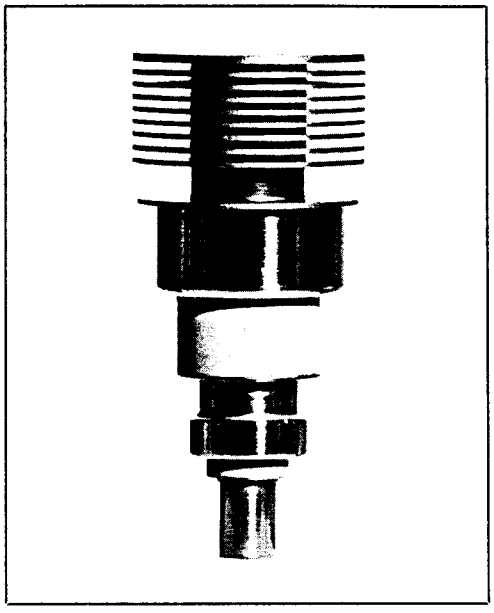
ISSUED 6-65



ML-7289/ 3CX100A5

UHF Planar Triode

CW or Pulsed
3 Gc

MACHLETT
ELECTRON TUBE SPECIALIST

DESCRIPTION

The ML-7289 is a ruggedized, high-mu, planar triode of ceramic-and-metal construction designed specifically for use in new equipment as an oscillator, amplifier or frequency multiplier, at frequencies up to 2.5 Gc. It is well suited for pulsed operation at frequencies up to 3 Gc.

The ML-7289 can, in most cases, replace a 2C39A or 2C39WA directly without equipment modification. It retains the desirable high-mu, low interelectrode capacitance and high transconductance characteristics of its predecessors. It is manufactured to exacting dimensional tolerances to insure mechanical uniformity. Improved reliability and minimum variation in electrical characteristics are achieved through extensive and precise electrical testing. The ML-7289 is capable of sustained, reliable operation at elevated temperatures.

GENERAL CHARACTERISTICS

Electrical

Heater Voltage, AC or DC (See Application Notes)	6.0	V
Heater Current at 6.0 Volts	1.0	A
Heater Heating Time, minimum	60	sec
Amplification Factor	100	
Transconductance (ib=70 ma, eb=600 v)	25000	μmhos
Interelectrode Capacitances, without Heater Voltage		
Grid-Plate	2.0	pf
Grid-Cathode	6.30	pf
Plate-Cathode, maximum	.035	pf

Mechanical

Mounting Position	Optional	
Type of Cooling	Forced-Air	
Maximum Anode Shank and Envelope Temperature	300	°C
Altitude Rating, CW operation	60000	ft
Net Weight	2.5	oz

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

RF Power Amplifier and Oscillator Class C Telegraphy

Key-down conditions per tube without amplitude modulation‡

Maximum Ratings, Absolute Values		
DC Plate Voltage	1000	V
DC Grid Voltage	—150	V
Instantanous 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†	100	W
Grid Dissipation	2	W
Frequency	2.5	Gc
Typical Operation, RF Power Amplifier, Grid Separation Circuit		
Frequency	500	Mc
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	Gc
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

Plate-Modulated RF Power Amplifier Class C Telephony

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

Maximum Ratings, Absolute Values		
DC Plate Voltage*	600	V
DC Grid Voltage	—150	V
Instantanous Peak Grid-Cathode Voltage		
Grid negative to cathode	—400	v
Grid positive to cathode	30	v
DC Cathode Current	100	mA
DC Grid Current§	50	mA
Plate Dissipation, Forced-Air Cooling†	70	W
Grid Dissipation	2	W
Frequency	2.5	Gc

