

**MACHLETT**

**ML-7479**

DESCRIPTION & RATINGS

### DESCRIPTION

The ML-7479 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. It features greater mass than usual, with thick external ribs or protrusions. Efficient cooling is accomplished by vaporization of water in a boiler\* and transport of the vapor to a secondary cooling circuit at a temperature of about 100°C. Sturdy coaxial grid and cath-

ode mounting structures provide low-inductance, high-dissipation r-f terminals. The cathode itself is a sturdy, self-supporting, stress-free, thoriated-tungsten filament. 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 30 Mc. Useful power output can be obtained at frequencies up to 70 Mc 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	Ohms
Amplification Factor .....	20	
Interelectrode Capacitances:		
Grid-Plate .....	38	pf
Grid-Filament .....	58	pf
Plate-Filament .....	1.8	pf

#### Mechanical

Mounting Position .....	Vertical, Anode Down
Type of Cooling, Anode .....	Vaporization of water
Air Flow on Bulb and Seals, approximate .....	100 cfm
Maximum Ceramic Temperature .....	165 °C
Net Weight, approximate .....	38 lb.

\* For information on boiler and application details, consult the Machlett Laboratories Engineering Department.

\*\* At frequencies up to 15 Mc, 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 165°C, around the circumference of the seals.

**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* .....	7.0	amps
Max.-Signal Plate Input* .....	90	kW
Plate Dissipation* .....	50	kW

Typical Operation (Values are for two tubes)

D-C Grid Voltage .....	8500	10000	12000	volts
D-C Plate 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.

**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

**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 .....	6.0	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.

**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 .....	7500	12500	volts
D-C Grid Voltage .....	-2000	-2000	volts
D-C Plate Current .....	8.0	8.0	amps
D-C Grid Current .....	0.8	1.0	amp
Plate Input .....	54	90	kW
Plate Dissipation .....	50	50	kW
Frequency .....	70	30	Mc

Typical Operation

		<b>Cathode-Drive Circuitry</b>	<b>Grid-Drive Circuitry</b>	
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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		Maximum
		Minimum	Bogey	
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	$E_b = 10.0$ kVdc; $I_b = 0.02$ Adc	$E_c$ :	-480 -560	-640 Vdc
Plate Power Output	$E_b = 12.0$ Adc; $E_c = -1200$ 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 30 Mc 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 .....	30	50	70 Mc
Percent Maximum Rated Plate Voltage and Plate Input			
Class B .....	100	90	70
Class C .....	100	75	60

