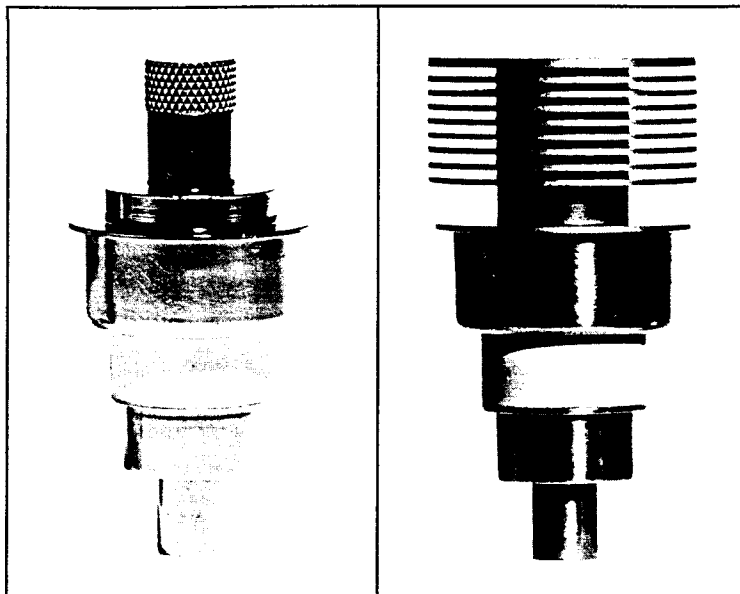


ML-7855K/AL
ML-7855/AL



**AIRLINE QUALITY
EXTENDED LIFE
UHF PLANAR TRIODES**
CW, Plate or Grid Pulsed
Frequency Stable
Phormat Cathode
3 GHz



DESCRIPTION

The ML-7855K/AL and ML-7855/AL planar triodes, interchangeable mechanically and electrically with the types ML-7855K and ML-7855 respectively, are intended especially for application in airline avionics equipment, where long life and uninterrupted performance are of prime importance. These tubes are ruggedized, high- μ planar triodes of ceramic-and-metal construction, designed for use as grid-pulsed, plate-pulsed or CW oscillators, frequency multipliers or amplifiers in transmitter service to 3 GHz.

In addition to low interelectrode capacitance, high transconductance and high μ , these tubes incorporate design features which help to assure frequency stable operation even under adverse ambient temperature and varying plate

dissipation conditions.

The ML-7855K/AL and ML-7855/AL employ a Phormat type cathode, which consists of an indirectly heated disk with an oxide coating impregnated in a nickel matrix. This construction, in combination with proper plate series impedance, reduces to a minimum failures of the cathode due to voltage surges.

The ML-7855K/AL is supplied without a radiator for conduction-convection cooling. The ML-7855/AL is supplied with a radiator for forced-air cooling. Except for plate-dissipation ratings, the electrical characteristics of the two tubes are the same.

GENERAL CHARACTERISTICS

Electrical

Heater Voltage (AC or DC)	5.7	V*
Heater Current at 5.7 Volts	1.0	A
Cathode Heating Time, minimum	60	sec
Amplification Factor	100	
Transconductance ($I_b = 70\text{mA}$, $E_b = 600\text{V}$)	25000	μmhos
Interelectrode Capacitance, without Heater Voltage		
Grid-Plate	2.5	pf
Grid-Cathode	6.3	pf
Plate-Cathode, maximum	.06	pf

Mechanical

Mounting Position	Optional	
Type of Cooling		
Without radiator (ML-7855K/AL)	Conduction & Convection	
With radiator (ML-7855/AL)	Forced-Air	
Maximum Envelope Temperature	250	°C
Net Weight		
Without radiator (ML-7855K/AL)	1.8	oz
With radiator (ML-7855/AL)	2.2	oz

*Nominal. The heater voltage regulation should be better than $\pm 3\%$.