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

Maximum Ratings, Absolute Values		
Plate Voltage		
Grid-Pulsed, DC	1000	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
Peak Plate Current	3	a
Peak Grid Current	1.8	a
Average Plate Dissipation, Forced-Air Cooling†	100	W
Average Grid Dissipation	2	W
Pulse Duration	3	μs•
Duty Factor	.0025	•
Frequency	3	Gc
Typical Operation, Plate-Pulsed Oscillator		
Frequency	3	Gc
Filament Voltage	5.8	V
Pulse Length	3	μs
Duty Factor	.0025	
Peak Plate Pulse Supply Voltage	3500	v
Peak Plate Current from Pulse Supply	3	a
Peak Grid Current	1.8	a
Useful Peak Power Output, approximate	1600	w

Pulse Modulator or Pulse Amplifier

Maximum Ratings, Absolute Values		
DC Plate Voltage	1000	V
Peak Plate Voltage	1200	v
DC Grid Voltage	—150	V
Instantaneous Peak Grid-Cathode Voltage		
Grid negative to cathode	—750	v
Grid positive to cathode	250	v
DC Plate Current	100	mA
Pulse Cathode Current	4.8	a
Average Plate Dissipation, Forced-Air Cooling†	100	W
Average Grid Dissipation	2	W
Pulse Duration	3	μs•
Duty Factor	.0025	•

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

§See "Application Notes" on "Determination of Proper Grid Drive".

†Refer to "Cooling" in "Application Notes".

*For modulation factors less than 1.0, a higher dc plate voltage may be used if the sum of the peak audio voltage and the dc plate voltage does not exceed 1200 volts.

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

CHARACTERISTIC RANGE VALUES FOR EQUIPMENT DESIGN

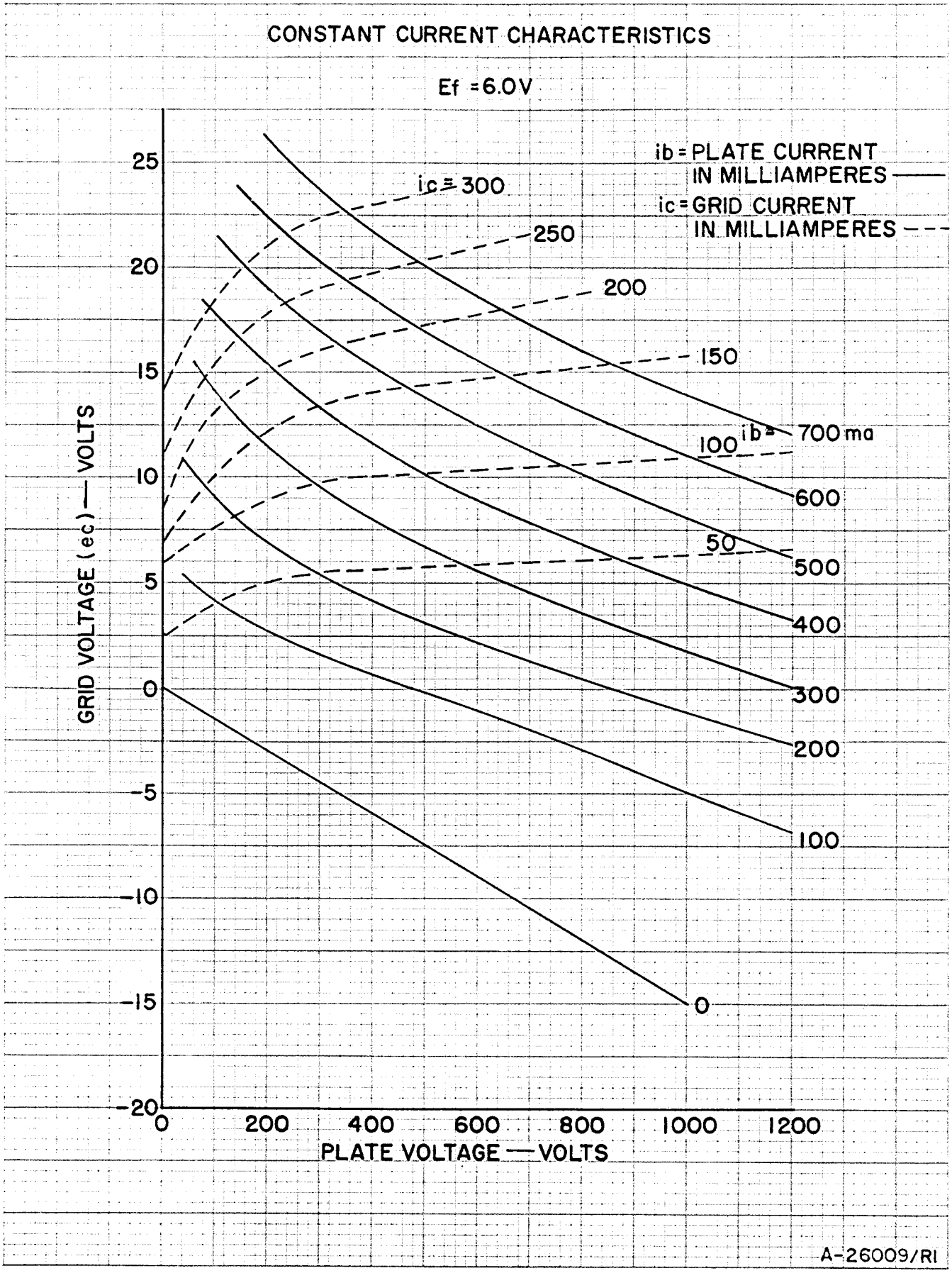
	Min.	Max.	
Filament Current at 6.0 volts	.90	1.05	A
Cut-off bias (Note 1)	—	—15	V
Grid-Plate Capacitance (Note 2)	1.95	2.15	pf
Grid-Cathode Capacitance (Note 2)	5.60	7.00	pf

