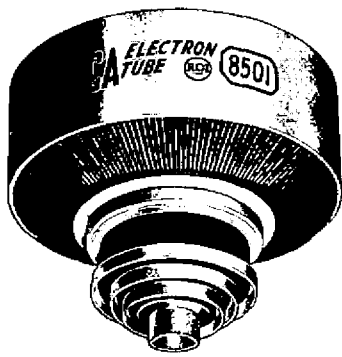




**CERMOLOX®**  
Thoriated-tungsten Mesh Filament  
Forced-Air Cooled  
5500 Watts UHF TV Output at 890 Mc  
5500 Watts CW Output at 900 Mc  
High Gain-Bandwidth Products

from JEDEC release #4660.  
April 6, 1964

# RCA-8501

## BEAM POWER TUBE

RCA-8501<sup>▲</sup> is a forced-air-cooled beam power tube designed especially for use in uhf television service in stationary and portable equipment. It is rated as an rf power amplifier in Class B television service, an rf power amplifier and oscillator in Class C telegraphy service, and an rf power amplifier in Class C FM telephony service.

The 8501 and variants of its basic design may also be useful in applications such as af power amplifiers or modulators, plate-modulated rf power amplifiers in Class C telephony service, AM or single-sideband linear rf power amplifiers, hard-tube modulators, pulsed-rf amplifiers, regulators, or other special services. Variations in cooling structure or other parameters are also possible. For information on variants, contact your RCA field representative, or the nearest District Sales Office.

Features of the 8501 include the Cermolox construction, a thoriated-tungsten mesh filament, and an integral louvered-fin radiator. Details of these features are described in the **Application Guide for RCA Power Tubes, 1CE-300**.

<sup>▲</sup> Formerly Dev. No. A2751C.

| INDEX                                                                                                                                                                                 |      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| I. DESCRIPTION                                                                                                                                                                        | page |
| General Data . . . . .                                                                                                                                                                | 1    |
| Ratings . . . . .                                                                                                                                                                     | 2    |
| Footnotes . . . . .                                                                                                                                                                   | 2    |
| Dimensional Outline . . . . .                                                                                                                                                         | 3    |
| Terminal Diagram . . . . .                                                                                                                                                            | 3    |
| II. CHARACTERISTICS                                                                                                                                                                   |      |
| Constant-Current Curves . . . . .                                                                                                                                                     | 4    |
| Cavity Tuning Curves . . . . .                                                                                                                                                        | 5    |
| Cooling . . . . .                                                                                                                                                                     | 6    |
| Mounting . . . . .                                                                                                                                                                    | 6    |
| III. GENERAL APPLICATIONS                                                                                                                                                             |      |
| This bulletin is to be used in conjunction with the publication <b>Application Guide for RCA Power Tubes, 1CE-300</b> . For a copy, write RCA, Commercial Engineering, Harrison, N.J. |      |

### GENERAL DATA

#### Electrical:

Filamentary Cathode, Thoriated-Tungsten Mesh Type:

|                                                        |                                       |
|--------------------------------------------------------|---------------------------------------|
| Voltage (ac or dc) . . . . .                           | { 4.5 typical volts<br>5.0 max. volts |
| Current:                                               |                                       |
| Typical value at 4.5 volts . . . . .                   | 125 amp                               |
| Maximum value for starting, even momentarily . . . . . | 300 amp                               |
| Cold Resistance . . . . .                              | 0.005 ohm                             |
| Minimum heating time . . . . .                         | 15 sec                                |

See further information on the filament in **Application Guide for RCA Power Tubes, 1CE-300; Section V.A.3, Filament or Heater.**

Mu-Factor, Grid No.2 to Grid No.1 for plate volts = 1200, grid-No.2 volts = 900, and plate amp. = 8 . . . . . 16

#### Direct Interelectrode Capacitances:

|                                              |               |
|----------------------------------------------|---------------|
| Grid No.1 to plate <sup>a</sup> . . . . .    | 0.32 max. pf  |
| Grid No.1 to filament . . . . .              | 65 pf         |
| Plate to filament <sup>ab</sup> . . . . .    | 0.040 max. pf |
| Grid No.1 to grid No.2 . . . . .             | 70 pf         |
| Grid No.2 to plate . . . . .                 | 13 pf         |
| Grid No.2 to filament <sup>b</sup> . . . . . | 2.0 max. pf   |

