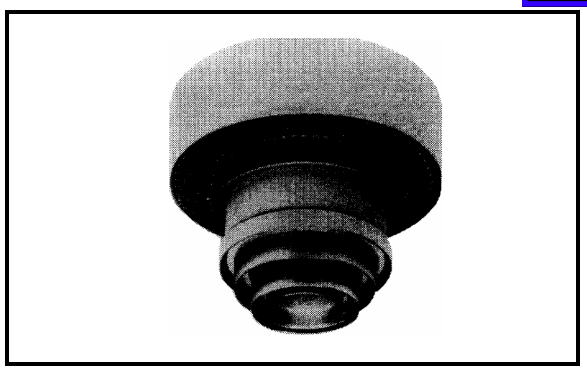
8791/V1
Power Tube

VHF-TV Amplifier Tube

- **CERMOLOX®**
- **Ruggedized, Reliable**
- **Matrix Oxide Cathode**
- **Full Input to 400 MHz**
- **1000 W Peak Sync Output in VHF-TV Service**



The BURLE 8791/V1 is designed specifically to meet the stringent requirements of modern VHF-TV equipments. Its high gain, CERMOLOX® tube construction and full input rating to 400 MHz make it ideally suited for high frequency applications such as VHF-TV grid-modulated service and VHF or UHF Class B linear service where it will deliver better than one kilowatt peak sync or 200 watts carrier output respectively.

The ruggedized, low inductance, coaxial construction of the 8791/V1 enables the use of simple, economical circuit techniques in all HF, VHF, and UHF applications.

Its matrix oxide cathode enhances system reliability while the efficient, forced-air cooled radiator reduces system air requirements and permits more reliable, lower temperature operation.

To comply with environmental design objectives, design samples are subjected to 50 g-3/4 millisecond shock; 500 g-3/4 millisecond shock; and 20 g-2000 hertz vibration testing.

This bulletin gives application information unique to the BURLE 8791/V1. General information, covering the installation and operation of this tube type, is given in the “Application Guide for BURLE Power Tubes”, TP-105. Close attention to the instructions contained therein will assure longer tube life, safer operation, less equipment downtime, and fewer tube handling accidents.

General Data

Electrical

Heater-Cathode:			
Type……	Unipotential, Oxide Coated, Matrix Type		
Voltage[1] (ac or dc)……..	5.5	typ.	V
	6.6	max	V
Current at 5.5 volts……	7.2		A
Minimum Heating Time……..	120		s
Mu-Factor, (Grid No.2 to Grid No.1)…	13		
Direct Interelectrode Capacitances:[2]			
Grid No.1 to plate……..	0.10	max.	pF
Grid No.1 to cathode & heater……	28		pF
Plate to cathode & heater……	0.010	max.	pF
Grid No.1 to grid No.2……..	36		pF
Grid No.2 to plate……	5.1		pF
Grid No.2 to cathode & heater……	1.0	max.	pF

Mechanical

Operating Position……..	Any
Overall Length……..	62.0 mm (2.44 in) max.
Greatest Diameter……..	64.8 mm (2.55 in) max.
Terminal Connections……	See Dimensional Outline
Sockets……..……..	See page 2
Radiator……..……..	Integral part of tube
Weight (Approx.) ……..……	0.3 kg (3/4 lb)

Thermal

Seal Temperature[3](Plate, Grid No.2)			
Grid No.1, Cathode-Heater and Heater)...	250	max.	°C
Plate-Core Temperature……..	250	max.	°C

ISO 9001

BURLE

Grid-Modulated RF Power Amplifier - Class C Television Service[4]

Synchronizing-level conditions per tube unless otherwise specified

Maximum CCS Ratings, Absolute-Maximum Values

	up to 216 MHz	
DC Plate Voltage[4]	3000	V
DC Grid-No.2 Voltage[4]	750	V
DC Grid-No. 1 Voltage (White Level)	-250	V
DC plate Current	750	mA
Grid-No.2 Input	25	W
Plate Dissipation	1000	W
Grid-No. 1 Current	100	mA

Calculated Operation

Grid-drive circuit at 216 MHz at a bandwidth of 8.5 MHz[5]