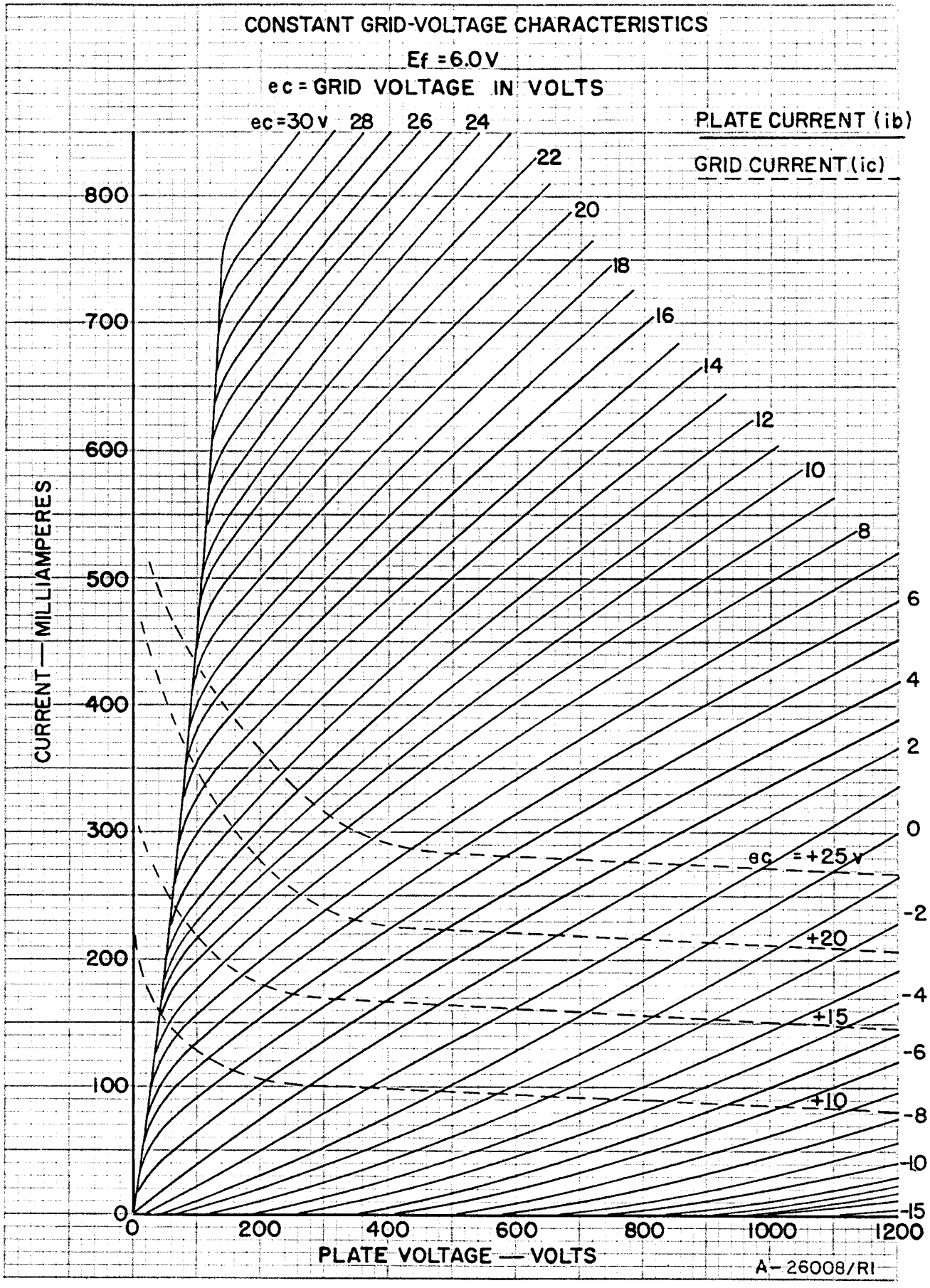
Note 1 — Measured at 1 mA of the plate current and a plate voltage of 600 volts.

