Beam Power Tube

MATRIX-TYPE CATHODE CERMOLOX FORCED-AIR COOLED

1350 Watts CW Power Output at 600 MHz

For Use at Frequencies up to 1215 MHz as a Linear RF Power Amplifier in Single-Sideband Suppressed-Carrier Service, as a Plate-Modulated RF Power Amplifier in Class C Telephony Service, as an RF Power Amplifier and Oscillator in Class C Telegraphy Service, and as an RF Power Amplifier in Class C FM Telephony Service.

ELECTRICAL

Heater, for Matrix-Type Oxide-Coated Unipotential Cathode[d]		
Voltage (AC or DC)	5.5 typ 6.0 max	V V
Current at 5.5 volts	17.3	A
Minimum Heating Time	5	minutes
Mu-Factor, Grid No.2 to Grid No.1	17	
For plate volts = 2500, grid No.2 volts = 600, and plate mA = 600		
Direct Interelectrode Capacitances		
Grid No.1 to plate[a]	0.181 max	pF
Grid No.1 to cathode & heater	42	pF
Plate to cathode & heater[a,b]	0.017 max	pF
Grid No.1 to grid No.2	55	pF
Grid No.2 to plate	12	pF
Grid No.2 to cathode & heater[b]	1.4 max	pF

MECHANICAL

Operating Position	Any
Maximum Overall Length	3.34 in
Maximum Diameter	3.75 in
Terminal Connections	See *Dimensional Outline*
Radiator	Integral part of tube
Weight (Approx.)	2 lb

THERMAL

Terminal Temperature	250 max	°C
Plate, grid No.2, grid No.1, cathode, and heater		
Plate-Seal Temperature	250 max	°C

See *Dimensional Outline* for temperature-measurement points

Forced-Air Cooling[e]

Air Flow:

Through radiator - Adequate air flow to limit the plate-seal temperature to 250°C should be delivered by a blower, such as Rotron[c] AXIMAX 2, KS-408 or equivalent, through the radiator before and during the application of heater, plate, grid-No.2, and grid-No.1 voltages, See graph, Typical Cooling Characteristics.

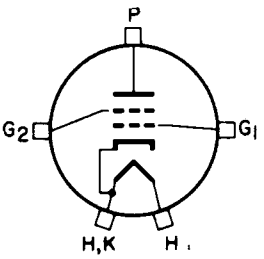
To Plate, Grid-No.2, Grid-No.1, Heater-Cathode, and Heater Terminals - A sufficient quantity of air should be allowed to flow past each of these terminals so that their temperature does not exceed the specified maximum value of 250°C.

During Standby Operation - Cooling air is required to the Heater-Cathode and Heater Terminals when only heater voltage is applied to the tube.

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

TERMINAL DIAGRAM (Bottom View)

G_1 - Grid-No.1-Terminal
Contact Surface
G_2 - Grid-No.2-Terminal
Contact Surface
H - Heater-Terminal
Contact Surface
H,K - Heater-& Cathode-Terminal
Contact Surface
P - Plate-Terminal
Contact Surface



LINEAR RF POWER AMPLIFIER, CLASS AB_1[f]

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 Values

	Up to 1215 MHz	
DC Plate Voltage	3000	V
DC Grid-No.2 Voltage	1000	V
Max.-Signal DC Plate Current	1.0	A
Max.-Signal DC Grid-No.1 Current	0.2	A
Max.-Signal Plate Input	2500	W
Max.-Signal Grid-No.2 Input	50	W
Plate Dissipation	1500	W

Maximum Circuit Values

Grid-No.1 Circuit Resistance Under Any Condition	
With fixed bias	5000 Ω
With fixed bias (in Class AB_1 operation)	Not recommended
With cathode bias	Not recommended
Grid-No.2 Circuit Impedance	See footnote g
Plate Circuit Impedance	See footnote h