DC Plate Voltage	2700	V
DC Grid-No.2 Voltage	450	V
DC Grid-No. 1 Voltage:		
Synchronizing level	-70	V
Blanking level	-80	V
White level	-110	V
Peak RF Grid-No. 1 Voltage	70	V
DC Plate Current:		
Synchronizing level	700	mA
Blanking level	500	mA
DC Grid-No.1 Current (Approx.):		
Synchronizing level	0	A
Blanking level	0	A
Driver Power Output (Approx.):		
Synchronizing level	8.0	W
Blanking level	4.5	W
Useful Power Output (Approx.):		
Synchronizing level	1100	W
Blanking level	615	W

Linear RF Power Amplifier[4] Class AB or Class B Telephony

Carrier conditions for use with a maximum modulation factor of 1.0

Maximum CCS Ratings, Absolute-Maximum Values:

DC Plate Voltage[4]	3000	V
DC Grid-No.2 Voltage[4]	75	V
DC Plate Current	500	mA
Grid-No.2 Input	25	W
Plate Dissipation	1000	W

Calculated CCS Operation as a Class AB_1 Amplifier

In a cathode drive circuit, at 400 MHz with an output circuit bandwidth of 10.0 MHz[5]

DC Plate Voltage	2500	V
DC Grid-No.2 Voltage	450	V
DC Grid-No. 1 Voltage	-45	V
DC Plate Current	340	mA
DC Grid-No. 1 Current	0	A
DC Grid-No. 2 Current	-2.0	mA
Drive Power	8.0	W
Output Circuit Efficiency (Approx.)	80	%
Useful Power Output	200	W

Characteristics Range Values

	Min.	Max.	
Heater Current[6]	6.9	8.3	A
Direct Interelectrode Capacitances:			
Grid No.1 to plate[7]	-	0.010	pF
Grid No.1 to cathode & heater[7]	27	32	pF
Plate to cathode & heater[7]	-	0.010	pF
Grid No.1 to grid No.2[7]	34	41	pF
Grid No.2 to plate[7]	4.5	6.0	pF
Grid No.2 to cathode & heater[7]	-	1.0	pF
Reverse Grid-No.1 Current[6,8]	-	-50	µA
Interelectrode Leakage Resistance[9]	8.0	-	Mohms
Cutoff Grid-No. 1 Voltage[76,10]	-	-82	V
Grid-No. 1 Voltage[6,8]	-25	-42	V
Socket		Erie 9706-011	
		Jettron 89-083 or equivalent	

Sockets may be obtained from: Jettron Products Incorporated, 56 Route 10, Hanover, NJ 07936.

1. For maximum life expectancy, the heater-voltage must be adjusted initially and throughout life to the lowest value that will give the desired performance.
   1. Before the application of any other voltages to a new tube, the heater voltage should be adjusted 5.5 volts at the tube socket. A true RMS voltmeter should be used for accurate measurement.
   2. Apply voltages and adjust tuning controls as necessary for proper operation as described in the appropriate instruction manual.
   3. Reduce the heater voltage in 0.1-volt increments -- repeating Step 2 until performance degradation is noted. Then increase the heater voltage 0.1 volt above this point. Typically, depending upon the application, this voltage will be in the range of 4.8 to 5.5 volts.

   During life when evidence is observed that a tube is becoming emission limited, increasing the heater voltage may extend the useful life of the tube. However, never increase heater voltage to compensate for a decrease in other circuit parameters such as RF drive or video modulating voltage!
2. Measured with special Adapter.
3. See Dimensional Outline for temperature measurement points.
4. See TP-105.
5. Computed between half-power points and based on 1-1/2 times tube output capacity.
6. With 6.3 V ac or dc on heater.
7. Measured with special shield adapter.
8. With dc plate voltage of 2500 volts, dc grid-No.2 voltage of 400 volts, and dc grid-No.1 voltage adjusted to give a plate current of 240 mA.
9. Under conditions 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 electrodes (except across heater terminals) is measured with a 200-volt Megger-type ohmmeter having an internal impedance of 1.0 megohm.
10. With dc plate voltage of 2500 volts, dc grid-No.2 voltage of 400 volts, and dc grid-No.1 voltage adjusted to give a plate current of 5 mA.

Mounting

See the preferred mounting arrangement in Figure 5. See TP105 for a description of the fixed method of mounting. The adjustable method is not recommended for the 8791/V1. Special sockets are available. (See page 2.)

Forced-Air Cooling

Air Flow:

Through radiator -- Adequate air flow to limit the plate-core temperature to 250 °C should be delivered by a blower through the radiator before and during the application of heater, plate, grid-No.2, and grid-No.1 voltages. In typical operation at 750 watts plate dissipation and 200 °C plate core temperature 12 cfm at 0.36 inch of water at 22 °C ambient air temperature should be sufficient as shown on Air Flow Chart.

