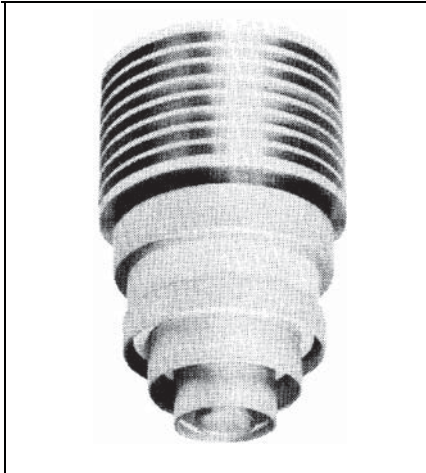


6884 Power Tube



Beam Power Tube

- CERMOLOX®
- Oxide-Coated Cathode
- Forced-Air Cooled
- 80 Watts CW Power Output at 400 MHz
- 40 Watts CW Power Output at 1215 MHz

BURLE-6884 is a compact, forced-air cooled UHF beam power tube designed for use in aircraft, mobile and stationary equipment applications. The tube features Cermolox construction, a uni-potential, oxide-coated cathode, and an integral stacked-disc-type finned radiator.

The tube is rated as an AF power amplifier and modulator, and up to 1215 MHz as a linear RF power amplifier, an anode-modulated RF power amplifier in Class C telephony service, an RF power amplifier and oscillator in Class C telegraphy service, and an RF power amplifier in Class C FM telephony service. The 6884 may also be useful in a variety of other applications such as frequency multipliers, linear RF power amplifiers (AM or television), pulse modulators, pulsed RF amplifiers, regulators, or other special services.

This data sheet gives application information unique to the BURLE-6884. Information contained in the following publications will help to assure longer tube life and safer operation:

TP-105 Application Guide for BURLE Power Tubes

TP-118 Application Guide for Forced-Air Cooling of BURLE Power Tubes

TP-122 Screen-Grid Current, Loading and Bleeder Considerations

For copies of these publications, contact your BURLE representative or write BURLE INDUSTRIES, INC., Tube Products Division, 1000 New Holland Avenue, Lancaster, PA 17601-5688.

General Data

Electrical

Heater for Oxide-Coated Unipotential Cathode:

Voltage (ac or dc)	26.5	typ.	V
	29.2	max.	V
Current at 26.5 volts	0.54		A
Minimum heating time	2		minutes
Mu-Factor, Grid No.2 to Grid No.1	18		

Direct Interelectrode Capacitances¹:

Grid No.1 to anode	0.065	max.	pF
Grid No.1 to cathode & heater	13		pF
Anode to cathode & heater	.013	max.	pF
Grid No.1 to grid No.2	17.5		pF
Grid No.2 to anode	4.7		pF
Grid No.2 to cathode & heater	0.45	max.	pF

Mechanical

Operating Position	Any
Overall Length	1.93" max.
Greatest Diameter	1.265" max.
Terminal Connections	See Dimensional Outline

For Operation Up to 400 MHz

Socket, including Grid-No.2	
Bypass Capacitor	Erie* 2948-000, 9819-000, or equivalent

Grid-No.2 Bypass Capacitor	Erie* 2929-001, or equivalent
----------------------------------	-------------------------------

For Operation at High Frequencies

See Preferred Mounting Arrangement	Figure 3
Weight (Approx.)	2 oz

Thermal

Terminal Temperature (Anode, grid No.2, grid No.1, cathode and heater)	250	max.	°C
Anode-Core Temperature	250	max.	°C

See Dimensional Outline for temperature-measurement points.

* Erie Specialty Products, Inc., 645 W. 11th Street, Erie, PA 16512.

