



6448

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## UHF BEAM POWER TUBE

WATER-COOLED ELECTRODES

## GENERAL DATA

## Electrical:

Filament\*, 2-Section Multi-strand

Thoriated Tungsten:

|                                          |                                                        |
|------------------------------------------|--------------------------------------------------------|
| Voltage per section (AC or DC) . . . . . | { 1.35 av. volts<br>1.50 max. volts                    |
| Current per section at 1.35 volts . . .  | 1000 amp                                               |
| Starting current per section . . . . .   | Must never exceed<br>1500 amperes,<br>even momentarily |
| Cold resistance per section . . . . .    | 0.0002 ohm                                             |
| Minimum heating time . . . . .           | 10 seconds                                             |
| Supply circuits . . . . .                | See Circuits                                           |

Mu-Factor, Grid No.2 to Grid No.1 for plate  
volts = 3000, grid-no.2 volts = 800, and plate  
amperes = 4 . . . . . 6

## Direct Interelectrode Capacitances:

|                              |          |               |
|------------------------------|----------|---------------|
| Grid No.1 to plate . . . . . | 0.1 max. | $\mu\text{f}$ |
| Input . . . . .              | 335      | $\mu\text{f}$ |
| Output . . . . .             | 30       | $\mu\text{f}$ |

## Internal Bypass Capacitors between

|                                         |       |               |
|-----------------------------------------|-------|---------------|
| Grid No.2 and Cathode (Total) . . . . . | 15000 | $\mu\text{f}$ |
|-----------------------------------------|-------|---------------|

## Mechanical:

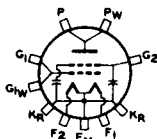
## Terminal Connections:

F<sub>1</sub> - Fil. Sect. No.1

&amp; Water Conn.

F<sub>2</sub> - Fil. Sect. No.2

&amp; Water Conn.

G<sub>1</sub> - RF Grid-No.1Term. Contact  
SurfaceG<sub>1W</sub> - DC Grid-No.1 &  
Water Conn.G<sub>2</sub> - DC Grid-No.2 &  
Water Conn.

For location of  
respective terminals, see  
Dimensional Outline

K<sub>R</sub> - RF Cath. Term.  
Contact Surface  
For Circuit  
Returns

F<sub>M</sub> - Common Point of  
Fil. Sections  
& Water Conn.

P - RF Plate Term.  
Contact Surface

P<sub>W</sub> - DC Plate &  
Water Conn.

Mounting Position . . . . . Tube axis vertical, with  
plate terminal either up or down

Overall Length . . . . . 7-11/32" + 3/8" - 1/2"

Maximum Diameter . . . . . 11-3/8"

## Air Cooling:

Forced-air cooling of the ceramic bushing at the grid-No.1 seal and at the plate seal is required only if the temperature of the ceramic bushing at either seal exceeds the specified maximum value of 150°C. Under such conditions, provision should be made for blowing air at the ceramic bushings through suitable openings in the coaxial-cylinder cavity circuit.

\*: See Operating Notes on conserving filament life.

MAY 3, 1954

TUBE DIVISION

TENTATIVE DATA 1

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



# UHF BEAM POWER TUBE

## Water Cooling:

Water cooling of the filament-section blocks, rf cathode terminals, grid-No.1 block, grid-No.2 block, and plate is required. The water flow must start before application of any voltage and preferably should continue for several seconds after removal of all voltages. Interlocking of the water flow through each of the cooled elements with all power supplies is recommended to prevent tube damage in case of failure of adequate water flow.

## Water Flow:

|                                              | Min.<br>gpm | Typical<br>gpm | Pressure<br>Drop*<br>psi |
|----------------------------------------------|-------------|----------------|--------------------------|
| To Filament-Section-<br>No.1 Block . . . . . | { 0.5       | 0.5            | 2                        |
|                                              |             | 1.2            | 11                       |
| To Filament-Section-<br>No.2 Block . . . . . | { 0.5       | 0.5            | 2                        |
|                                              |             | 1.2            | 11                       |
| To Filament Mid-Tap Block . .                | { 0.5       | 0.5            | 2                        |
|                                              |             | 1.2            | 10                       |
| To Grid-No.1 Block . . . . .                 | { 0.5       | 0.5            | 1                        |
|                                              |             | 1.2            | 6                        |
| To Grid-No.2 Block . . . . .                 | { 0.5       | 0.5            | 3                        |
|                                              |             | 1.2            | 15                       |

## To Plate:

|                                         |     |   |     |
|-----------------------------------------|-----|---|-----|
| For plate dissipation of<br>10 kw . . . | 4.5 | - | 3.5 |
| For plate dissipation of<br>15 kw . . . | 7.5 | - | 8.5 |
| For plate dissipation of<br>20 kw . . . | 11  | - | 16  |
| For plate dissipation of<br>26 kw . . . | 14  | - | 25  |

|                                             |          |     |
|---------------------------------------------|----------|-----|
| Gauge Pressure at Any Inlet . . . . .       | 70 max.  | psi |
| Ceramic Bushing Temperature . . . . .       | 150 max. | °C  |
| Outlet Water Temperature (Any outlet) . . . | 70 max.  | °C  |
| Weight (Approx.) . . . . .                  | 25       | lbs |

