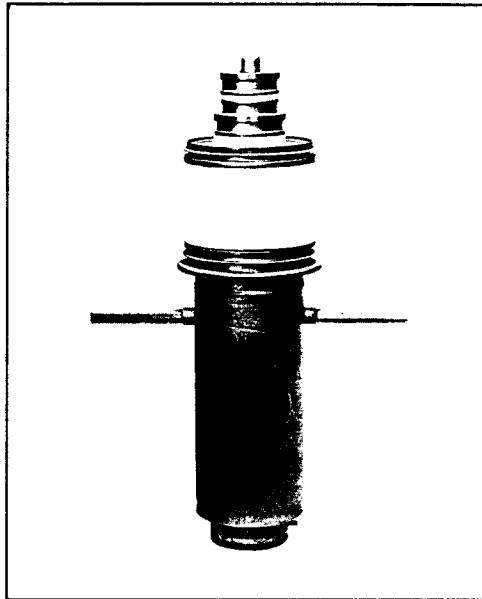


The Machlett Laboratories, Inc.
 1063 Hope Street • Stamford, Conn. 06907
 Tel. 203-348-7511 • TWX 710-474-1744

ISSUED 2-71



ML-8795
 ML-8796



General Purpose Triodes
 240 kW CW

DESCRIPTION

The ML-8795 and ML-8796 are high-power, general-purpose triodes. The ML-8795 is water cooled and the ML-8796 is vapor cooled. Electrical characteristics of the tubes are the same. The cathodes of these tubes consist of sturdy thoriated-tungsten filaments. The coaxial terminals have low inductance and high heat dissipation capability. Low-loss alumina ceramics are used for all envelope insulation members.

When operated as class C amplifiers or oscillators, these tubes will produce a continuous output of up to 240 kW. The anodes are capable of dissipating up to 140 kW. The tubes can be operated in air at maximum plate voltage ratings. Maximum ratings apply at frequencies up to 30 MHz; useful power output can be obtained at higher frequencies with a reduction in plate voltage.

GENERAL CHARACTERISTICS

Electrical

Filament Voltage (AC)	16.5	V
Filament Current	325	A
Filament Starting Current, maximum	800	A
Filament Cold Resistance0052	ohm
Amplification Factor	40	
Interelectrode Capacitances, approximate		
Grid-Plate	58	pf
Grid-Filament	149	pf
Plate-Filament	1.8	pf

Mechanical

Mounting Position	Vertical, Anode Down
Type of Cooling, ML-8795	Water & Forced-Air†
Maximum water inlet pressure	80 psi
Maximum outgoing water temperature	70 °C
Water flow on anode for 140 kW dissipation	40 gpm
Water jacket pressure drop for 40 gpm flow	25 psi
Type of Cooling, ML-8796	Vaporization of Water & Forced-Air†
Maximum Envelope Temperature	200 °C
Net Weight	
ML-8795	75 lb
ML-8796	85 lb

†Additional forced-air cooling of the grid and filament terminals will require an air flow of about 200 cfm uniformly distributed on the ceramic bulb and terminal assembly.

WARNING: This electron tube when operating at peak voltages in excess of 15 kv may give off x rays, which can be harmful unless adequately shielded by the enclosure within which the tube is used. Instructions for protective installation are given in National Bureau of Standards Handbook 93, "Safety Standards for Non-Medical X-Ray and Sealed Gamma-Ray sources."

ACCESSORIES

Item	Part No.
Small Filament Connector	F-27218
Large Filament Connector	F-27219
Grid Connector	F-27220
Mounting Socket, ML-8795	F-12527

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

(Continuous Commercial Service)

VALUES APPLY TO BOTH TYPES

RF Power Amplifier and Oscillator Class C Telegraphy

Key-down conditions per tube without amplitude modulation.