AF Power Amplifier & Modulator - Class AB₁

Maximum CCS Ratings, Absolute-Maximum Values

DC Anode Voltage	1000	V
DC Grid-No.2 Voltage	300	V
Max.-Signal DC Anode Current	180	mA
Max.-Signal Anode Input	180	W
Max.-Signal Grid-No.2 Input	4.5	W
Anode Dissipation	115	W

Maximum Circuit Values

Grid-No.1 Circuit Resistance Under Any Condition:

With fixed bias	30,000	ohms
With cathode bias	Not	recommended

Typical CCS Operation

Values are for 2 tubes

DC Anode Voltage	650	850	V
DC Grid-No.2 Voltage	300	300	V
DC Grid-No. 1 Voltage:			
From fixed-bias source	-15	-15	V
Peak AF Grid-No. 1-to-Grid-No.1 Voltage	30	30	V
Zero-Signal DC Anode Current	80	80	mA
Max.-Signal DC Anode Current	200	200	mA
Zero-Signal DC Grid-No.2 Current	0	0	mA
Max.-Signal DC Grid-No.2 Current	20	20	mA
Effective Load Resistance (Anode to anode)	4330	7000	ohms
Max.-Signal Driving Power (Approx.)	0	0	W
Max.-Signal Power Output (Approx.)	50	80	W

AF Power Amplifier & Modulator - Class AB₂

Maximum CCS Ratings, Absolute-Maximum Values

DC Anode Voltage	1000	V
DC Grid-No.2 Voltage	300	V
Max.-Signal DC Anode Current	180	mA
Max.-Signal DC Grid-No.1 Current	30	mA
Max.-Signal Anode Input	180	W
Max.-Signal Grid-No.2 Input	4.5	W
Anode Dissipation	115	W

Typical CCS Operation

Values are for 2 tubes

DC Anode Voltage	650	850	V
DC Grid-No.2 Voltage	300	300	V
DC Grid-No.1 Voltage:			
From fixed-bias source	-15	-15	V
Peak AF Grid-No.1-to-Grid-No. 1 Voltage	46	46	V
Zero-Signal DC Anode Current	80	80	mA
Max.-Signal DC Anode Current	355	355	mA
Zero-Signal DC Grid-No.2 Current	0	0	mA
Max.-Signal DC Grid-No.2 Current	25	25	mA
Max.-Signal DC Grid-No.1 Current	15	15	mA
Effective Load Resistance (Anode to anode)	2450	3960	ohms
Max.-Signal Driving Power (Approx.)	0.3	0.3	W
Max.-Signal Power Output (Approx.)	85	140	W

Anode-Modulated RF Power Amplifier - Class C Telephony

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

Maximum CCS Ratings, Absolute-Maximum Values

Up to 1215 MHz

DC Anode Voltage	800	V
DC Grid-No.2 Voltage	300	V
DC Grid-No.1 Voltage	-100	V
DC Anode Current	150	mA
DC Grid-No.1 Current	30	mA
Anode Input	120	W
Grid-No.2 Input	3	W
Anode Dissipation	75	W

Typical CCS Operation

At 400 MHz

DC Anode Voltage	400	700	V
DC Grid-No.2 Voltage	200	250	V
DC Grid-No.1 Voltage	-20	-50	V
DC Anode Current	100	130	mA
DC Grid-No.2 Current	5	10	mA
DC Grid-No.1 Current	5	10	mA
Driver Power Output (Approx.)	2	3	W
Useful Power Output (Approx.)	16	45	W

Maximum Circuit Values

Grid No.1 Circuit Resistance Under Any Condition ... 30,000 ohms

RF Power Amplifier & Oscillator - Class C Telegraphy and RF Power Amplifier - Class C FM Telephony

Maximum CCS Ratings, Absolute-Maximum Values

Up to 1215 MHz

DC Anode Voltage	1000	V
DC Grid-No.2 Voltage	300	V
DC Grid-No.1 Voltage	-100	V
DC Anode Current	180	mA
DC Grid-No.1 Current	30 ²	mA
Anode Input	180	W
Grid-No.2 Input	4.5	W
Anode Dissipation	115	W

Typical CCS Operation

At 400 MHz At 1215 MHz

DC Anode Voltage	400	900	900	V
DC Grid-No.2 Voltage	200	300	300	V
DC Grid-No.1 Voltage	-35	-30	-22	V
DC Anode Current	150	170	170	mA
DC Grid-No.2 Current	5	1	1	mA
DC Grid-No.1 Current	3	10	4	mA
Driver Power Output (Approx.)	3	3	5	W
Useful Power Output (Approx.)	23	80	40	W

