

## Beam Power Tube

## FORCED-AIR COOLED

CERAMIC-METAL SEALS  
COAXIAL ELECTRODE STRUCTURE  
UNIPOENTIAL CATHODE

380 WATTS PEP OUTPUT AT 30 Mc  
300 WATTS CW OUTPUT AT 470 Mc  
INTEGRAL RADIATOR

Full Ratings up to 500 Mc

## GENERAL DATA

## Electrical:

Heater, for Unipotential Cathode:

Voltage (AC or DC) <sup>a</sup> . . . . .	13.5 ± 10%	volts
Current at 13.5 volts. . . . .	1.3	amp
Minimum heating time . . . . .	60	sec

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

for plate volts = 450, grid-No.2  
volts = 325, plate amperes = 1.2 . . . . . 12

Direct Interelectrode Capacitances:<sup>b</sup>

Grid No.1 to plate . . . . .	0.13 max.	μf
Grid No.1 to cathode . . . . .	16	μf
Plate to cathode . . . . .	0.011	μf
Grid No.1 to grid No.2 . . . . .	22	μf
Grid No.2 to plate . . . . .	6.5	μf
Grid No.2 to cathode . . . . .	3.2	μf
Cathode to heater. . . . .	3.4	μf

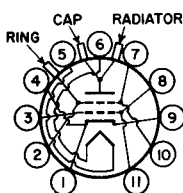
## Mechanical:

Operating Position . . . . .	. . . . .	Any
Maximum Overall Length . . . . .	. . . . .	2.26"
Seated Length. . . . .	1.920" ± 0.065"	
Diameter . . . . .	1.625" ± 0.015"	
Weight (Approx.) . . . . .	. . . . .	3.5 oz
Socket . . . . .	Mycalex <sup>c</sup> No.CP464-2, or equivalent	
Base . . . . .	Large-Wafer Elevenar 11-Pin with Ring (JEDEC No.E11-81)	

Terminal Connections (See *Dimensional Outline*):

## BOTTOM VIEW

Pin 1 - Cathode  
Pin 2 - Grid No.2  
Pin 3 - Grid No.1  
Pin 4 - Cathode  
Pin 5 - Heater  
Pin 6 - Heater  
Pin 7 - Grid No.2  
Pin 8 - Grid No.1  
Pin 9 - Cathode  
Pin 10 - Grid No.2



Pin 11 - Grid No.1  
CAP - Plate  
Terminal  
RADIATOR - Plate  
Terminal  
RING<sup>d</sup> - Grid-No.2  
Terminal  
Contact  
Surface

## Thermal:

Terminal Temperature (All terminals) . . . . .	250 max.	°C
Radiator Core Temperature (See <i>Dimensional Outline</i> ) . . . . .	250 max.	°C



## Air Flow:

See accompanying *Typical Cooling Requirements* curve.

**LINEAR RF POWER AMPLIFIER**  
**Single-Sideband Suppressed-Carrier Service**

*Peak envelope conditions for a signal having  
 a minimum peak-to-average power ratio of 2*

**Maximum CCS Ratings, Absolute-Maximum Values:**

*Up to 500 Mc*

DC PLATE VOLTAGE. . . . .	2200	max.	volts
DC GRID-No.2 VOLTAGE. . . . .	400	max.	volts
DC GRID-No.1 VOLTAGE. . . . .	-100	max.	volts
DC PLATE CURRENT AT PEAK OF ENVELOPE. . . . .	450 <sup>e</sup>	max.	ma
DC GRID-No.1 CURRENT. . . . .	100	max.	ma
PLATE DISSIPATION . . . . .	400	max.	watts
GRID-No.2 DISSIPATION . . . . .	8	max.	watts
<b>PEAK HEATER-CATHODE VOLTAGE:</b>			
Heater negative with respect to cathode.	150	max.	volts
Heater positive with respect to cathode.	150	max.	volts