#### Mechanical:

|                                |                                |
|--------------------------------|--------------------------------|
| Operating Position . . . . .   | Vertical, either end up        |
| Overall Length . . . . .       | 5.65" max.                     |
| Greatest Diameter . . . . .    | 6.17" max.                     |
| Terminal Connections . . . . . | See <i>Dimensional Outline</i> |
| Radiator . . . . .             | Integral part of tube          |
| Weight (Approx.) . . . . .     | 10 lbs.                        |

#### Thermal:

|                                                                                             |             |
|---------------------------------------------------------------------------------------------|-------------|
| Terminal Temperature (Plate, grid No.2, grid No.1, cathode-filament and filament) . . . . . | 250 max. °C |
| Plate-Core Temperature . . . . .                                                            | 250 max. °C |

See *Dimensional Outline for temperature-measurement points*

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Electronic Components and Devices Lancaster, Pa.

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8501 3-64  
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**RF POWER AMPLIFIER --****Class B Television Service<sup>c</sup>**

*Synchronizing-level conditions per tube  
unless otherwise specified*

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

|                                |             |       |
|--------------------------------|-------------|-------|
| DC PLATE VOLTAGE. . . . .      | 7000 max.   | volts |
| DC GRID-No.2 VOLTAGE . . . . . | 1500 max.   | volts |
| DC PLATE CURRENT. . . . .      | 4 max.      | amp   |
| PLATE DISSIPATION . . . . .    | 10,000 max. | watts |
| GRID-No.2 INPUT. . . . .       | 150 max.    | watts |
| GRID-No.1 INPUT. . . . .       | 100 max.    | watts |

**Typical CCS Operation:**

*In a cathode-drive circuit at 890Mc and bandwidth of 8.5Mc*

|                                    |       |       |
|------------------------------------|-------|-------|
| DC Plate Voltage . . . . .         | 5700  | volts |
| DC Grid-No.2 Voltage . . . . .     | 1000  | volts |
| DC Grid-No.1 Voltage . . . . .     | -40   | volts |
| DC Plate Current:                  |       |       |
| Synchronizing level . . . . .      | 2.9   | amp   |
| Pedestal level . . . . .           | 2.2   | amp   |
| DC Grid-No.2 Current:              |       |       |
| Synchronizing level . . . . .      | 0.015 | amp   |
| Pedestal level . . . . .           | 0.011 | amp   |
| DC Grid-No.1 Current:              |       |       |
| Synchronizing level . . . . .      | 0.375 | amp   |
| Pedestal level . . . . .           | 0.275 | amp   |
| Driver Power Output:               |       |       |
| Synchronizing level . . . . .      | 600   | watts |
| Pedestal level . . . . .           | 335   | watts |
| Output Circuit Efficiency. . . . . | 80    | %     |
| Useful Power Output:               |       |       |
| Synchronizing level . . . . .      | 5500  | watts |
| Pedestal level . . . . .           | 3100  | watts |

**RF POWER AMPLIFIER & OSCILLATOR -- Class C Telegraphy<sup>c</sup>**

and

**RF POWER AMPLIFIER -- Class C FM Telephony<sup>c</sup>****Maximum CCS Ratings, Absolute-Maximum Values:**

|                                        |             |       |
|----------------------------------------|-------------|-------|
| DC PLATE VOLTAGE. . . . .              | 7000 max.   | volts |
| DC GRID-No.2 VOLTAGE . . . . .         | 1500 max.   | volts |
| DC GRID-No.1 VOLTAGE . . . . .         | -100 max.   | volts |
| DC PLATE CURRENT. . . . .              | 3 max.      | amp   |
| DC GRID-No.1 CURRENT . . . . .         | 0.65 max.   | amp   |
| GRID-No.1 INPUT <sup>d</sup> . . . . . | 100 max.    | watts |
| GRID-No.2 INPUT <sup>e</sup> . . . . . | 150 max.    | watts |
| PLATE DISSIPATION . . . . .            | 10,000 max. | watts |

**Maximum Circuit Values:**

|                                        |             |      |
|----------------------------------------|-------------|------|
| Grid-No.1-Circuit Resistance . . . . . | 5,000 max.  | ohms |
| Grid-No.2-Circuit Impedance . . . . .  | .See Note d |      |
| Plate-Circuit Impedance . . . . .      | .See Note f |      |