Maximum Ratings, Absolute Values

DC Plate Voltage	20	kV
DC Grid Voltage	-3200	V
DC Plate Current	20	A
Grid Dissipation	2500	W
Plate Dissipation	140	kW

Typical Operation

DC Plate Voltage	17	kV
DC Grid Voltage	-1200	V
Peak RF Plate Voltage	14	kv
Peak RF Grid Voltage	1900	v
DC Plate Current	19	A
DC Grid Current, approximate	3.5	A
RF Load Resistance	410	ohms
Driving Power, approximate	6500	W
Plate Dissipation	83	kW
Grid Dissipation	2100	W
Power Output	240	kW
Power Gain	37	

TUBE PROTECTION

The handling of very high power requires particular attention to the removal of power from tubes during fault conditions (initiated by tube or circuit instabilities) since the larger amount of energy involved can cause tube damage if not properly controlled. The tube must, therefore, be protected by limiting the time elapsed from inception of a fault condition to diverting the energy from the tube, as well as the amount of energy expended in the tube during this interval.

In addition to the normal circuit breakers and overload relays, it is necessary that a fast-acting electronic protective device (crowbar) or equivalent be used. This device will in most cases be a triggered gaseous device connected across the output of the plate supply filter, if used, to dissipate the filter-circuit energy as well as the rectifier output. The complete energy source must be shorted out as quickly as possible after the inception of a "fault", and in most cases the time interval should not be allowed to exceed approximately ten microseconds. For some basic electronic-crowbar fault-protection circuit considerations, as well as tests of the effectiveness of a protection device, refer to the references listed.

A nominal value of resistance must be placed in the plate lead of the tube being protected in order to be assured that the impedance of this tube under a flash arc condition is greater than that of the crowbar device when the latter is triggered. Critical damping is required for the crowbar discharge circuit. It is also recommended that a minimum of five to ten ohms resistance be connected in series with each rectifier tube in order to limit surge currents.

In circuits where high transient voltages may be developed due to a shorted load or other fault, special precautions are necessary to keep these excessive voltages from appearing at the tube electrodes.

References:

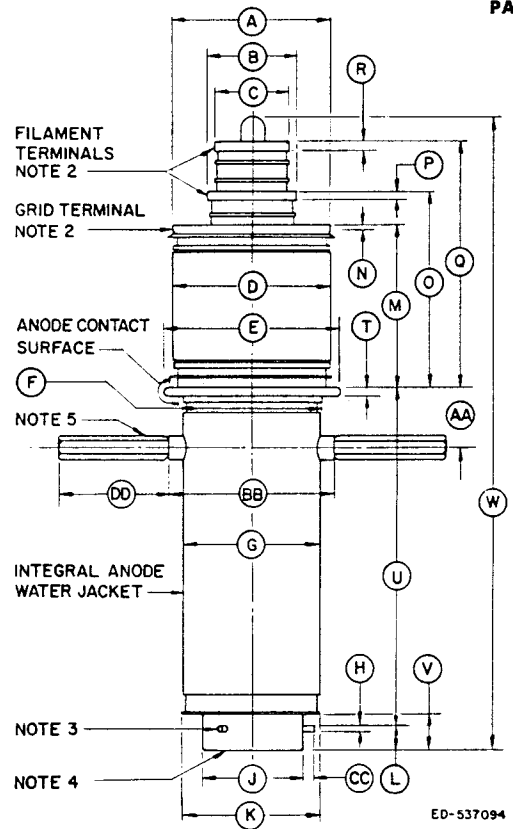
1. W. N. Parker and M. V. Hoover, "Gas Tubes Protect High Power Transmitters", *Electronics*, 29, 144, January 1956.
2. H. D. Doolittle, "High Power Hydrogen Thyratrons", *Cathode Press*, 1, 6, 1954.

