8916

VHF Linear Power Amplifier Tube

27.5 Kilowatt Peak Sync. Output thru VHF-TV Band

- CERMOLOX® Construction
- 13 dB Gain
- Efficient Forced-Air Cooling
- High Gain-Bandwidth Products
- Full Input to 400 MHz

ELECTRICAL

Filamentary Cathode, Thoriated-Tungsten Mesh Type

Voltage[a] (ac or dc)	9.5	typ.	V
	10.0	max.	V
Current:			
Typical value at 9.5 volts	153		A
Maximum value for starting, even momentarily	300		A
Cold resistance	0.01		Ω
Minimum heating time	15		s
Mu-Factor[b], (Grid No.2 to Grid No.1)	12.5		
Direct Interelectrode Capacitances:			
Grid No.1 to plate[c]	0.4	max.	pF
Grid No.1 to filament	100		pF
Plate to filament[c,d]	0.15	max.	pF
Grid No.1 to grid No.2	85		pF
Grid No.2 to plate	20		pF
Grid No.2 to filament[d]	4.0	max.	pF

MECHANICAL

Operating Position	Vertical, either end up
Overall Length (max.)	(180.3 mm) 7.10 in
Greatest Diameter	(210.4 mm) 8.285 in
Radiator	Integral part of tube
Weight (Approx.)	(10.0 kg) 22 lbs

THERMAL

Seal Temperature[e] (Plate, Grid No.2, Grid-No.1) Cathode-Filament, and Filament)	250 max. °C
Plate-Core Temperature[e.f]	275 max. °C

RF Power Amplifier
Class B Television Service[g,h]

Synchronizing-level conditions per tube unless otherwise specified.

MAXIMUM CCS RATINGS, Absolute-Maximum Values

DC Plate Voltage[j]	10,000	max.	V
DC Grid No.2 Voltage[k]	2000	max.	V
DC Grid No.1 Voltage[m]	−600	max.	V
DC Plate Current	6.0	max.	A
Grid No.2 Input	450	max.	W
Grid No.1 Input	250	max.	W
Plate Dissipation	See notes f & p		

TYPICAL CCS OPERATION

In a cathode-drive circuit at 216 MHz and a bandwidth of 6.3 MHz[n]

DC Plate Voltage	7800	8300	V
DC Grid No.2 Voltage	1000	1500	V
DC Grid No.1 Voltage	−110	−190	V
Zero Signal DC Plate Current	1.25	1.25	A
Effective RF Load Resistance	670	670	Ω
DC Plate Current			
Synchronizing level	5.8	5.75	A
Blanking level	4.4	4.40	A
DC Grid No.2 Current			
Synchronizing level	120	190	mA
Blanking level	20	100	mA
DC Grid No.1 Current			
Synchronizing level	700	140	mA
Blanking level	250	10	mA
Input Circuit Efficiency (Approx.)	85	85	%
Driver Power Output			
Synchronizing level	1240	1300	W
Blanking level	700	790	W
Output Circuit Efficiency (Approx.)	95	95	%
Useful Power Output			
Synchronizing level	27,500	27,500	W
Blanking level	15,500	15,500	W

Linear RF Power Amplifier[g,h]
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 400 MHz		
DC Plate Voltage[j]	10,000	max.	V
DC Grid-No.2 Voltage[k]	2,000	max.	V
DC Plate Current at Peak of Envelope	6.0	max.	A
DC Grid-No.1 Current	500	max.	mA
Grid-No.2 Input	450	max.	W
Plate Dissipation	See Notes f & p		

MAXIMUM CIRCUIT VALUES

Grid-No.1-Circuit Resistance Under Any Conditions:

With fixed bias	5.000	max.	Ω
With fixed bias (in Class AB_1 operation)	25,000	max.	Ω
With cathode bias	Not recommended		
Grid-No.2 Circuit Impedance	See Note k		
Plate Circuit Impedance	See Note j		

CALCULATED CLASS AB_1 OPERATION WITH "TWO-TONE" MODULATION

In a grid-drive circuit at 7 MHz

DC Plate Voltage	8,000	V
DC Grid-No.2 Voltage	1,500	V
DC Grid-No.1 Voltage	−190	V
Zero-Signal DC Plate Current	1.0	A
Effective RF Load Resistance	978.5	Ω
DC Plate Current (At peak of envelope)	3.90	A
Average DC Plate Current	2.50	A
DC Grid-No.2 Current (At peak of envelope)	140	mA
Average DC Grid-No.2 Current	55	mA
Peak Envelope Drive Power	See Note r	
Output Circuit Efficiency (Approx.)	95	%
Useful Power Output (Approx.)		
Average	8,750	W
Peak envelope	17,500	W