**Typical CCS Operation:**

*In Cathode-Drive Circuit at 900Mc*

|                                    |       |       |
|------------------------------------|-------|-------|
| DC Plate Voltage . . . . .         | 5700  | volts |
| DC Grid-No.2 Voltage . . . . .     | 1000  | volts |
| DC Grid-No.1 Voltage . . . . .     | -85   | volts |
| DC Plate Current . . . . .         | 2.7   | amp   |
| DC Grid-No.2 Current . . . . .     | 0.025 | amp   |
| DC Grid-No.1 Current . . . . .     | 0.200 | amp   |
| Driver Power Output. . . . .       | 900   | watts |
| Output-Circuit Efficiency. . . . . | 72    | %     |
| Useful Power Output. . . . .       | 5500  | watts |

**FOOTNOTES**

<sup>a</sup> With external flat metal shield 8" in diameter having a center hole 3" in diameter. Shield is located in plane of the grid-No.2 terminal, perpendicular to the tube axis, and is connected to grid No.2.

<sup>b</sup> With external flat metal shield 8" in diameter having a center hole 2-3/8" in diameter. Shield is located in plane of the grid-No.1 terminal, perpendicular to the tube axis, and is connected to grid No.1.

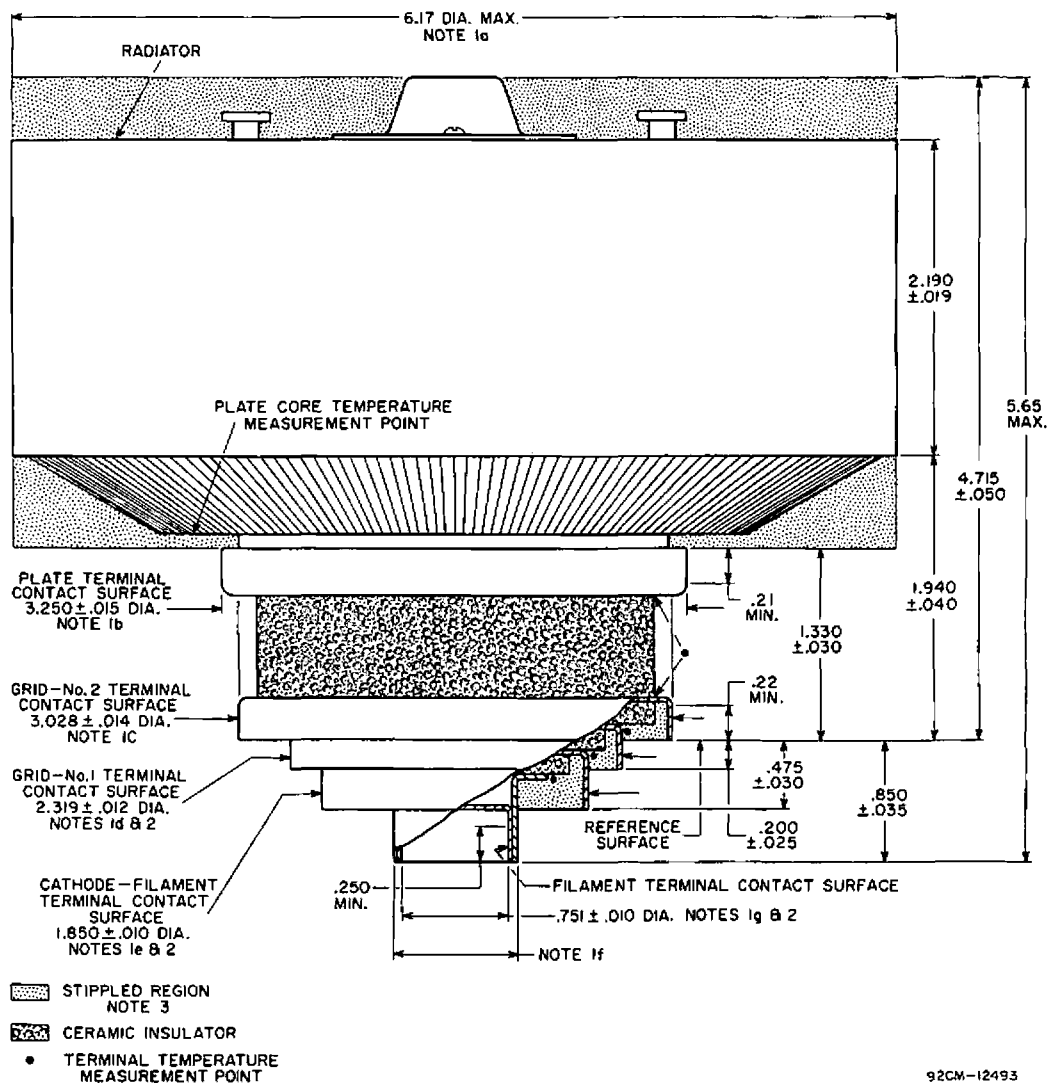
<sup>c</sup> See Section V.C. of 1CE-300.

