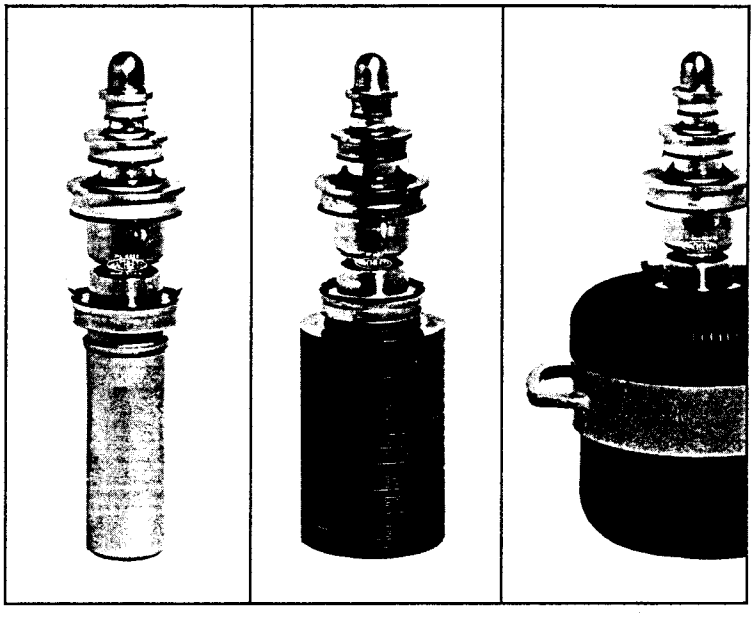


ISSUED 5-64

ML-6422
ML-6423
ML-6423F

General Purpose Triodes
18 kW CW
900 kw Pulse Power

MACHLETT
ELECTRON TUBE SPECIALIST

DESCRIPTION

The ML-6422 and ML-6423 are general-purpose high-mu triodes suitable for industrial heating, AM broadcasting and pulse modulation. These tubes feature coaxial mounting structures providing high-dissipation, low-inductance rf electrode terminals. The cathode of each type consists of sturdy, self-supporting, stress-free, thoriated-tungsten filaments.

The ML-6422 has a water-cooled, heavy-wall anode capable of dissipating 20 kW. The ML-6423 has a forced-air-cooled, heavy-wall anode with high-efficiency disc fins. The ML-6423-F has an anode fin construction which fits tube supports used with types 892-R, 5699, etc.

These tubes will operate with plate voltages up to 12.5 kV in CW operation or 35 kV in pulse modulator service. Maximum ratings apply at frequencies up to 30 Mc. Useful power output can be obtained at frequencies up to 70 Mc with reduced ratings. In a typical pulse modulator application these tubes are capable of switching 900 kW.

GENERAL CHARACTERISTICS

Electrical

Filament Voltage		7.0	Volts
Filament Current		85	Amps
Filament Starting Current, maximum		400	Amps
Filament Cold Resistance		0.0095	Ohms
Amplification Factor		90	
Interelectrode Capacitances:	ML-6422 ML-6423	ML-6423-F	
Grid-Plate	25	26	$\mu\mu f$
Grid-Filament	32	32	$\mu\mu f$
Plate-Filament	1.5	1.9	$\mu\mu f$

Mechanical

Mounting Position	Vertical, anode down	
Type of Cooling — ML-6422	Water and forced-air†	
Water flow on anode, minimum for 20 kW dissipation	7	gpm
Maximum outgoing water temperature	70	°C
Type of Cooling — ML-6423, ML-6423-F	Forced-air	
Air flow on anode		
ML-6423, minimum for 12.5 kW dissipation	Pressure: 710 cfm at 4.7″ water*	
ML-6423-F, minimum for 10 kW dissipation	Exhaust: 815 cfm at 5.1″ water*	
	750	cfm
Maximum incoming air temperature	50	°C
Maximum Glass Temperature	165	°C†
Net Weight, approximately		
ML-6422	10	lbs.
ML-6423	15	lbs.
ML-6423-F	50	lbs.

*When used with Machlett ML-6423 Air Distributor F-17797.