Linear RF Power Amplifier[g,h]
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[j]	10,000	max.	V
DC Grid-No.2 Voltage[k]	2,000	max.	V
DC Plate Current	3.0	max.	A
Grid-No.2 Input	300	max.	W
Plate Dissipation	See Notes f &p		

CALCULATED CCS OPERATION

In a cathode drive circuit at 400 MHz

DC Plate Voltage	8,000	V
DC Grid-No.2 Voltage	1,500	V
DC Grid-No.1 Voltage[s]	−235	V
DC Plate Current	2.50	A
DC Grid-No.1 Current	0	mA
DC Grid-No.2 Current	25	mA
Driver Power Output	500	W
Output Circuit Efficiency (Approx.)	80	%
Useful Power Output	5,000	W

a Measured at the tube terminals. The filament may be subjected to rf heating as the frequency of operation is increased. It is recommended that the filament power be regulated at the lowest value that will give stable performance. For those applications where hum is a critical consideration, dc filament operation or hum bucking circuits are recommended.

b For plate voltage = 2000 V, grid No.2 voltage = 1250 V, and plate current = 15 A.

c With external flat metal shield 8" (200 mm) in diameter having a center hole 3" (76 mm) 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.

d With external flat metal shield 8" (200 mm) in diameter having a center hole 2-3/8" (60 mm) 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.

e See Dimensional Outline for Temperature Measurement Points.

f The value of 275° C is the average of three readings taken 120° apart around the periphery of the anode core. No one reading may exceed 300° C.

h The maximum voltage and air flow rates must be modified to obtain adequate holdoff voltage and cooling at temperatures in excess of 35° C and altitudes above 7000 feet.

n The bandwidth of 6.3 MHz is calculated at the −0.72 dB power points of a double tuned output circuit using two times the tube output capacity and a damping factor of $\sqrt{1.5}$ as shown in BANDWITH CALCULATION below.

p Permitted plate dissipation is a function of cooling. For specific ratings see Forced Air Cooling information.

r Driver power output represents circuit losses and is the actual power measured at the input to the grid No.1 circuit. The actual power required depends on the operating frequency and the circuits used. The tube driving power is approximately zero watts.

s Obtained from a fixed supply with an internal impedance of 695 ohms to provide necessary increase in bias at crest of modulating signal.

The following footnotes apply to the RCA Transmitting Tube operating considerations given at the front of this section.

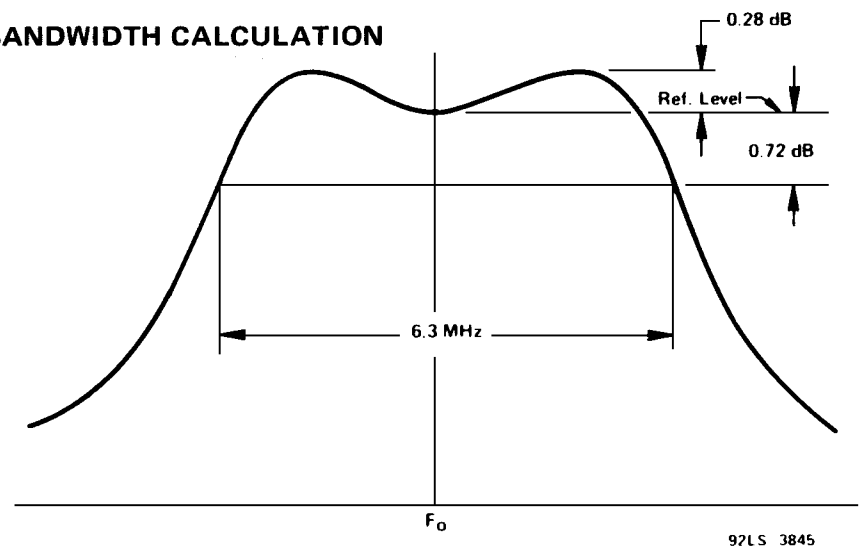
g See Classes of Service.

j See Plate Voltage Supply.

k See Grid-No. 2 Voltage Supply.

m See Grid-No. 1 Voltage Supply.

BANDWIDTH CALCULATION



FORCED-AIR COOLING

Air Flow:

Through radiator-adequate air flow to limit the plate-core temperature to 275° 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.

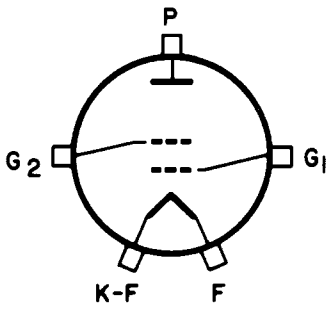
For typical operation, the required air flow, related to sea level and at a temperature of 35° C, is as follows:

Plate Dissipation	Air Flow	Pressure Drop
Kilowatts	**CFM**	**Inches H_2O**
18.0	520	3.75
20.0	600	4.50
22.0	800	6.30

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 its temperature does not exceed the specified maximum value of 250° C.