**Typical CCS Operation with "Two-Tone Modulation":**

*At 30 Mc*

DC Plate Voltage. . . . .	2000		volts
DC Grid-No.2 Voltage <sup>f</sup> . . . . .	400		volts
DC Grid-No.1 Voltage <sup>f</sup> . . . . .	-35		volts
Zero-Signal DC Plate Current. . . . .	100		ma
Effective RF Load Resistance. . . . .	3050		ohms
<b>DC Plate Current:</b>			
Peak of envelope. . . . .	335		ma
Average . . . . .	250		ma
<b>DC Grid-No.2 Current:</b>			
Peak of envelope. . . . .	10		ma
Average . . . . .	7		ma
Average DC Grid-No.1 Current. . . . .	0.05 <sup>g</sup>		ma
<b>Peak-of-Envelope Driver Power Output</b>			
(Approx.) <sup>h</sup> . . . . .	0.3		watt
Output-Circuit Efficiency (Approx.) . . . . .	90		%
<b>Distortion Products Level:<sup>j</sup></b>			
Third order . . . . .	29		db
Fifth order . . . . .	32		db
<b>Useful Power Output (Approx.):</b>			
Peak of envelope. . . . .	380 <sup>k</sup>		watts
Average . . . . .	190 <sup>k</sup>		watts

**Maximum Circuit Values:**

Grid-No.1 Circuit Resistance  
 under any condition:

With fixed bias . . . . .	25000	max.	ohms
With fixed bias (In Class-AB <sub>1</sub> operation). . . . .	100000	max.	ohms
With cathode bias . . . . .	Not	recommended	
Grid-No.2-Circuit Impedance . . . . .	10000	max.	ohms
Plate-Circuit Impedance . . . . .	m		



## RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy and

## RF POWER AMPLIFIER — Class C FM Telephony

**Maximum CCS Ratings, Absolute-Maximum Values:**

	<i>Up to 500 Mc</i>	
DC PLATE VOLTAGE. . . . .	2200 max.	volts
DC GRID-No.2 VOLTAGE. . . . .	400 max.	volts
DC GRID-No.1 VOLTAGE. . . . .	-100 max.	volts
DC PLATE CURRENT. . . . .	300 max.	ma
DC GRID-No.1 CURRENT. . . . .	100 max.	ma
GRID-No.2 DISSIPATION . . . . .	8 max.	watts
PLATE DISSIPATION . . . . .	400 max.	watts
<b>PEAK HEATER-CATHODE VOLTAGE:</b>		
Heater negative with respect to cathode.	150 max.	volts
Heater positive with respect to cathode.	150 max.	volts

**Typical CCS Operation:**

*In grid-drive circuit at 50 Mc*

DC Plate Voltage. . . . .	700	1000	1500	2000	volts
DC Grid-No.2 Voltage. . . . .	175	200	200	200	volts
DC Grid-No.1 Voltage. . . . .	-10	-30	-30	-30	volts
DC Plate Current. . . . .	300	300	300	300	ma
DC Grid-No.2 Current. . . . .	25	20	20	20	ma
DC Grid-No.1 Current. . . . .	50	40	40	30	ma
Driver Power Output (Approx.) <sup>n</sup> .	1.2	2	2	2	watts
Useful Power Output . . . . .	120 <sup>k</sup>	175 <sup>k</sup>	275 <sup>k</sup>	375 <sup>k</sup>	watts

*In grid-drive circuit at 470 Mc*

DC Plate Voltage. . . . .	700	1000	1500	2000	volts
DC Grid-No.2 Voltage. . . . .	200	200	200	200	volts
DC Grid-No.1 Voltage. . . . .	-30	-30	-30	-30	volts
DC Plate Current. . . . .	300	300	300	300	ma
DC Grid-No.2 Current. . . . .	10	10	5	5	ma
DC Grid-No.1 Current. . . . .	30	30	30	30	ma
Driver Power Output (Approx.) <sup>n</sup> .	5	5	5	5	watts
Useful Power Output . . . . .	100 <sup>p</sup>	165 <sup>p</sup>	235 <sup>p</sup>	300 <sup>p</sup>	watts

**Maximum Circuit Values:**

Grid-No.1 Circuit Resistance

under any condition:

With fixed bias . . . . . 25000 max. ohms

Grid-No.2-Circuit Impedance . . . . . 10000 max. ohms

Plate-Circuit Impedance . . . . . m

<sup>a</sup> Because the cathode is subjected to back bombardment as the frequency is increased with resultant increase in temperature, the heater voltage should, for optimum life, be reduced to a value such that at the heater voltage obtained at minimum supply voltage conditions (all other voltages constant) the tube performance just starts to show some degradation; e.g., at 470 Mc, heater volts = 12.5 (approx.).

<sup>b</sup> Measured with special shield adapter.

<sup>c</sup> Mycalex Corporation of America, 125 Clifton Boulevard, Clifton, New Jersey.

<sup>d</sup> For use at higher frequencies.