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 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.

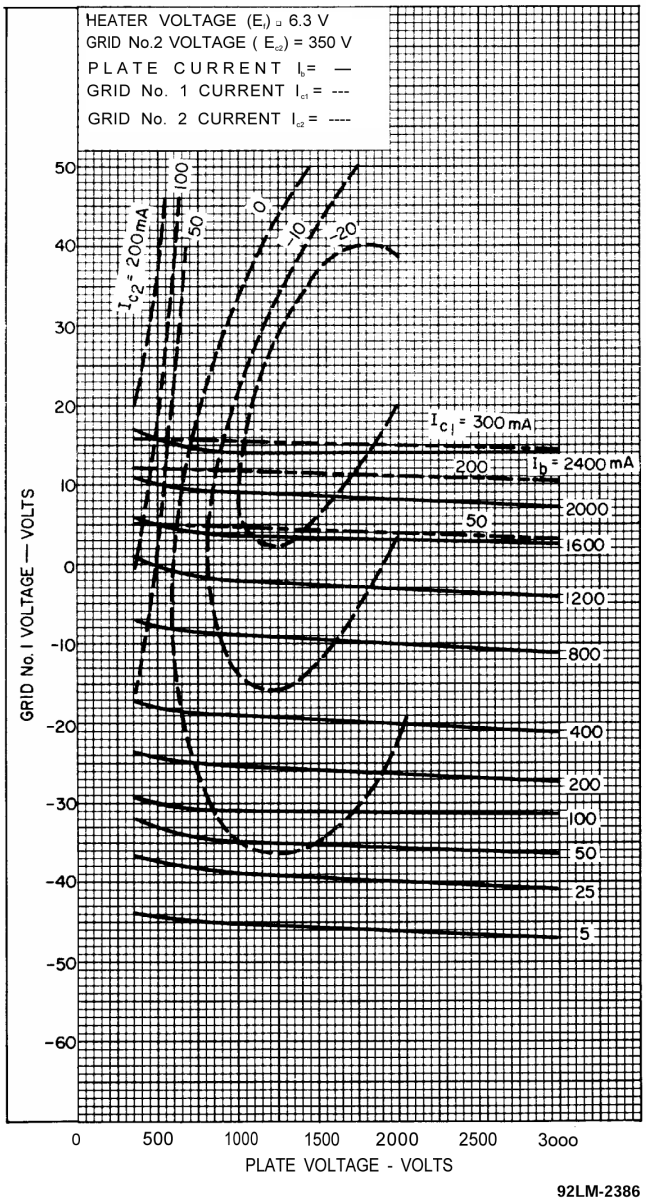


Figure 1 - **Typical Constant Current Characteristics (E_{C2} 350 V)**

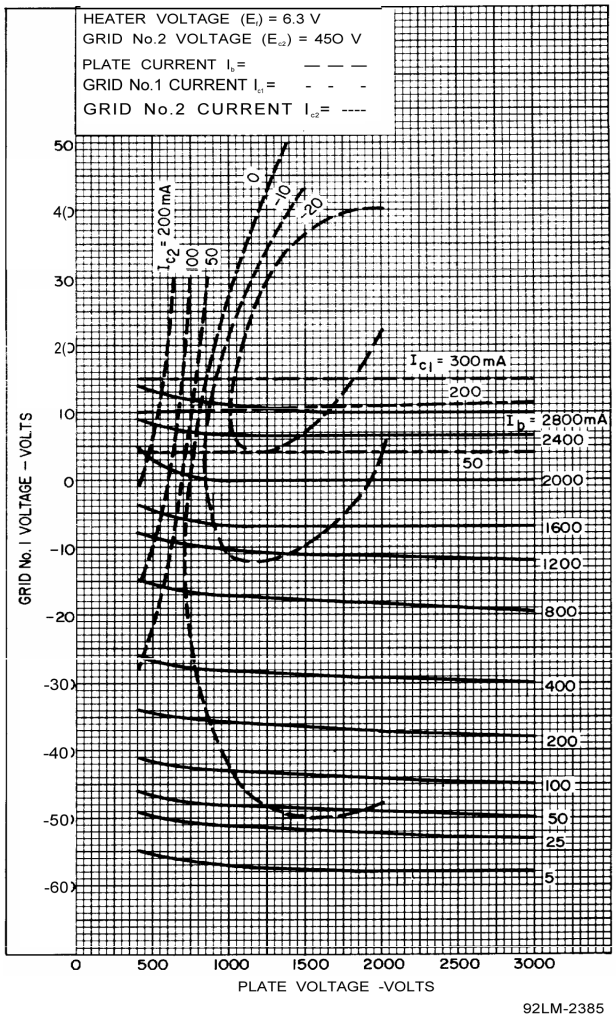


Figure 2 - **Typical Constant Current Characteristics (E_{C2} = 450 V)**

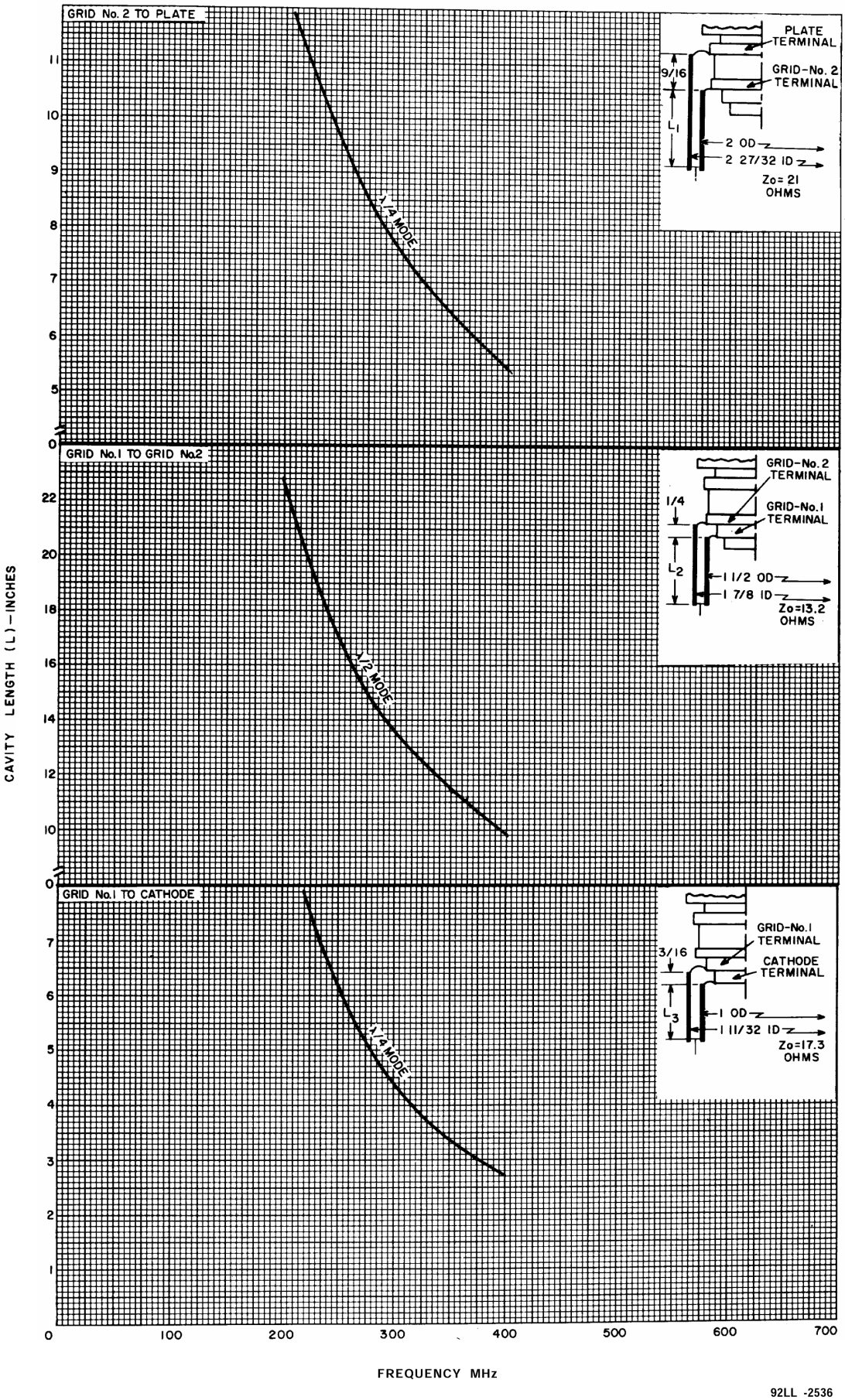


Figure 3 - Electrode Cavity Tuning Characteristics

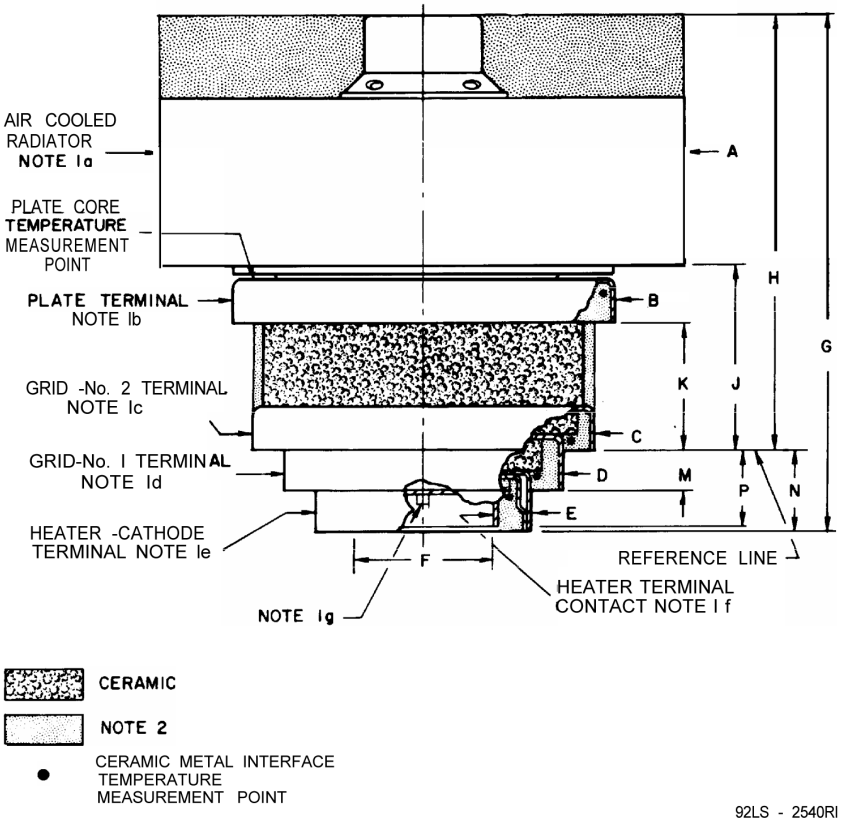