Typical CCS Class AB_1 "Single-Tone" Operation

	Up to 60 MHz		
DC Plate Voltage	2250	2250	V
DC Grid-No.2 Voltage	700	700	V
DC Grid-No.1 Voltage	-50	-50	V
Zero-Signal DC Plate Current	0.2	0.2	A
Zero-Signal DC Grid-No.2 Current	0	0	A
Effective RF Load Resistance	1100	1100	Ω
Max.-Signal DC Plate Current	0.9	1.0	A
Max.-Signal DC Grid-No.2 Current	0.045	0.045	A
Max.-Signal DC Grid-No.1 Current	0	0	A
Max.-Signal Peak RF Grid-No.1 Voltage	50	50	V
Max.-Signal Driving Power (Approx.)	0	0	W
Max.-Signal Power Output (Approx.)	1000	1250	W

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PLATE-MODULATED RF POWER AMP.-Class C Telephony[f]

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

Maximum CCS Ratings, Absolute Values

	Up to 1215 MHz	
DC Plate Voltage	2500	V
DC Grid-No.2 Voltage	1000	V
DC Grid-No.1 Voltage	-300	V
DC Plate Current	0.85	A
DC Grid-No.1 Current	0.2	A
Plate Input	1700	W
Grid-No.2 Input	35	W
Plate Dissipation	1000	W

Maximum Circuit Value

Grid-No.1-Circuit Resistance
Under any condition . . . . . 5000 Ω

Typical CCS Operation

In a Grid-Drive Circuit at 600 MHz

DC Plate Voltage	2500	2500	V
DC Grid-No.2 Voltage	500	500	V
DC Grid-No.1 Voltage	-75	-75	V
DC Plate Current	0.9	1.0	A
DC Grid-No.2 Current	0.02	0.02	A
DC Grid-No.1 Current (Approx.)	0.07	0.07	A
Output Circuit Efficiency (Approx.)	90	90	%
Driver Power Output (Approx.)	70	75	W
Useful Power Output (Approx.)	1050	1350	W

Maximum Circuit Value

Grid-No.1-Circuit Resistance
Under any condition . . . . . 5000 Ω

RF POWER AMPLIFIER & OSC. - Class C Telegraphy[f]

and

RF POWER AMPLIFIER - Class C FM Telephony[f]

Maximum CCS Ratings, Absolute Values

	Up to 1215 MHz	
DC Plate Voltage	3000	V
DC Grid-No,2 Voltage	1000	V
DC Grid-No.1 Voltage	-300	V
DC Plate Current	1.0	A
DC Grid-No.1 Current	0.2	A
Plate Input	2500	W
Grid-No.2 Input	50	W
Plate Dissipation	1500	W

Typical CCS Operation

In a Grid-Drive Circuit at 600 MHz

DC Plate Voltage	1800	2000	V
DC Grid-No.2 Voltage	500	500	V
DC Grid-No.1 Voltage	-75	-75	V
DC Plate Current	0.75	0.83	A
DC Grid-No.2 Current	0.015	0.015	A
DC Grid-No.1 Current (Approx.)	0.04	0.04	A
Driver Power Output (Approx.)	50	55	W
Useful Power Output (Approx.)	650	800	W

Characteristics Range Values

	Note	Min	Max	
1. Heater Current	1	16.3	18.2	A
2. Direct Interelectrode Capacitances				
Grid No.1 to plate	2	-	0.181	pF
Grid No.1 to cathode & heater	-	37	46	pF
Plate to cathode & heater	2,3	-	0.017	pF
Grid No.1 to grid No.2	-	46	62	pF
Grid No.2 to plate	-	9.9	13.1	pF
Grid No.2 to cathode & heater	3	-	1.4	pF
3. Mu-Factor, Grid No.2 to Grid No.1	1,4	8	24	
4. Cutoff Grid-No.1 Voltage	1,5	-	-140	V
5. Grid-No.2 Current	1,6	-28	12	mA
6. Useful Power Output	1,7	1000	-	W
7. Low-Frequency Vibration	1,8	-	500	mV
8. High-Frequency Vibration	9	(See Note 9)		

Note 1: With 5.5 volts ac on heater.

Note 2: With external flat metal shield having diameter of 8", at center hole approximately 3" in diameter provided with spring fingers that connect the shield to grid-No.2 terminal. Shield is located in plane of grid-No.2 terminal perpendicular to the tube axis.

Note 3: With external flat metal shield having diameter of 8", and center hole approximately 2-3/8" in diameter provided with spring fingers that connect the shield to grid-No.1 terminal. Shield is located in plane of grid-No.1 terminal perpendicular to the tube axis.