DIMENSIONS FOR OUTLINE OF ML-8795

Ref	Inches			Notes
	Minimum	Nominal	Maximum	
A	6.917	6.937	6.957	1,2
B	3.985	4.005	4.025	1,2
C	3.298	3.318	3.338	1,2
D		7.19	7.30	
E	8.00	8.00	8.03	
F		6.19	6.21	
G		6.12	6.15	
H	.305	.315	.320	3
J	4.486	4.496	4.501	
K	6.02	6.06	6.10	
L	1.02	1.06	1.10	3
M		7.27		
N	.10	.18		
O		8.76		
P	.31	.38		
Q		10.94		
R	.31	.38		
T	.36	.38	.40	
U		15.12		
V	1.64	1.68		
W		28.30		
AA		2.68		
BB		7.38	7.44	
CC	.47	.50	.53	3
DD		5.00	5.06	

NOTES:

1. Add $\pm .010''$ to limits for out of roundness.
2. Electrical connections to be made only on periphery of these terminals.
3. Three bayonet pins 120 degrees apart to fit Machlett mounting socket, part no. F-12527.
4. Water inlet and outlet orifices in anode water jacket base to fit part no. F-12527 mounting socket.
5. Two handles (DD) inches long screw into bosses on water jacket for lifting tube.



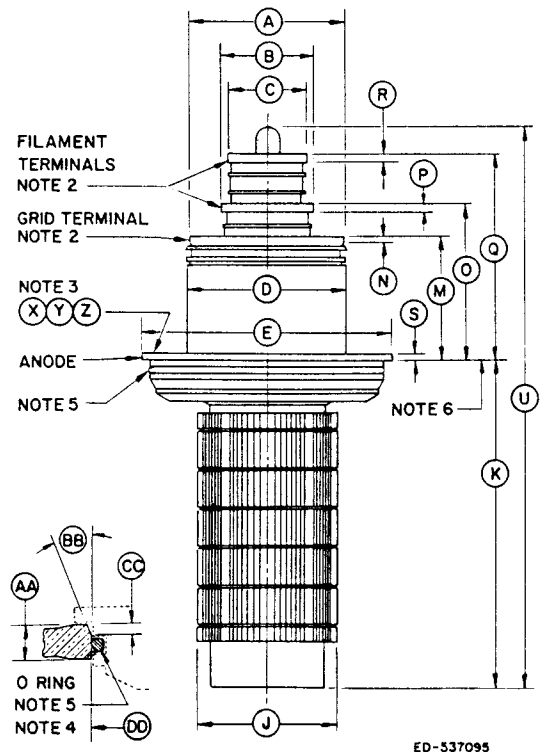
OUTLINE OF ML-8795

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A	6.917	6.937	6.957	1,2
B	3.985	4.005	4.025	1,2
C	3.298	3.318	3.338	1,2
D		7.19	7.40	
E	11.240	11.250	11.260	
J		6.63	6.69	
K		14.50		
M		6.02		
N	.10	.18		
O		7.51		
P	.31	.38		
Q		9.69		
R	.31	.38		
S	.34	.38		
U		25.38		
X	.44	.50		3
Y	9.610	9.625	9.640	3
Z	3.66	3.68	3.70	3
AA		.75		
BB		20°		degrees
CC		.19		
DD	10.498	10.503	10.508	4