Figure 4- Dimensional Outline

Tabulated Dimensions*

Dimension	Value			
A	64.0	(2.52)	Max.	Dia.
B	44.32	(1.745)	Min.	Dia.
C	40.38	(1.590)	Min.	Dia.
D	32.76	(1.290)	Min.	Dia.
E	25.14	(0.99)	Min.	Dia.
F	17.02	(0.67)	Max.	Dia.
G	62.0	(2.44)	Max.	
H	50.29 ± 1.01	(1.98 ± .04)		
J	21.08 ± .88	(0.830 ± .035)		
K	14.61 ± .63	(0.575 ± .025)		
M	5.08 ± .51	(0.20 ± .02)		
N	10.16 ± .51	(0.40 ± .02)		
P	9.78 ± .63	(0.385 ± .025)		

* Dimensions in millimeters. Dimensions in parentheses are in inches.

Note 1: The contact distance* listed is the indicated, uniform length as measured from the edge of the terminal.

Note	Element	Contact Distance	
1a	Radiator	18.5	(0.730) min.
1b	Plate Terminal	3.68	(0.145) min.
1c	Grid-No.2 Terminal	3.81	(0.150) min.
1d	Grid-No.1 Terminal	4.57	(0.180) min.
1e	Heater-Cathode Terminal	4.06	(0.160) min.
1f	Heater Terminal (post)	2.92	(0.115) max.
1g	Pin		

Note 2: 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 its associated diameter.