<sup>d</sup> See Section V.B.2 of 1CE-300.

<sup>e</sup> See Section V.B.3 of 1CE-300.

<sup>f</sup> See Section V.B.1 of 1CE-300.

## DIMENSIONAL OUTLINE



92CM-12493

## DIMENSIONS IN INCHES

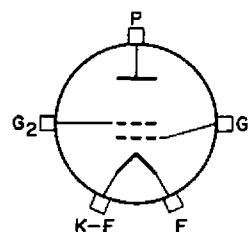
**NOTE 1:** CONCENTRICITY BETWEEN THE VARIOUS DIAMETERS IS SUCH THAT THE TUBE WILL ENTER A GAUGE HAVING SUITABLY SPACED CONCENTRIC APERTURES AND POSTS OF THE FOLLOWING DIAMETERS:

- a. Radiator - 6.240
- b. Plate Terminal - 3.288
- c. Grid-No.2 Terminal - 3.061
- d. Grid-No.1 Terminal - 2.338
- e. Cathode-Filament Terminal - 1.878
- f. Filament Terminal (OD) - 0.908
- g. Filament Terminal (ID) - 0.722

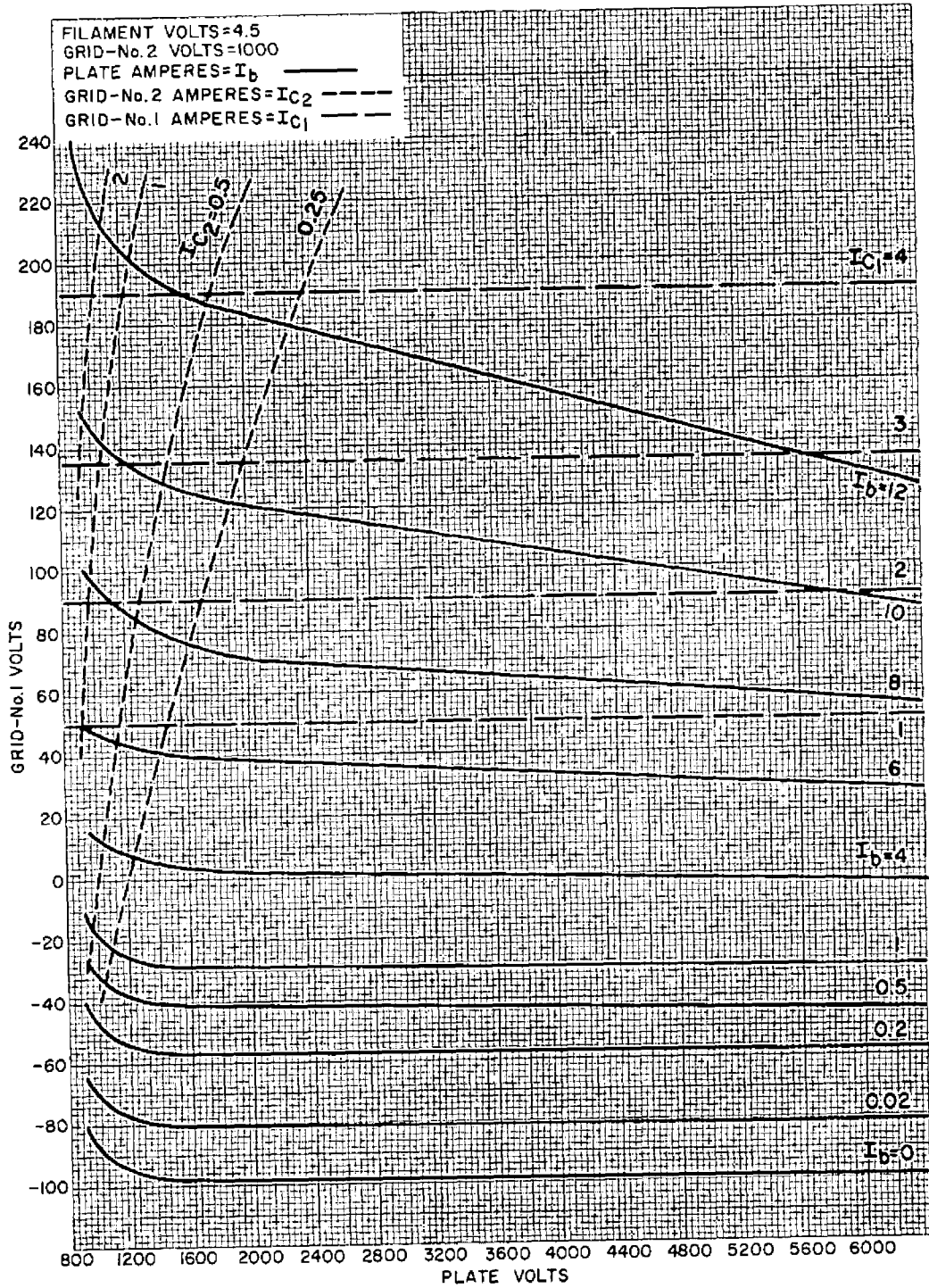
**NOTE 2:** THE DIAMETER OF THE TERMINAL IS HELD TO THE INDICATED VALUE ONLY OVER THE CONTACT SURFACE LENGTH. THE CONTACT SURFACE LENGTH OF THE FILAMENT, CATHODE-FILAMENT, AND GRID-No.1 TERMINALS EXTENDS FROM THE EDGE OF ITS TERMINAL TO THE PLANE COINCIDENT WITH THE EDGE OF THE ADJACENT LARGER TERMINAL.

**NOTE 3:** KEEP ALL STIPPLED REGIONS CLEAR. DO NOT ALLOW CONTACTS OR CIRCUIT COMPONENTS TO PROTRUDE INTO THESE ANNULAR REGIONS.

