

# Beam Power Tube

For Use in Communications Equip-  
ment at Frequencies Up to 175 Mc.

## 9-PIN MINIATURE TYPE

### Electrical:

#### Heater Characteristics and Ratings:

|                              |               |       |
|------------------------------|---------------|-------|
| Voltage (AC or DC) . . . . . | $6.3 \pm 5\%$ | volts |
| Current . . . . .            | 0.800         | amp   |

#### Peak heater-cathode voltage:

|                                                      |          |       |
|------------------------------------------------------|----------|-------|
| Heater negative with respect<br>to cathode . . . . . | 100 max. | volts |
|------------------------------------------------------|----------|-------|

|                                                      |          |       |
|------------------------------------------------------|----------|-------|
| Heater positive with respect<br>to cathode . . . . . | 100 max. | volts |
|------------------------------------------------------|----------|-------|

#### Direct Interelectrode Capacitances:<sup>0</sup>

|                                                                     |      |    |
|---------------------------------------------------------------------|------|----|
| Grid No.1 to plate . . . . .                                        | 0.15 | pf |
| Grid No.1 to cathode, grid No.3,<br>grid No.2, and heater . . . . . | 10.0 | pf |
| Plate to cathode, grid No.3,<br>grid No.2, and heater . . . . .     | 5.5  | pf |

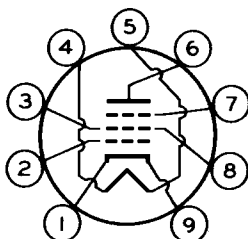
### Characteristics, Class A<sub>1</sub> Amplifier:

|                                             |                                       |            |
|---------------------------------------------|---------------------------------------|------------|
| Plate Voltage . . . . .                     | 250                                   | volts      |
| Grid No.3 . . . . .                         | <i>Connected to cathode at socket</i> |            |
| Grid-No.2 Voltage . . . . .                 | 250                                   | volts      |
| Grid-No.1 Voltage . . . . .                 | -18                                   | volts      |
| Mu-Factor, Grid No.2 to Grid No.1 . . . . . | 8.7                                   |            |
| Transconductance . . . . .                  | 5300                                  | $\mu$ mhos |
| Plate Current . . . . .                     | 40                                    | ma         |
| Grid-No.2 Current . . . . .                 | 3                                     | ma         |

### Mechanical:

|                                                         |                                          |
|---------------------------------------------------------|------------------------------------------|
| Operating Position . . . . .                            | Any                                      |
| Type of Cathode . . . . .                               | Coated Unipotential                      |
| Maximum Overall Length . . . . .                        | 2-5/8"                                   |
| Maximum Seated Length . . . . .                         | 2-3/8"                                   |
| Length, Base Seat to Bulb Top (Excluding tip) . . . . . | 2" $\pm$ 3/32"                           |
| Diameter . . . . .                                      | 0.750" to 0.875"                         |
| Dimensional Outline . . . . .                           | See <i>General Section</i>               |
| Bulb . . . . .                                          | T6-1/2                                   |
| Base . . . . .                                          | Small-Button Noval 9-Pin (JEDEC No.E9-1) |
| Basing Designation for BOTTOM VIEW . . . . .            | 9LK                                      |

Pin 1 - Cathode  
Pin 2 - Grid No.1  
Pin 3 - Grid No.2  
Pin 4 - Heater  
Pin 5 - Heater



Pin 6 - Plate  
Pin 7 - Grid No.3  
Pin 8 - Grid No.2  
Pin 9 - Cathode

|                                                                  |          |              |
|------------------------------------------------------------------|----------|--------------|
| Bulb Temperature (At hottest point<br>on bulb surface) . . . . . | 225 max. | $^{\circ}$ C |
|------------------------------------------------------------------|----------|--------------|



## → AF POWER AMPLIFIER & MODULATOR — Class AB<sub>1</sub>†

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

|                                              |          |       |
|----------------------------------------------|----------|-------|
| DC PLATE VOLTAGE . . . . .                   | 375 max. | volts |
| GRID No.3 (SUPPRESSOR GRID) . . . . .        | 0 max.   | volts |
| DC GRID-No.2 (SCREEN-GRID) VOLTAGE . . . . . | 300 max. | volts |
| MAX.-SIGNAL DC PLATE CURRENT ■ . . . . .     | 70 max.  | ma    |
| MAX.-SIGNAL PLATE INPUT ■ . . . . .          | 21 max.  | watts |
| MAX.-SIGNAL GRID-No.2 INPUT ■ . . . . .      | 2 max.   | watts |
| PLATE DISSIPATION ■ . . . . .                | 10 max.  | watts |