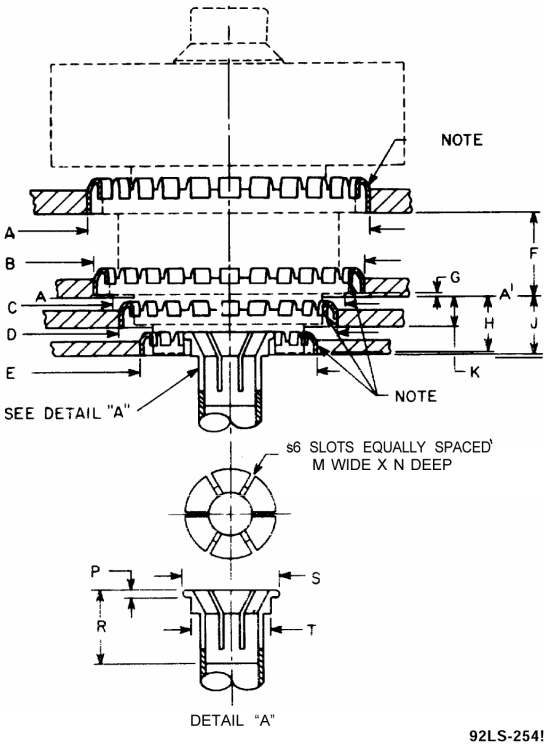


Figure 5 - **Preferred Mounting Arrangement and Layout of Associated Contacts**

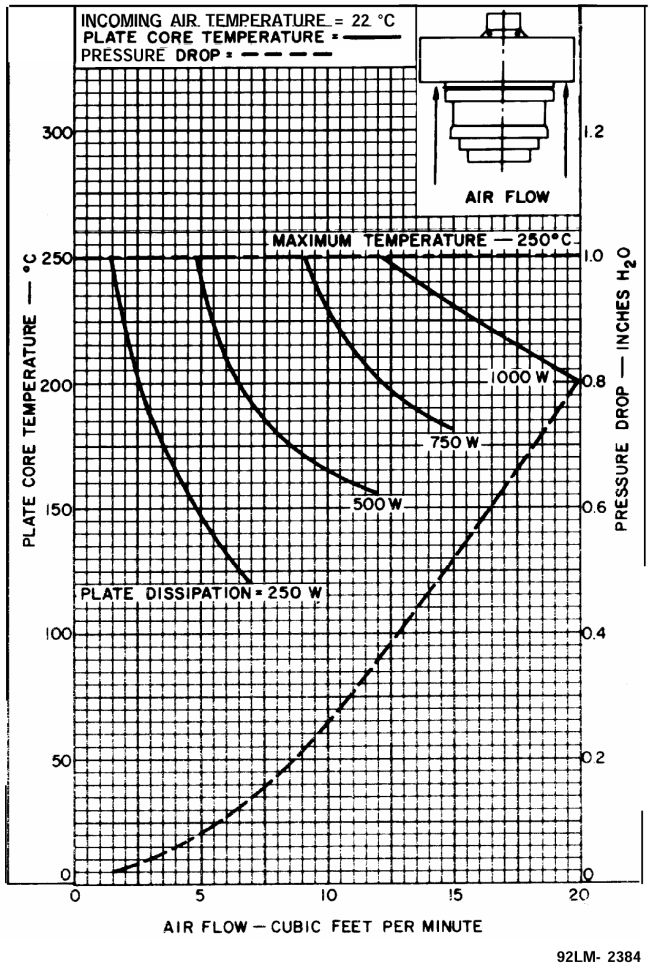


Figure 6 - **Typical Cooling Characteristics**

Dimension	Value		
A	49.225 ± .025	(1.938 ± .001)	Dia.
B	44.348 ± .025	(1.746 ± .001)	Dia.
C	39.370 ± .025	(1.550 ± .001)	Dia.
D	36.779 ± .025	(1.448 ± .001)	Dia.
E	29.159 ± .025	(1.148 ± .001)	Dia.
F	15.01 ±.13	(0.591 ± .005)	
G	1.02 ± .13	(0.040 ± .005)	
H	9.78 ± .13	(0385 ± .005)	
J	10.16 ± .13	(0.400 ± .005)	
K	4.67 ± .13	(0.184 ± .005)	
M	0.51 ± .25	(0.020 ± .010)	
N	10.16 ± .13	(0.400 ± .005)	
P	1.272 ± .13	(0.050 ± .005)	
R	12.70 ± .13	(0.500 ± .005)	
S	17.018 ± .025	(0.670 ± .001)	Dia.
T	14.35 ± .13	(0.565 ± .005)	Dia.

Note: Contact Strip: No. 97-360A as made by: Instrument Specialties Co., P.O. Box A, Delaware Water Gap, PA 18327