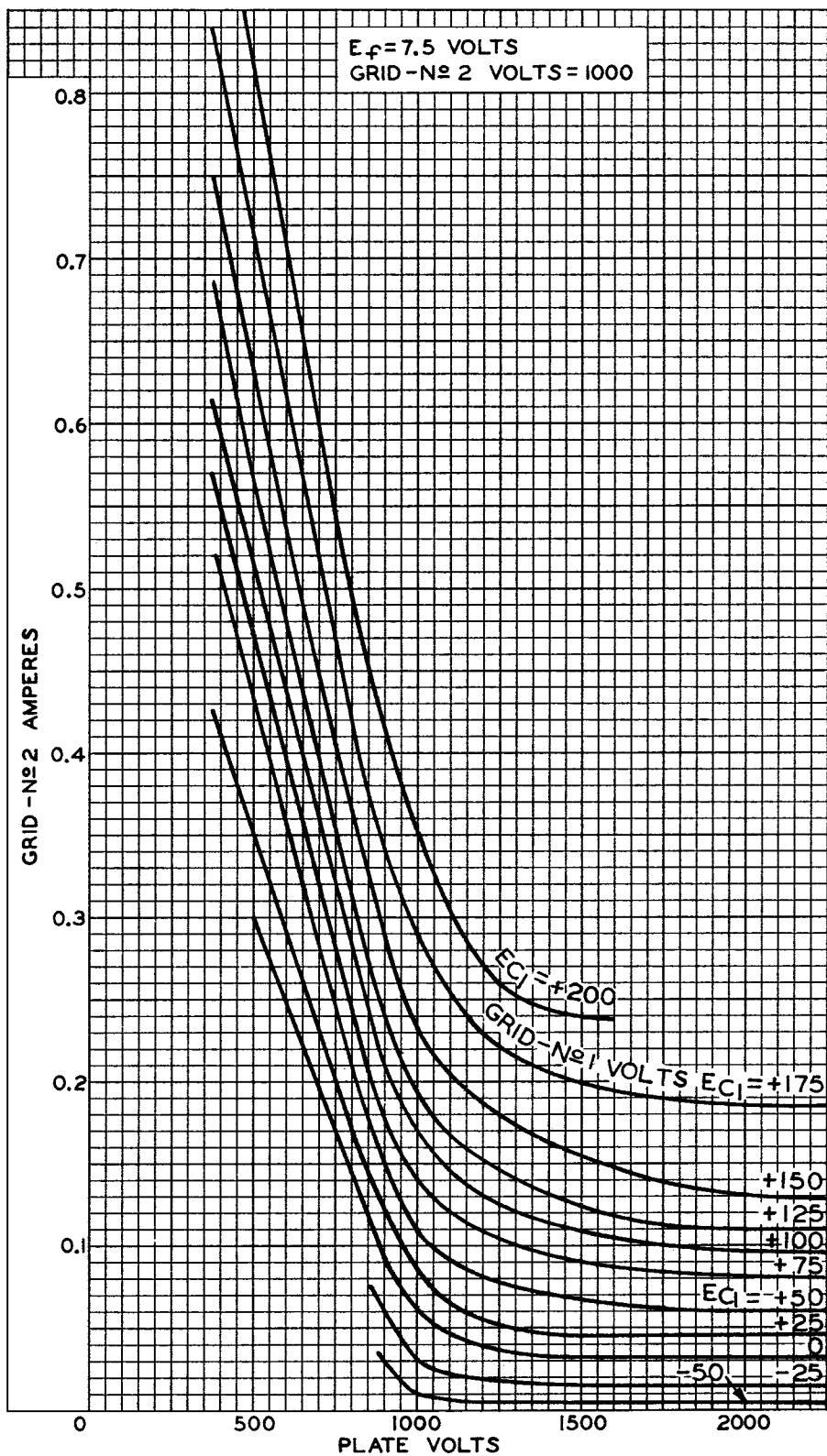


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TYPICAL CHARACTERISTICS



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