### Typical CCS Push-Pull Operation:

*Values are for 2 tubes*

|                                                      |                                |       |
|------------------------------------------------------|--------------------------------|-------|
| DC Plate Voltage . . . . .                           | 300                            | volts |
| Grid No.3. . . . .                                   | Connected to cathode at socket |       |
| DC Grid-No.2 Voltage§. . . . .                       | 250                            | volts |
| DC Grid-No.1 Voltage§. . . . .                       | -21                            | volts |
| Peak AF Grid-No.1-to-Grid-No.1 Voltage . . . . .     | 40                             | volts |
| Zero-Signal DC Plate Current . . . . .               | 40                             | ma    |
| Max.-Signal DC Plate Current . . . . .               | 125                            | ma    |
| Zero-Signal DC Grid-No.2 Current . . . . .           | 2                              | ma    |
| Max.-Signal DC Grid-No.2 Current . . . . .           | 14                             | ma    |
| Effective Load Resistance (Plate to plate) . . . . . | 5000                           | ohms  |
| Max.-Signal Driving Power . . . . .                  | 0                              | watts |
| Total Harmonic Distortion. . . . .                   | 5                              | %     |
| Max.-Signal Power Output (Approx.) . . . . .         | 20.5                           | watts |

### Maximum Circuit Values:

|                                        |          |        |
|----------------------------------------|----------|--------|
| Grid-No.1-Circuit Resistance . . . . . | 0.1 max. | megohm |
|----------------------------------------|----------|--------|

## → RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy† and RF POWER AMPLIFIER — Class C FM Telephony

### Maximum Ratings, Absolute-Maximum Values:

|                                                 | Up to 175 Mc |           |       |
|-------------------------------------------------|--------------|-----------|-------|
|                                                 | CCS*         | ICAS**    |       |
| DC PLATE VOLTAGE . . . . .                      | 375 max.     | 375 max.  | volts |
| GRID No.3 (SUPPRESSOR GRID). . . . .            | 0 max.       | 0 max.    | volts |
| DC GRID-No.2 (SCREEN-GRID)<br>VOLTAGE. . . . .  | 300 max.     | 300 max.  | volts |
| DC GRID-No.1 (CONTROL-GRID)<br>VOLTAGE. . . . . | -125 max.    | -125 max. | volts |
| DC PLATE CURRENT . . . . .                      | 70 max.      | 80 max.   | ma    |
| DC GRID-No.2 CURRENT . . . . .                  | 15 max.      | 15 max.   | ma    |
| DC GRID-No.1 CURRENT . . . . .                  | 5 max.       | 5 max.    | ma    |
| PLATE INPUT. . . . .                            | 21 max.      | 24 max.   | watts |
| GRID-No.2 INPUT. . . . .                        | 2 max.       | 2 max.    | watts |
| PLATE DISSIPATION. . . . .                      | 10 max.      | 12 max.   | watts |

→ Indicates a change.



**Typical Operation:***As amplifier at 175 Mc*

|                                                       | CCS                                   |     | ICAS |       |
|-------------------------------------------------------|---------------------------------------|-----|------|-------|
| DC Plate Voltage. . . . .                             | 250                                   | 300 | 300  | volts |
| Grid No.3 . . . . .                                   | <i>Connected to cathode at socket</i> |     |      |       |
| DC Grid-No.2 Voltage <sup>□□</sup> . . . . .          | 200                                   | 200 | 250  | volts |
| DC Grid-No.1 Voltage <sup>⊗⊗</sup> . . . . .          | -40                                   | -42 | -55  | volts |
| Peak RF Grid-No.1 Voltage . . . . .                   | 47                                    | 52  | 62   | volts |
| DC Plate Current. . . . .                             | 60                                    | 70  | 80   | ma    |
| DC Grid-No.2 Current. . . . .                         | 3.7                                   | 3.7 | 5.1  | ma    |
| DC Grid-No.1 Current (Approx.) . . . . .              | 1.5                                   | 2.1 | 1.6  | ma    |
| Driver Power Output (Approx.) <sup>▲▲</sup> . . . . . | 1                                     | 1   | 1.5  | watts |
| Useful Power Output (Approx.) . . . . .               | 6.5                                   | 8.5 | 10   | watts |

**Maximum Circuit Values:**

Grid-No.1-Circuit Resistance. . . . . 0.1 max. 0.1 max. megohm

**PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony** ←*Carrier conditions per tube for use  
with a maximum modulation factor of 1***Maximum Ratings, Absolute-Maximum Values:**

|                                                  | <i>Up to 175 Mc</i> |           |       |
|--------------------------------------------------|---------------------|-----------|-------|
|                                                  | CCS                 | ICAS      |       |
| DC PLATE VOLTAGE. . . . .                        | 300 max.            | 300 max.  | volts |
| GRID No.3 (SUPPRESSOR GRID) . . . . .            | 0 max.              | 0 max.    | volts |
| DC GRID-No.2 (SCREEN-GRID)<br>VOLTAGE . . . . .  | 300 max.            | 300 max.  | volts |
| DC GRID-No.1 (CONTROL-GRID)<br>VOLTAGE . . . . . | -125 max.           | -125 max. | volts |
| DC PLATE CURRENT. . . . .                        | 60 max.             | 70 max.   | ma    |
| DC GRID-No.2 CURRENT. . . . .                    | 10 max.             | 10 max.   | ma    |
| DC GRID-No.1 CURRENT. . . . .                    | 5 max.              | 5 max.    | ma    |
| PLATE INPUT . . . . .                            | 15 max.             | 17.5 max. | watts |
| GRID-No.2 INPUT . . . . .                        | 1.4 max.            | 1.4 max.  | watts |
| PLATE DISSIPATION . . . . .                      | 7 max.              | 8 max.    | watts |