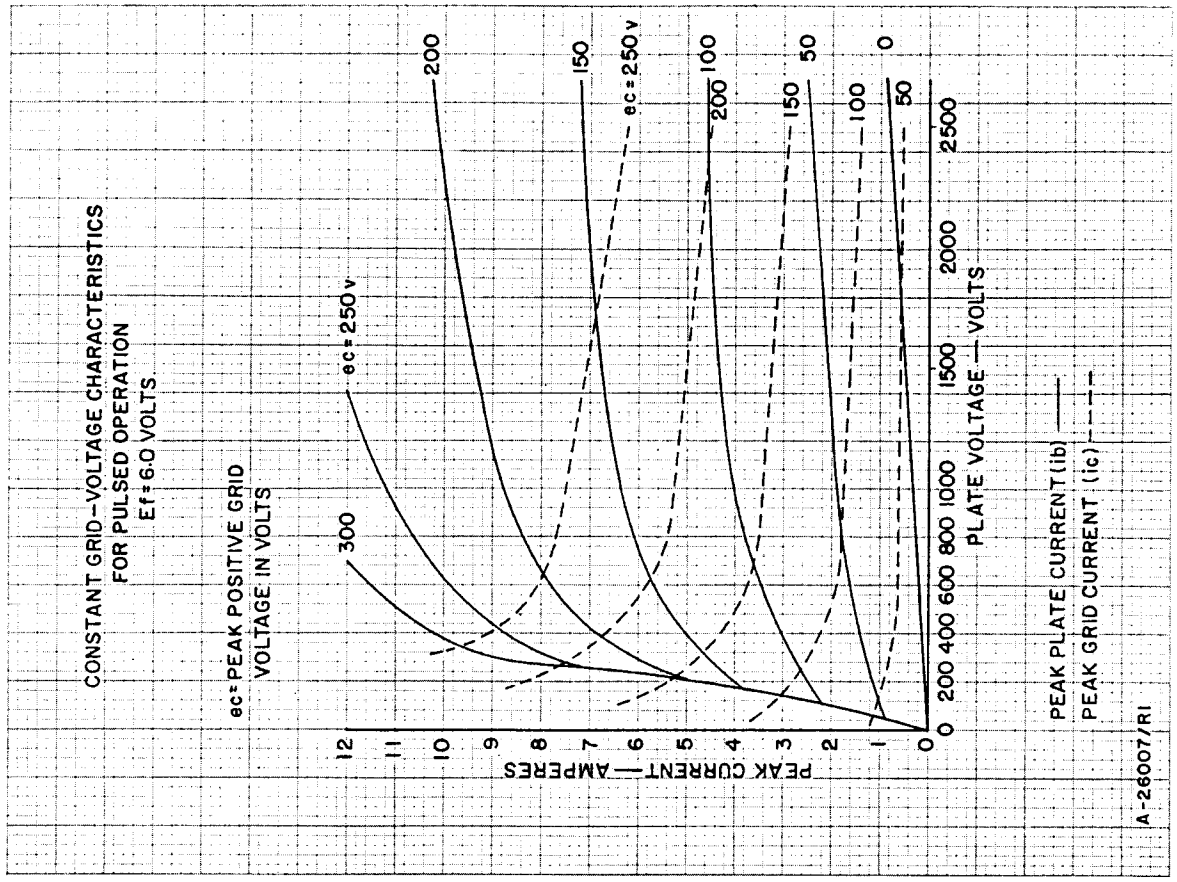
Note 2 — Capacitance measurements are with the tube cold.

