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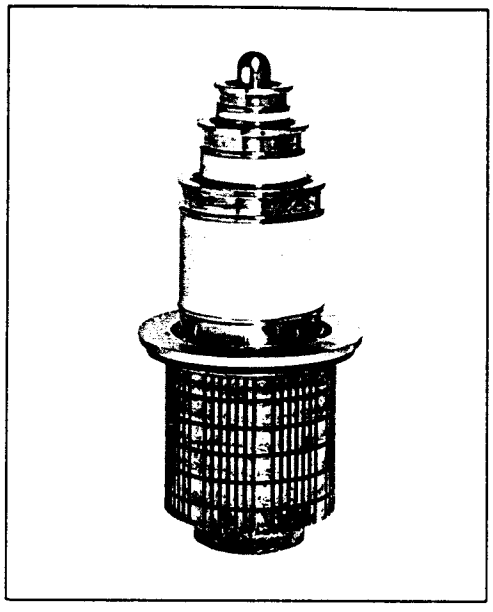


ISSUED 4-68

ML-7479A

MACHLETT

General Purpose Triode
55 kW CW

DESCRIPTION

The ML-7479A is a general-purpose vapor-cooled triode conservatively designed for 40-50 kW industrial heating and AM broadcast service.

The anode is designed to dissipate 50 kilowatts, and substantially higher power during momentary overloads or intermittent operation. Efficient cooling is accomplished by vaporization of water in a jacket and transport of the vapor to a secondary cooling circuit at a temperature of about 100°C. Sturdy coaxial grid and cathode mounting structures provide low-inductance, high-dissipation rf terminals. The cathode consists of sturdy, self-supporting, stress-free, thoriated-tungsten filaments. Envelope insulation members are strong, low-loss, ceramic cylinders.

Maximum ratings of 12.5 kVdc plate voltage and 90 kW plate input apply at frequencies up to 40 MHz. Useful power output can be obtained at frequencies up to 80 MHz at reduced plate voltage and plate input.

GENERAL CHARACTERISTICS

Electrical

Filament Voltage	8.0	Volts
Filament Current	200	Amps
Filament Starting Current, maximum	800	Amps
Filament Cold Resistance	0.0051	Ohm
Amplification Factor	20	
Interelectrode Capacitances		
Grid-Plate	38	pf
Grid-Filament	58	pf
Plate-Filament, maximum	2.5	pf

Mechanical

Mounting Position	Vertical, Anode Down	
Type of Cooling, Anode	Vaporization of water	
Air Flow on Bulb and Seals, approximate	100	cfm*
Maximum Envelope Temperature	200	°C
Net Weight, approximate	44	lb.

* At frequencies up to 15 MHz, air flow should be directed primarily on filament seals and the main ceramic bulb; at higher frequencies or high ambient temperatures, additional air flow may be required on the grid seals. Air flow should be distributed to maintain uniform temperature, not greater than 200 °C, around the circumference of the seals.

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."

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

(Continuous Commercial Service)

Audio-Frequency Power Amplifier and Modulator Class B

Maximum Ratings, Absolute Values

D-C Plate Voltage	12500	volts
Max.-Signal D-C Plate Current*	8.0	amps
Max.-Signal Plate Input*	90	kW
Plate Dissipation*	50	kW

Typical Operation (Values are for two tubes)

D-C Plate Voltage	8500	10000	12000	volts
D-C Grid Voltage	−400	−500	−550	volts
Peak A-F Grid-to-Grid Voltage	1600	1940	2120	volts
Peak A-F Plate-to-Plate Voltage	14000	16000	19000	volts
Zero-Signal D-C Plate Current	1.3	1.2	2.4	amps
Max.-Signal D-C Plate Current	7.8	10.0	12.4	amps
Effective Load Resistance, Plate-to-Plate	2300	2000	1950	ohms
Max.-Signal Driving Power, approximate	200	200	170	watts
Max.-Signal Power Output, approximate	42	63	93	kW

*Averaged over any audio-frequency cycle of sine-wave form.