**Typical Operation:**

|                                                 | <i>At 175 Mc</i>                      |       |       |
|-------------------------------------------------|---------------------------------------|-------|-------|
| DC Plate Voltage. . . . .                       | 250                                   | 250   | volts |
| Grid No.3 . . . . .                             | <i>Connected to cathode at socket</i> |       |       |
| DC Grid-No.2 Voltage <sup>▲</sup> . . . . .     | 250                                   | 250   | volts |
| DC Grid-No.1 Voltage <sup>★</sup> . . . . .     | -70                                   | -75   | volts |
| From a grid-No.2<br>resistor of . . . . .       | 33000                                 | 33000 | ohms  |
| RF Grid-No.1 Voltage. . . . .                   | 75                                    | 80    | volts |
| DC Plate Current. . . . .                       | 60                                    | 70    | ma    |
| DC Grid-No.2 Current. . . . .                   | 2.5                                   | 3     | ma    |
| DC Grid-No.1 Current (Approx.) . . . . .        | 2.1                                   | 2.3   | ma    |
| Driving Power (Approx.) <sup>▲▲</sup> . . . . . | 1                                     | 1     | watt  |
| Useful Power Output <sup>*</sup> . . . . .      | 6.5                                   | 7.5   | watts |

← Indicates a change.



**Maximum Circuit Values:**

Grid-No.1-Circuit

Resistance . . . . . 0.1 max. 0.1 max. megohm

**FREQUENCY MULTIPLIER****Maximum Ratings, Absolute-Maximum Values:**

|                                                 | CCS       | ICAS      |       |
|-------------------------------------------------|-----------|-----------|-------|
| DC PLATE VOLTAGE . . . . .                      | 375 max.  | 375 max.  | volts |
| GRID No.3 (SUPPRESSOR GRID) . . .               | 0 max.    | 0 max.    | volts |
| DC GRID-No.2 (SCREEN-GRID)<br>VOLTAGE. . . . .  | 300 max.  | 300 max.  | volts |
| DC GRID-No.1 (CONTROL-GRID)<br>VOLTAGE. . . . . | -125 max. | -125 max. | volts |
| DC PLATE CURRENT . . . . .                      | 50 max.   | 60 max.   | ma    |
| DC GRID-No.2 CURRENT . . . . .                  | 15 max.   | 15 max.   | ma    |
| DC GRID-No.1 CURRENT . . . . .                  | 5 max.    | 5 max.    | ma    |
| PLATE INPUT. . . . .                            | 13 max.   | 15 max.   | watts |
| GRID-No.2 INPUT. . . . .                        | 2 max.    | 2 max.    | watts |
| PLATE DISSIPATION. . . . .                      | 10 max.   | 12 max.   | watts |

**Typical Operation:***As doubler to 175 Mc*

|                                           |                                       |       |       |
|-------------------------------------------|---------------------------------------|-------|-------|
| DC Plate Voltage . . . . .                | 250                                   | 250   | volts |
| Grid No.3. . . . .                        | <i>Connected to cathode at socket</i> |       |       |
| DC Grid-No.2 Voltage . . . . .            | 200                                   | 250   | volts |
| DC Grid-No.1 Voltage** . . . . .          | -53                                   | -66   | volts |
| From a grid-No.1<br>resistor of . . . . . | 53000                                 | 44000 | ohms  |

→ Indicates a change.



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## BEAM POWER TUBE

|                                                 |     |     |       |
|-------------------------------------------------|-----|-----|-------|
| Peak RF Grid-No.1                               |     |     |       |
| Voltage. . . . .                                | 60  | 74  | volts |
| DC Plate Current . . . . .                      | 50  | 60  | ma    |
| DC Grid-No.2 Current . . . . .                  | 2.6 | 3.5 | ma    |
| DC Grid-No.1 Current                            |     |     |       |
| (Approx.). . . . .                              | 1   | 1.5 | ma    |
| Driving Power (Approx.) <sup>▲▲</sup> . . . . . | 0.4 | 0.6 | watt  |
| Useful Power Output* . . . . .                  | 3   | 4.5 | watts |

*As tripler at 175 Mc*

|                                                 |                                       |       |       |
|-------------------------------------------------|---------------------------------------|-------|-------|
| DC Plate Voltage . . . . .                      | 200                                   | 250   | volts |
| Grid No.3. . . . .                              | <i>Connected to cathode at socket</i> |       |       |
| DC Grid-No.2 Voltage . . . . .                  | 200                                   | 250   | volts |
| DC Grid-No.1 Voltage <sup>⊕⊕</sup> . . . . .    | -90                                   | -120  | volts |
| From a grid-No.1                                |                                       |       |       |
| resistor of. . . . .                            | 50000                                 | 70000 | ohms  |
| Peak RF Grid-No.1                               |                                       |       |       |
| Voltage. . . . .                                | 105                                   | 130   | volts |
| DC Plate Current . . . . .                      | 50                                    | 60    | ma    |
| DC Grid-No.2 Current . . . . .                  | 3                                     | 3.9   | ma    |
| DC Grid-No.1 Current                            |                                       |       |       |
| (Approx.). . . . .                              | 1.85                                  | 1.7   | ma    |
| Driving Power (Approx.) <sup>▲▲</sup> . . . . . | 0.4                                   | 0.6   | watt  |
| Useful Power Output* . . . . .                  | 1.4                                   | 2.3   | watts |