Maximum Circuit Values

Grid-No.1 Circuit Resistance Under Any Condition 3000 ohms

Linear RF Power Amplifier, Class AB₁ 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 1215 MHz		
DC Anode Voltage	1000	V
DC Grid-No.2 Voltage	300	V
DC Grid-No.1 Voltage	-100	V
DC Anode Current at Peak of Envelope	250 ³	mA
DC Grid-No.1 Current	30	mA
Anode Input	180	W
Grid-No.2 Input	4.5	W
Anode Dissipation	115	W

Maximum Circuit Values

Grid-No.1 Circuit Resistance Under Any Condition:

With fixed bias	25,000	ohms
With fixed bias (In Class AB ₁ operation)	100,000	ohms
With cathode bias	Not recommended	

Grid-No.2 Circuit Impedance See Note 4

Anode Circuit Impedance See Note 4

Typical CCS Operation with "Two-Tone" Modulation

At 30 MHz		
DC Anode Voltage	650	850 V
DC Grid-No.2 Voltage	300	300 V
DC Grid-No.1 Voltage	-18.5	-18.5 V
Zero-Signal DC Anode Current	40	40 mA
Effective RF Load Resistance	2200	3500 ohms
DC Anode Current at Peak of Envelope	100	100 mA
Average DC Anode Current	75	75 mA
DC Grid-No.2 Current at Peak of Envelope	8.2	4.2 mA
Average DC Grid-No.2 Current	3.6	1.7 mA
Peak-Envelope Driver Power Output (Approx.) ..	0.5	0.5 W
Output-Circuit Efficiency (Approx.)	90	90 %
Distortion Products Level:		
Third Order	35	30 dB
Fifth Order	40	36 dB
Useful Power Output (Approx.):		
Average	12.5	20 W
Peak envelope	25	40 W