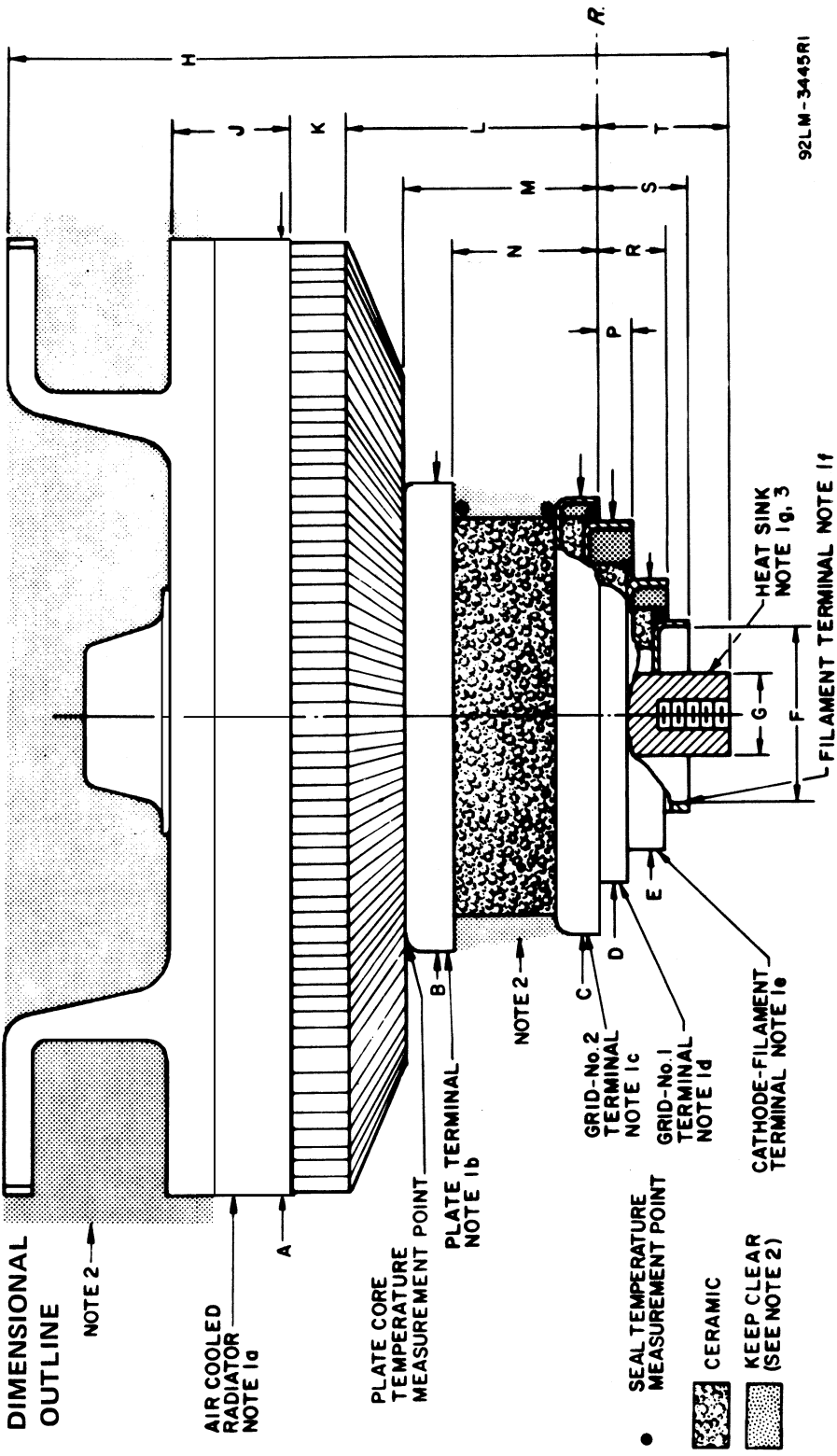
During Standby Operation – Cooling air is required when only filament voltage is applied to the tube.