## RF POWER AMPLIFIER--Class B Television Service

Synchronizing-level conditions per tube unless otherwise indicated

## Maximum CCS\* Ratings, Absolute Values:

|                                         | Up to<br>1000 Mc |       |
|-----------------------------------------|------------------|-------|
| DC PLATE VOLTAGE . . . . .              | 7000 max.        | volts |
| DC PLATE-SUPPLY VOLTAGE . . . . .       | 8000 max.        | volts |
| DC GRID-No.2 (SCREEN) VOLTAGE . . . . . | 1000 max.        | volts |
| DC GRID-No.2-SUPPLY VOLTAGE . . . . .   | 1100 max.        | volts |

\* Directly across cooled element for the indicated flow.

• See next page.



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## UHF BEAM POWER TUBE

|                                               |            |       |
|-----------------------------------------------|------------|-------|
| DC PLATE CURRENT . . . . .                    | 7 max.     | amp   |
| DC GRID-No.1 (CONTROL-GRID) CURRENT . . . . . | 0.5 max.   | amp   |
| PLATE INPUT . . . . .                         | 49000 max. | watts |
| GRID-No.2 INPUT (Pedestal Level) . . . . .    | 600 max.   | watts |
| PLATE DISSIPATION . . . . .                   | 26000 max. | watts |

## Typical Operation:

At 500 Mc

At 900 Mc

| Bandwidth <sup>▲</sup> of                   | 7                   | 7                   | Mc       |
|---------------------------------------------|---------------------|---------------------|----------|
| DC Plate Voltage . . . . .                  | 6000                | 6500                | volts    |
| DC Grid-No.2 Voltage . . . . .              | 950                 | 950                 | volts    |
| DC Grid-No.1 Voltage . . . . .              | -140                | -140                | volts    |
| Peak RF Grid-No.1 Voltage:                  |                     |                     |          |
| Synchronizing level . . . . .               | 160                 | 160                 | volts    |
| Pedestal level . . . . .                    | 100                 | 100                 | volts    |
| DC Plate Current:                           |                     |                     |          |
| Synchronizing level . . . . .               | 6.9                 | 6.8                 | amp      |
| Pedestal level . . . . .                    | 5.3                 | 5.2                 | amp      |
| DC Grid-No.2 Current:                       |                     |                     |          |
| Synchronizing level . . . . .               | 0.75                | 0.6                 | amp      |
| Pedestal level . . . . .                    | 0.35                | 0.3                 | amp      |
| DC Grid-No.1 Current (Approx.):             |                     |                     |          |
| Synchronizing level . . . . .               | 0.13                | 0.1                 | amp      |
| Pedestal level . . . . .                    | 0                   | 0                   | amp      |
| Driver Power Output (Approx.): <sup>⬤</sup> |                     |                     |          |
| Synchronizing level . . . . .               | 600                 | 1000                | watts    |
| Pedestal level . . . . .                    | 350                 | 560                 | watts    |
| Output-Circuit Efficiency                   |                     |                     |          |
| (Approx.)                                   | 85                  | 80                  | per cent |
| Useful Power Output (Approx.):              |                     |                     |          |
| Synchronizing level . . . . .               | 15000 <sup>⬤⬤</sup> | 12000 <sup>⬤⬤</sup> | watts    |
| Pedestal level . . . . .                    | 8400 <sup>⬤⬤</sup>  | 6700 <sup>⬤⬤</sup>  | watts    |

## PLATE-MODULATED RF POWER AMP.--Class C Telephony

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

Maximum CCS<sup>®</sup> Ratings, Absolute Values:

|                                               | Up to<br>1000 Mc |       |
|-----------------------------------------------|------------------|-------|
| DC PLATE VOLTAGE . . . . .                    | 4500 max.        | volts |
| DC GRID-No.2 (SCREEN) VOLTAGE . . . . .       | 1000 max.        | volts |
| PEAK GRID-No.2 VOLTAGE                        |                  |       |
| (DC + AC Component) . . . . .                 | 1200 max.        | volts |
| DC GRID-No.1 (CONTROL-GRID) VOLTAGE . . . . . | -300 max.        | volts |
| DC PLATE CURRENT . . . . .                    | 4.5 max.         | amp   |
| DC GRID-No.1 CURRENT . . . . .                | 1 max.           | amp   |
| PLATE INPUT . . . . .                         | 22500 max.       | watts |

<sup>▲</sup> Between the half-power points as measured in the output circuit.<sup>⬤</sup>, <sup>⬤⬤</sup>, <sup>⬤⬤⬤</sup>: See next page.