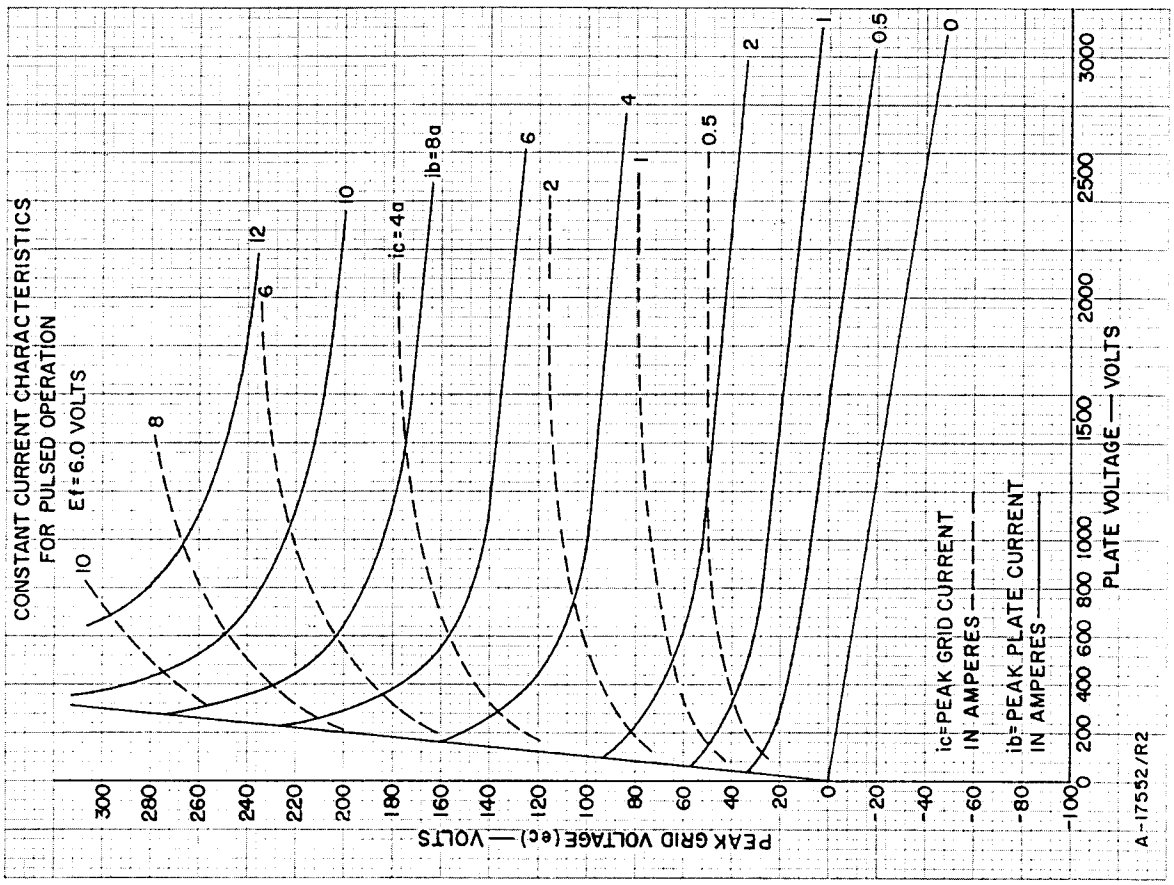
APPLICATION NOTES

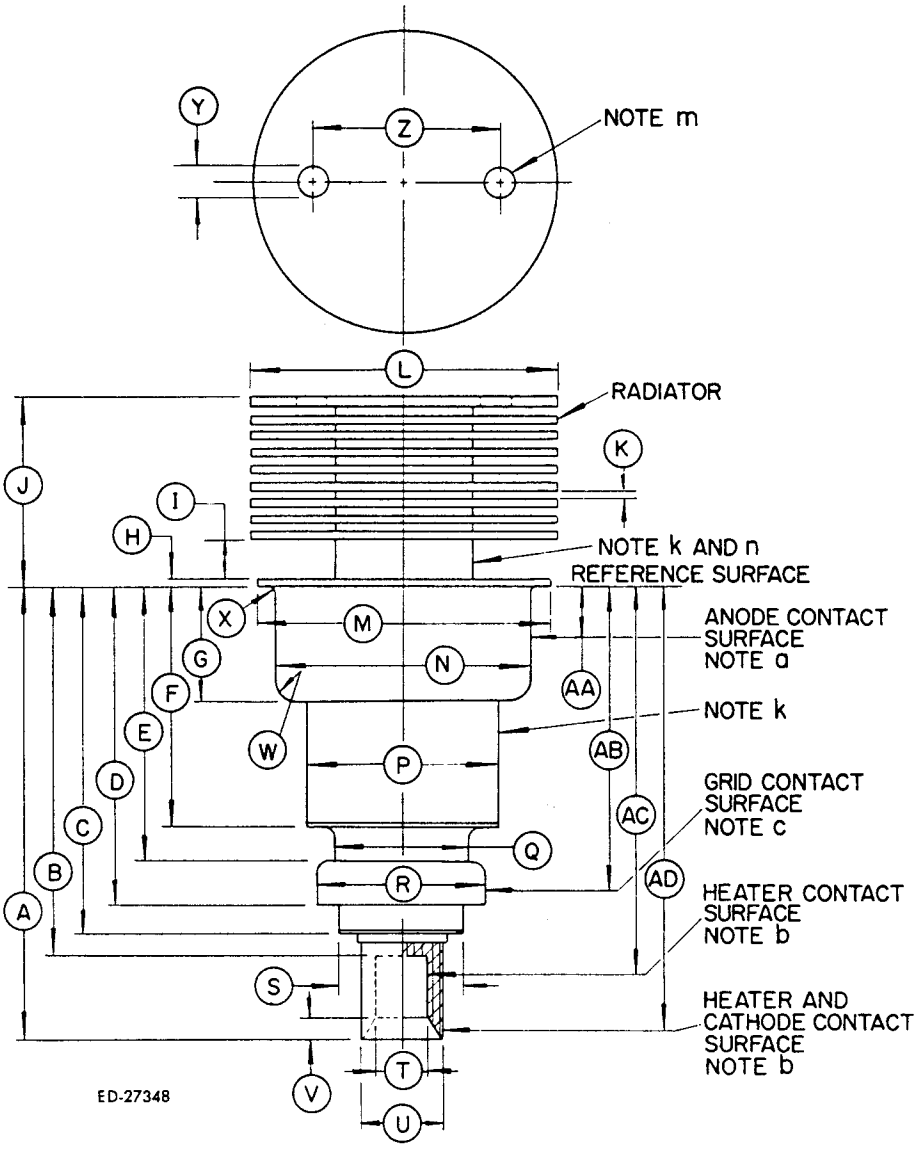
Before designing equipment for use with these tubes and before installing tubes in equipment, refer to the general information given in the Machlett publication entitled *Application Notes, UHF Tubes — General.*