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



92LS-3454

P – Plate Terminal
G_2 – Grid-No.2 Terminal
G_1 – Grid-No.1 Terminal
K-F – Cathode-Filament Terminal
F – Filament Terminal


DIMENSIONAL OUTLINE
NOTE 2
AIR COOLED RADIATOR NOTE 1a
A
PLATE CORE TEMPERATURE MEASUREMENT POINT
PLATE TERMINAL NOTE 1b
B
NOTE 2
C
GRID-No.2 TERMINAL NOTE 1c
D
GRID-No.1 TERMINAL NOTE 1d
E
SEAL TEMPERATURE MEASUREMENT POINT
CERAMIC
KEEP CLEAR (SEE NOTE 2)
CATHODE-FILAMENT TERMINAL NOTE 1e
HEAT SINK NOTE 1g, 3
FILAMENT TERMINAL NOTE 1f
F
G
H
J
K
L
M
N
P
R
S
T
R
92LM-3445R1

TABULATED DIMENSIONS*

Dimensions	Value	Value
A Dia.	8.250 ± .035	(209.5 ± .9)
B Dia.	4.188 ± .020	(106.58 ± .51)
C Dia.	3.915 ± .015	(99.44 ± .38)
D Dia.	3.315 ± .015	(84.20 ± .38)
E Dia.	2.696 ± .015	(68.48 ± .38)
F Dia.	1.960 ± .015	(49.78 ± .38)
G Dia.	0.810 max.	(20.57 max.)
H	7.10 max.	(180.3 max.)
J	1.750 ± .030	(44.5 ± .8)
K	0.500 ref.	(12.7 ref.)
L	2.150 ± .050	(54.6 ± 1.3)
M	1.775 min.	(45.1 min.)
N	1.420 ± .030	(36.1 ± .8)
P	0.330 ± .030	(8.4 ± .8)
R	0.650 ± .038	(16.5 ± 1.0)
S	0.960 ± .050	(24.4 ± 1.3)
T	1.200 ref.	(30.5 ref.)

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

		Contact Distance
1a.	Radiator	0.800 (20.32)
1b.	Plate Terminal	0.265 (6.73)
1c.	Grid No.2 Terminal	0.265 (6.73)
1d.	Grid No.1 Terminal	0.265 (6.73)
1e.	Cathode-Filament Terminal	0.250 (6.35)
1f.	Filament Terminal	0.265 (6.73)
1g.	Heat Sink (post)	0.450 (11.43)

Note 2 — Keep all stippled regions clear. In general do not allow contacts to protrude into these annular regions. If special connectors are required which may intrude on these regions, contact RCA Power Tube Application Engineering, Lancaster, PA 17604.

Note 3 — Tapped 1/4-20 NC x 0.5 in (12.7 mm) deep.

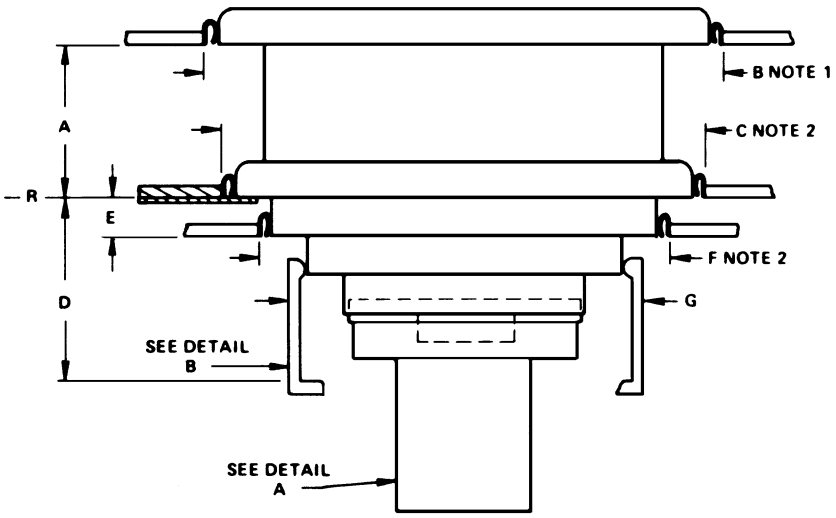
*Dimensions are in inches unless otherwise stated. Dimensions in parentheses are in millimeters and are derived from the basic inch dimension (1 inch = 25.4 mm).

MOUNTING

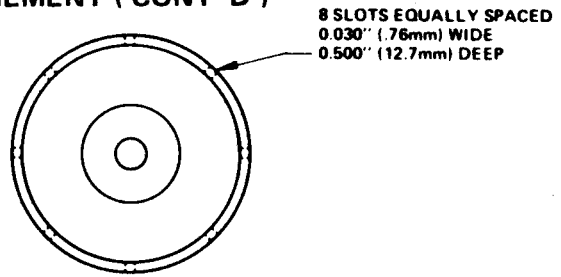
The preferred mounting arrangement is depicted below. Other arrangements, such as cavity-type mounting, for multiple-ring terminal tubes may be constructed using either fixed or adjustable contact rings in the transverse plane.