MAY 3, 1954

TUBE DIVISION

TENTATIVE DATA 2

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



# UHF BEAM POWER TUBE

|                             |            |       |
|-----------------------------|------------|-------|
| GRID-No.2 INPUT . . . . .   | 400 max.   | volts |
| PLATE DISSIPATION . . . . . | 16500 max. | watts |

## Typical Operation:

|                                               | At 400 Mc | At 900 Mc |          |
|-----------------------------------------------|-----------|-----------|----------|
| DC Plate Voltage . . . . .                    | 4000      | 4250      | volts    |
| DC Grid-No.2 Voltage* . . . . .               | 600       | 600       | volts    |
| DC Grid-No.1 Voltage . . . . .                | -200      | -200      | volts    |
| Peak RF Grid-No.1 Voltage . . . . .           | 210       | 210       | volts    |
| DC Plate Current . . . . .                    | 4.25      | 4         | amp      |
| DC Grid-No.2 Current . . . . .                | 0.65      | 0.6       | amp      |
| DC Grid-No.1 Current (Approx.) . . . . .      | 0.3       | 0.2       | amp      |
| Driver Power Output (Approx.)†. . . . .       | 700       | 1000      | watts    |
| Output-Circuit Efficiency (Approx.) . . . . . | 80        | 75        | per cent |
| Useful Power Output (Approx.) . . . . .       | 7250**    | 4500**    | watts    |

## RF POWER AMPLIFIER--Class C Telegraphy<sup>□</sup> and

## RF POWER AMPLIFIER--Class C FM Telephony

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

|                                               | Up to<br>1000 Mc |       |
|-----------------------------------------------|------------------|-------|
| DC PLATE VOLTAGE . . . . .                    | 7000 max.        | volts |
| DC PLATE-SUPPLY VOLTAGE . . . . .             | 8000 max.        | volts |
| DC GRID-No.2 (SCREEN) VOLTAGE . . . . .       | 1000 max.        | volts |
| DC GRID-No.2-SUPPLY VOLTAGE . . . . .         | 1100 max.        | volts |
| DC GRID-No.1 (CONTROL-GRID) VOLTAGE . . . . . | -300 max.        | volts |
| DC PLATE CURRENT . . . . .                    | 6.5 max.         | amp   |
| DC GRID-No.1 CURRENT . . . . .                | 0.5 max.         | amp   |
| PLATE INPUT . . . . .                         | 45500 max.       | watts |
| GRID-No.2 INPUT . . . . .                     | 600 max.         | watts |
| PLATE DISSIPATION . . . . .                   | 26000 max.       | watts |

## Typical Operation:

|                                               | At 400 Mc | At 900 Mc |          |
|-----------------------------------------------|-----------|-----------|----------|
| DC Plate Voltage . . . . .                    | 6500      | 6500      | volts    |
| DC Grid-No.2 Voltage† . . . . .               | 800       | 800       | volts    |
| DC Grid-No.1 Voltage††. . . . .               | -140      | -140      | volts    |
| Peak RF Grid-No.1 Voltage . . . . .           | 160       | 160       | volts    |
| DC Plate Current . . . . .                    | 6         | 6.3       | amp      |
| DC Grid-No.2 Current . . . . .                | 0.5       | 0.4       | amp      |
| DC Grid-No.1 Current (Approx.) . . . . .      | 0.2       | 0.15      | amp      |
| Driver Power Output (Approx.)‡. . . . .       | 400       | 800       | watts    |
| Output-Circuit Efficiency (Approx.) . . . . . | 85        | 77        | per cent |
| Useful Power Output (Approx.) . . . . .       | 14000**   | 11000**   | watts    |

\* Continuous Commercial Service.

† Obtained preferably from a separate source.

□, \*\*, ‡, †, ††: See next page.



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## UHF BEAM POWER TUBE

- key-down conditions per tube without amplitude modulation. Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.
- ✦ The 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 value to take care of variations in line voltage, in components, in initial tube characteristics, and in tube characteristics during life.
- This value of useful power is measured at load of output circuit having indicated efficiency.
- † obtained preferably from a separate source, or from the plate-supply voltage with a voltage divider, or through a series resistor. A series grid-No.2 resistor should not be used if the 6448 or a preceding stage is keyed. In this case, the regulation of the source should be sufficient to prevent the grid-No.2 voltage from rising above 1100 volts under key-up conditions; and additional fixed grid-No.1 bias must be provided to limit the plate current.
- †† obtained from fixed supply, by grid-No.1 resistor, by cathode resistor, or by combination methods.

## CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

|                                        | Note  | Min.  | Max. |       |
|----------------------------------------|-------|-------|------|-------|
| Filament Current per Section . . . . . | 1     | 900   | 1100 | amp   |
| Filament Current per Section . . . . . | 2     | 960   | 1160 | amp   |
| Grid-No.1 Voltage . . . . .            | 1,3   | -     | -160 | volts |
| Useful Power Output . . . . .          | 1,4   | 11000 | -    | watts |
| Power Gain . . . . .                   | 1,4,5 | 10    | -    |       |

Note 1: With 1.35 volts ac per section.