†At frequencies up to 15 Mc, normal cabinet ventilation should be sufficient to cool glass portion of tube. At higher frequencies or high ambient temperatures, auxiliary air flow of 25-50 cfm may be required and should be distributed to maintain uniform glass temperature, not greater than 165°C, around the circumference of the seals.

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

(Continuous Commercial Service)

VALUES APPLY TO ALL THREE TYPES UNLESS OTHERWISE SPECIFIED

Audio-Frequency Power Amplifier and Modulator Class B

Maximum Ratings, Absolute Values		
D-C Plate Voltage	12500	volts
Max.-Signal D-C Plate Current*	2.5	amps
Max.-Signal Plate Input*	30	kW
Plate Dissipation*		
ML-6422	20	kW
ML-6423	12.5	kW
ML-6423-F	10	kW

Typical Operation (Values are for two tubes)			
D-C Plate Voltage	9000	10000	volts
D-C Grid Voltage	−50	−50	volts
Peak A-F Grid to Grid Voltage	1040	1120	volts
Peak A-F Plate to Plate Voltage	14800	16000	volts
Zero Signal D-C Plate Current	0.4	0.4	amp
Max.-Signal D-C Plate Current	4.0	4.6	amps
Effective Load Resistance, Plate to Plate	4700	4400	ohms
Max.-Signal Driving Power, approximate	160	170	watts
Max.-Signal Power Output, approximate	23	29	kW

*Average 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	1.8	amp
Plate Input		
ML-6422	22	kW
ML-6423	19	kW
ML-6423-F	15	kW
Plate Dissipation		
ML-6422	20	kW
ML-6423	12.5	kW
ML-6423-F	10	kW

Typical Operation		
D-C Plate Voltage	12000	volts
D-C Grid Voltage	−80	volts
Peak R-F Grid Voltage	235	volts
Peak R-F Plate Voltage	5200	volts
D-C Plate Current	0.74	amp
D-C Grid Current	0	mA
R-F Load Resistance	4500	ohms
Driving Power, approximate§	40	watts
Power Output, approximate	3.0	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 maximum modulation factor of 1.0.

Maximum Ratings, Absolute Values		
D-C Plate Voltage	9000	volts
D-C Grid Voltage	−1400	volts
D-C Plate Current	1.8	amps
D-C Grid Current	0.50	amp
Plate Input	16	kW
Plate Dissipation		
ML-6422	13	kW
ML-6423	8	kW
ML-6423-F	7	kW

Typical Operation		
D-C Plate Voltage	9000	volts
D-C Grid Voltage	−600	volts
Peak R-F Grid Voltage	985	volts
Peak R-F Plate Voltage	8000	volts
D-C Plate Current	0.85	amp
D-C Grid Current	0.14	amp
R-F Load Resistance	6500	ohms
Driving Power, approximate	135	watts
Power Output, approximate	6.3	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	−1400			volts
D-C Plate Current	2.5			amps
D-C Grid Current	0.50			amp
Plate Input	30			kW
Plate Dissipation				
ML-6422	20			kW
ML-6423	12.5			kW
ML-6423-F	10			kW

Typical Operation				
D-C Plate Voltage	10000	10000	12000	volts
D-C Grid Voltage	−400	−400	−400	volts
Peak R-F Grid Voltage	900	1050	970	volts
Peak R-F Plate Voltage	8500	8200	10200	volts
D-C Plate Current	1.6	2.4	2.1	amps
D-C Grid Current	0.18	0.29	0.20	amp
R-F Load Resistance	3000	2000	2900	ohms
Driving Power, approximate	160	300	200	watts
Power Output, approximate	11.9	17.1	18.2	kW

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

CHARACTERISTIC RANGE VALUES FOR EQUIPMENT DESIGN

Characteristics	Conditions		Limits Minimum	Limits Bogey	Limits Maximum	
Grid Voltage	e_b = 1400 volts; i_b = 9.0 amps	e_c:	——	——	800	volts
Grid Current	e_b = 1400 volts; i_b = 9.0 amps	i_c:	——	——	4.0	amps
Plate Voltage	E_c = 0 Vdc; I_b = 0.50 Adc	E_b:	6.6	7.4	8.2	kVdc
Plate Voltage	E_c = −50 Vdc; I_b = 0.50 Adc	E_b:	10.7	11.9	13.1	kVdc
Grid Voltage	E_b = 12.0 kVdc; I_b = 0.02 Adc	E_c:	−100	−130	−160	Vdc
Plate Power Output	E_b = 12.0 kVdc; I_b = 2.1 Adc E_c = −400 Vdc; I_c = 0.20 Adc	P_o:	15.5	——	——	kW