Radio-Frequency Power Amplifier Class B

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

Maximum Ratings, Absolute Values

D-C Plate Voltage	12500	volts
D-C Plate Current	8.0	amps
Plate Input	75	kW
Plate Dissipation	50	kW

Typical Operation

D-C Plate Voltage	12000	10000	12000	volts
D-C Grid Voltage	−550	−450	−550	volts
Peak R-F Grid Voltage	550	580	600	volts
Peak R-F Plate Voltage	5400	4200	5300	volts
D-C Plate Current	2.6	3.6	3.2	amps
D-C Grid Current	0	0	0	mA
R-F Load Resistance	1330	730	1040	ohms
Driving Power, approximate**	350	550	480	watts
Power Output, approximate	11	12	13.5	kW

**At crest of audio-frequency cycle with modulation factor of 1.0.

Plate-Modulated R-F Power Amplifier Class C Telephony

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

Maximum Ratings, Absolute Values

D-C Plate Voltage	9000	volts
D-C Grid Voltage	−2000	volts
D-C Plate Current	6.0	amps
D-C Grid Current	1.0	amp
Plate Input	60	kW
Plate Dissipation	32	kW

Typical Operation

D-C Plate Voltage	8500	volts
D-C Grid Voltage	−1400	volts
Peak R-F Grid Voltage	2140	volts
Peak R-F Plate Voltage	7000	volts
D-C Plate Current	4.8	amps
D-C Grid Current	0.50	amp
R-F Load Resistance	800	ohms
Driving Power, approximate	1.1	kW
Power Output, approximate	30.7	kW

R-F Power Amplifier and Oscillator Class C Telegraphy

Key-down conditions per tube without amplitude modulation‡

Maximum Ratings, Absolute Values

D-C Plate Voltage	12500	volts
D-C Grid Voltage	−2000	volts
D-C Plate Current	8.0	amps
D-C Grid Current	1.0	amp
Plate Input	90	kW
Plate Dissipation	50	kW
Grid Dissipation	750	watts

Typical Operation	Cathode-Drive Circuitry	Grid-Drive Circuitry			
D-C Plate Voltage	7500	10000	12000	12000	volts
D-C Grid Voltage	−850	−1100	−1200	−1200	volts
Peak R-F Grid Voltage	1500	1880	1880	1940	volts
Peak R-F Plate Voltage	5600	8000	10000	9800	volts
D-C Plate Current	5.3	6.5	5.4	6.4	amps
D-C Grid Current	0.35	0.48	0.30	0.35	amp
R-F Load Resistance	750	700	550	870	ohms
Driving Power, approx.	7500	900	550	670	watts
Power Output, approx.	33§	46.4	48.5	55.4	kW

‡Modulation essentially negative may be used if the positive peak of the envelope does not exceed 115% of the carrier conditions.

§Includes power transferred from driver stage.

CHARACTERISTIC RANGE VALUES FOR EQUIPMENT DESIGN

Characteristics	Conditions		Limits Minimum	Limits Bogey	Maximum	
Grid Voltage	e_b = 1500 volts; i_b = 28 amps	e_c:	——	——	1000	volts
Grid Current	e_b = 1500 volts; i_b = 28 amps	i_c:	——	——	8.5	amps
Plate Voltage	E_c = 0 Vdc; I_b = 3.0 Adc	E_b:	3.3	3.8	4.3	kVdc
Plate Voltage	E_c = −200 Vdc; I_b = 3.0 Adc	E_b:	7.2	7.8	8.4	kVdc
Grid Voltage	E_b = 12.0 kVdc; I_b = 0.02 Adc	E_c:	−570	−670	−800	Vdc
Plate Power Output	E_b = 12.0 kVdc; E_c = −1200 Vdc; I_b = 5.4 Adc; I_c = 0.30 Adc	P_o:	40	——	——	kW

MAXIMUM FREQUENCY RATINGS

Maximum ratings apply at frequencies up to 40 MHz except as noted. The tube may be operated at higher frequencies provided the maximum values of plate voltage and plate input are reduced according to the tabulation below (other maximum ratings are the same as shown above). Special attention should be given to adequate ventilation of the bulb at the higher frequencies.