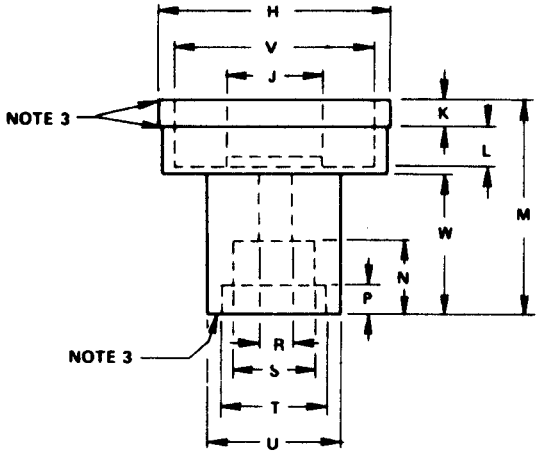
Ready-made sockets may be obtained, in limited quantities, from RCA as the J15293, or in production quantities as the CD 89-094, from Jettron Products Inc., 56 Route 10, Hanover, NJ 07936.

PREFERRED MOUNTING ARRANGMENT

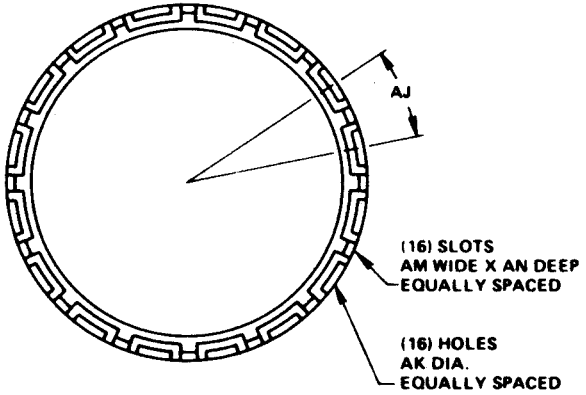


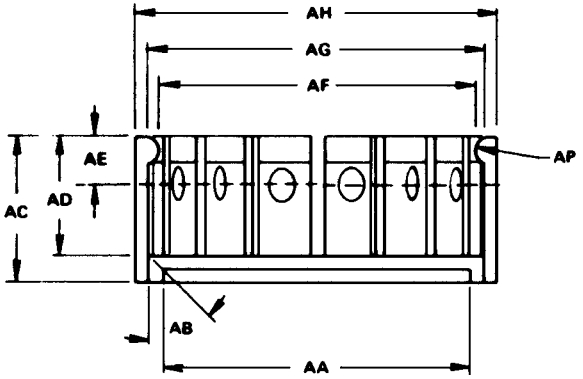
PREFERRED MOUNTING ARRANGEMENT (CONT' D)