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

Grid-Pulsed or Plate-Pulsed RF Oscillator or Amplifier — Class C

Maximum Ratings, Absolute Values

Plate Voltage		
Grid-Pulsed, DC	2500	V
Plate-Pulsed, Peak Pulse Supply	3500	v
DC Grid Voltage	—150	V
Instantaneous Peak Grid-Cathode Voltage		
Grid negative to cathode	—750	v
Grid positive to cathode	250	v
Average Plate Current	10	mA
Average Grid Current	5	mA
Peak Plate Current	3	a
Average Plate Dissipation		
Forced-air cooling (ML-7855/AL)	35	W
Conduction and convection (ML-7855K/AL)	10	W
Average Grid Dissipation	2	W
Pulse Duration	6	μs†
Duty Factor	.0033	†
Frequency	3	GHz

Typical Operation, Plate-Pulsed RF Oscillator

Frequency	2.5	GHz
Filament Voltage	5.5	V
Pulse Duration	5	μs
Duty Factor	.0030	
Peak Plate Pulse Supply Voltage	3500	V
Peak Plate Current from Pulse Supply	3	a
Average Plate Current	9	mA
Average Grid Current	3	mA
Useful Peak Power Output, approximate	2	kw

Typical Operation, Grid-Pulsed RF Amplifier

Frequency	1.1	GHz
Filament Voltage	5.7	V
Pulse Duration	3.5	μs
Duty Factor	.001	
DC Plate Voltage	2200	V
DC Grid Voltage	—45	V
Peak Plate Current from DC Supply	1.9	a
Peak Grid Current from Pulse Supply	1.1	a
Driving Power during Pulse, approximate	400	w
Useful Peak Power Output, approximate	2	kw

CW RF Power Amplifier and Oscillator Class C Telegraphy

Key-down conditions per tube without amplitude modulation‡

Maximum Ratings, Absolute Values

DC Plate Voltage	2500	V
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DC Grid Voltage	—150	V
Instantaneous Peak Grid-Cathode Voltage		
Grid negative to cathode	—400	v
Grid positive to cathode	30	v
DC Cathode Current	125	mA
DC Grid Current	50	mA
Plate Dissipation		
Forced-air cooling (ML-7855/AL)	100	W
Conduction and convection (ML-7855K/AL)	10	W
Grid Dissipation	2	W
Frequency	2.5	GHz

Typical Operation, RF Power Amplifier, Grid Separation Circuit

Frequency	500	MHz
DC Plate Voltage	900	V
DC Grid Voltage	—40	V
DC Plate Current	90	mA
DC Grid Current, approximate	30	mA
Driving Power, approximate	6	W
Useful Power Output	40	W

Typical Operation, RF Oscillator

Frequency	2.5	GHz
DC Plate Voltage	900	V
DC Grid Voltage, approximate	—22	V
DC Plate Current	90	mA
DC Grid Current	10	mA
Useful Power Output	17	W

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

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

CHARACTERISTIC RANGE VALUES FOR EQUIPMENT DESIGN

	Min.	Max.
Filament Current at 5.7 Volts	0.90	1.05 A
Cutoff Bias (Note 1)	—	—15 V
Grid-Plate Capacitance (Note 2)	2.25	2.75 pf
Grid-Cathode Capacitance (Note 2)	5.60	7.00 pf
Plate-Cathode Capacitance (Note 2)		.040 pf