CONSTANT CURRENT CHARACTERISTICS
Ef = 6.0V
ib = PLATE CURRENT IN MILLIAMPERES
ic = GRID CURRENT IN MILLIAMPERES
ic = 300
250
200
150
100
50
ib = 700 ma
600
500
400
300
200
100
0
GRID VOLTAGE (ec) — VOLTS
25
20
15
10
5
0
-5
-10
-15
-20
0
200
400
600
800
1000
1200
PLATE VOLTAGE — VOLTS
A-26009/R1


CONSTANT GRID-VOLTAGE CHARACTERISTICS
Ef = 6.0 V
ec = GRID VOLTAGE IN VOLTS
ec = 30 v
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-15
PLATE CURRENT (ib)
GRID CURRENT (ic)
ec = +25 v
+20
+15
+10
CURRENT — MILLIAMPERES
800
700
600
500
400
300
200
100
0
0
200
400
600
800
1000
1200
PLATE VOLTAGE — VOLTS
A-26008/RI


CONSTANT GRID-VOLTAGE CHARACTERISTICS
FOR PULSED OPERATION
Ef = 6.0 VOLTS
ec = PEAK POSITIVE GRID VOLTAGE IN VOLTS
ec = 250 v
300
200
150
ec = 250 v
200
100
150
50
100
50
0
PEAK CURRENT — AMPERES
PLATE VOLTAGE — VOLTS
PEAK PLATE CURRENT (ib) ——
PEAK GRID CURRENT (ic) - - - -
A-26007/R1


CONSTANT CURRENT CHARACTERISTICS
FOR PULSED OPERATION
Ef = 6.0 VOLTS
10
8
12
6
10
ic = 4a
ib = 8a
6
2
4
1
0.5
2
1
0.5
0
PEAK GRID VOLTAGE (ec) — VOLTS
ic = PEAK GRID CURRENT IN AMPERES - - - -
ib = PEAK PLATE CURRENT IN AMPERES ——
PLATE VOLTAGE — VOLTS
A-17552/R2



DIMENSIONS FOR OUTLINE (INCHES)

Ref.	Minimum	Maximum
A	1.815	1.875
B	—	1.534
C	—	1.475
D	1.289	1.329
E	1.085	1.135
F	.880	.920
G	.462	.477
H	—	.040
I	.125	.185
J	.766	.826
K	.025	.046
L	1.234	1.264
M	1.180	1.195
N	1.025	1.035
P	.772	.792
Q	.541	.561
R	.655	.665
S	—	.545
T	.213	.223
U	.315	.325
V	—	.086
W	—	.100
X	—	.035
Y	.105	.145
Z	.650	.850

NOTES

a. The total indicated runout of the anode contact surface with respect to the cathode contact surfaces will not exceed .020 inch.

b. The total indicated runout of the cathode contact surface with respect to the heater contact surfaces will not exceed .012 inch.

c. The total indicated runout of the grid contact surface with respect to the cathode contact surface will not exceed .020 inch.

k. Do not clamp or locate on this surface.

m. Hole provided for tube extractor through the top fin only.

n Measure anode shank temperature on this surface.

DIMENSIONS FOR ELECTRODE CONTACT AREA (INCHES)

Ref.	Dimension	Contact
AA	.198 ± .163	Anode
AB	1.225 ± .040	Grid
AC	1.631 ± .097	Heater
AD	1.645 ± .170	Cathode

DIMENSIONS — ML-7289

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