<sup>e</sup> The maximum rating for a signal having a minimum peak-to-average power ratio less than 2, such as is obtained in "Single-Tone" operation, is



300 ma. During short periods of circuit adjustment under "Single-Tone" conditions, the average plate current may be as high as 450 ma.

f Obtained preferably from a separate, well-regulated source.

g This value represents the approximate grid-No.1 current obtained due to initial electron velocities and contact-potential effects when grid No.1 is driven to zero volts at maximum signal.

h Driver power output represents circuit losses and is the actual power measured at input to grid No.1 circuit. The actual power required depends on the operating frequency and the circuit used. The tube driving power is approximately zero watts.

j With maximum signal output used as a reference, and without the use of feedback to enhance linearity.

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

m The tube should see an effective plate supply impedance which limits the peak current through the tube under surge conditions to 15 amperes.

n Driver power output includes circuit losses and is the actual power measured at the input to the grid circuit. It will vary depending upon the frequency of operation and the circuit used.

o Measured in a typical coaxial-cavity circuit.

### CHARACTERISTICS RANGE VALUES

Test No.	Note	Min.	Max.	
1. Heater Current . . . . .	1	1.15	1.45	amp
2. Direct Interelectrode Capacitances:	2			
Grid No.1 to plate . . . . .	-	—	0.13	$\mu\text{f}$
Grid No.1 to cathode . . . . .	-	14.3	17.7	$\mu\text{f}$
Plate to cathode . . . . .	-	0.0065	0.0155	$\mu\text{f}$
Grid No.1 to grid No.2 . . . . .	-	19.8	24.2	$\mu\text{f}$
Grid No.2 to plate . . . . .	-	5.7	7.1	$\mu\text{f}$
Grid No.2 to cathode . . . . .	-	2.6	3.6	$\mu\text{f}$
Cathode to heater . . . . .	-	2.5	4.1	$\mu\text{f}$
3. Grid-No.1 Voltage . . . . .	1,3	-8	-19	volts
4. Reverse Grid-No.1 Current . . . . .	1,3	—	-25	$\mu\text{a}$
5. Grid-No.2 Current . . . . .	1,3	-7	+6	ma
6. Peak Emission . . . . .	1,4	13	—	peak amp
7. Interelectrode Leakage Resistance . . . . .	5	1	—	megohm

Note 1: With 13.5 volts ac or dc on heater.

Note 2: Measured with special shield adapter.

Note 3: With dc plate voltage at 700 volts, dc grid-No.2 voltage of 250 volts, and dc grid-No.1 voltage adjusted to give a dc plate current of 185 ma.

Note 4: For conditions with grid No.1, grid No.2, and plate tied together; and pulse voltage source connected between plate and cathode. Pulse duration is 2.5 microseconds and pulse repetition frequency is 60 pps. The voltage-pulse amplitude is 200 volts peak. After 1 minute at this value, the current-pulse amplitude will not be less than the value specified.

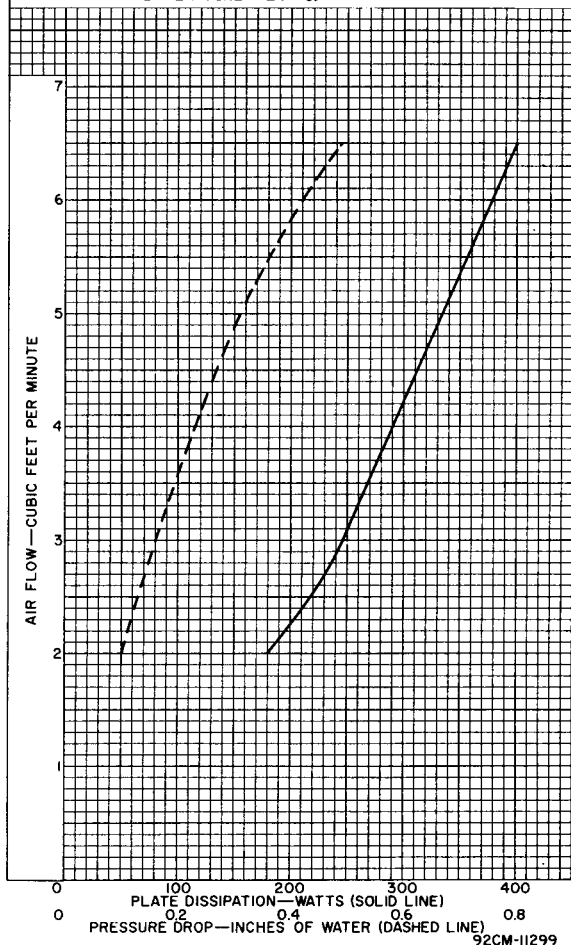
Note 5: Under conditions with tube at 20° to 30° C for at least 30 minutes without any voltages applied to the tube. The minimum resistance between any two electrodes as measured with a 200-volt Megger-type ohmmeter having an internal impedance of 1 megohm, will be 1 megohm.