Note 2: With 1.5 volts ac per section.

Note 3: With 2-phase excitation of the filament sections, dc plate voltage of 6500 volts, dc grid-No.2 voltage of 800 volts, and dc grid-No.1 voltage adjusted to give a dc plate current of 0.5 ampere.

Note 4: With 2-phase excitation of the filament sections. In rf power amplifier circuit having bandwidth of 7 Mc as defined by the half-power points and with dc plate voltage of 7000 volts, dc grid-No.2 voltage of 800 volts, dc grid-No.1 voltage of -130 volts, drive adjusted to give dc plate current of 6.75 amperes, and frequency of 900 Mc.

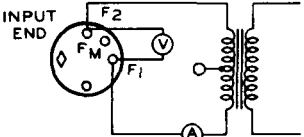
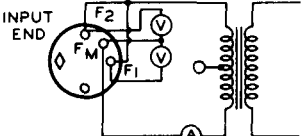
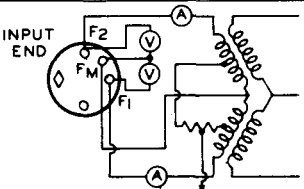
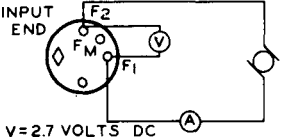
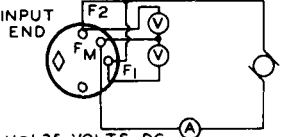
Note 5: With driving power measured at input to input-cavity circuit fed by transmission line having voltage-standing-wave ratio not greater than 2. Power gain is ratio of useful power output to driving power.

## OPERATING NOTES

Instructions for conserving filament life of the 6448 and for the use of high-speed electronic protective devices with it are given in the technical bulletin. A copy of the technical bulletin for the 6448 will be supplied on request to Commercial Engineering, RCA, Harrison, N.J.



## FILAMENT-SUPPLY CIRCUITS

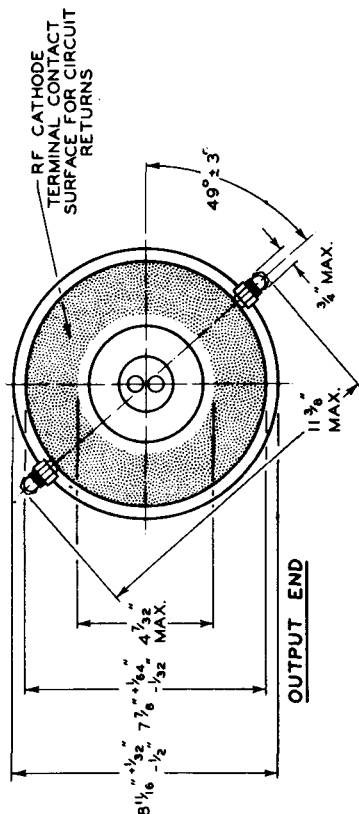
|                                              |                      |                                                                                                                                                                 |
|----------------------------------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WITH SINGLE-PHASE AC EXCITATION              | SECTIONS IN SERIES   |  <p>V=2.7 VOLTS RMS<br/>A=1000 AMPERES</p>                                     |
|                                              | SECTIONS IN PARALLEL |  <p>V=1.35 VOLTS RMS<br/>A=2000 AMPERES</p>                                    |
| WITH TWO-PHASE (QUARTER PHASE) AC EXCITATION |                      |  <p>Center Tap For Circuit Returns<br/>V=1.35 VOLTS RMS<br/>A=1000 AMPERES</p> |
| WITH DC EXCITATION                           | SECTIONS IN SERIES   |  <p>V=2.7 VOLTS DC<br/>A=1000 AMPERES</p>                                    |
|                                              | SECTIONS IN PARALLEL |  <p>V=1.35 VOLTS DC<br/>A=2000 AMPERES</p>                                   |
|                                              |                      | <p>F<sub>1</sub> = FILAMENT SECTION №1<br/>F<sub>2</sub> = FILAMENT SECTION №2<br/>F<sub>M</sub> = COMMON POINT OF FILAMENT SECTIONS</p> <p>92CM-8249</p>       |



