

ML-LPT 45

ML-LPT 45H



APPLICATION

The ML-LPT 45 and LPT 45H are shielded grid triodes designed primarily for use as switch tubes in hard-tube pulse modulators for radar applications. They can deliver a peak pulse power output of 1.5 megawatts with less than 5 kilowatts driving power.

CONSTRUCTION

These tubes incorporate a beamed electrode structure to minimize driving power. This design avoids the fine-wire grids usually used in tetrodes and provides a rugged structure. The shield grid is strapped to the cathode internally and protects the cathode from transient arcs. These features provide a tube which operates much more stably at high voltages than hard-tube modulators of earlier design. The high amplification factor coupled with low grid current results in unusually low driving power requirements. Additionally, the input and output circuits are isolated so that feedback capacitance is small. The cathode is a unipotential oxide-coated type. The anode is forced-air cooled and is capable of dissipating 1 kW with 80 cfm air flow.

WARNING

When operating at peak voltage in excess of 15 kV, this electron tube 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 114, "Safety Standard for Non-Medical X-Ray and Sealed Gamma Ray Sources." Additional information is available in National Council on Radiation Protection and Measurements Report No. 33, "Medical X-Ray and Gamma Ray Protection for Energies up to 10 MeV." Periodic checks of shielding effectiveness are also required since x-ray radiation levels may increase with the operating life of the tube.

ORDERING NOTES

Refer to Machlett price list. When ordering specify

- tube type
- accessories
 - small filament connector
F-21989
 - large filament connector
F-21991
 - grid connector
F-21987
 - tube support
P-16981

SPECIFICATION

ELECTRICAL CHARACTERISTICS

Filament Voltage: 6.0 $\pm$ 5% volts

Filament Current: 60 amps

Filament Starting
Current, maximum: 300 amps

Cathode Warmup Time: 10 minutes*

Amplification Factor: 130

Interelectrode

Capacitances:

Grid-Plate, maximum: 3 pf
Grid-Cathode: 260 pf
Plate-Cathode: 35 pf

Strapped Resonant

Frequency (grid to
cathode), approx.: 63.5 MHz

MECHANICAL CHARACTERISTICS

Mounting Position

(support tube by
anode radiator only): any

Type of Cooling: Forced-air†

Air Flow on Anode
[at 45°C (113°F)
and 14.7 psi
(101 kPa) ambient
atmospheric
pressure]: 80 cfm†
Static Pressure: 0.3" of water
Air Flow on Grid
Radiator, minimum: 5 cfm
Maximum Incoming
Air Temperature: 75°C (167°F)

Maximum Glass
Temperature: 175°C (347°F)

Net Weight
approximate: 13 lbs. (5.9 kg)

- * For accelerated cathode warmup, the heater may be energized at 7.0 volts for 5 minutes and then reduced to rated value for high voltage operation. If a heater standby voltage of 5.0 volts is used, the minimum cathode warmup time is 1 minute at rated voltage.

† Sufficient air cooling must be provided to maintain glass temperatures at less than 175°C (347°F) under all conditions of operation.

‡ For air-flow requirements at other temperatures and pressures, consult the Machlett Engineering Department.