Note 4: With dc plate voltage of 2500 volts, dc grid-No.2 voltage of 600 volts, and dc grid-No.1 voltage adjusted to give a plate current of 0.6 ampere.

Note 5: With dc plate voltage of 3000 volts, dc grid-No.2 voltage of 1000 volts, and dc grid-No.1 voltage adjusted to give a plate current of 20 mA.

Note 6: With dc plate voltage of 2500 volts, dc grid-No.2 voltage of 500 volts, and dc grid-No.1 voltage adjusted to give a plate current of 0.6 ampere.

Note 7: In a CW cathode-driven amplifier circuit at 600 MHz and for conditions: dc plate voltage at 2500 volts, dc grid-No.2 voltage of 700 volts, and dc grid-No.1 voltage adjusted to give a plate current of 1.0 ampere.

Note 8: As specified in MIL-E-IE Test Method 1031, and with plate voltage of 450 volts, grid-No.2 voltage of 300 volts, grid-No.1 voltage varied to give a plate current of 10 mA, and plate load resistor of 2000 ohms.

Note 9: As specified in MIL-E-IE Test Method 1031.

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[a] With external metal shield having diameter of 8", and center hole approximately 3" in diameter provided with spring fingers that connect the shield to grid-No.2 terminal. Shield is located in plane of grid-No.2 terminal perpendicular to the tube axis.

[b] With external flat metal shield having diameter of 8", and center hole approximately 2-3/8" in diameter provided with spring fingers that connect the shield to grid-No.1 terminal. Shield is located in plane of grid-No.1 terminal perpendicular to the tube axis.

[c] Rotron Mfg. Co., Inc., Woodstock, N. Y.

The following footnotes apply to the *RCA Transmitting Operation Considerations* given at front of this section.

[d] See *Electrical Considerations* — Filament or Heater.

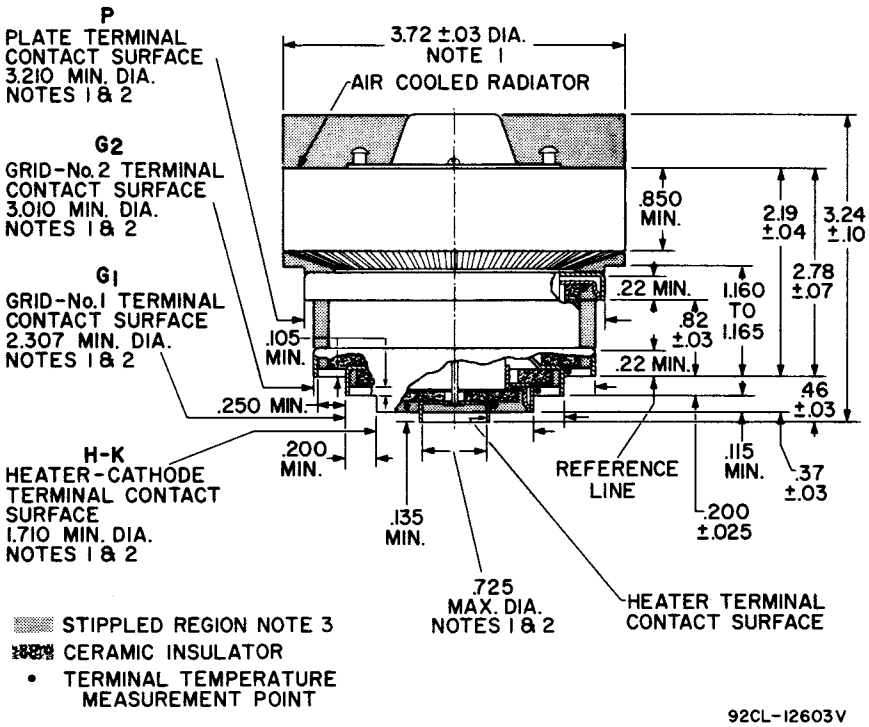
[e] See *Cooling Considerations* — Forced-Air Cooling.

[f] See *Classes of Service.*

[g] See Electrical Considerations - Grid-No.2 Voltage Supply.

[h] See Electrical Considerations - Plate Voltage Supply.