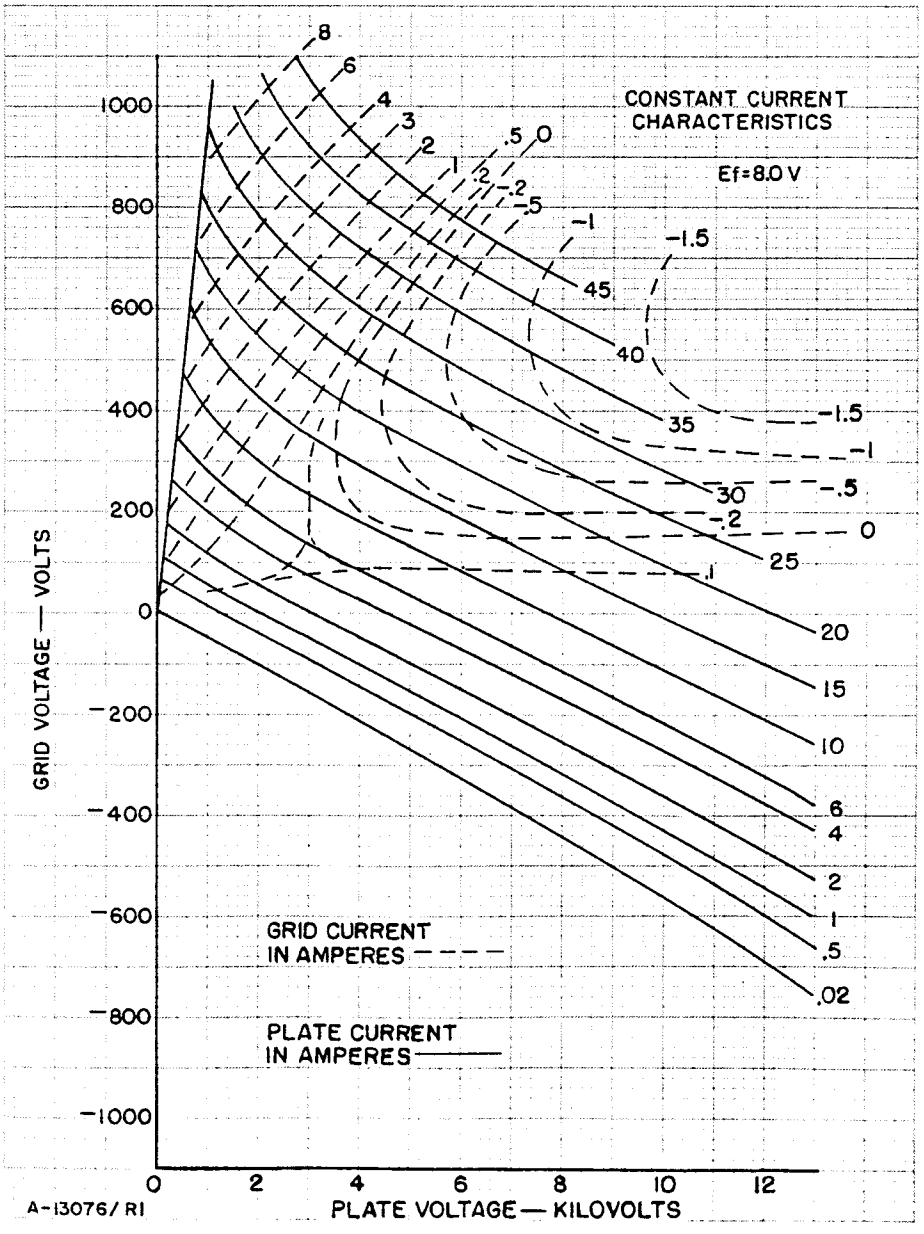
Frequency	40	60	80MHz
Percent Maximum Rated Plate Voltage and Plate Input	100	75	50%

APPLICATION NOTES

The handling of high power requires particular attention to the removal of power under fault conditions, since the large amount of energy involved can severely damage the electron tube if not properly controlled. Therefore the ground leads of the plate and grid circuits should be equipped with individual quick-acting overload relays which will remove power from these circuits within 1/10 second.