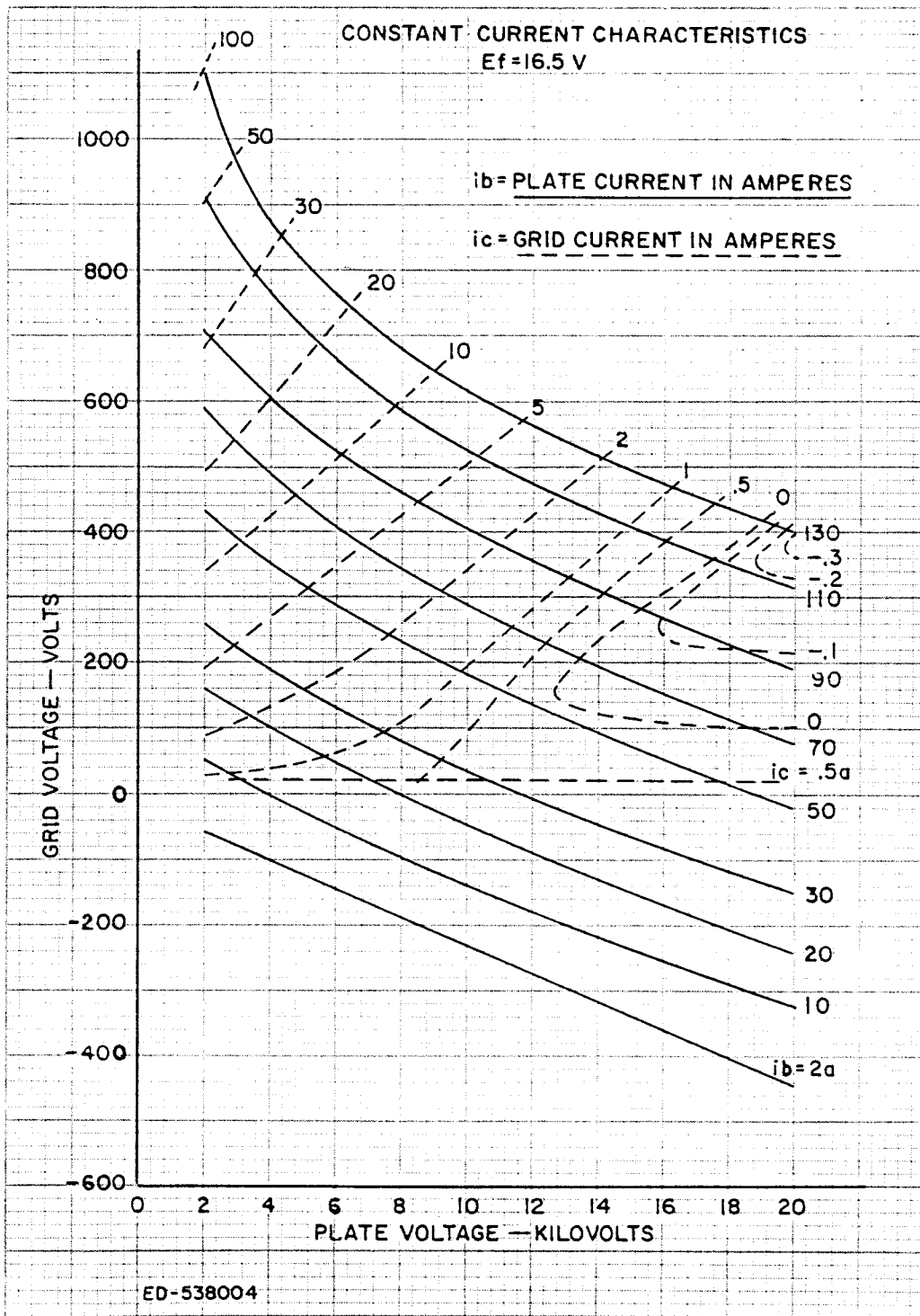
NOTES:

1. Add $\pm .010''$ to limits for out of roundness.
2. Electrical connections to be made only on periphery of these terminals.
3. Eight $\frac{1}{4}''$ -20 tapped holes, (X) deep, on circle diameter (Y), spaced at chordal distances (Z). For lifting tube.
4. Recommended diameter of opening for tube in cooling jacket.
5. O-ring gasket, Machlett part P-25946, supplied with tube.
6. Tube to be supported in equipment only by this surface.



DETAIL OF RECOMMENDED
OPENING IN COOLING JACKET

OUTLINE OF ML-8796



THE MACHLETT LABORATORIES, INC.

A SUBSIDIARY OF RAYTHEON COMPANY