DETAIL A





DETAIL B

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MOUNTING ARRANGEMENT
TABULATED DIMENSIONS

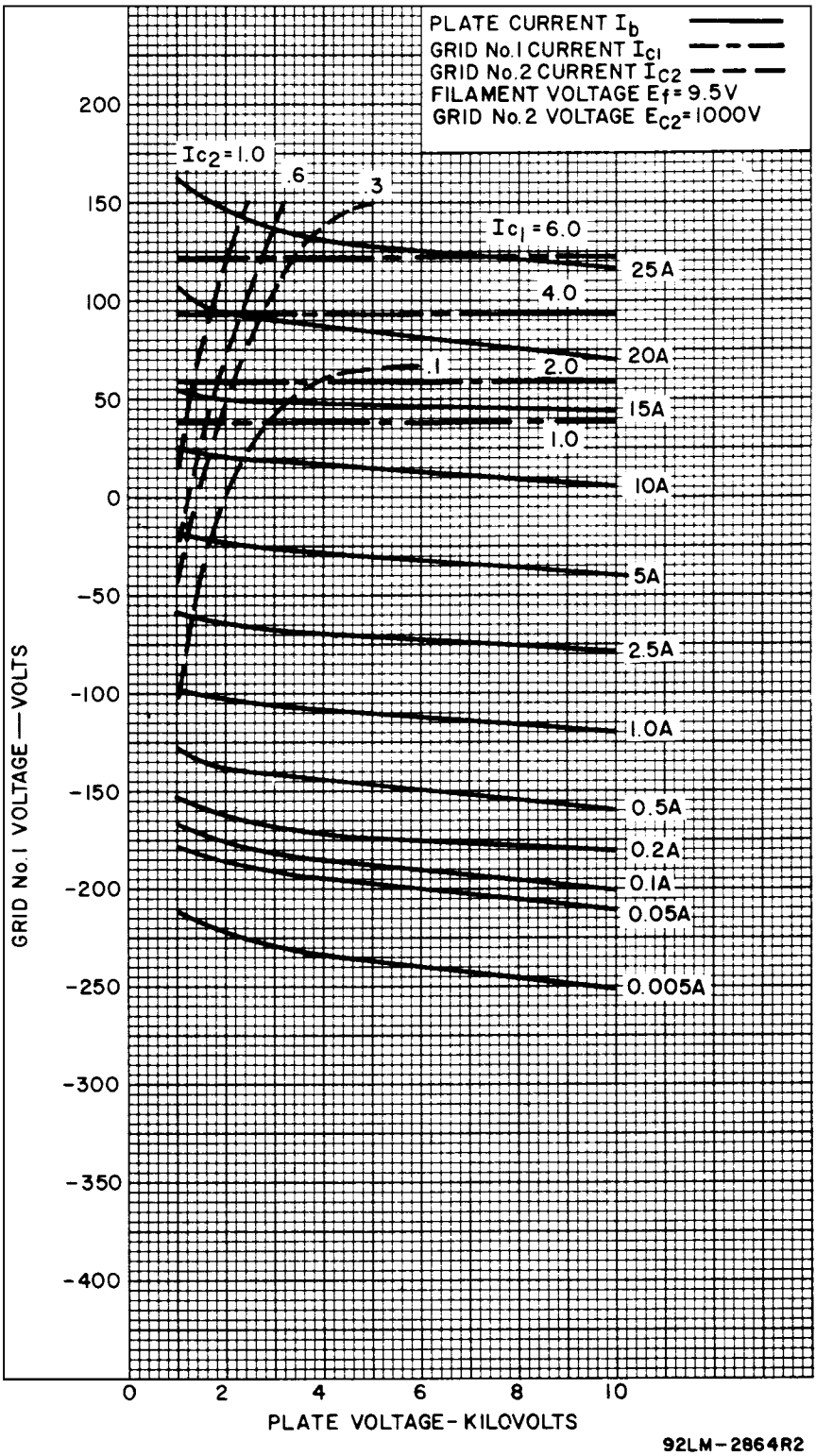
Dimension	Inches	Millimeters
A	1.320	(33.53)
B Dia.	4.440	(112.78)
C Dia.	4.095	(104.02)
D	1.713	(43.51)
E	0.330	(8.38)
F Dia.	3.495	(88.77)
G Dia.	3.000	(76.20)
H Dia.	$1.975\ ^{+0.002}_{-0.000}$	$(\ 50.17\ ^{+0.05}_{-0.00})$
J Dia.	0.810	(20.57)
K	0.250	(6.35)
L	0.312	(7.92)
M	1.812	(49.98)
N	0.625	(15.88)
P	0.250	(6.35)
R Dia.	0.261	(6.63)
S Dia.	0.700	(17.78)
T Dia.	0.918	(23.32)
U Dia.	1.135	(28.83)
V Dia.	1.737	(44.11)
W	1.125	(28.58)
AA Dia.	2.625	(66.68)
AB	45°	
AC	1.25	(31.75)
AD	1.00	(25.40)
AE	0.40	(10.16)
AF Dia.	$2.681 \pm .002$	$(\ 68.10 \pm .05)$
AG Dia.	2.840	(72.14)
AH Dia.	3.00	(76.20)
AJ	22-1/2°	
AK Dia.	0.281	(7.14)
AM	0.125	(3.18)
AN	1.000	(25.40)
AP Radius	0.125	(3.18)

Note 1 – Finger stock is 97-139 made by Instrument Specialties Co., Little Falls, NJ.