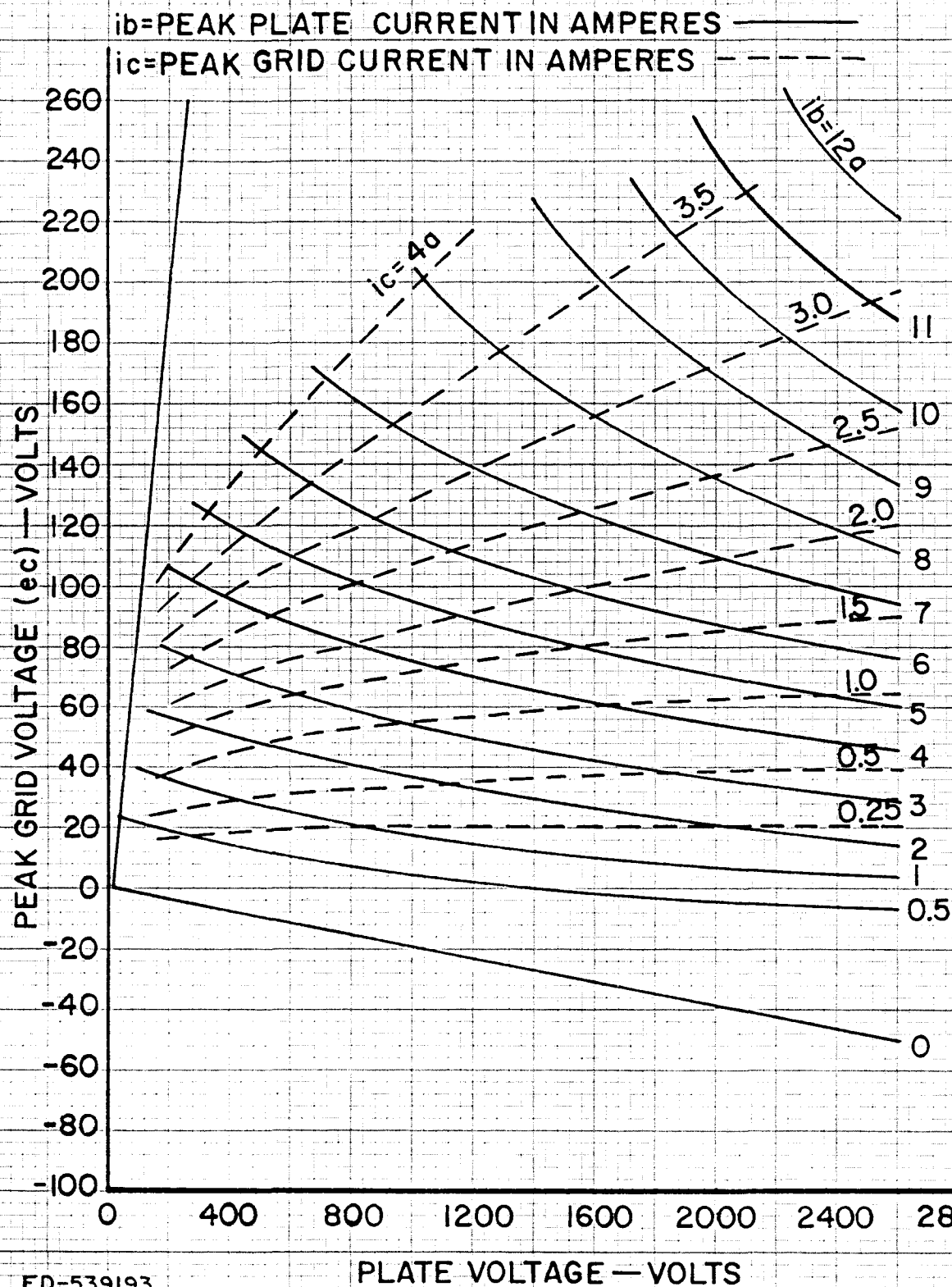
Note 1 — Measured at 1 mA of plate current and a plate voltage of 600 volts.