MAXIMUM FREQUENCY RATINGS

Maximum ratings apply up to 30 Mc except as noted. These tubes may be operated at higher frequencies provided the maximum values of plate voltage and power input are reduced according to the tabulation on the right (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

Pulse Modulator or Pulse Amplifier ‡

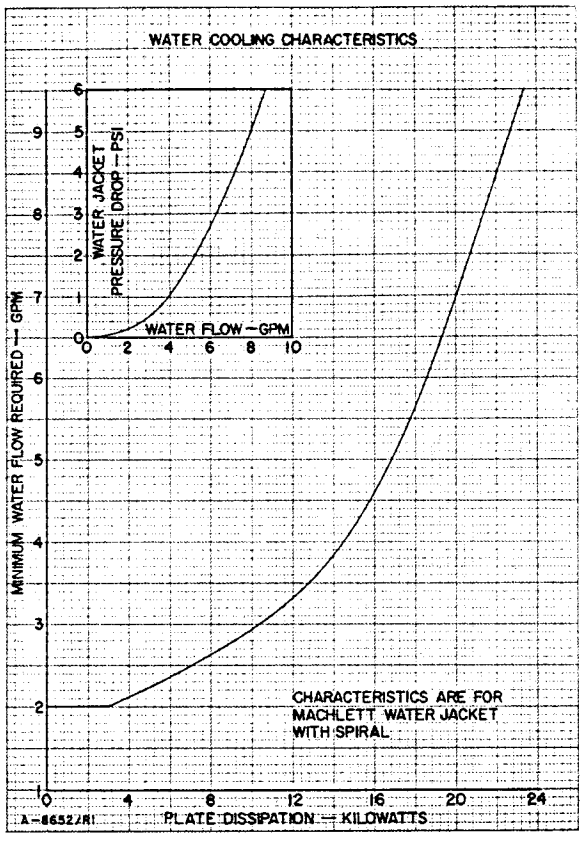
Maximum Ratings, Absolute Values		
D-C Plate Voltage	35	kV
Peak Plate Voltage	35	kv
Peak Negative Grid Voltage	−3500	volts
Pulse Cathode Current	35	amps
Grid Dissipation	300	watts
Plate Dissipation	12.5	kW
Pulse Duration, approximate*	1000	μsec
Duty Factor*	0.03	
Typical Operation		
D-C Plate Voltage	35	kV
D-C Grid Voltage	−500	volts
Pulse Positive Grid Voltage	1900	volts
Pulse Plate Current	30	amps
Pulse Grid Current	4.5	amps
Pulse Driving Power	11	kw
Pulse Power Output	900	kw
Plate Output Voltage	30	kv

‡When ordering for this application add the suffix "P" to the Machlett tube number.

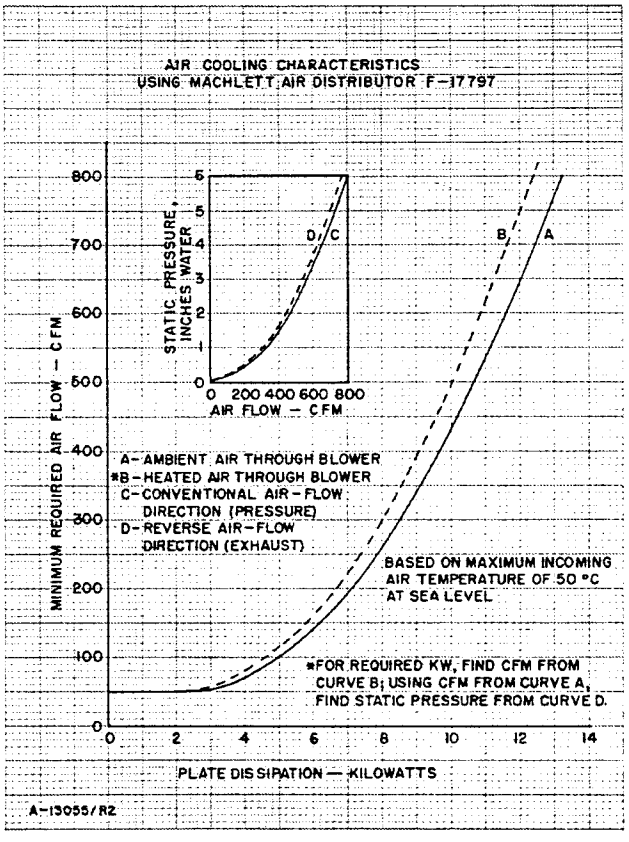
*For applications requiring longer pulse duration or higher duty factors, consult the Machlett Engineering Department.