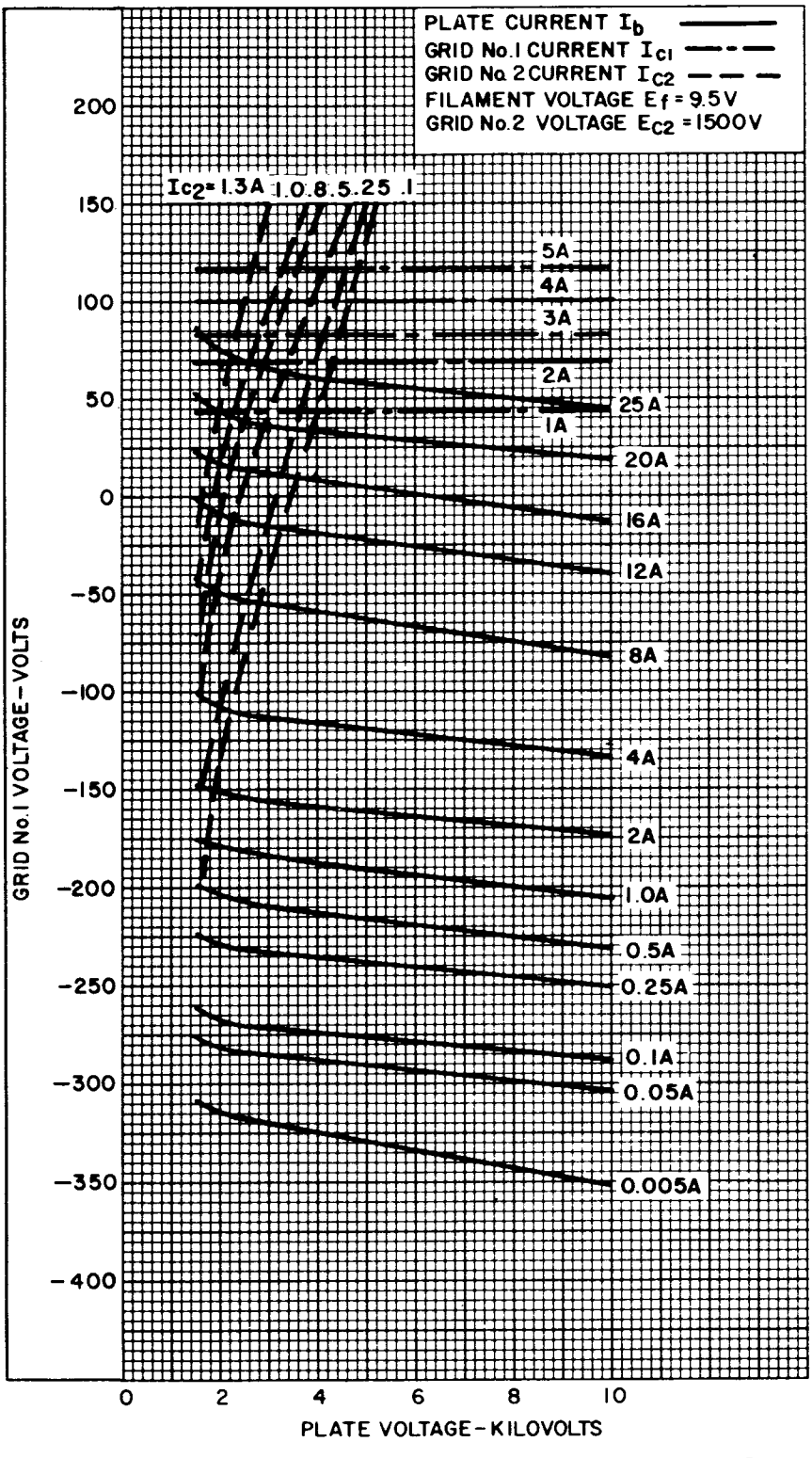
Note 2 – Finger stock is 97-360 made by Instrument Specialties Co., Little Falls, NJ.

Note 3 – Round all corners.