**Maximum Circuit Values:**

|                      |          |          |        |
|----------------------|----------|----------|--------|
| Grid-No.1-Circuit    |          |          |        |
| Resistance . . . . . | 0.1 max. | 0.1 max. | megohm |

- Without external shield.
- ◆ Subscript 1 indicates that grid-No.1 current does not flow during any part of the input cycle.
- Continuous Commercial Service.
- Averaged over any audio-frequency cycle of sine-wave form.
- ⊕ Obtained preferably from a fixed supply.
- † Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of of the audio-frequency envelope does not exceed 115% of the carrier conditions.
- Intermittent Commercial and Amateur Service.
- Obtained preferably from a separate source or from the plate-voltage supply with a voltage divider. If a series resistor is used, it should be adjustable to obtain the desired operating plate current after initial tuning adjustments are completed.
- ⊕⊕ Obtained from a grid-No.1 resistor, or from a combination of grid-No.1 resistor with either fixed supply or cathode resistor.
- ▲▲ Driver stage is required to supply tube losses and rf-circuit losses. The driver stage should be designed to provide an excess of power above the indicated values to take care of variations in line voltage, components, initial tube characteristics, and tube characteristics during life.
- \* Measured at load.
- ▲ Obtained preferably from a separate source modulated along with the plate supply, or from the modulated plate supply through a series resistor. It is recommended that this resistor be adjustable to obtain the desired operating plate current after initial tuning adjustments are made.



# BEAM POWER TUBE

- \* Obtained from a grid-No.1 resistor or from a combination of grid-No.1 resistor with either fixed supply or cathode resistor. The combination of grid-No.1 resistor and fixed supply has the advantage of not only protecting the tube from damage through loss of excitation but also of minimizing distortion by bias-supply compensation.

## CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

|                                                                   | Note | Min.  | Max.  |            |
|-------------------------------------------------------------------|------|-------|-------|------------|
| Heater Current. . . . .                                           | 1    | 0.745 | 0.855 | amp        |
| Transconductance. . . . .                                         | 1,2  | 4200  | 6400  | $\mu$ mhos |
| Plate Current . . . . .                                           | 1,2  | 30    | 50    | ma         |
| Plate Current . . . . .                                           | 1,3  | —     | 50    | $\mu$ a    |
| Grid-No.2 Current . . . . .                                       | 1,2  | —     | 7.5   | ma         |
| Reverse Grid-No.1 Current . . .                                   | 1,4  | —     | 2     | $\mu$ a    |
| Heater-Cathode Leakage Current:                                   |      |       |       |            |
| Heater negative with respect to cathode. . . . .                  | 1,5  | —     | 20    | $\mu$ a    |
| Heater positive with respect to cathode. . . . .                  | 1,5  | —     | 20    | $\mu$ a    |
| Leakage Resistance:                                               |      |       |       |            |
| Between grid-No.1 and all other electrodes tied together. . . . . | 1,6  | 100   | —     | megohms    |
| Between plate and all other electrodes tied together. . . . .     | 1,7  | 100   | —     | megohms    |

Note 1: With 6.3 volts ac or dc on heater.

Note 2: With plate voltage of 250 volts, grid No.3 connected to cathode, grid-No.2 voltage of 250 volts, and grid-No.1 voltage of -18 volts.

Note 3: With plate voltage of 250 volts, grid No.3 connected to cathode, grid-No.2 voltage of 250 volts, and grid-No.1 voltage of -48 volts.

Note 4: With plate voltage of 180 volts, grid No.3 connected to cathode, grid-No.2 voltage of 250 volts, grid-No.1 resistor of 0.1 megohm, and cathode resistor of 170 ohms.

Note 5: With 100 volts dc between heater and cathode.

Note 6: With grid No.1 100 volts negative with respect to all other electrodes tied together.

Note 7: With plate 300 volts negative with respect to all other electrodes tied together.



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## AVERAGE CHARACTERISTICS

$E_f = 6.3$  VOLTS

GRID N<sup>o</sup> 3 CONNECTED TO CATHODE AT SOCKET.