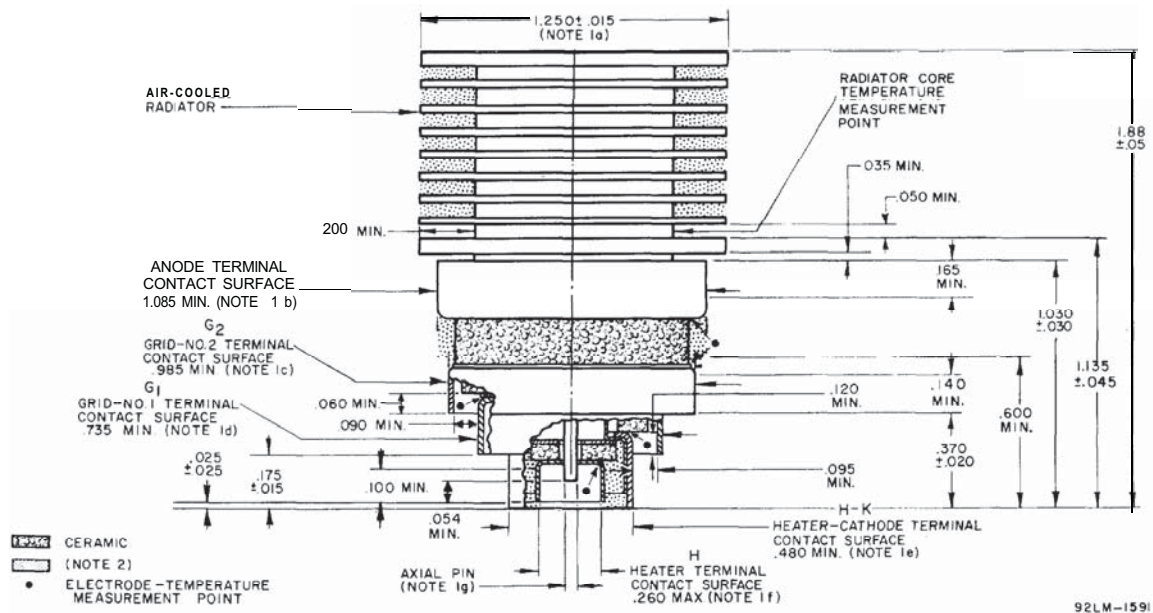
Characteristics Range Values

	Min.	Max.	
Heater Current ⁵	0.48	0.60	A
Direct Interelectrode Capacitances:			
Grid No.1 to anode ¹	0.065		pF
Grid No.1 to cathode & heater ¹	11.0	15.0	pF
Anode to cathode & heater ¹	0.013		pF
Grid No.1 to grid No.2 ¹	15.0	20.0	pF
Grid No.2 to anode ¹	4.2	5.2	pF
Grid No.2 to cathode & heater ¹	0.26	0.45	pF
Grid-No. 1 Voltage ^{5,6}	-6	-15	V
Grid-No.1 Cutoff Voltage ^{5,7}	-	-48	V
Grid-No.1 Current ^{5,8}	10	-	mA
Reverse Grid-No.1 Current ^{5,6}	-	8	uA
Grid-No.2 Current ^{5,6}	-8	+2.0	mA
Peak Emission ^{5,9}	-	300	peak V
Interelectrode Leakage Resistance ¹⁰	1.0	-	Mohm
Useful Power Output ¹¹	80	-	W

1. Measured with special shield adapter.
2. In applications where the frequency is less than 80 MHz and the bias is less than -50 volts, the maximum value is 40 mA.
3. 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 180 mA. During short periods of circuit adjustment under "Single-Tone" conditions, the average plate current may be as high as 250 mA.
4. See TP-105.
5. With 26.5 volts ac or dc on heater.
6. With dc anode voltage of 1000 volts, dc grid-No.2 voltage of 300 volts, and dc grid-No.1 voltage adjusted to give a dc anode current of 115 mA.
7. With dc anode voltage of 1000 volts, dc grid-No.2 voltage of 300 volts, and dc grid-No.1 voltage adjusted to give a dc anode current of 1 mA.
8. With anode and grid-No.2 floating and dc grid-No.1 voltage of +2 volts.
9. With grid No.1, grid No.2, and anode tied together; and pulse voltage source connected between anode and cathode. Pulse duration is 2 microseconds, pulse repetition frequency is 60 pps, and duty factor is 0.00012. The voltage-pulse amplitude is adjusted until a peak cathode current of 10 amperes is obtained. After 1 minute at this value, the voltage-pulse amplitude will not exceed 300 volts (peak).
10. 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 adjacent electrodes as measured with a 200-volt Megger-type ohmmeter having an internal impedance of 1.0 megohm, will be 1.0 megohm.
11. In a single-tube, grid-driven coaxial-cavity class C amplifier circuit at 400 MHz and for conditions with 24.0 volts ac or dc on heater, dc anode voltage of 1000 volts, dc grid-No.2 voltage of 300 volts, grid-No.1 resistor adjustable between zero and 10,000 ohms, dc anode current of 180 mA maximum, dc grid-No.1 current of 30 mA maximum and driver power output of 3.3 watts.

Warning - Personal Safety Hazards

Electrical Shock - Operating voltages applied to this device present a shock hazard.



DIMENSIONS IN INCHES

Figure 1 - Dimensional Outline

Note 1: The following diametrical space requirements accommodate the concentricity of the cylindrical surfaces of the radiator fins, axial pin, and each electrode terminal:

- Radiator Band - 1.317"
- Anode Terminal - 1.120"
- Grid-No.2 Terminal - 1.020"
- Grid-No.1 Terminal - 0.765"
- Heater-Cathode Terminal - 0.520"
- Heater Terminal - 0.238"
- Axial Pin - 0.072"

Note 2: Keep all stippled regions clear. Do not allow contacts or circuit components to protrude into these annular volumes.