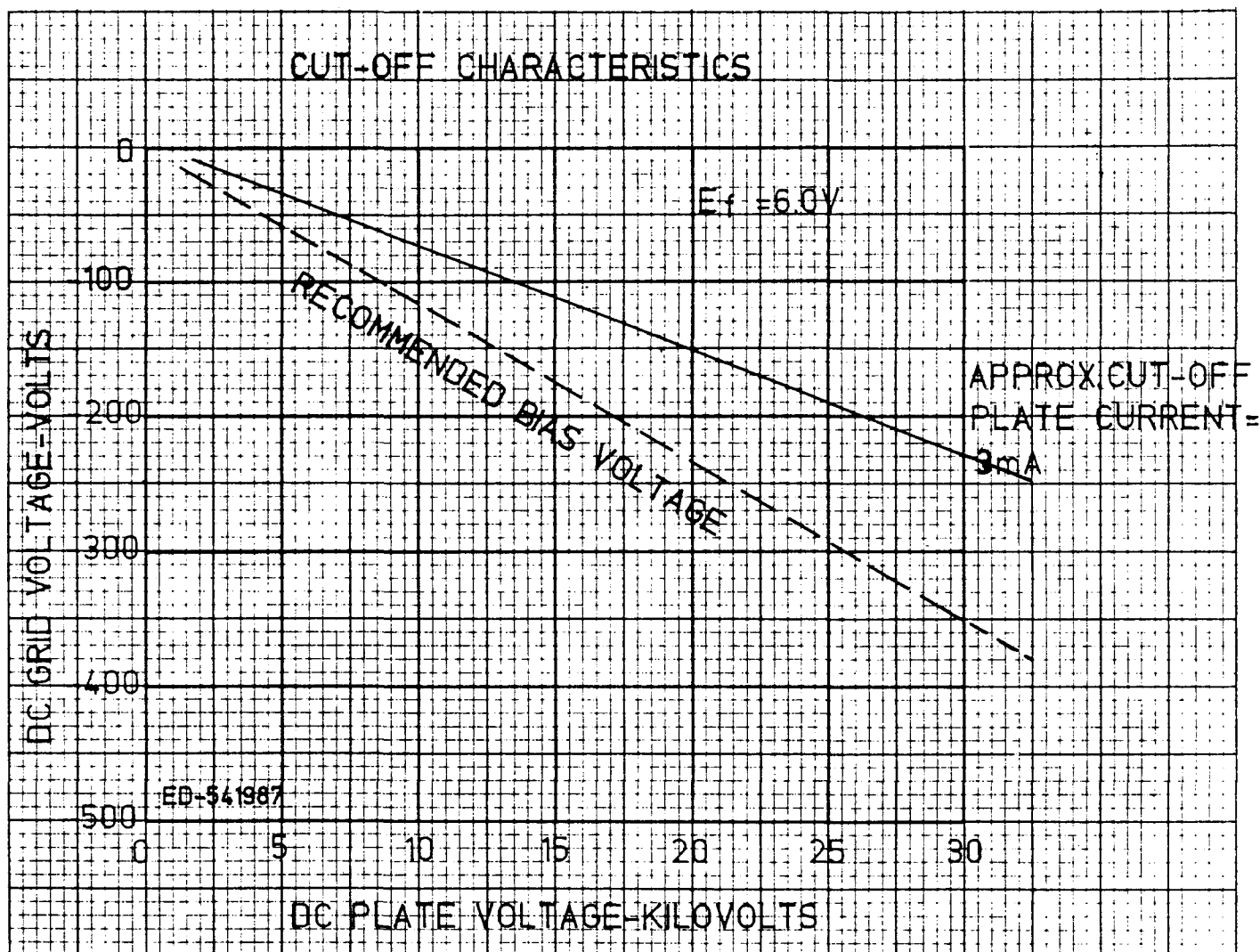
MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