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## UHF BEAM POWER TUBE



MAY 3, 1954

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

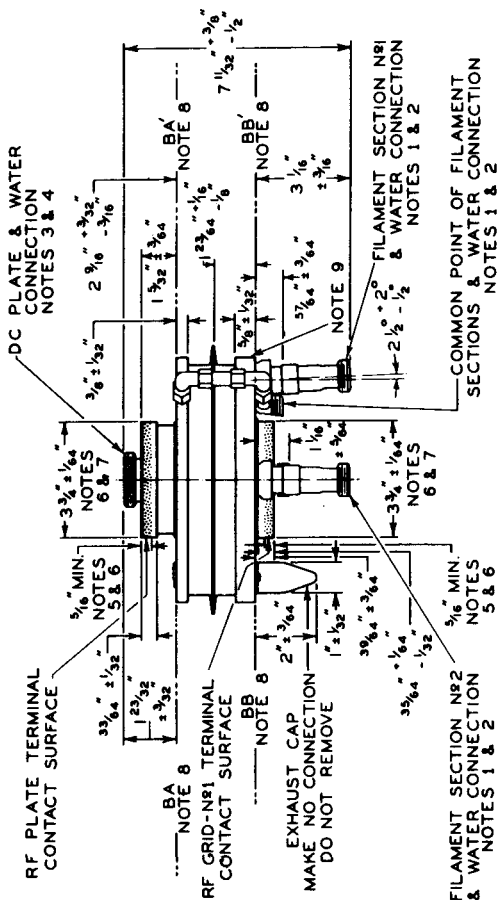
CE-8256A

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## UHF BEAM POWER TUBE



MAY 3, 1954

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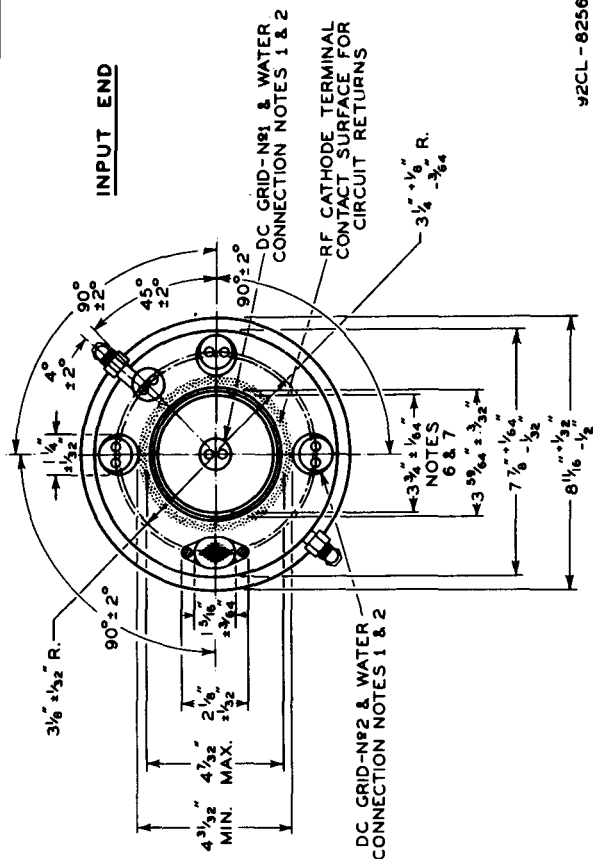
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## UHF BEAM POWER TUBE

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952CL-8256



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## UHF BEAM POWER TUBE

**NOTE 1:** WATER CONNECTIONS FOR FILAMENT SECTIONS No.1 AND No.2, COMMON POINT OF FILAMENT SECTIONS, GRID No.1, AND GRID No.2 HAVE 1" -16 AMERICAN STANDARD THREAD, FREE FIT (CLASS 2), 3/8" LONG, AND 2 HOLES 0.257" - 0.270" DIAMETER SPACED 7/16" ON CENTERS.

**NOTE 2:** THE HOLES IN THE INDICATED WATER CONNECTIONS OF NOTE 1 WILL ACCEPT THE PINS OF THE PLUG-AND-CYLINDER COMBINATION GAUGE SHOWN IN SKETCH G<sub>1</sub>.

**NOTE 3:** WATER CONNECTION FOR THE PLATE HAS 1-3/4"-16 AMERICAN STANDARD THREAD, FREE FIT (CLASS 2), 3/8" LONG, AND 2 HOLES 0.508"-0.522" DIAMETER SPACED 11/16" ON CENTERS.

**NOTE 4:** THE HOLES IN THE PLATE WATER CONNECTION WILL ACCEPT THE PINS OF THE PLUG-AND-CYLINDER COMBINATION GAUGE SHOWN IN SKETCH G<sub>2</sub>.

**NOTE 5:** CONTACT LENGTH OF CIRCUIT CONNECTOR IS 5/16" MAX.

**NOTE 6:** THIS DIAMETER DIMENSION IS HELD ONLY OVER A LENGTH OF 5/16"; OVER REMAINDER OF LENGTH, THE DIAMETER MAY INCREASE TO 3-7/8" MAX.

**NOTE 7:** THE AXIS OF THE RF PLATE CONTACT SURFACE IS COINCIDENT WITH THE AXIS OF THE RF GRID-No.1 CONTACT SURFACE WITHIN 3/32".