Additional protection is recommended and may be obtained by connecting a resistor in series with the plate lead of each tube for protection of the tube during the time required for the plate overload relay to act. The criterion is the total energy to which the tube can be subjected. The minimum value of resistance which will give adequate protection with reasonably low power loss is as follows:

Maximum Power Output of Rectifier	80	160	320	640 kW
Series Resistor	15	25	40	60 ohms

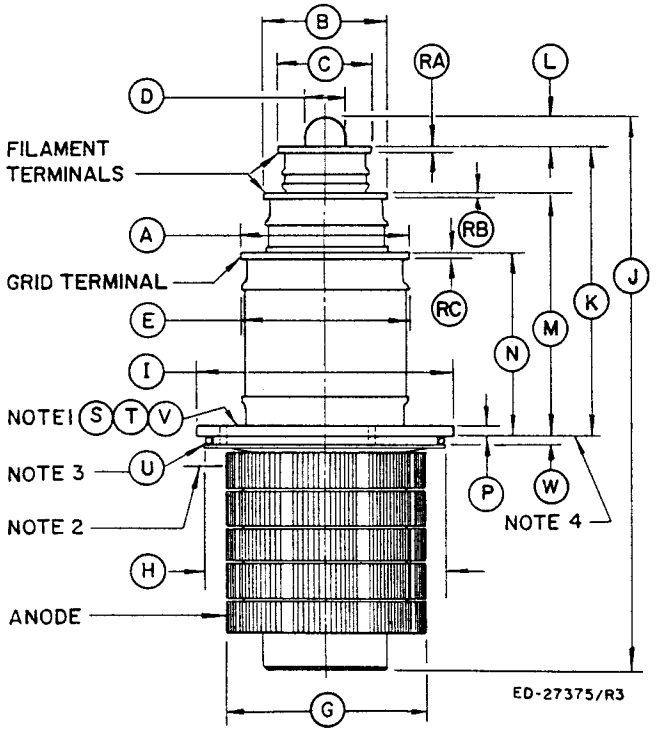


CONSTANT CURRENT CHARACTERISTICS — ML-7479A

ACCESSORIES

Item	Part. No.
Small Filament Connector	F-17488
Large Filament Connector	F-17489
Grid Connector	F-17397
O Ring	P-512126
Jacket for Vapor-Up System, 50 kW	F-27893
Jacket for Vapor-Down System, 50 kW	F-28901

NOTE: For additional information on accessories, refer to Accessory Data Sheet No. ST-2236.



DIMENSIONS FOR OUTLINE OF ML-7479A

Ref	Inches			Notes
	Minimum	Nominal	Maximum	
A	4.62	4.65	4.68	
B	3.47	3.50	3.53	
C	2.47	2.50	2.53	
D	—	1.12	1.19	
E	—	4.63	5.38	
G	—	5.38	5.42	
H	6.47	6.50	6.53	
I	7.00	7.00	7.12	
J	—	—	16.5	
K	7.93	8.12	8.50	
L	—	—	1.00	
M	6.71	6.87	7.22	
N	5.06	5.12	5.37	
P	.25	.31	—	
RA	.15	.19	—	
RB	.15	.19	—	
RC	.15	.19	—	
S	5.74	5.75	5.76	1
T	.38	.50	—	1
U	6.559	6.562	6.565	3
V	4.96	4.98	5.00	1
W	.249	.264	.279	

NOTES:

1. Three holes, ¼"-20 tap, (T) inches deep, on a circle of diameter (S), spaced at chordal distances (V).
2. Water level for vapor-up cooling system.
3. Hole of diameter (U) recommended for sealing tube in jacket. O-ring gasket, Machlett Part No. P-512126, supplied with tube.
4. Tube supported by this surface only.

RAYTHEON
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