Pulse Modulator or Pulse Amplifier

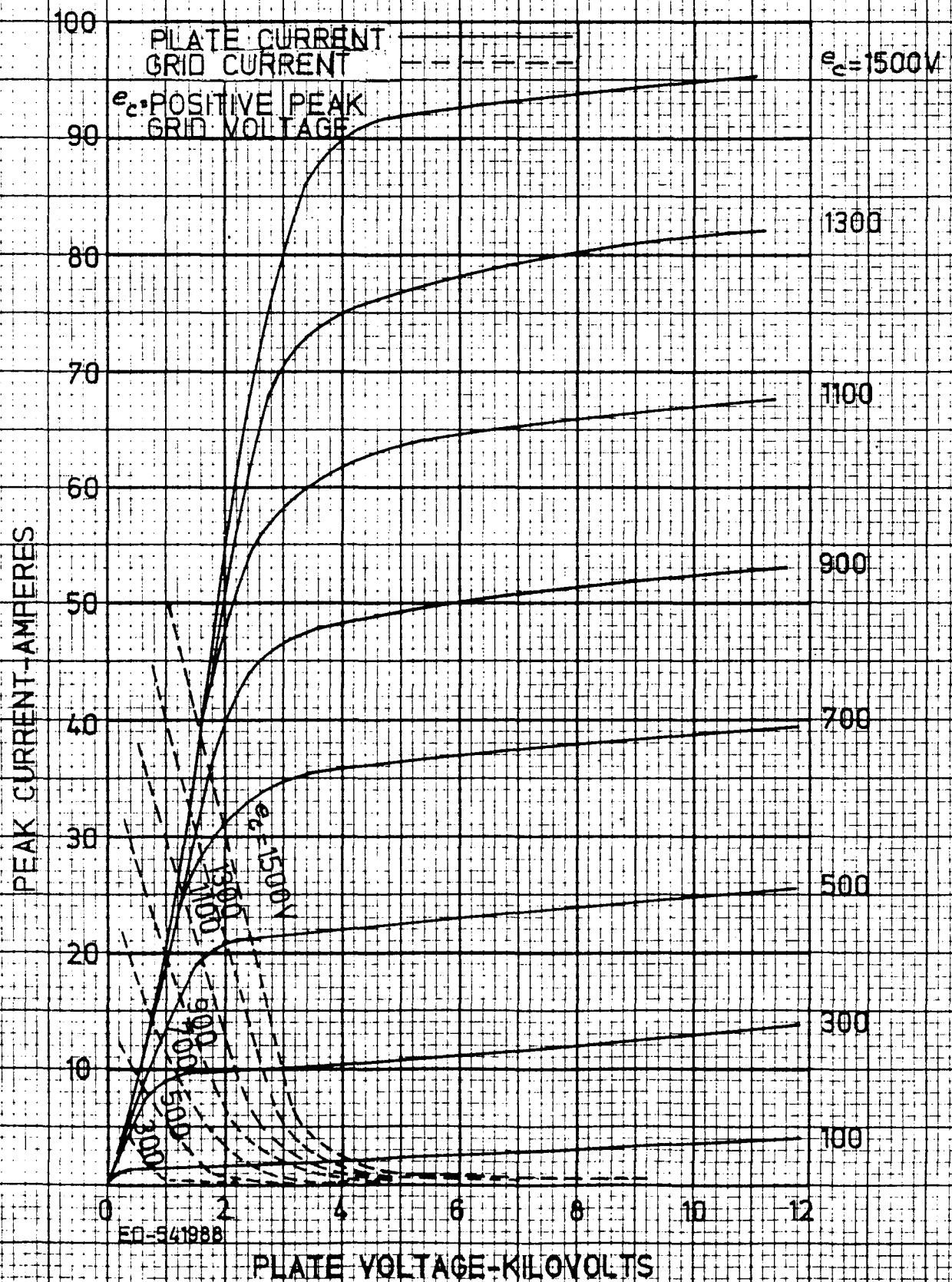
Maximum Ratings, Absolute Values*	LPT 45	LPT 45H	Typical Operation*	LPT 45	LPT 45H	LPT 45H
DC Plate Voltage	27 kV	32 kV	DC Plate Voltage	17 kV	25 kV	31 kV
Peak Plate Voltage	32 kv	34 kv	DC Grid Voltage	-200 v	-200 v	-360 v
DC Grid Voltage	-600 v	-600 v	Pulse Positive Grid Voltage ..	600 v	1200 v	680 v
Peak Positive Grid Voltage ..	1500 v	1500 v	Pulse Plate Current	25 a	65 a	30 a
Peak Negative Grid Voltage ..	-1500 v	-1500 v	Pulse Grid Current	1 a	3 a	3 a
Pulse Cathode Current	90 a	90 a	Pulse Driving Power	0.8 kw	4.5 kw	3.1 kw
DC Plate Current	600 mA	600 mA	Pulse Power Output	0.35 Mw	1.35 Mw	0.87 Mw
Grid Dissipation	25 W	25 W	Plate Output Voltage	14 kv	21 kv	29 kv
Plate Dissipation	1.0 kW	1.0 kW	Duty Factor	.01	.003	.01
Pulse Duration	10 μsec#	10 μsec#				
Duty Factor	0.03 #	0.03 #				

- * All given maximum ratings may not apply simultaneously. Due to the possibility of instantaneous overheating of electrodes during the pulse, it may be necessary to restrict some of the parameters, e.g., peak plate current, tube drop, pulse duration, duty or average dissipation, in order not to adversely affect the performance of the tube. Because of the many possible combinations of operating conditions, all restrictions cannot be delineated here, and it is suggested to review new applications with the Machlett Engineering Department.