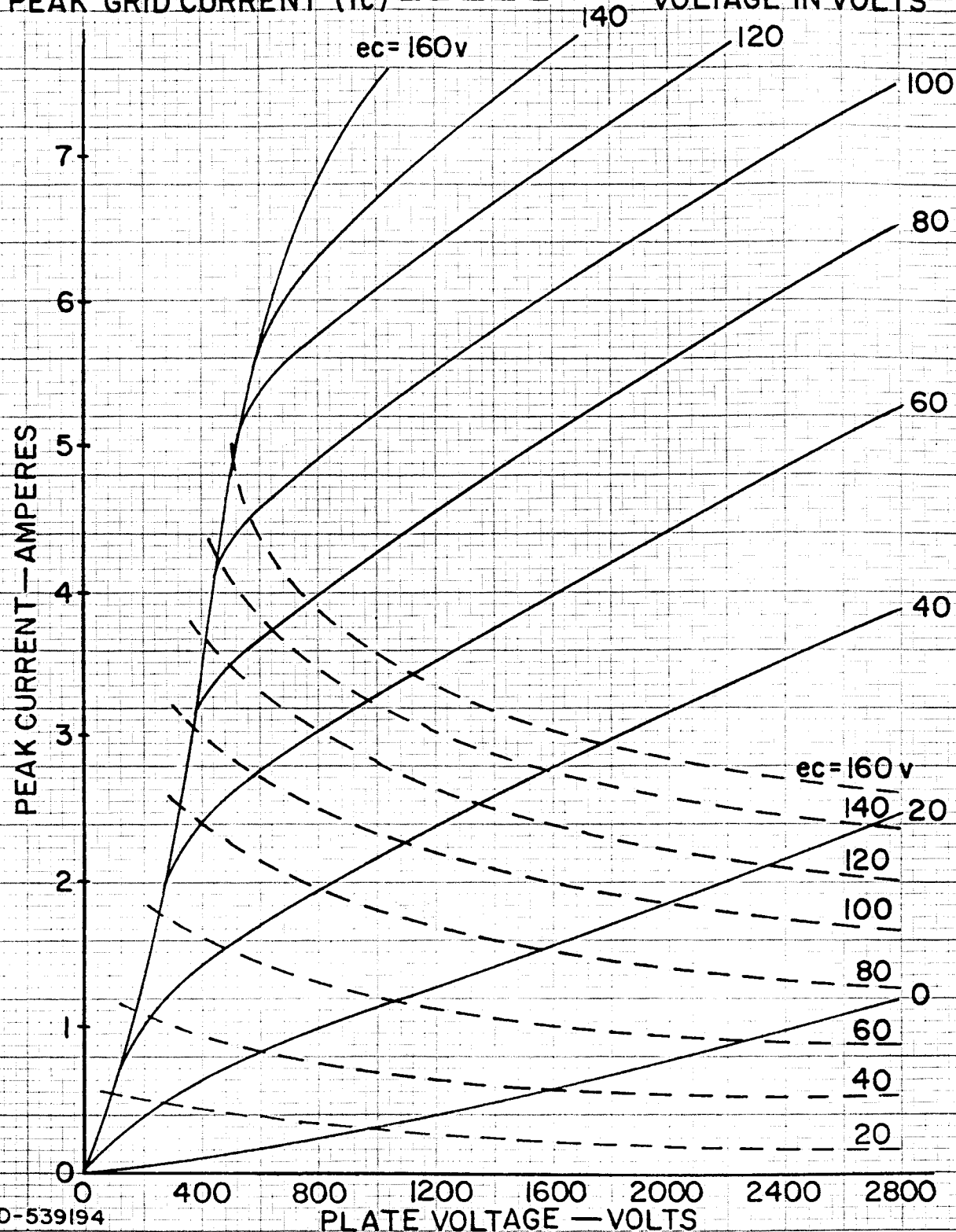
Note 2 — Capacitance measurements are made with tube cold.