GRID-N<sup>o</sup> 2 VOLTS=200

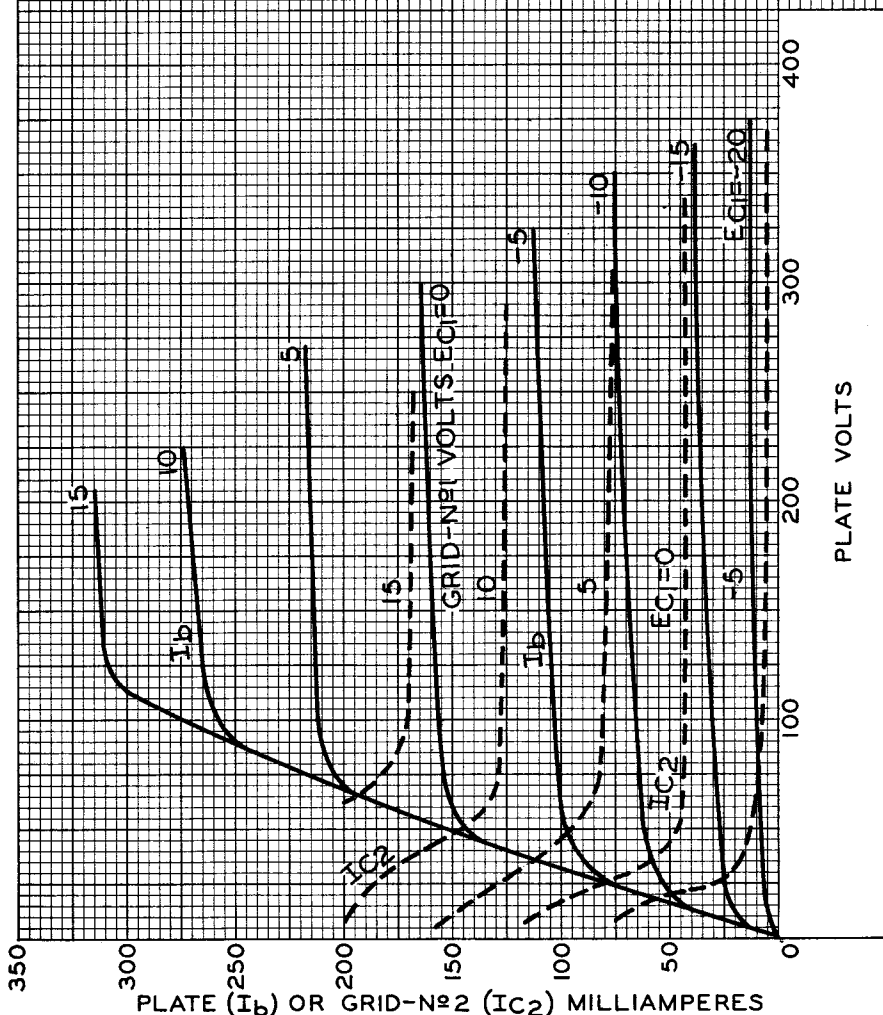


PLATE ( $I_b$ ) OR GRID-N<sup>o</sup> 2 ( $I_{C2}$ ) MILLIAMPERES

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92CM-10305R1

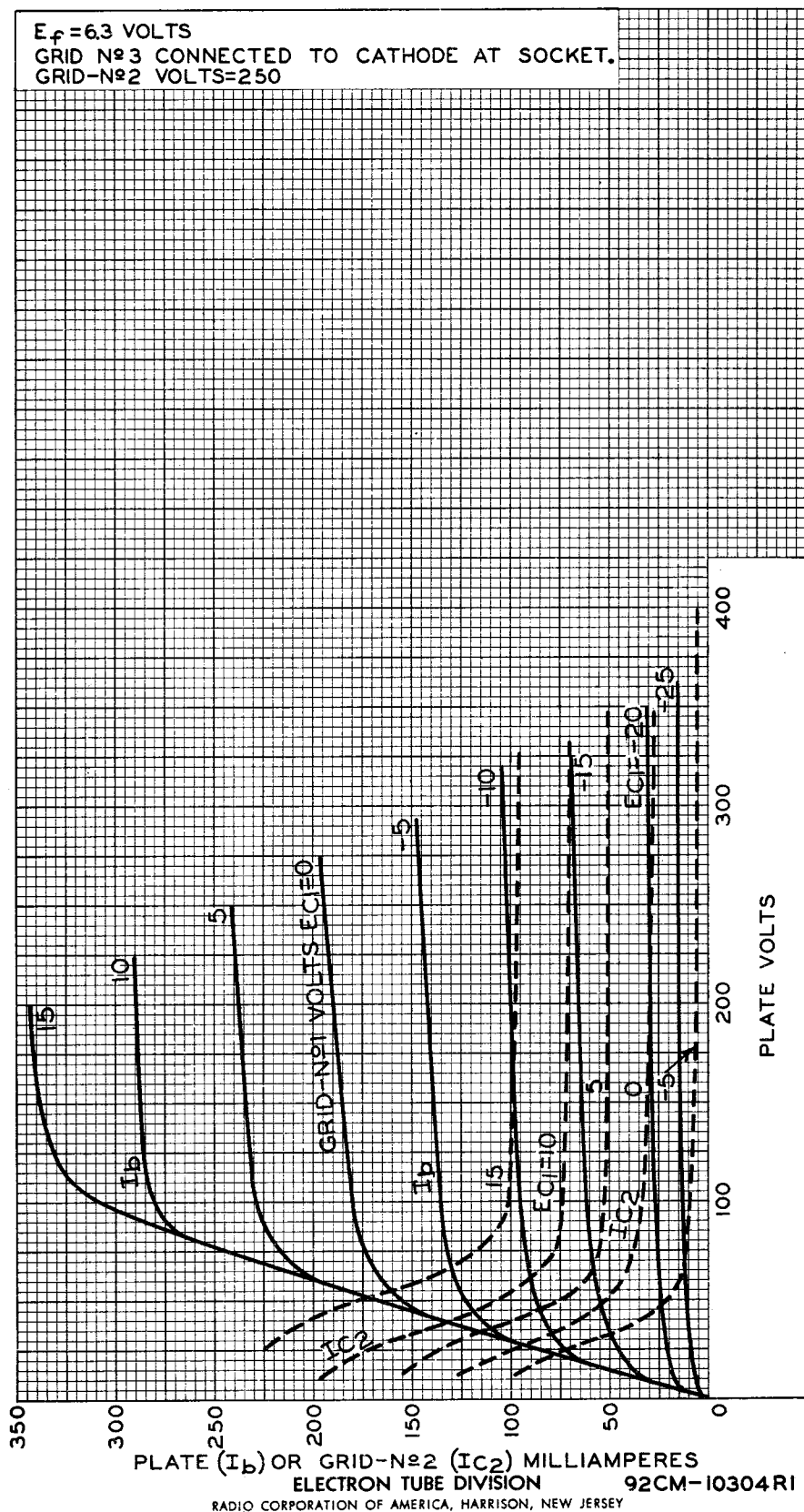
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## AVERAGE CHARACTERISTICS