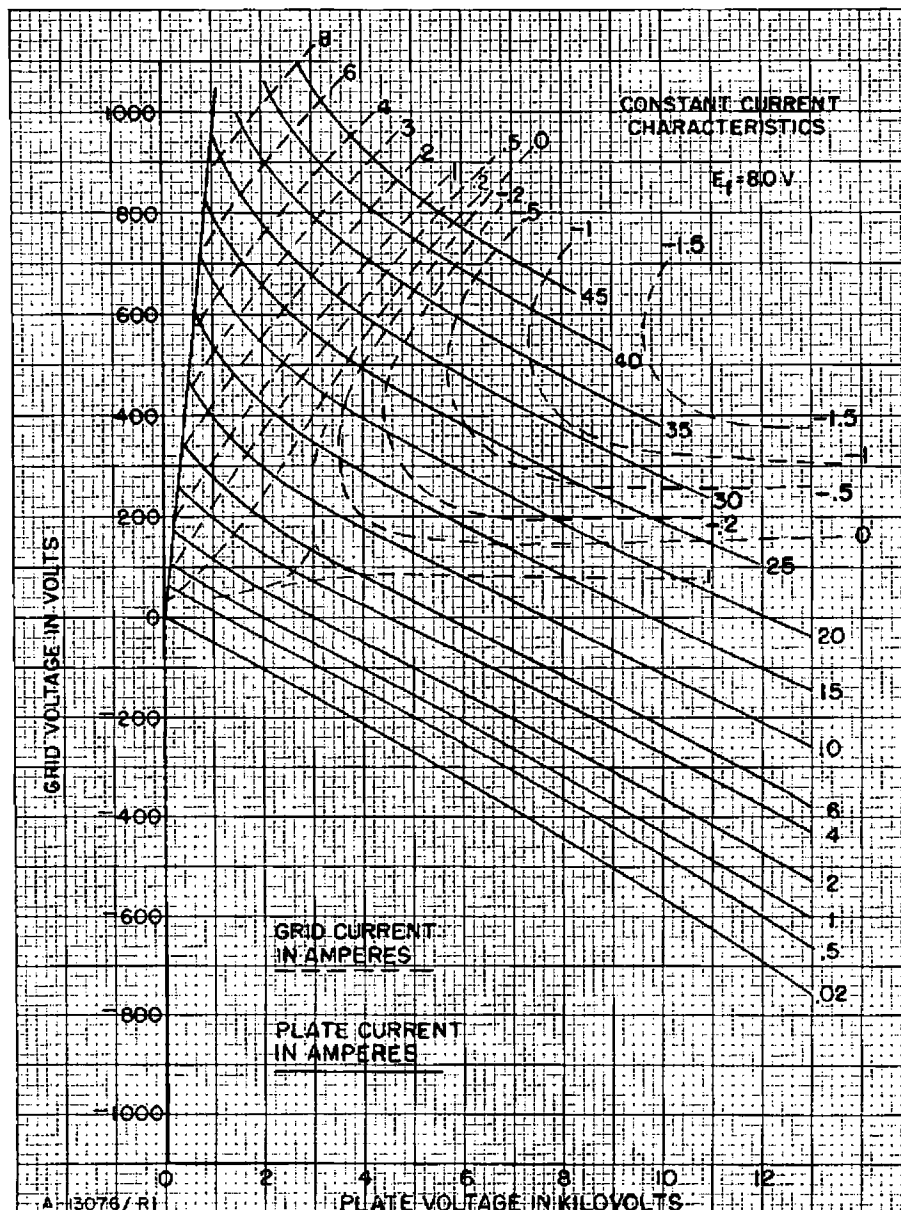
**APPLICATION NOTES**

The handling of high power requires particular attention

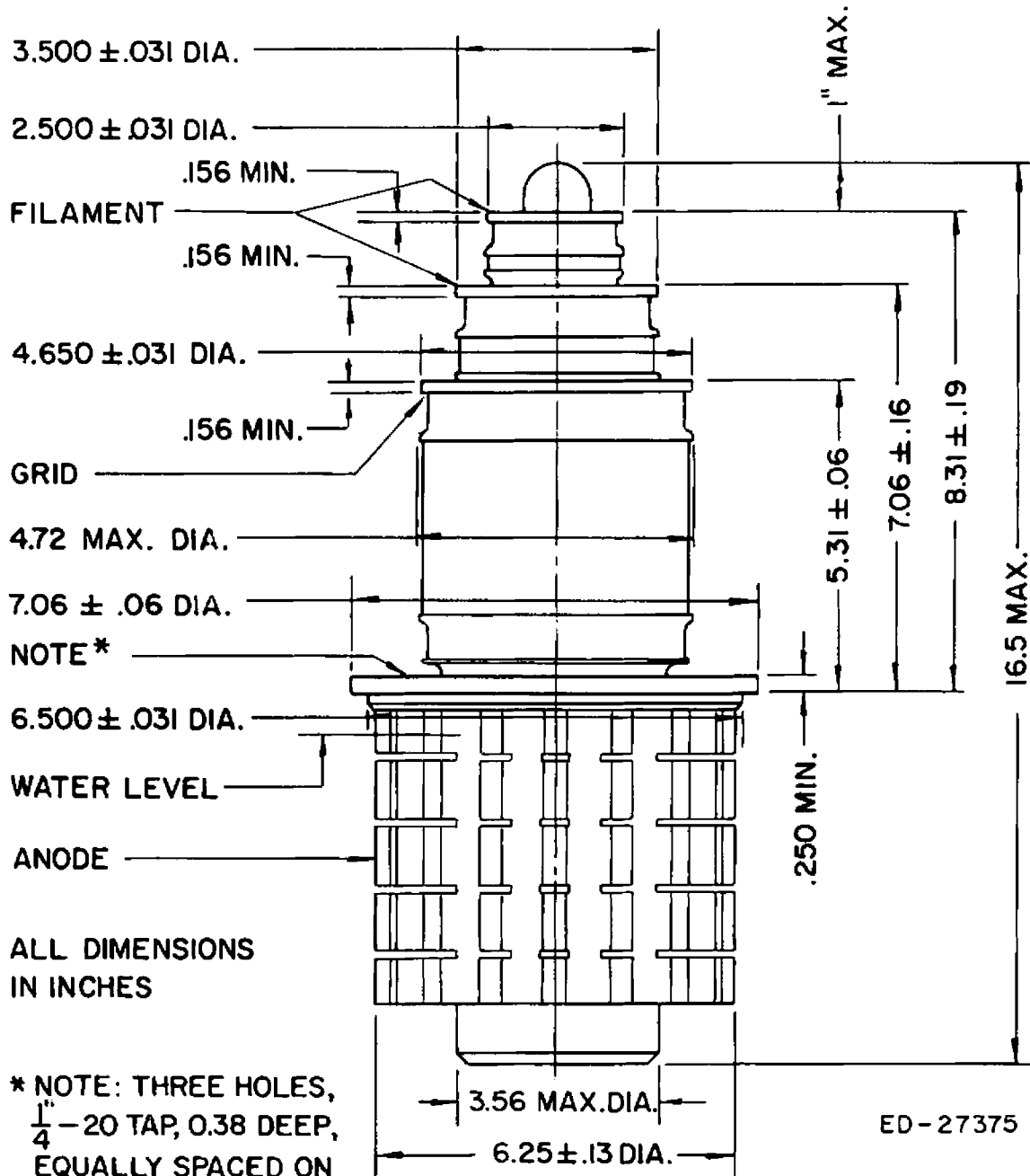
to the removal of power under fault conditions, since the large amount of energy involved can severely damage the electron tube if not properly controlled. Therefore the ground leads of the plate and grid circuits should be equipped with individual quick-acting overload relays which will remove power 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-7479



ALL DIMENSIONS  
IN INCHES

\* NOTE: THREE HOLES,  
 $\frac{1}{4}$ " - 20 TAP, 0.38 DEEP,  
EQUALLY SPACED ON  
5.750 ± .010 B.C., FOR  
LIFTING

DIMENSIONS — ML-7479

**THE MACHLETT LABORATORIES, INC.**

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SPRINGDALE **MACHLETT** CONNECTICUT

U. S. A.