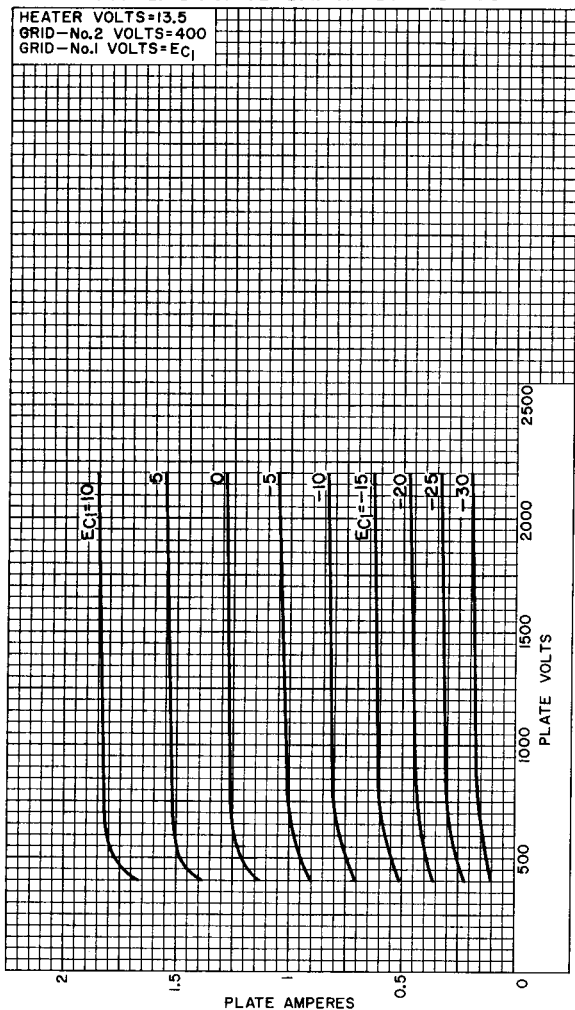


## TYPICAL COOLING REQUIREMENTS

AIR FLOW DIRECTED THROUGH RADIATOR WITH AIR CHIMNEY SK-606 (EITEL-McCULLOUGH INC.), AND SOCKET CD464-2 (MYCALEX CORP. OF AMERICA), AND BY-PASS CAPACITOR (E.F. JOHNSON CO.)  
 PLATE-CORE TEMPERATURE — 250° C.  
 INCOMING-AIR TEMPERATURE — 24° C.



## TYPICAL PLATE CHARACTERISTICS

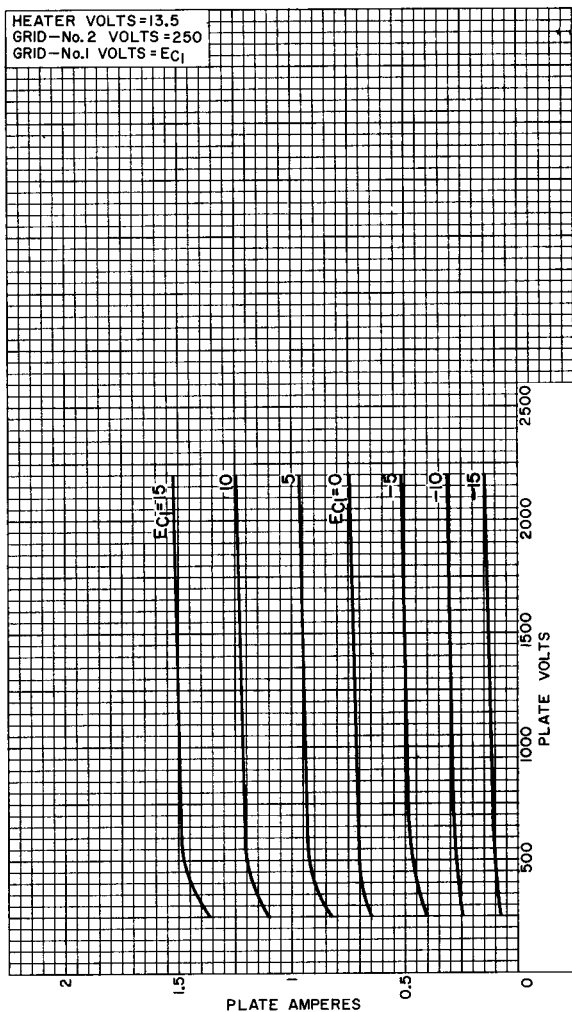


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## TYPICAL PLATE CHARACTERISTICS