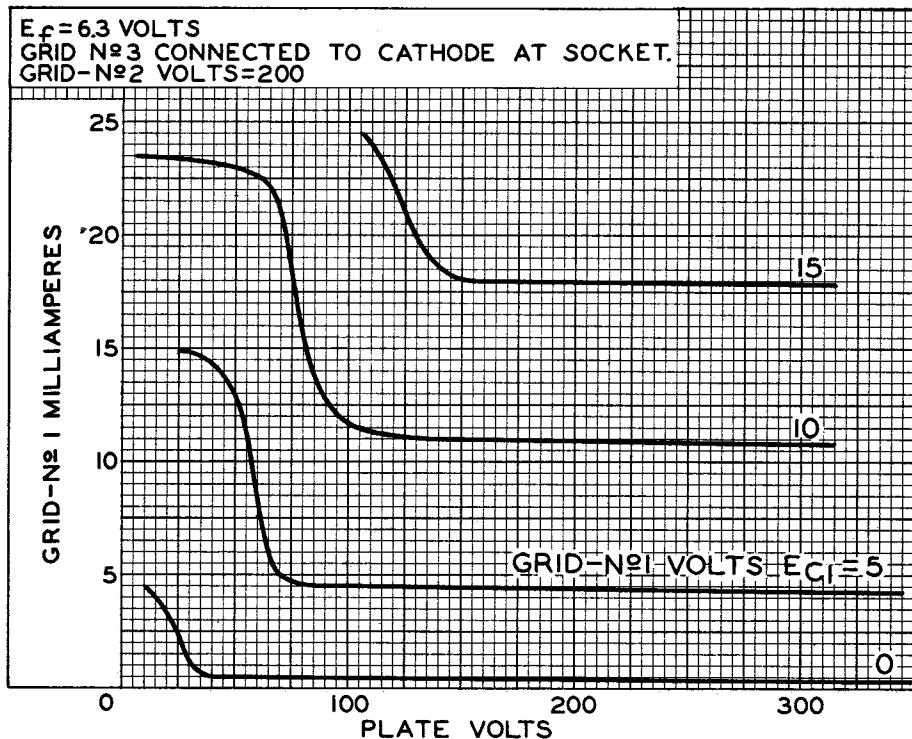
 $E_f = 6.3$  VOLTSGRID N<sup>o</sup>3 CONNECTED TO CATHODE AT SOCKET.GRID-N<sup>o</sup>2 VOLTS=250