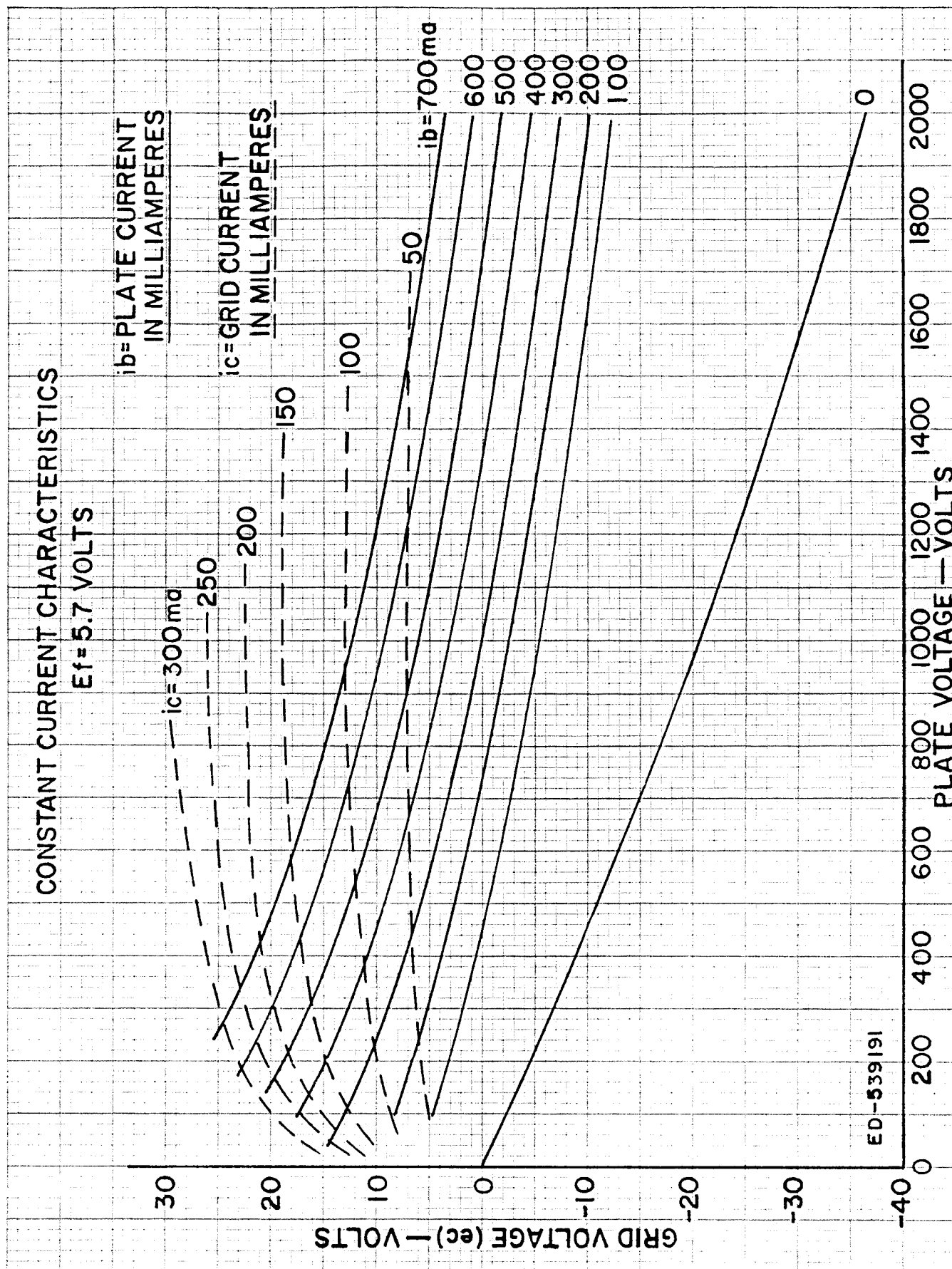
APPLICATION NOTES

Before designing equipment for use with these tubes and before installing tubes in equipment, refer to the general information given in the Machlett publications entitled *Application Notes, UHF Tubes — General and Application Notes, UHF Triodes, Extended Life AL Series Tubes for Airline Operation*.