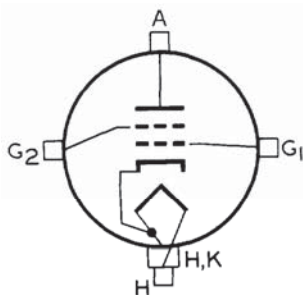
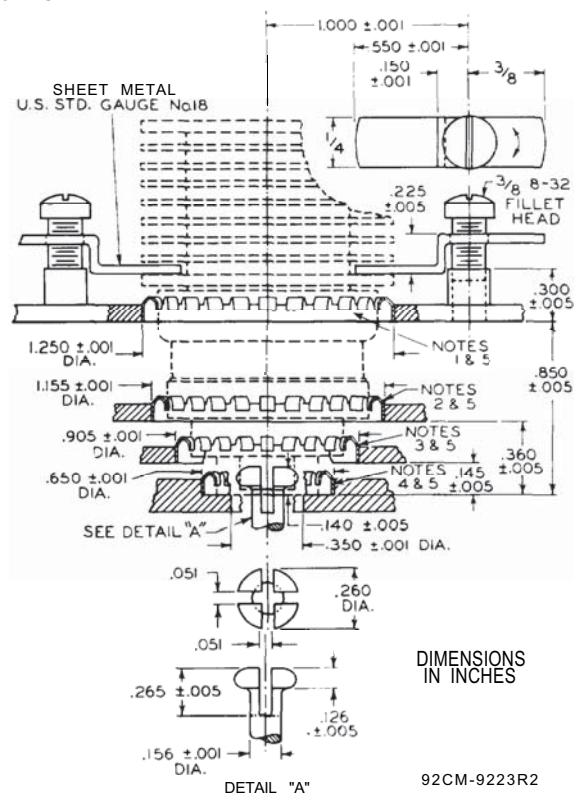


Figure 2 - Terminal Diagram

See Dimensional Outline for Terminal Connections



DIMENSIONS IN INCHES

Figure 3 - Preferred Mounting Arrangement

Note 1: Contact ring No.97-252 or finger stock No.97-380.

Note 2: Contact ring No.97-253 or finger stock No.97-380.

Note 3: Contact ring No.97-254 or finger stock No.97-380.

Note 4: Contact ring No.97-255 or finger stock No.97-380.

Note 5: The specified contact ring of preformed finger stock and finger stock No.97-380 provide adequate electrical contact, but the finger stock No.97-380 is less susceptible to breakage than the specified contact ring. Both types are made by Instruments Specialties Co., P.O. Box A, Delaware Water Gap, PA 18327.