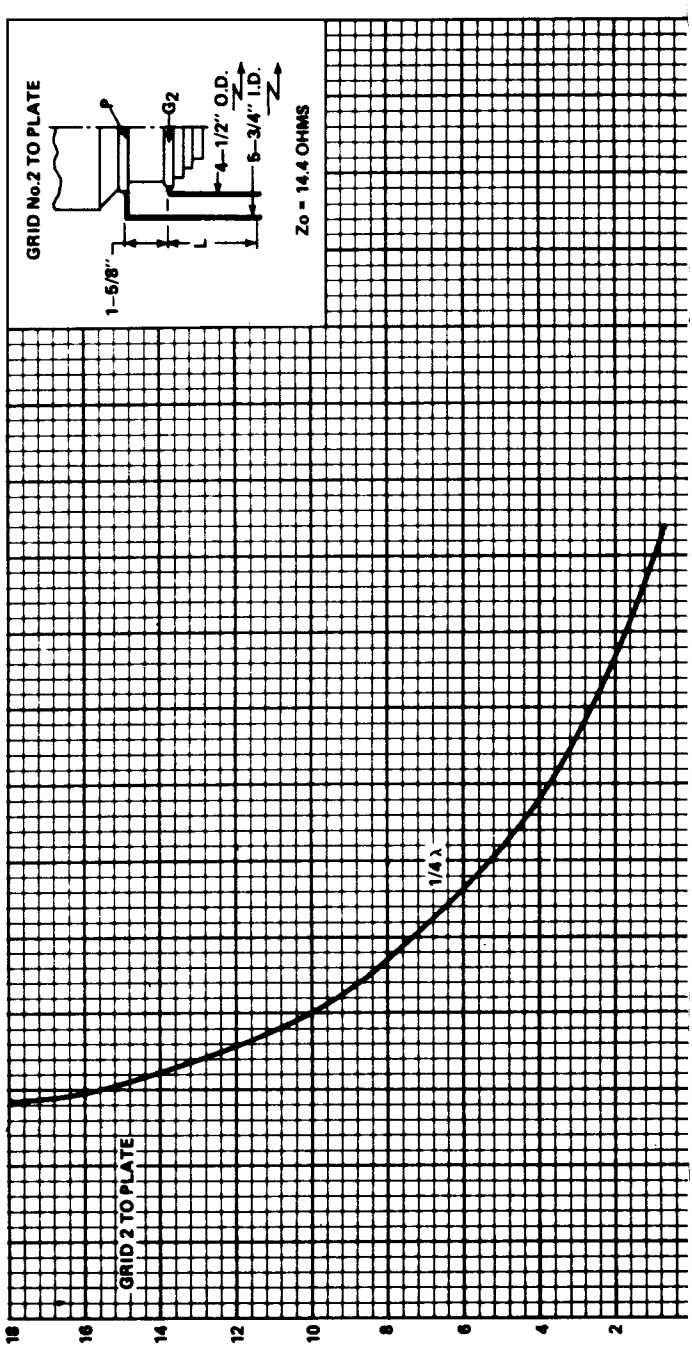
TYPICAL CONSTANT CURRENT CHARACTERISTICS



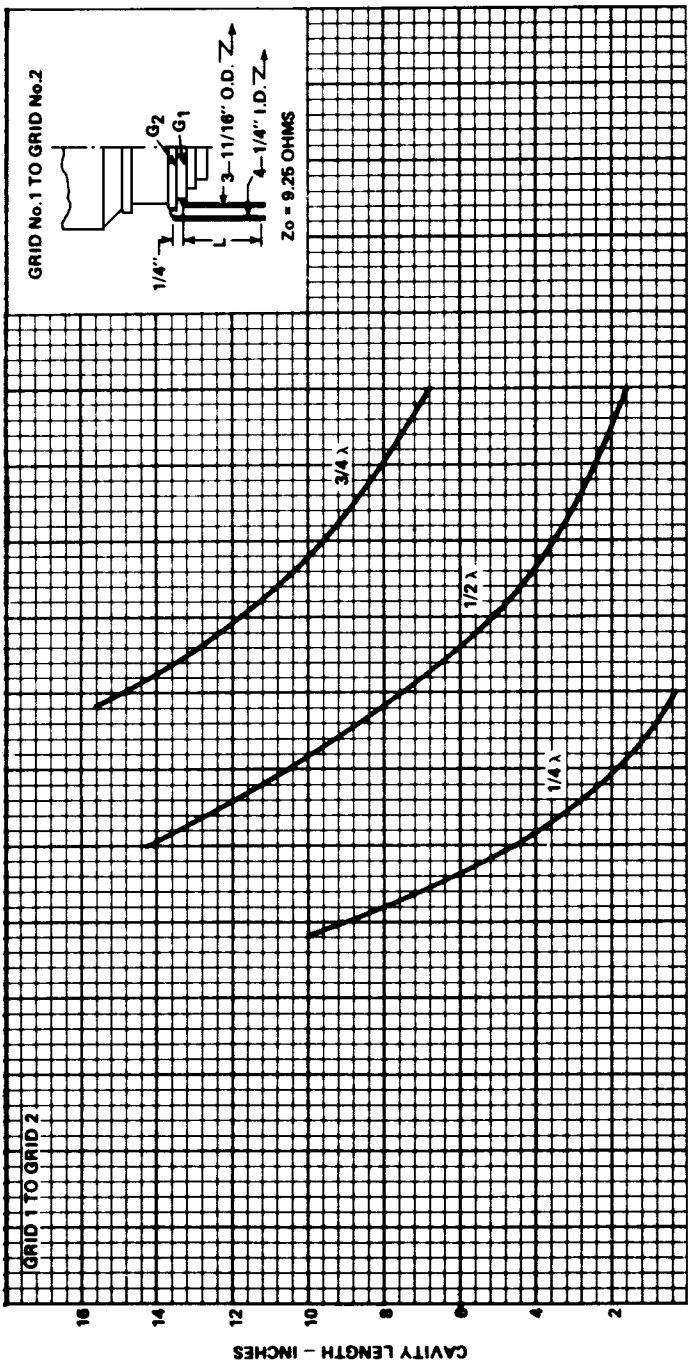
TYPICAL CONSTANT CURRENT CHARACTERISTICS



ELECTRODE CAVITY TUNING CHARACTERISTICS



ELECTRODE CAVITY TUNING CHARACTERISTICS



ELECTRODE CAVITY TUNING CHARACTERISTICS