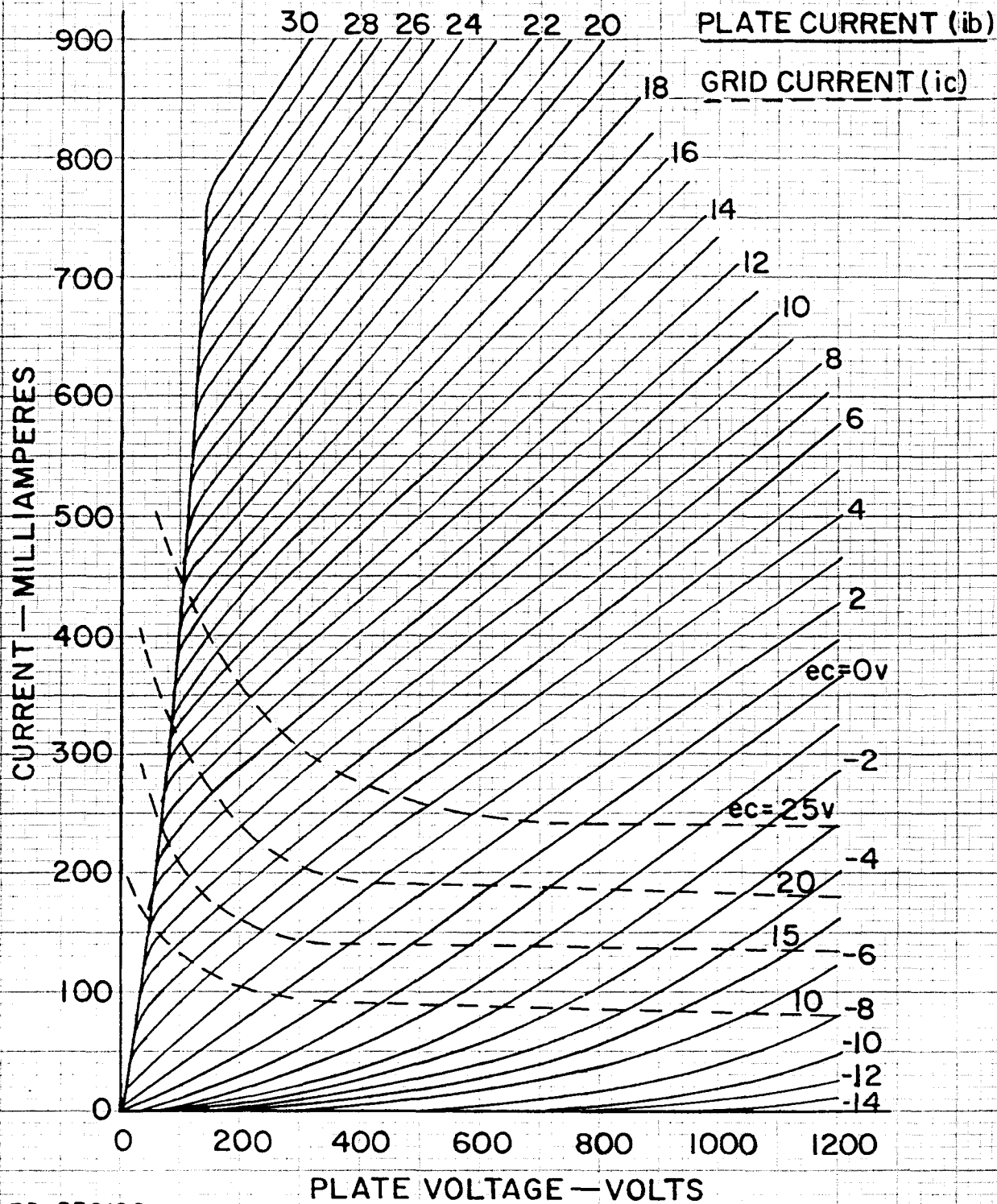
CONSTANT CURRENT CHARACTERISTICS
FOR PULSED OPERATION
 $E_f = 5.7$ VOLTS



CONSTANT GRID-VOLTAGE CHARACTERISTICS
FOR PULSED OPERATION $E_f = 5.7$ VOLTSPEAK PLATE CURRENT (i_b) —————
PEAK GRID CURRENT (i_c) - - - - - e_c = PEAK POSITIVE GRID
VOLTAGE IN VOLTS