## TERMINAL DIAGRAM

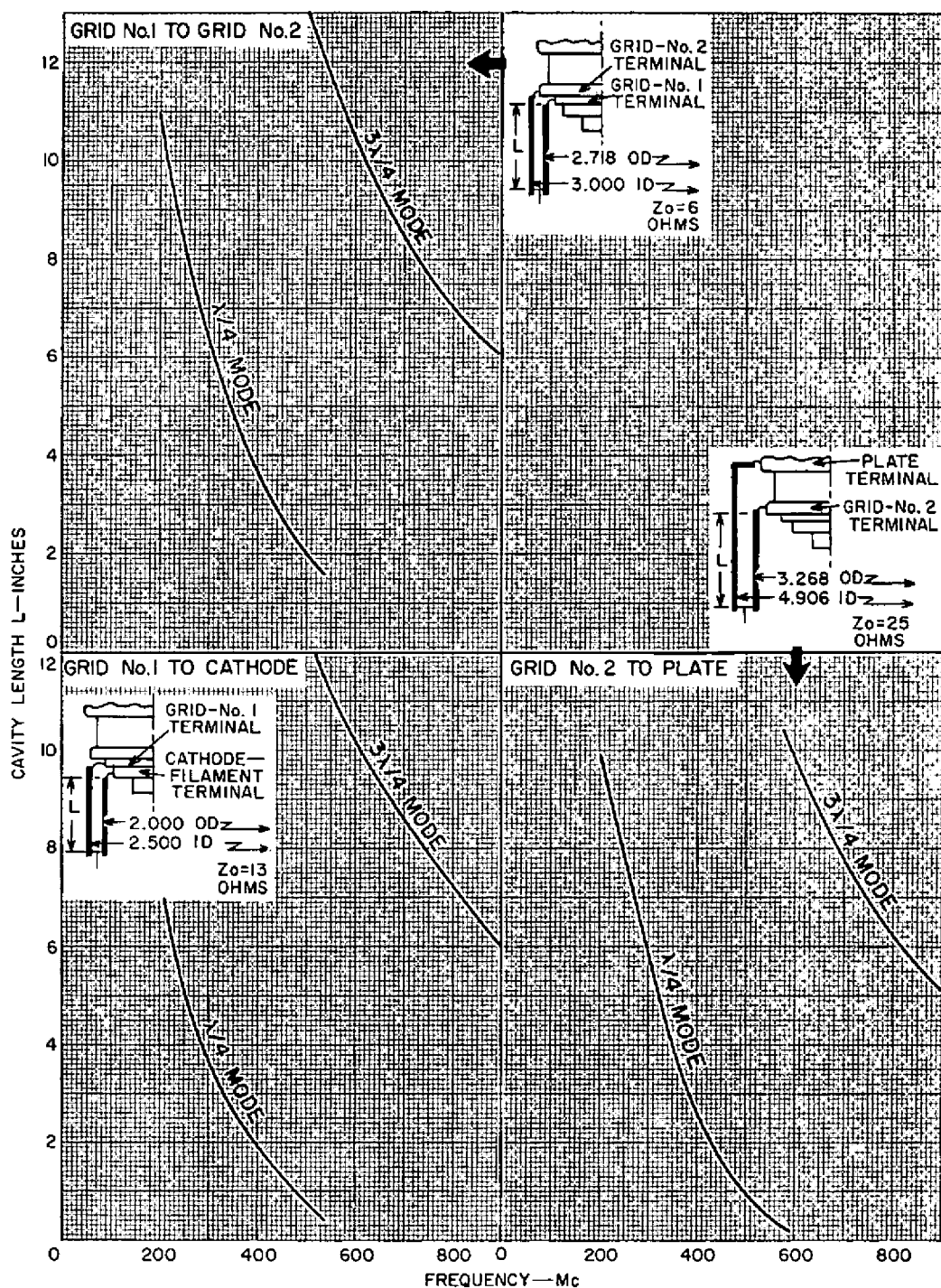


## TYPICAL CONSTANT-CURRENT CHARACTERISTICS



92CM-12500

## CAVITY TUNING CHARACTERISTICS



92CM-12492

## FORCED-AIR COOLING

### Air Flow:

Through radiator -- Adequate air flow to limit the plate-core temperature to  $250^{\circ}\text{C}$  should be delivered by a blower through the radiator before and