WARNING: Operation of this tube may produce x-rays. Adequate rayproof shielding must therefore be provided in the equipment.

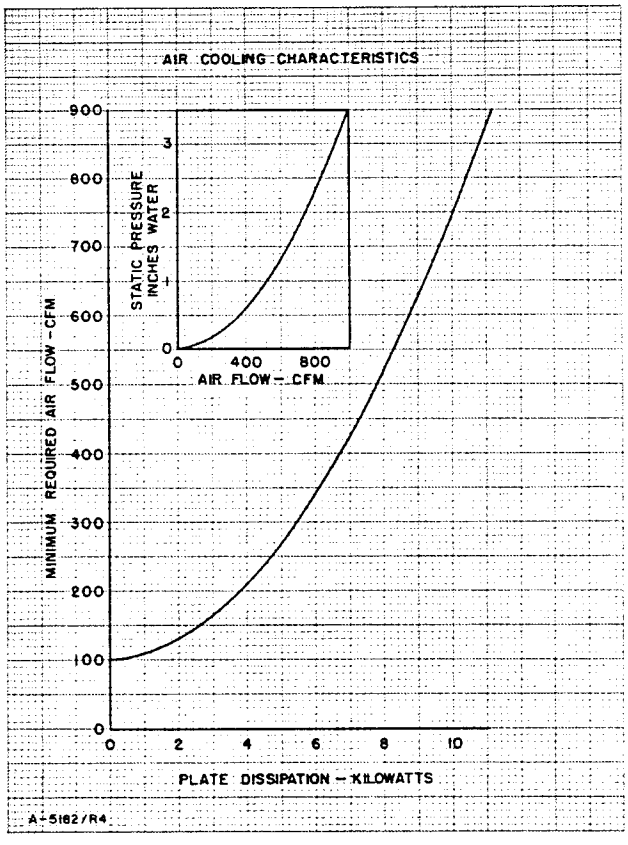
COOLING CHARACTERISTICS — ML-6422

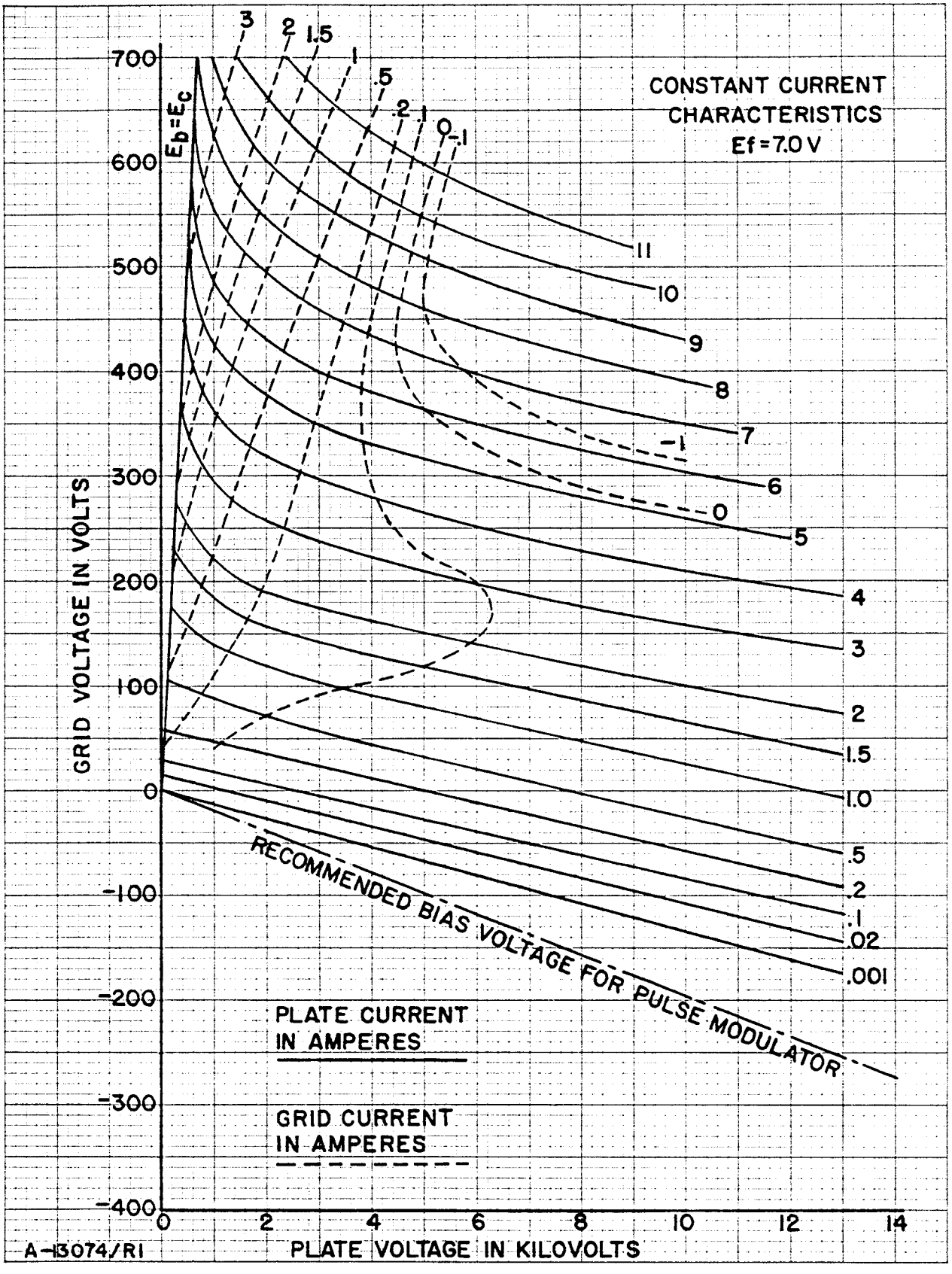


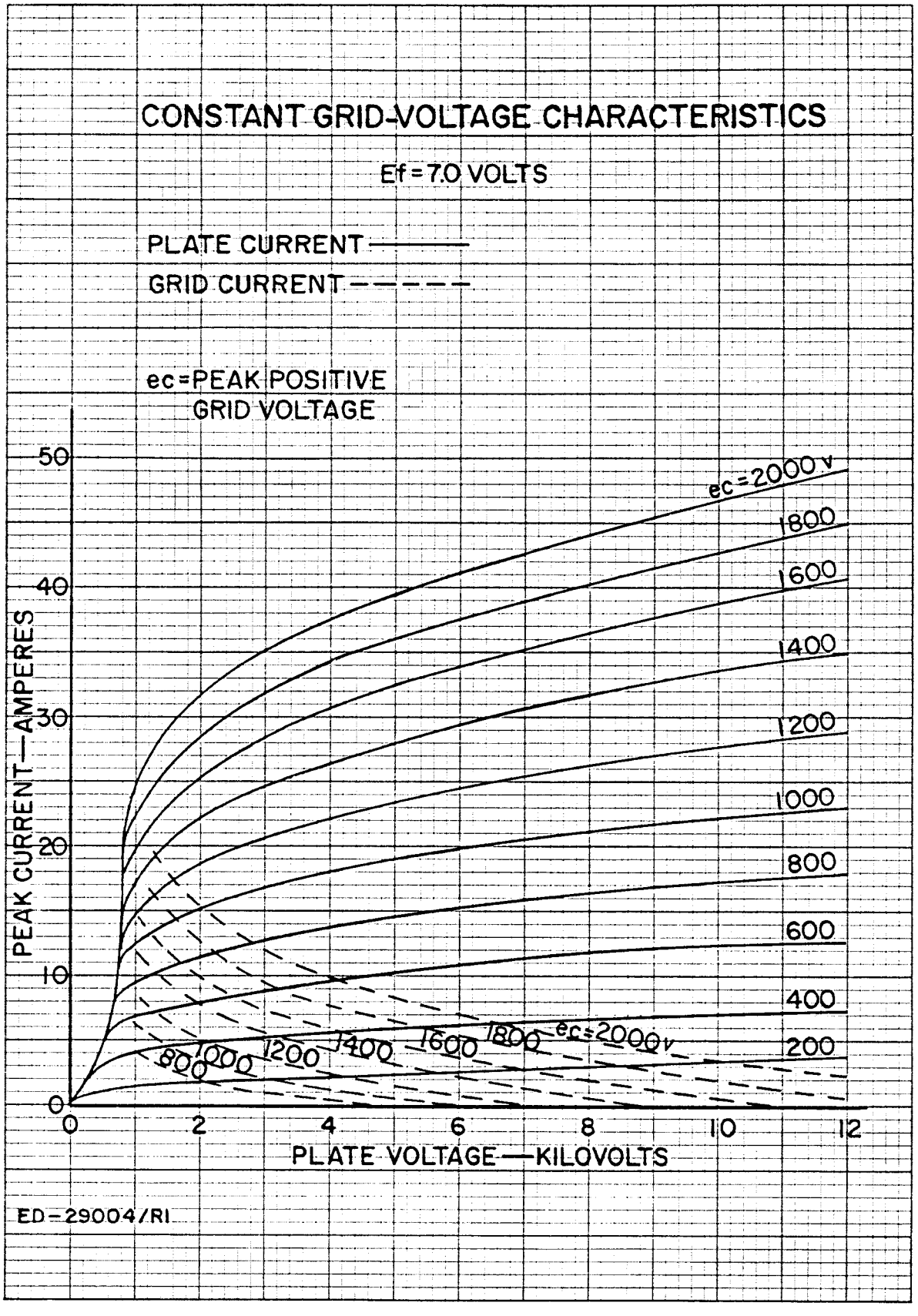
COOLING CHARACTERISTICS — ML-6423