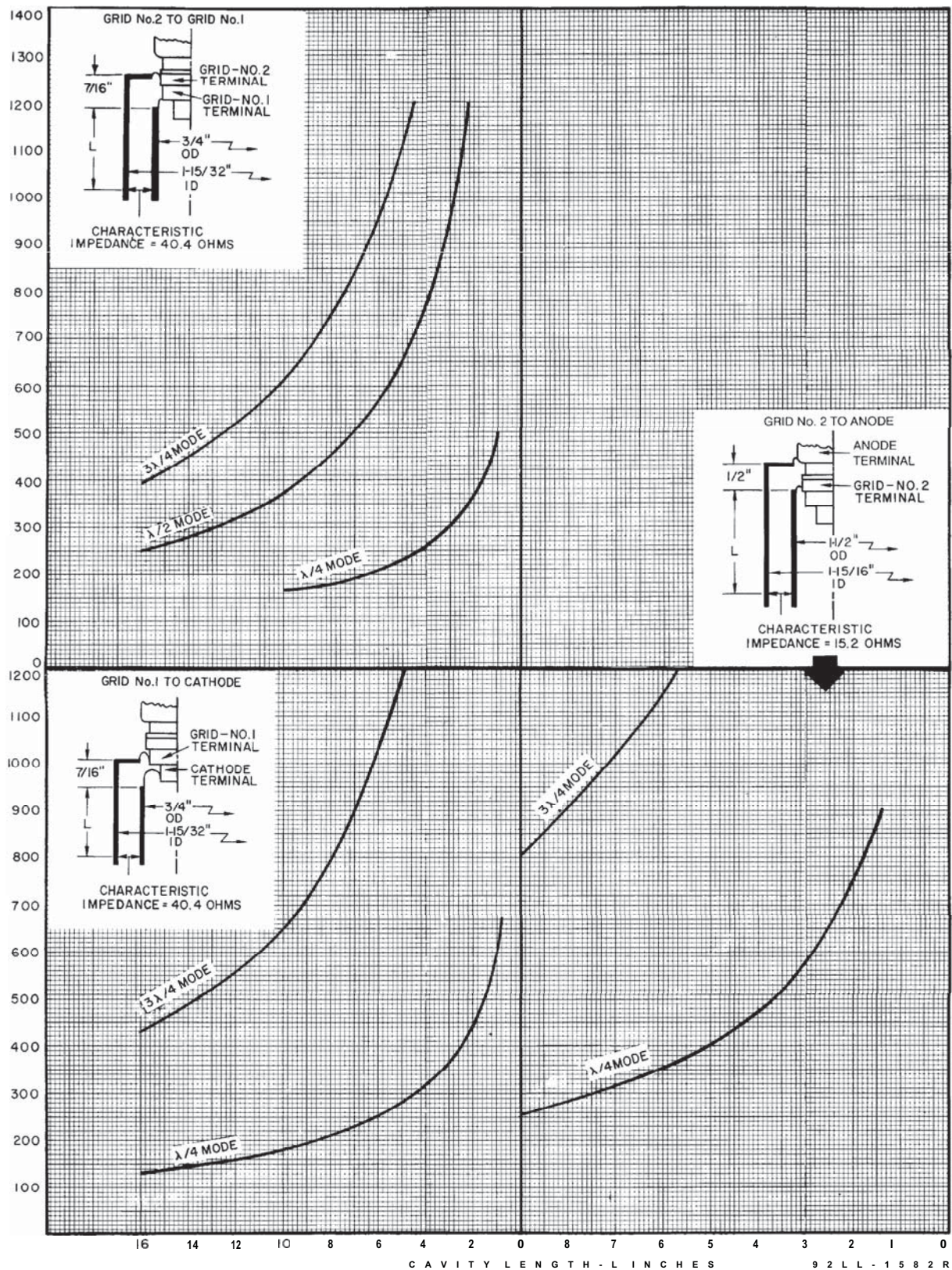


Figure 4 - Tuning Characteristics

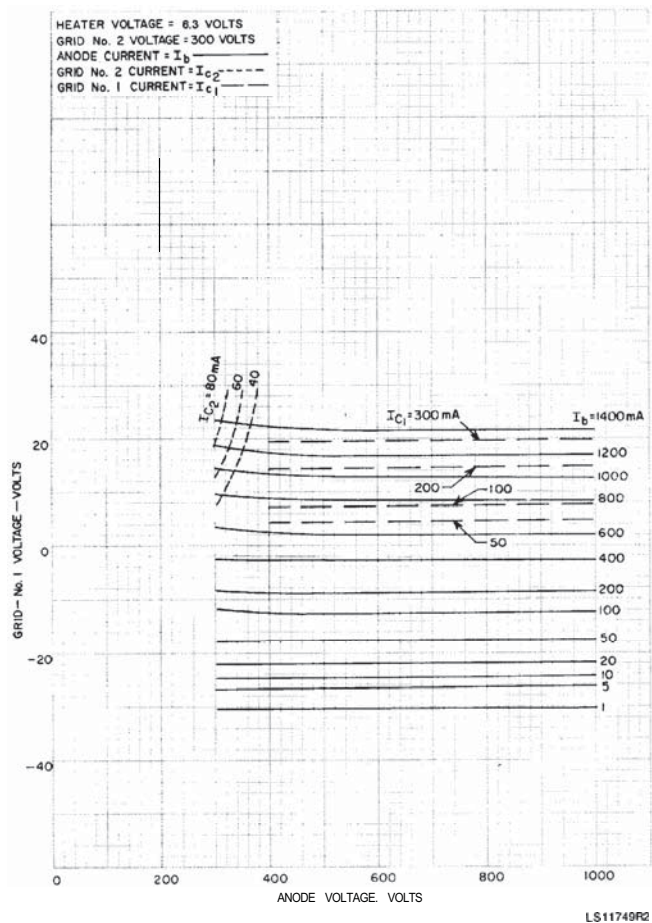


Figure 5 - Typical Constant-Current Characteristics
 With Grid-No.2 Volts = 300

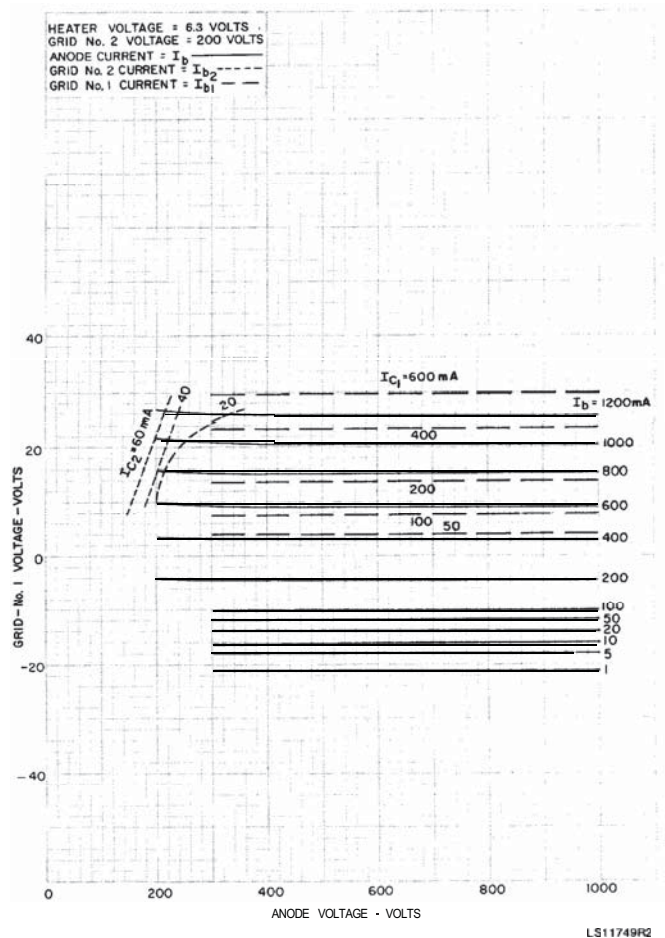


Figure 6 - Typical Constant-Current Characteristics
 With Grid-No.2 Volts=200

Forced-Air Cooling

Air Flow:

Through radiator - Adequate air flow to limit the radiator core temperature to 250° C should be delivered by a blower across the radiator before and during the application of anode, grid-No.2, and grid-No.1 voltages. Typical values of airflow directed across the radiator versus anode dissipation are shown in Figures 7 and 8.

To Anode, Grid-No.2, Grid-No.1, Cathode, and Heater Terminals - A sufficient quantity of air should flow across each of these

terminals so that their temperature does not exceed the specified maximum value of 250° C.

During Standby Operation - Cooling air is not normally required when only heater voltage is applied to the tube.

Anode power, grid-No.2 power, heater power, and air flow may be removed simultaneously.

At sea level, cooling requirements with air flow directed across the radiator with cowling as indicated may be met by use of blowers and associated motors manufactured by Rotron Mfg. Co., Inc., Woodstock, N.Y., or equivalent.