DIMENSIONAL OUTLINE



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 Band - 3.7805

b. Plate Terminal - 3.2605

c. Grid-No.2 Terminal - 3.0605

d. Grid-No.1 Terminal - 2.3375

e. Heater-Cathode Terminal - 1.7445

f. Heater Terminal - 0.6945

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 heater-cathode 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 volumes. Diameters of stippled areas above air-cooled radiator, plate terminal contact surface, and grid-No.2 terminal contact surface shall not be greater than is associated diameter.

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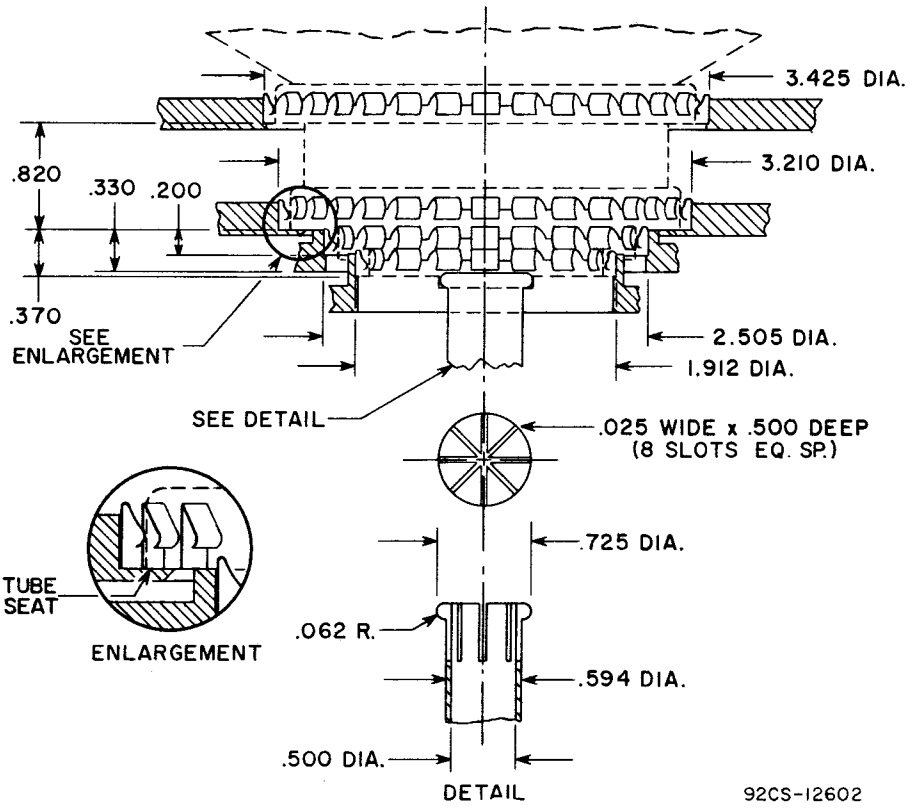
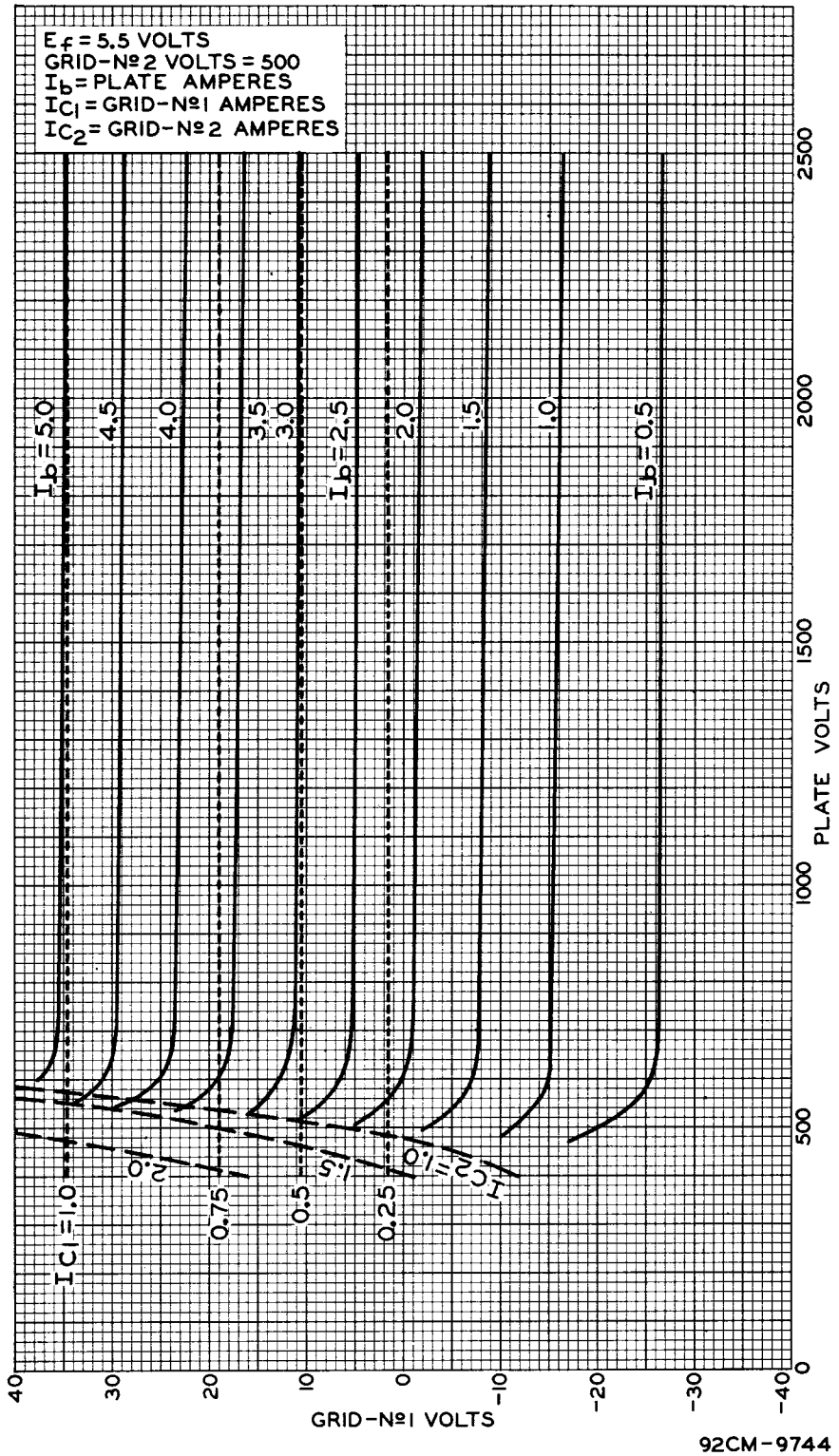
PREFERRED MOUNTING ARRANGEMENT[i]