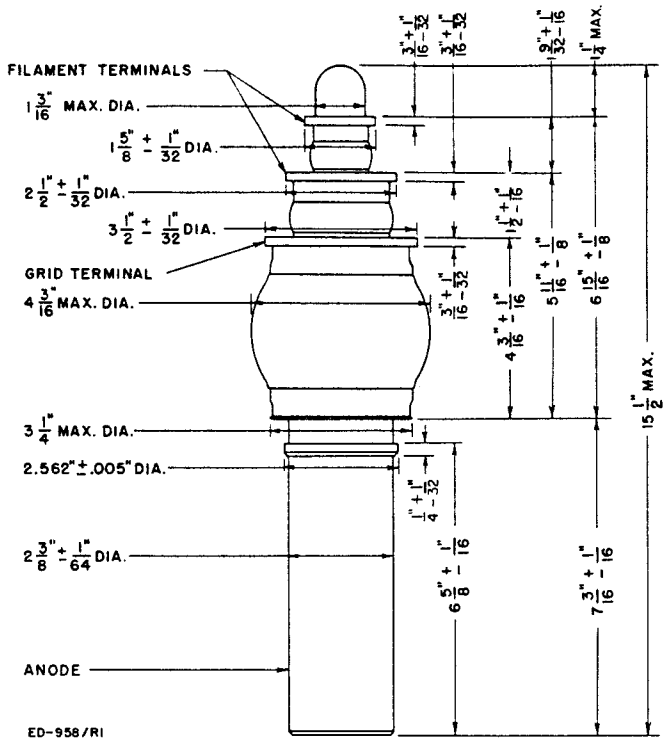


COOLING CHARACTERISTICS — ML-6423-F

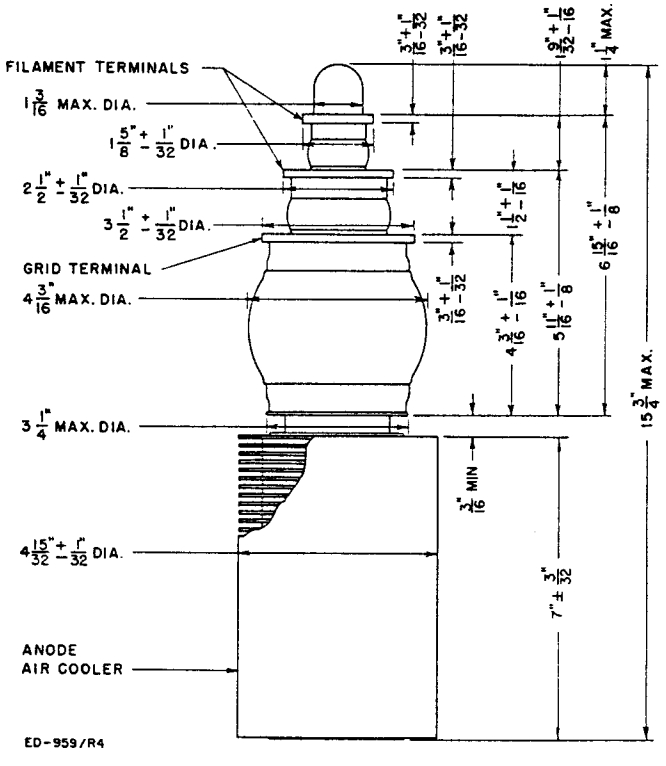



CONSTANT CURRENT
CHARACTERISTICS
Ef = 7.0 V
Eb=Ec
3
2
1.5
1
.5
.2
.1
0
-.1
11
10
9
8
7
6
5
4
3
2
1.5
1.0
.5
.2
.1
.02
.001
-1
0
RECOMMENDED BIAS VOLTAGE FOR PULSE MODULATOR
PLATE CURRENT
IN AMPERES
GRID CURRENT
IN AMPERES