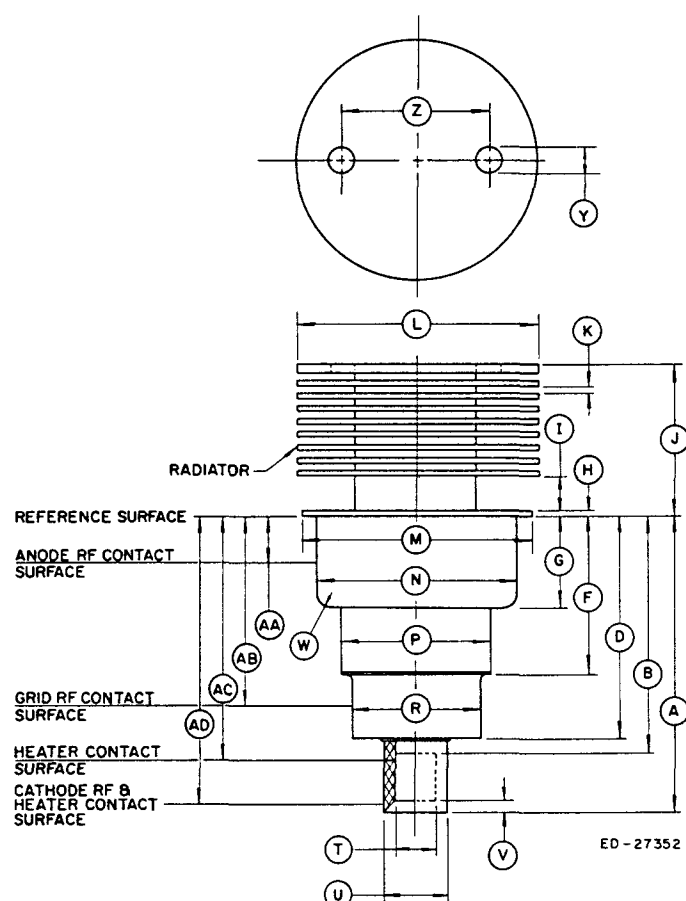
CONSTANT GRID-VOLTAGE CHARACTERISTICS

 e_c = GRID VOLTAGE IN VOLTS E_f = 5.7 VOLTS

DIMENSIONS FOR OUTLINE OF ML-7855/AL

The millimeter dimensions are derived from the original inch dimensions.

Ref.	Inches			Millimeters			Notes
	Minimum	Nominal	Maximum	Minimum	Nominal	Maximum	
A	1.500		1.560	38.10		39.62	
AA	.035	.198	.361	.89	5.03	9.17	1, 5
AB	1.021	1.061	1.101	25.93	26.95	27.97	2, 5
AC	1.219	1.316	1.413	80.96	33.43	35.89	3, 6
AD	1.160	1.330	1.500	29.46	33.78	38.10	4, 5, 6
B			1.214			30.84	
D	1.125		1.165	28.58		29.59	
F	.800		.840	20.32		21.34	
G	.462		.477	11.73		12.12	
H			.040			1.02	
I	.125		.185	3.18		4.70	
J	.766		.826	19.46		20.98	
K	.025		.046	.64		1.17	
L	1.234		1.264	31.34		32.11	
M	1.180		1.195	27.97		30.35	
N	1.025		1.035	26.04		26.29	5
P	.752		.792	19.10		20.12	
R	.655		.665	16.64		16.89	5
T	.213		.223	5.41		5.66	6
U	.315		.325	8.00		8.26	5, 6
V			.086			2.18	
W			.100			2.54	
Y	.105		.145	2.67		3.68	
Z	.650		.850	16.51		21.59	