Only the fixed method of mounting is recommended. The fixed method offers simpler design and construction with resulting lower cost. It especially simplifies the associated hollow-cylinder cavity construction, if used. On the other hand, it requires greater finger stock accommodation. As used here, accommodation is defined as the amount of flexing required by the fingers of the finger contact strip to accept tubes at all the extremes of mechanical variation. Accommodation, which must be provided for in the fixed method, is determined from the *Dimensional Outline* and its associated notes. It may be calculated as the difference between the minimum terminal diameter on the *Dimensional Outline* (maximum finger opening) and the associated concentricity gauge aperture opening in the appropriate note (minimum finger opening).

Typical Constant-Current Characteristics

With Grid-No.2 Volts =500



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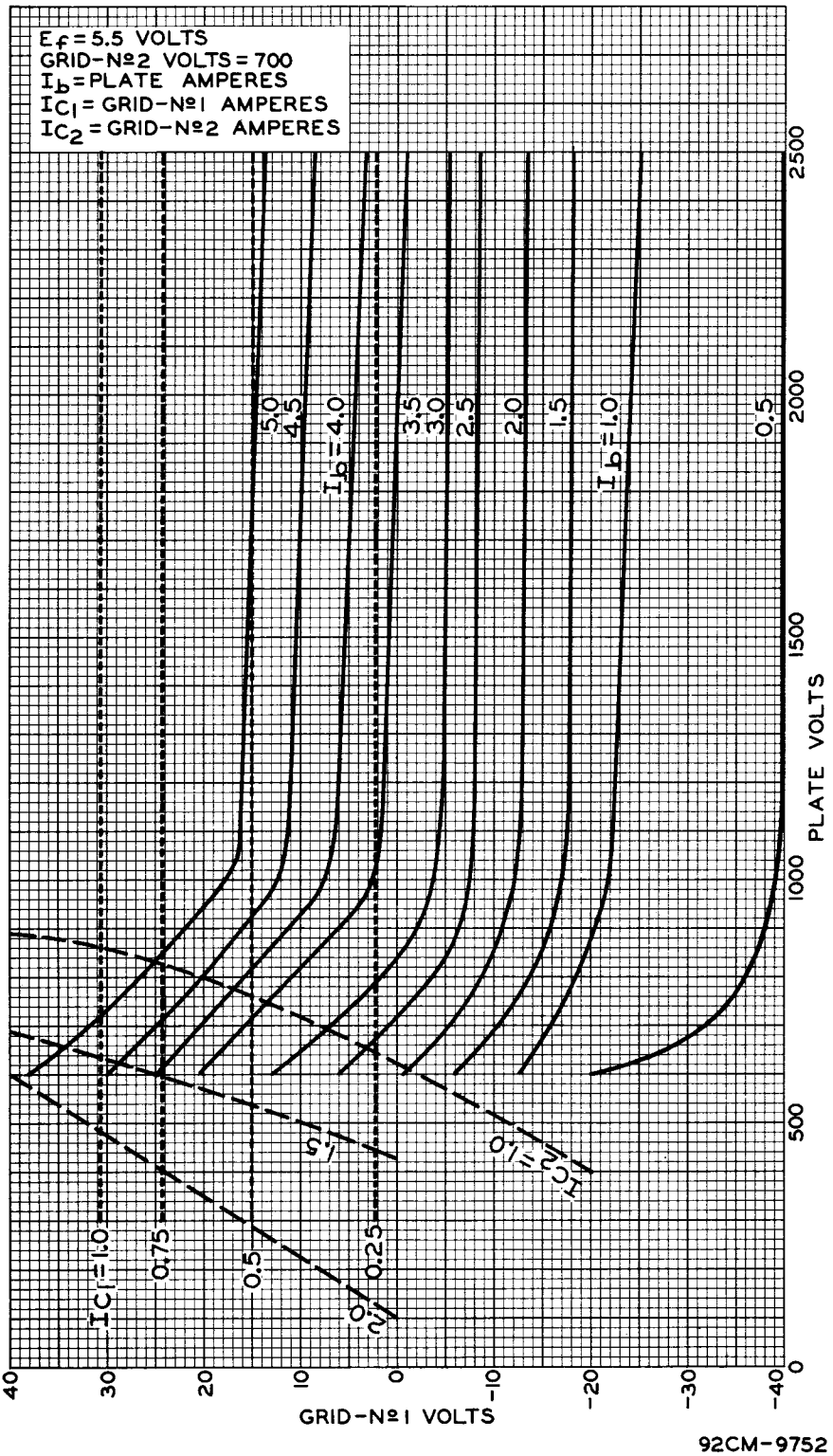
Typical Constant-Current Characteristics