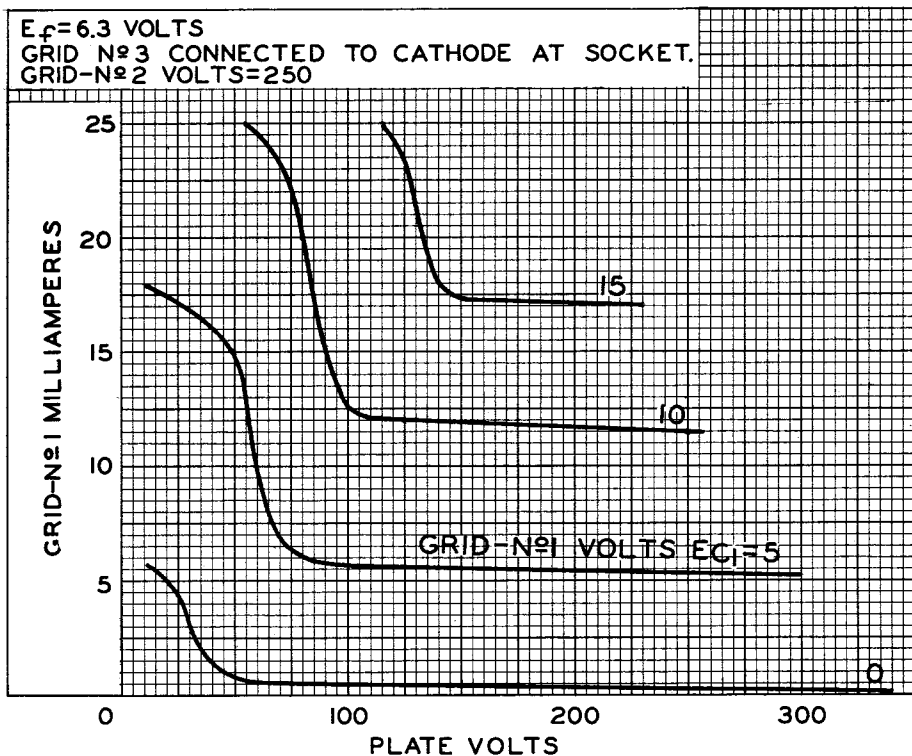
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## AVERAGE CHARACTERISTICS



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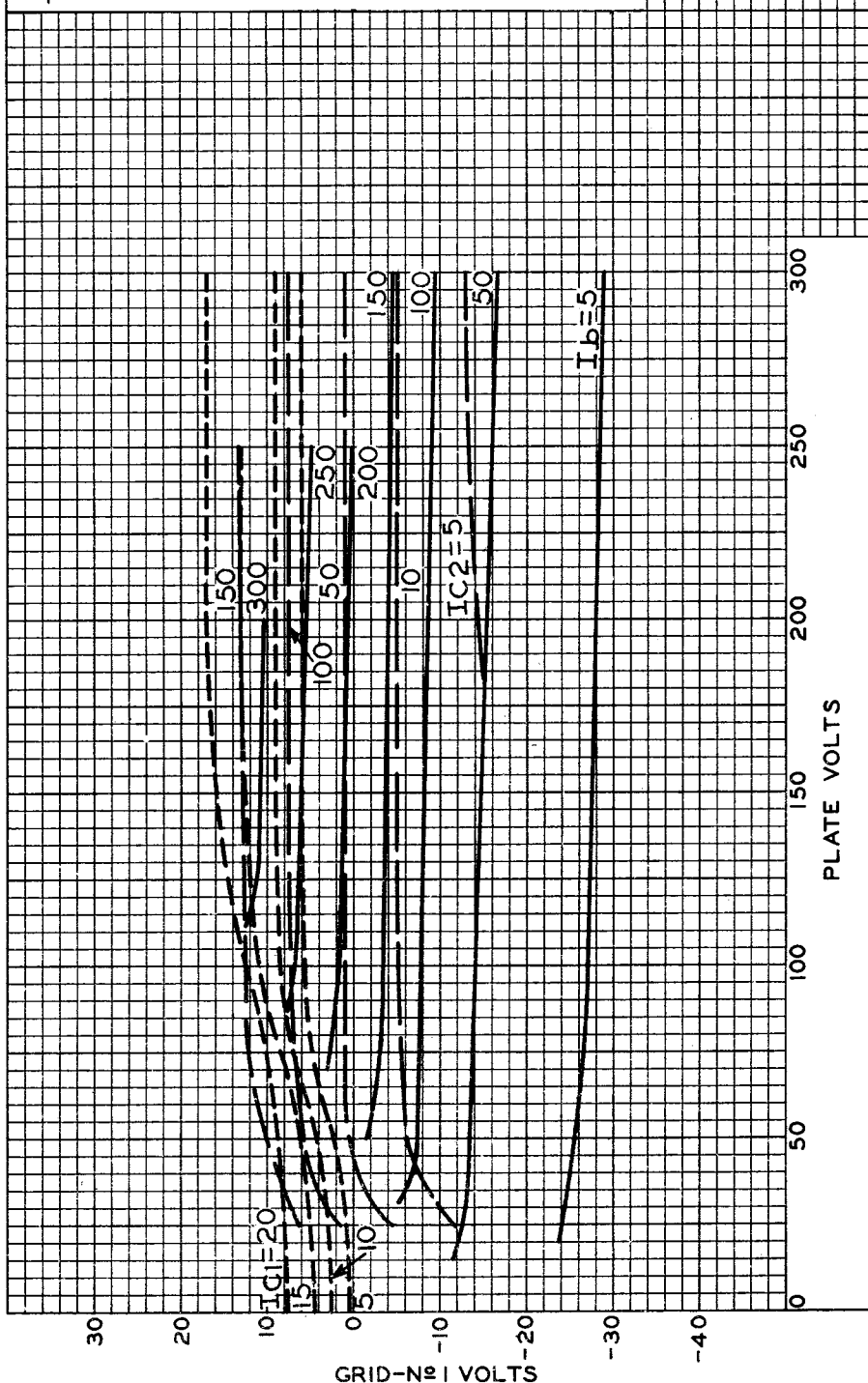
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## AVERAGE CONSTANT-CURRENT CHARACTERISTICS

 $E_f = 6.3$  VOLTS

GRID-Nº3 CONNECTED TO CATHODE AT SOCKET.