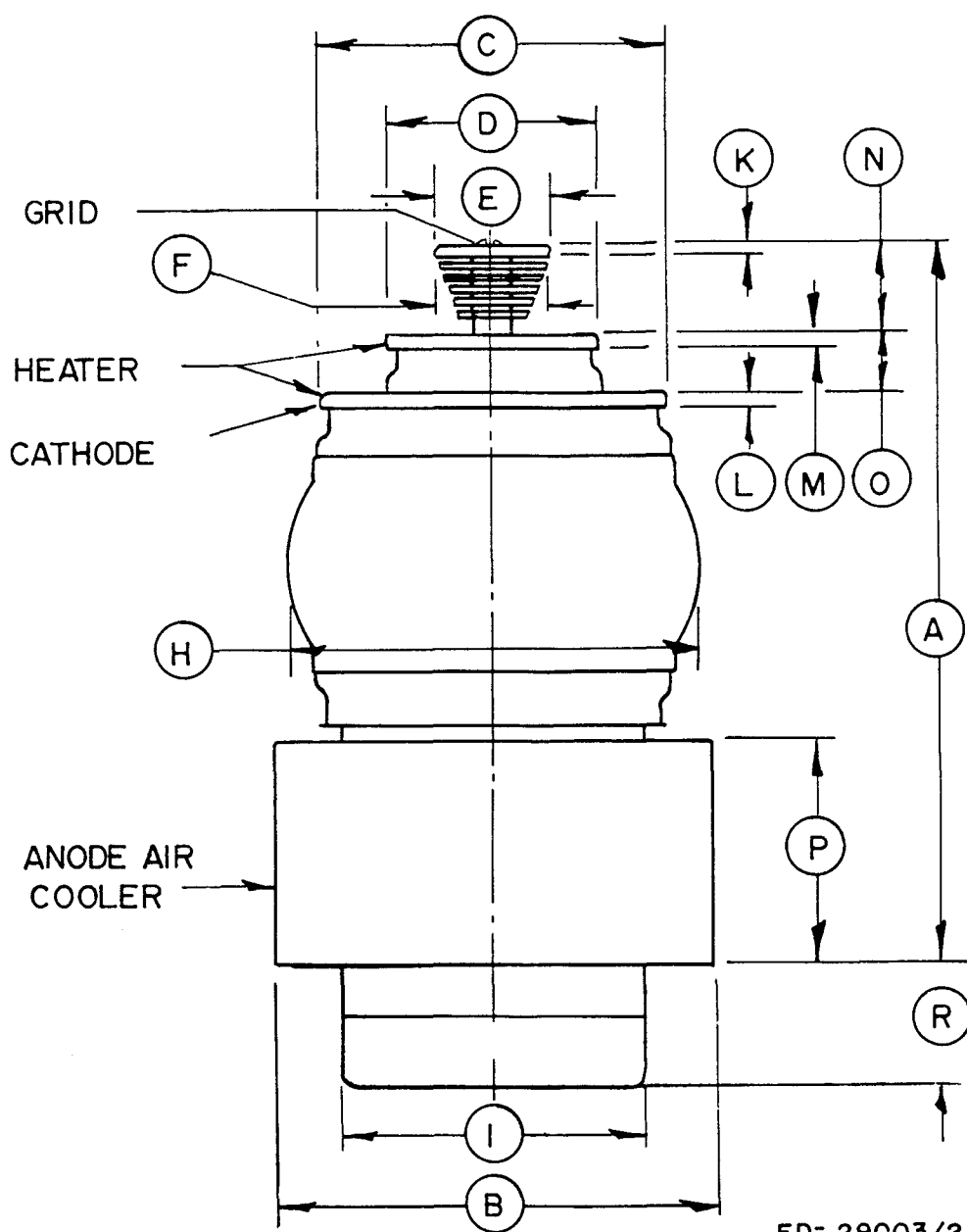
For applications requiring longer pulse duration or higher duty factors, consult the Machlett Engineering Department.



CONSTANT GRID-VOLTAGE CHARACTERISTICS



OUTLINE DATA



ED- 29003/2

DIMENSIONS FOR OUTLINE OF ML-LPT 45 AND LPT 45H

Ref	Inches (mm)		
	Minimum	Nominal	Maximum
A	—	—	8.625 (219.08)
B	5.075 (128.9)	5.125 (130.18)	5.135 (130.43)
C	4.047 (102.79)	4.062 (103.17)	4.078 (103.58)
D	2.422 (61.52)	2.438 (61.93)	2.453 (62.31)
E	1.370 (34.80)	1.375 (34.92)	1.380 (35.05)
F	—	—	1.312 (33.32)
H	—	—	5.375 (136.53)
I	—	—	3.562 (90.47)
K	0.135 (3.43)	0.140 (3.56)	0.145 (3.68)
L	0.172 (4.37)	0.188 (4.78)	0.203 (5.16)
M	0.172 (4.37)	0.188 (4.78)	0.203 (5.16)
N	0.969 (24.61)	1.031 (26.19)	1.094 (27.79)
O	0.625 (15.88)	0.688 (17.48)	0.75 (19.05)
P	2.562 (65.07)	2.625 (66.68)	2.688 (68.28)
R	—	—	1.75 (44.45)