With Grid-No.2 Volts =700



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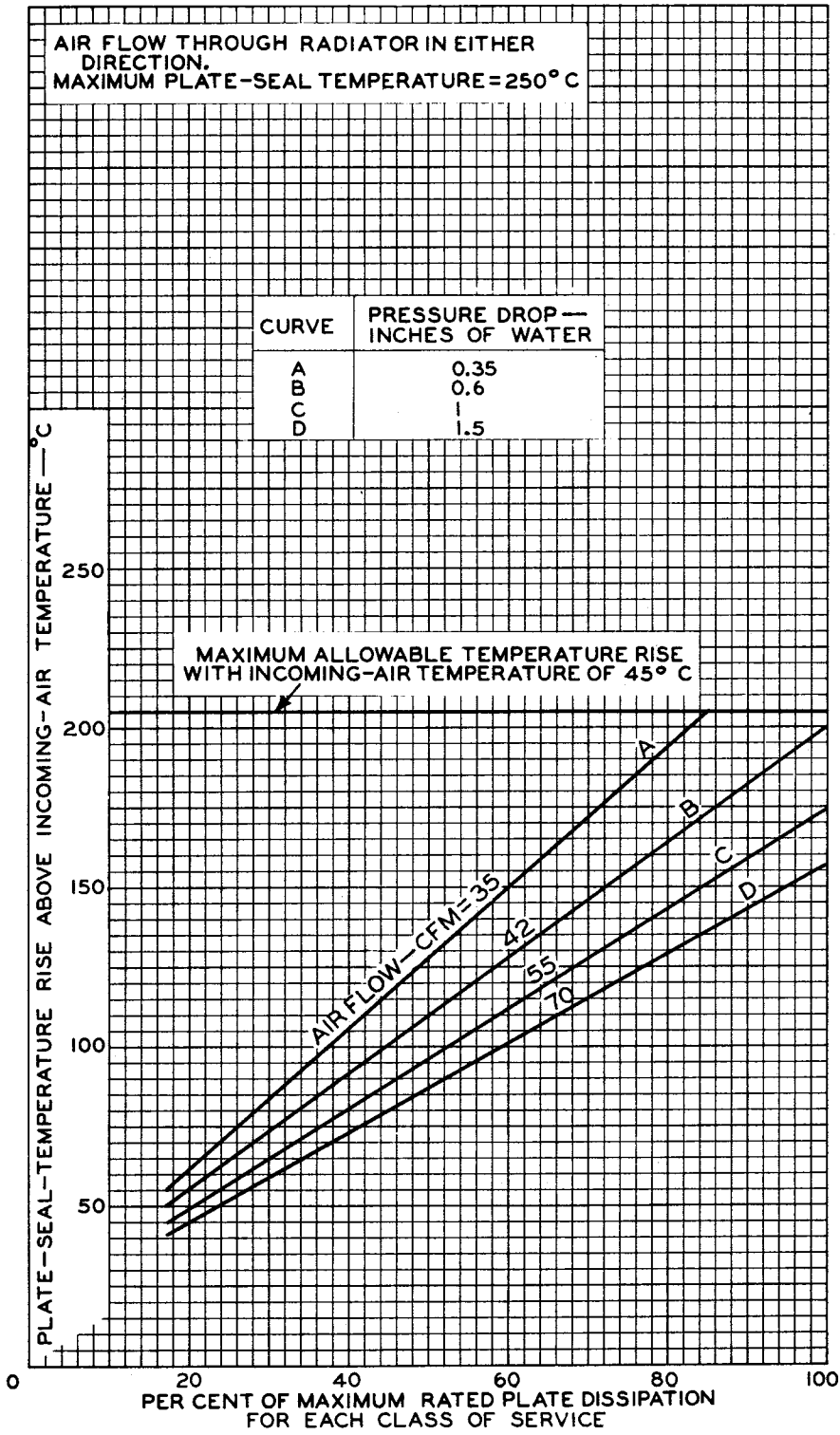
Typical Cooling Characteristics



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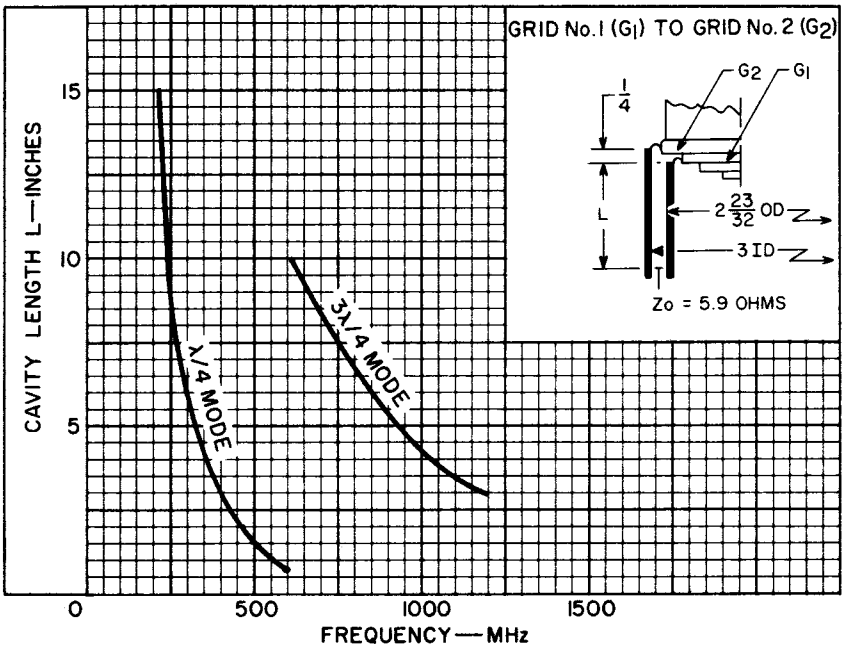
Tuning Characteristics