GRID-Nº2 VOLTS=200

 $I_b$  = PLATE MILLIAMPERES $I_{C2}$  = GRID-Nº2 MILLIAMPERES $I_{C1}$  = GRID-Nº1 MILLIAMPERES

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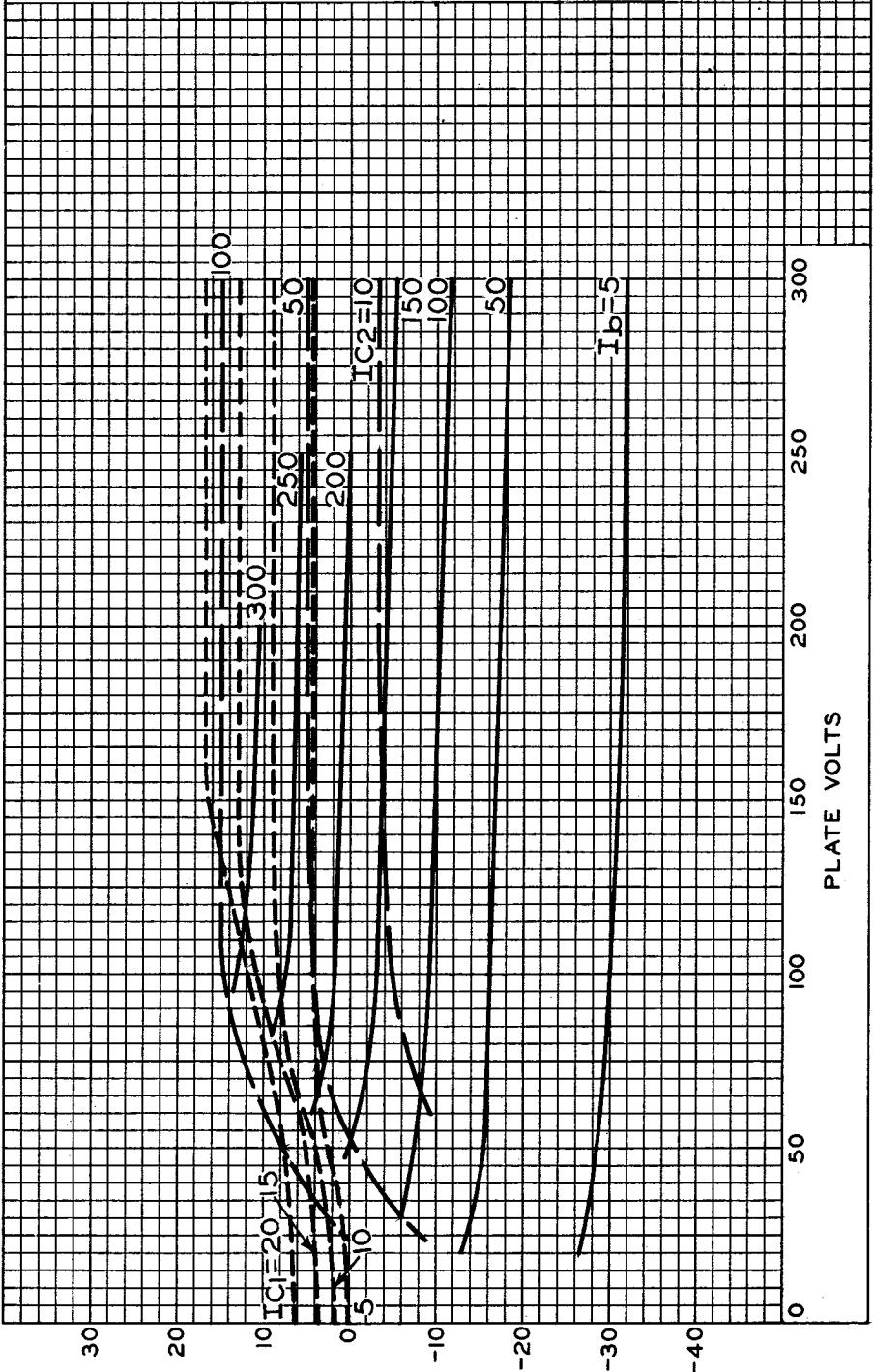


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# AVERAGE CONSTANT-CURRENT CHARACTERISTICS

$E_f = 6.3$  VOLTS  
GRID-Nº 3 CONNECTED TO CATHODE AT SOCKET.  
GRID-Nº 2 VOLTS = 250  
 $I_b$  = PLATE MILLIAMPERES  
 $I_{C2}$  = GRID-Nº 2 MILLIAMPERES  
 $I_{C1}$  = GRID-Nº 1 MILLIAMPERES



GRID-Nº 1 VOLTS

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