**NOTE 8:** THE CONTACT SURFACES BA-BA' AND BB-BB' ARE PARALLEL WITHIN 1/16".

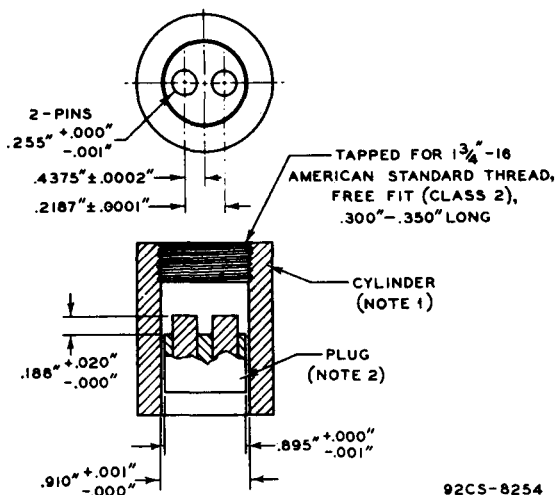
**NOTE 9:** SERIAL NUMBER IS LOCATED ON THIS SURFACE BETWEEN DC GRID-NO.2 AND FILAMENT SECTION No.1 CONNECTIONS.



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## UHF BEAM POWER TUBE

GAUGE SKETCH G<sub>1</sub>

NOTE 1: TAPPED SECTION OF CYLINDER MUST BE CONCENTRIC WITH UNTAPPED SECTION OF CYLINDER WITHIN  $.002''$ .

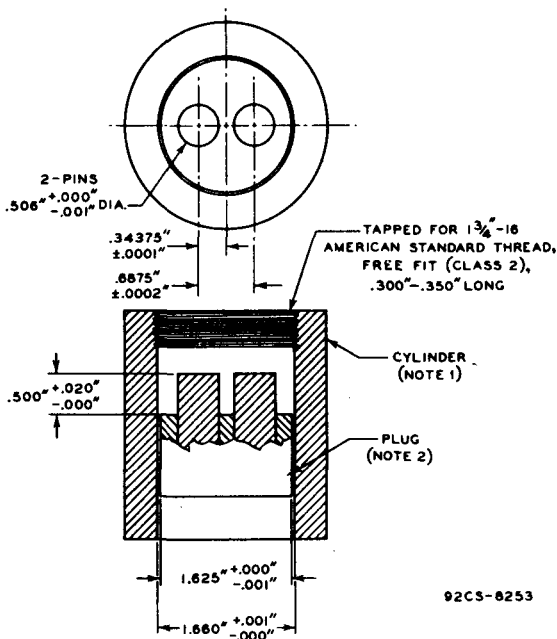
NOTE 2: PLUG SIDES & PIN SIDES MUST BE PARALLEL WITHIN  $.001''$ .

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## UHF BEAM POWER TUBE

GAUGE SKETCH G<sub>2</sub>

NOTE 1: TAPPED SECTION OF CYLINDER MUST BE CONCENTRIC WITH UNTAPPED SECTION OF CYLINDER WITHIN  $.002$ ".

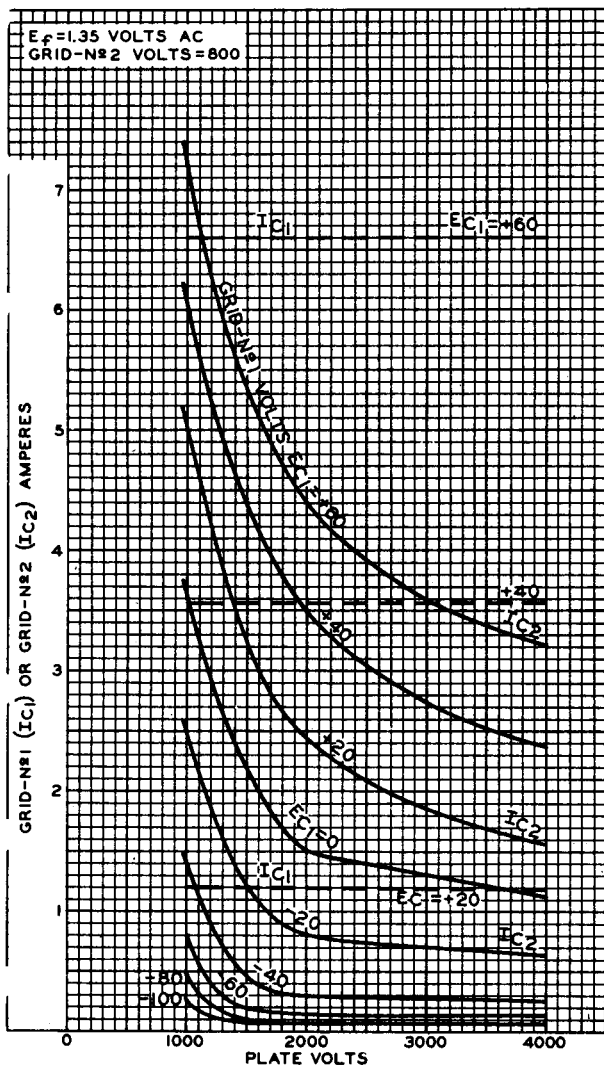
NOTE 2: PLUG SIDES & PIN SIDES MUST BE PARALLEL WITHIN  $.001$ ".