during the application of filament, plate, grid-No.2, and grid-No.1 voltages.

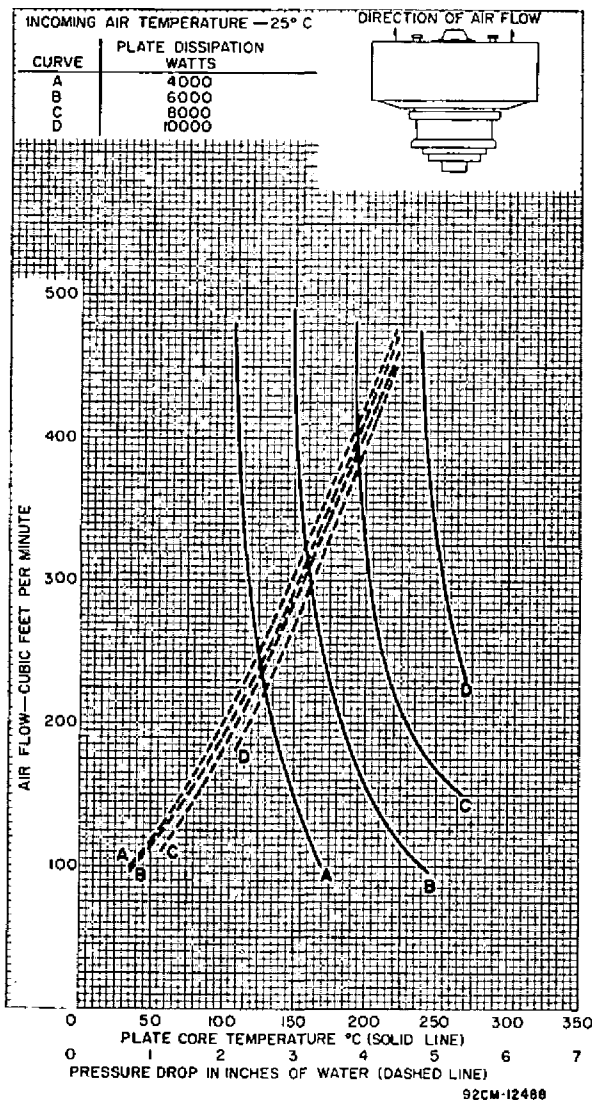
*To Plate, Grid-No.2, Grid-No.1, Cathode-Filament, and Filament Terminals* -- A sufficient quantity of air should be allowed to flow past each of these terminals so that their temperature does not exceed the specified maximum value of  $250^{\circ}\text{C}$ .