GRID VOLTAGE IN VOLTS
700
600
500
400
300
200
100
0
-100
-200
-300
-400
0
2
4
6
8
10
12
14
PLATE VOLTAGE IN KILOVOLTS
A-13074/R1

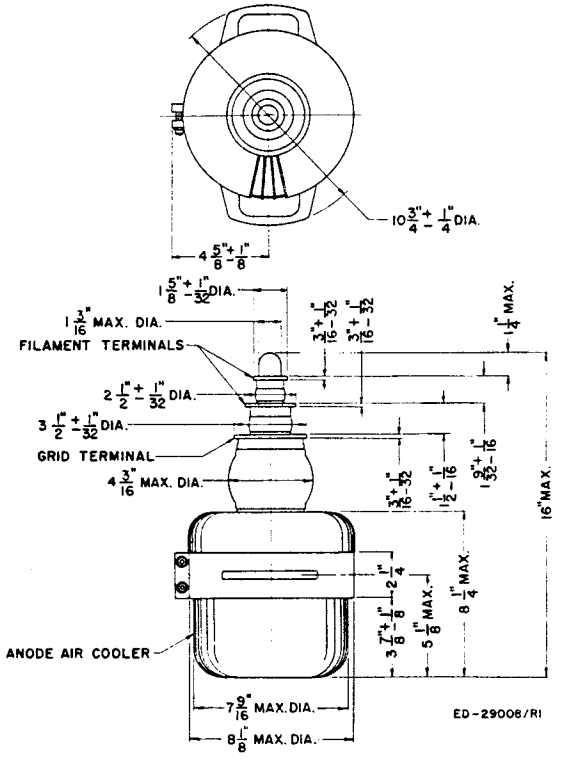

CONSTANT GRID-VOLTAGE CHARACTERISTICS
Ef = 7.0 VOLTS
PLATE CURRENT
GRID CURRENT
ec = PEAK POSITIVE GRID VOLTAGE
PEAK CURRENT—AMPERES
PLATE VOLTAGE—KILOVOLTS
ec = 2000 v
1800
1600
1400
1200
1000
800
600
400
200
0
2
4
6
8
10
12
50
40
30
20
10
ED-29004/R1



DIMENSIONS — ML-6422



DIMENSIONS — ML-6423



DIMENSIONS — ML-6423-F

THE MACHLETT LABORATORIES, INC.

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ST-1688 4.5M 5-64

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