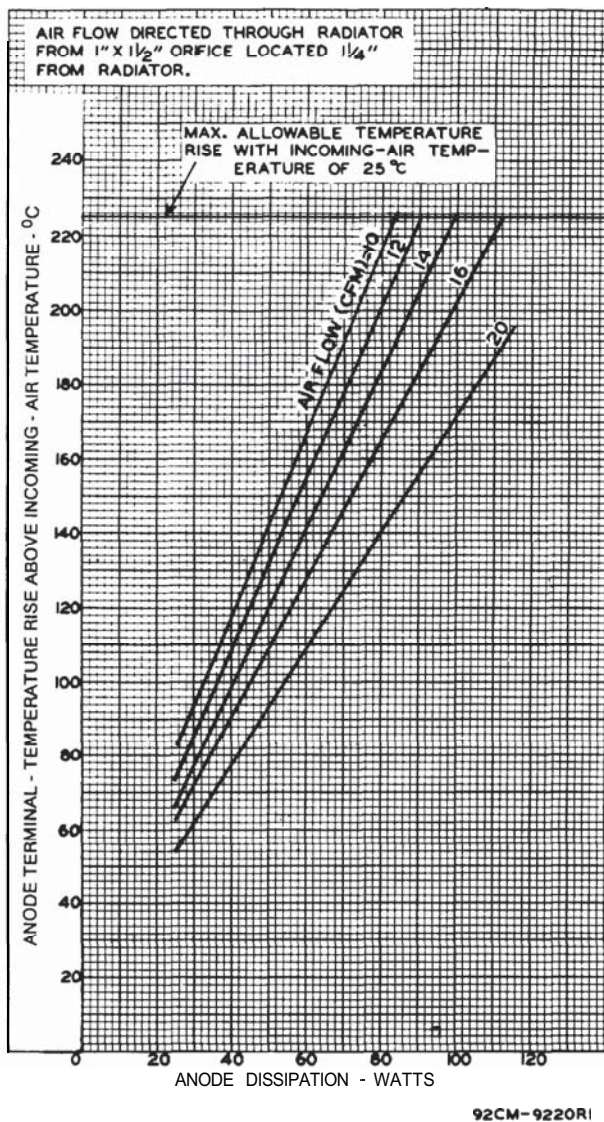


Figure 7 - Typical Cooling Requirements

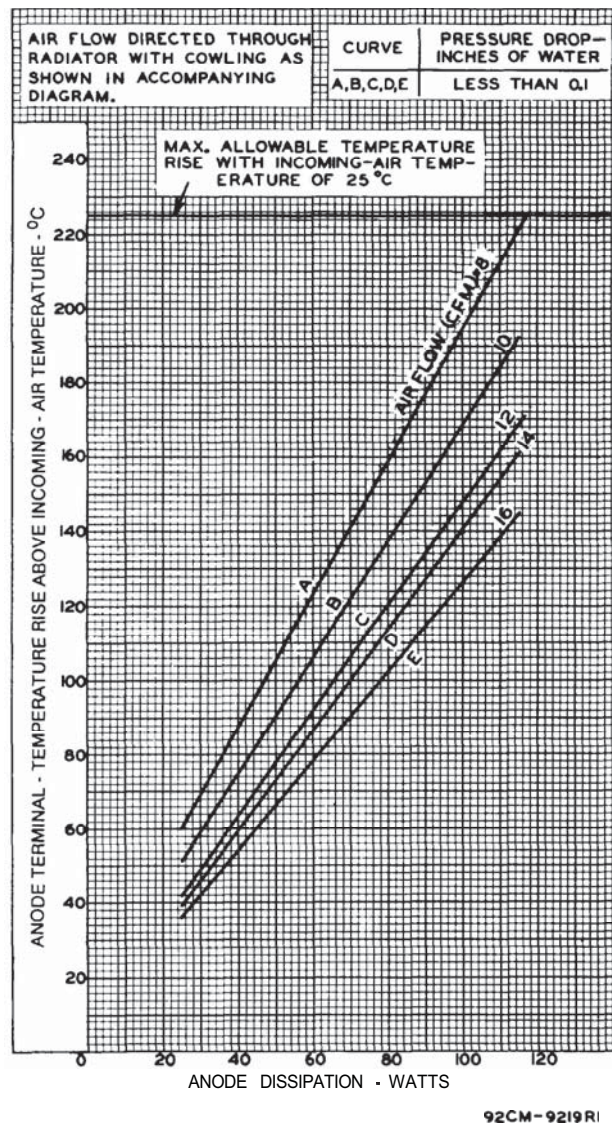
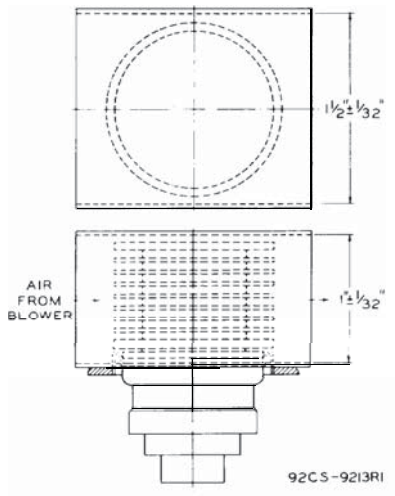


Figure 8 - Typical Cooling Requirements



**Figure 9 - Recommended Cowling
For Directing Air Flow Through Radiator**

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BURLE INDUSTRIES, INC., Tube Products Division
1000 New Holland Ave., Lancaster, PA 17601-5688 U.S.A

Printed in U.S.A. / 11-89
6884