*During Standby Operation* -- Cooling air is required when only filament voltage is applied to the tube.

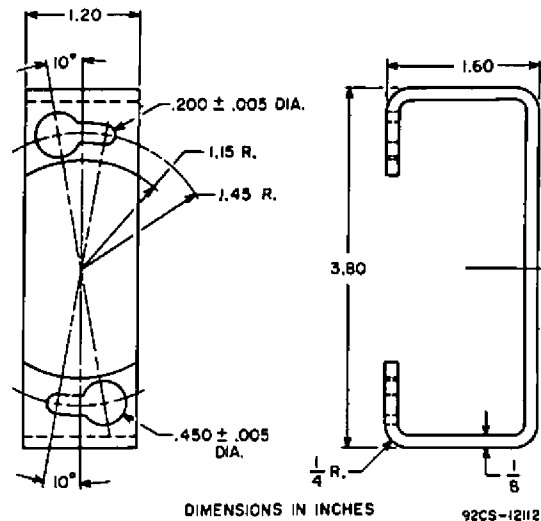
*During Shutdown Operation* -- Air flow should continue for a few minutes after all electrode power is removed.

For further information on forced-air cooling, see section IV.C of 1CE-300.

### TYPICAL COOLING CHARACTERISTICS



## TUBE EXTRACTOR Suggested Design



NOTE 1: MATERIAL  $1/8"$  THICK COLD ROLLED STEEL.

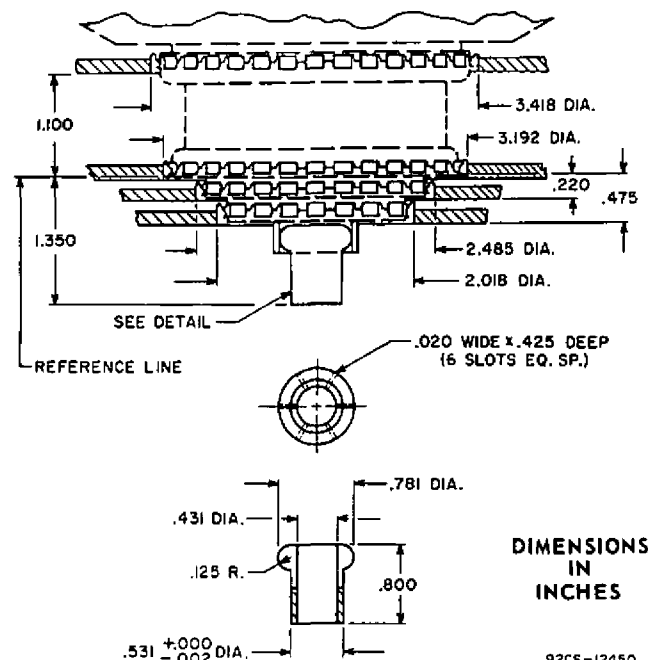
NOTE 2: SLOT BETWEEN HOLES.

NOTE 3: ROUND ALL EDGES.

### Mounting

See the preferred mounting arrangement below. For other arrangements, cavity-type mounting for multiple-ring terminal-type tubes, such as the 8501 may be constructed by using either fixed or adjustable contact rings of finger contact strips in the transverse plane as described in section III.C.3 of 1CE-300.

### PREFERRED MOUNTING ARRANGEMENT



NOTE: ALL FINGER STOCK No.97-380, MADE BY INSTRUMENT SPECIALTIES Co., LITTLE FALLS, N.J.