HEATER VOLTS = 13.5  
 GRID—No. 2 VOLTS = 250  
 GRID—No. 1 VOLTS =  $E_{c1}$



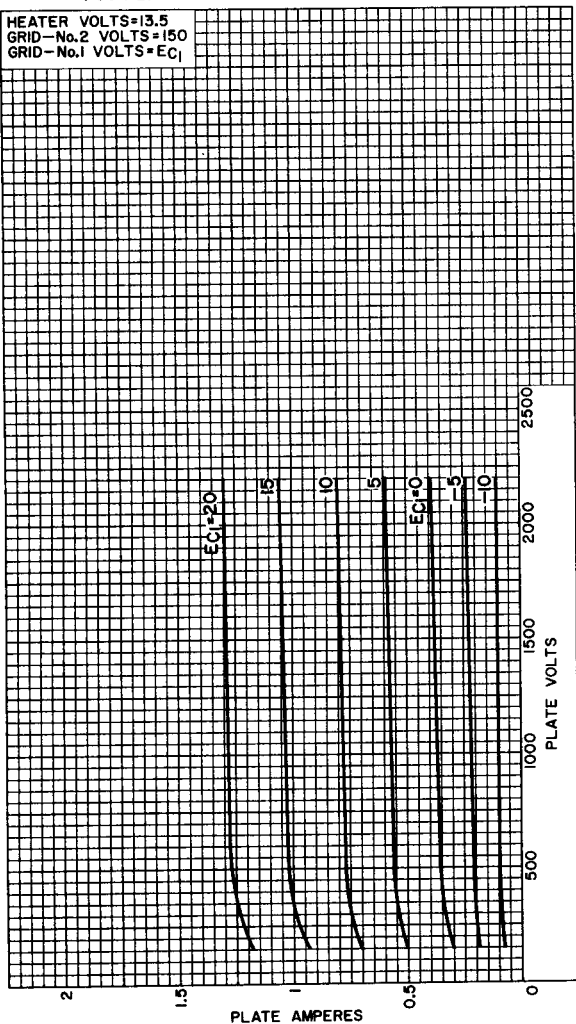
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## TYPICAL PLATE CHARACTERISTICS

HEATER VOLTS=13.5  
 GRID—No.2 VOLTS=150  
 GRID—No.1 VOLTS= $E_{C1}$



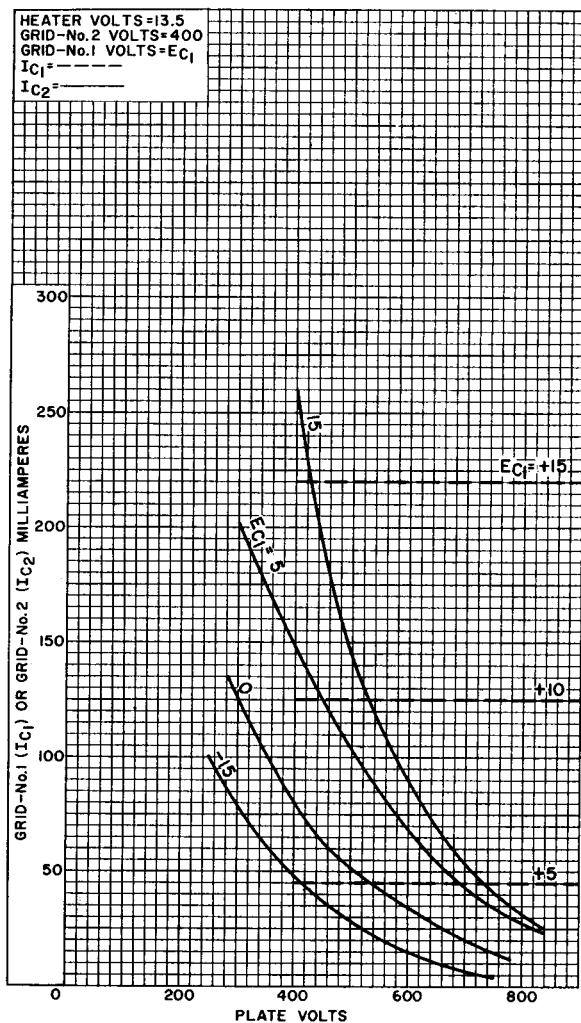
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RADIO CORPORATION OF AMERICA  
 Electron Tube Division  
 Harrison, N. J.