NOTES:

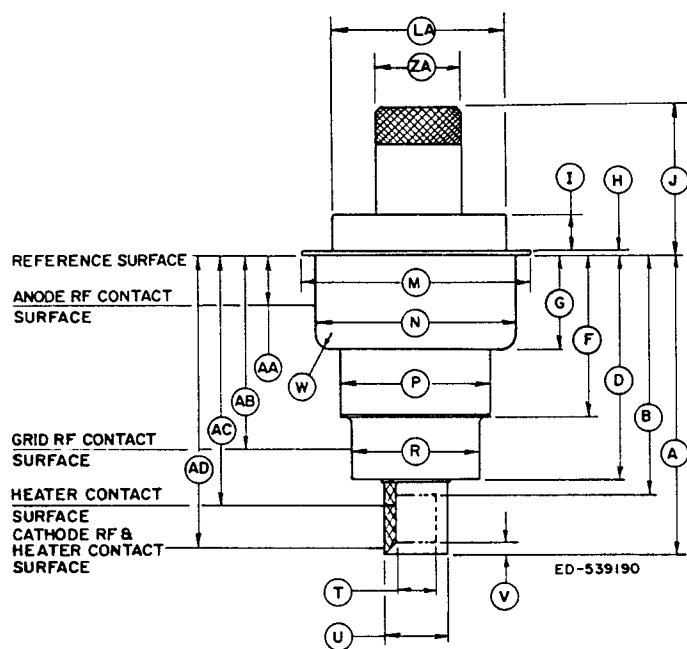
1. Anode rf contact surface and reference dimension for eccentricity measurements.
2. Grid rf contact surface and reference dimension for eccentricity measurements.
3. Heater contact surface and reference dimension for eccentricity measurements.
4. Heater and cathode rf contact surface and reference dimension for eccentricity measurements.
5. The total indicated runout of the anode and grid contact surface with respect to the cathode contact surface will not exceed .020 inch.
6. The total indicated runout of the cathode contact surface with respect to the heater contact surface will not exceed .012 inch.

OUTLINE — ML-7855/AL

DIMENSIONS FOR OUTLINE OF ML-7855K/AL

The millimeter dimensions are derived from the original inch dimensions.

Ref.	Inches			Millimeters			Notes
	Minimum	Nominal	Maximum	Minimum	Nominal	Maximum	
A	1.500		1.560	38.10		39.62	
AA	.035	.198	.361	.89	5.03	9.17	1.5
AB	1.021	1.061	1.101	25.93	26.95	27.97	2, 5
AC	1.219	1.316	1.413	30.96	33.43	35.89	3.6
AD	1.160	1.330	1.500	29.46	33.78	38.10	4, 5, 6
B			1.214			30.84	
D	1.125		1.165	28.58		29.59	
F	.800		.840	20.32		21.34	
G	.462		.477	11.73		12.12	
H			.040			1.02	
I			.185			4.70	
J	.766		.826	19.46		20.98	
LA	.840		.860	21.34		21.84	
M	1.180		1.195	29.97		30.35	
N	1.025		1.035	26.04		26.29	5
P	.752		.792	19.10		20.12	
R	.655		.665	16.64		16.89	5
T	.213		.223	5.41		5.66	6
U	.315		.325	8.00		8.26	5, 6
V			.086			2.18	
W			.100			2.54	
ZA	.427		.447	10.85		11.35	



OUTLINE — ML-7855K/AL

NOTES:

1. Anode rf contact surface and reference dimension for eccentricity measurements.
2. Grid rf contact surface and reference dimension for eccentricity measurements.
3. Heater contact surface and reference dimension for eccentricity measurements.
4. Heater and cathode rf contact surface and reference dimension for eccentricity measurements.
5. The total indicated runout of the anode and grid contact surface with respect to the cathode contact surface will not exceed .020 inch.
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RAYTHEON

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