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## AVERAGE CHARACTERISTICS



FEB. 17, 1954

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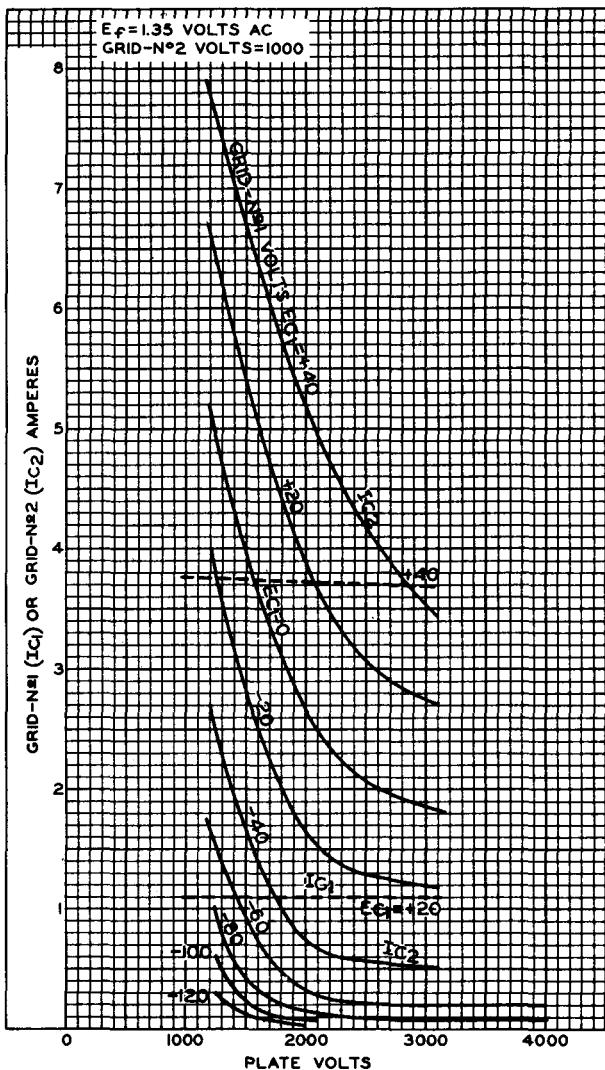
92CM-6245

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## AVERAGE CHARACTERISTICS



FEB. 18, 1954

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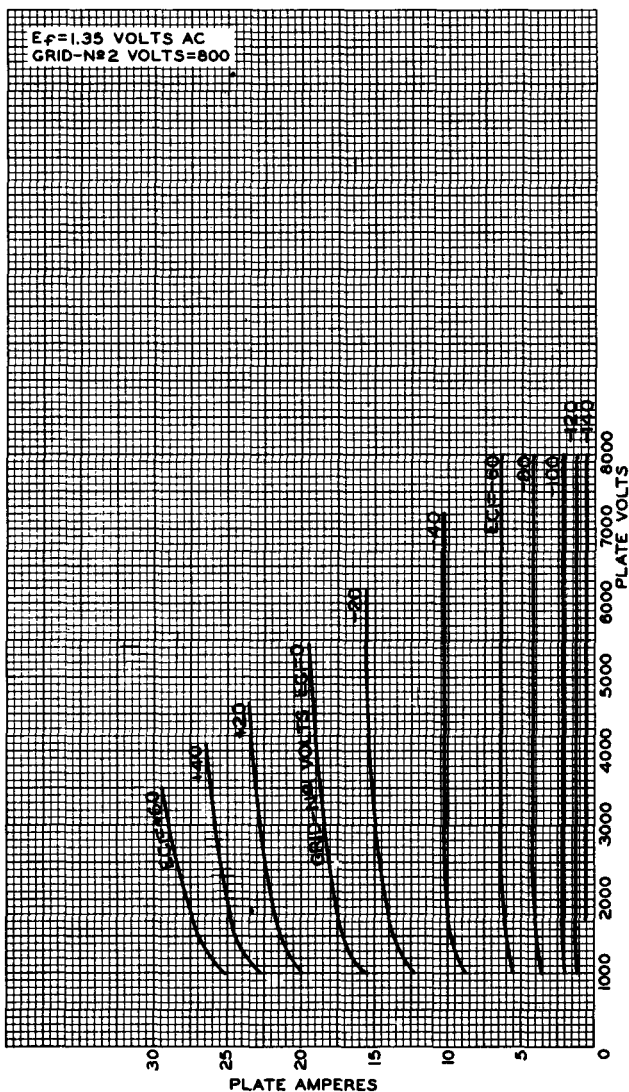
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## AVERAGE PLATE CHARACTERISTICS