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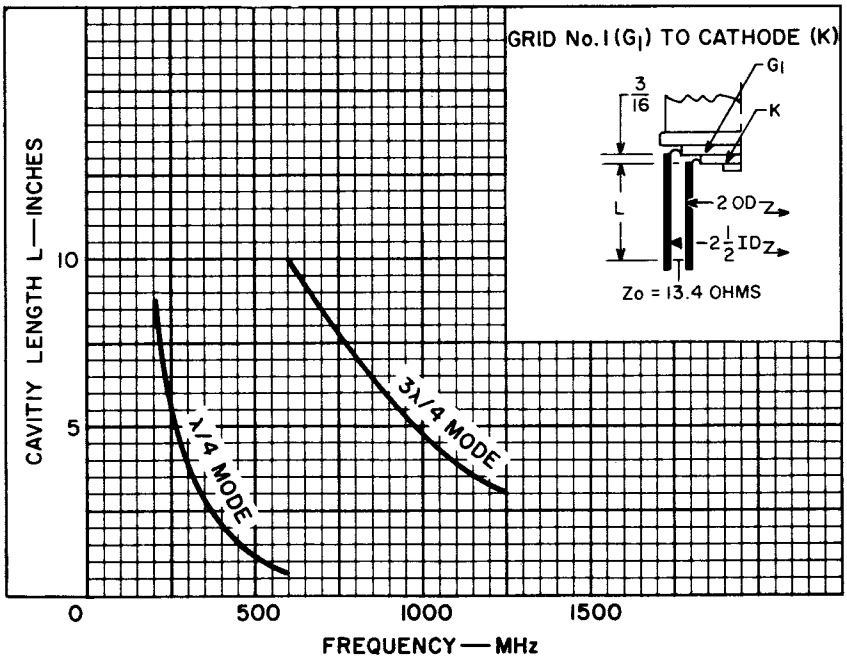
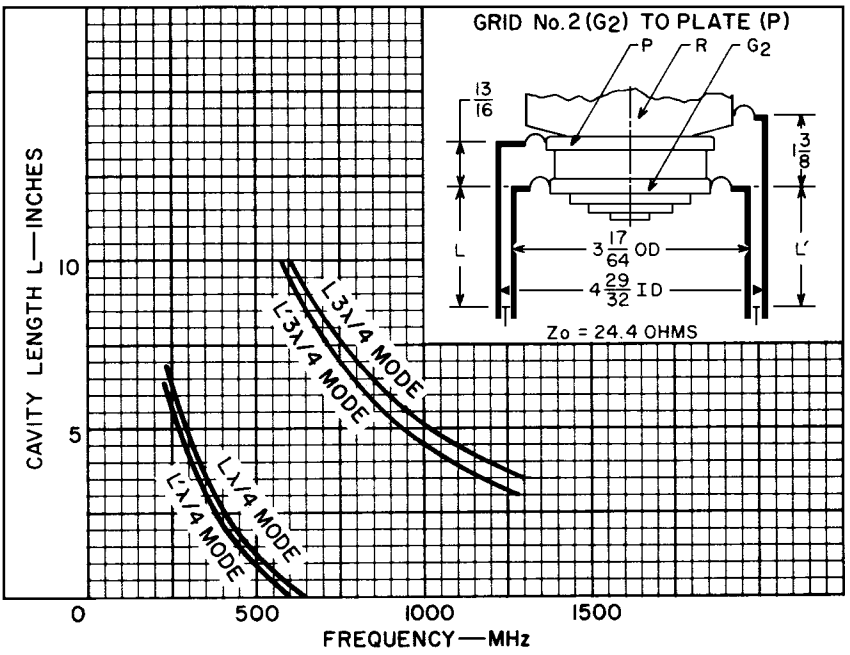


92CS-14802

Tuning Characteristics



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