DATA 5  
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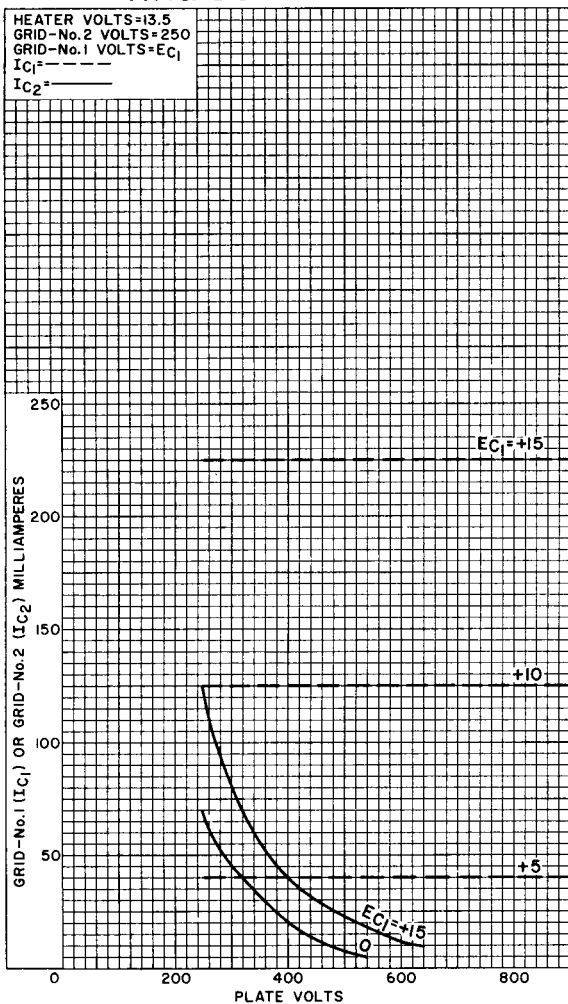
## TYPICAL CHARACTERISTICS



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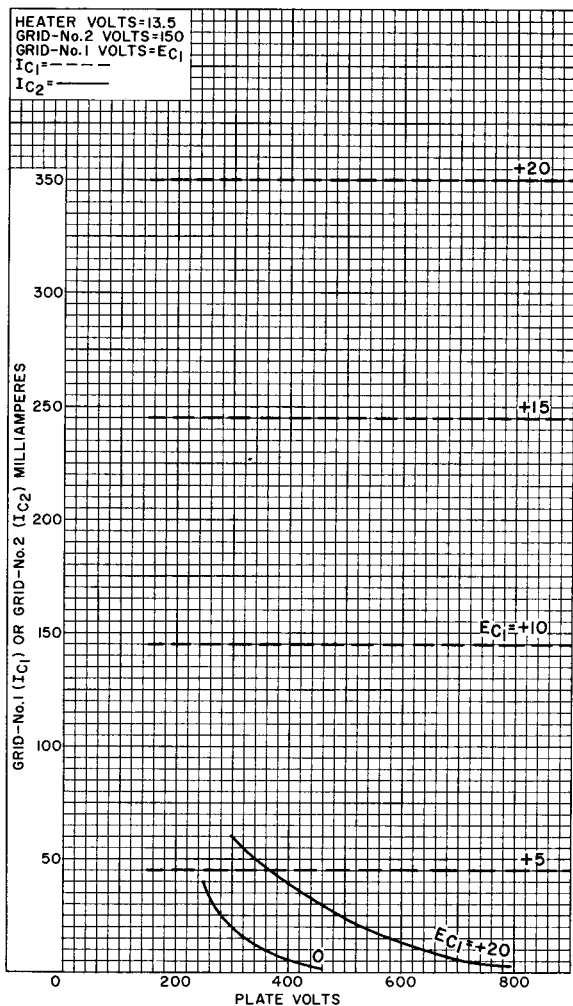
## TYPICAL CHARACTERISTICS



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## TYPICAL CHARACTERISTICS



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