FEB. 16, 1954

TUBE DIVISION

92CM-8247

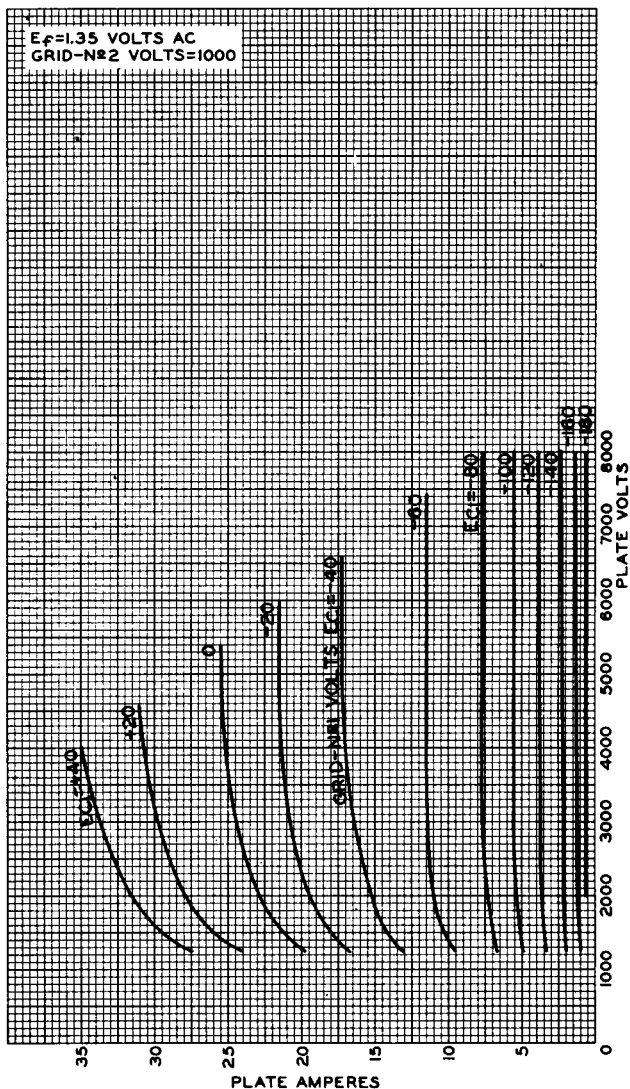
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## AVERAGE PLATE CHARACTERISTICS



FEB. 19, 1954

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92CM-8248

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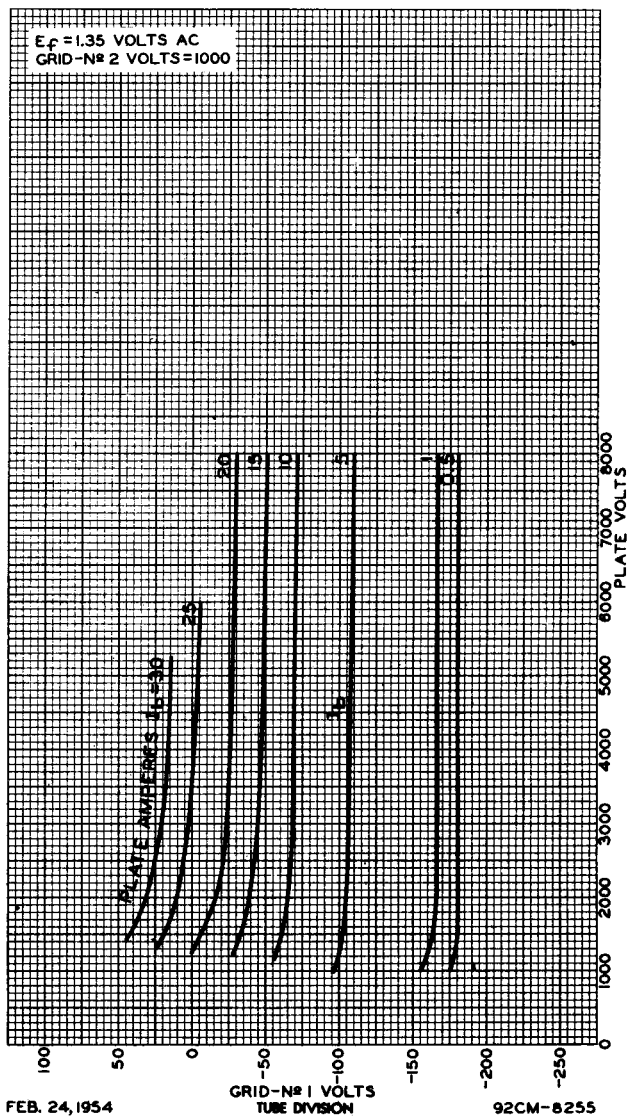
**FEB. 24, 1934**

GRID-N21 VOLTS  
TUBE DIVISION  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

**92CM-8252**



## AVERAGE CONSTANT-CURRENT CHARACTERISTICS



FEB. 24, 1954

92CM-8255