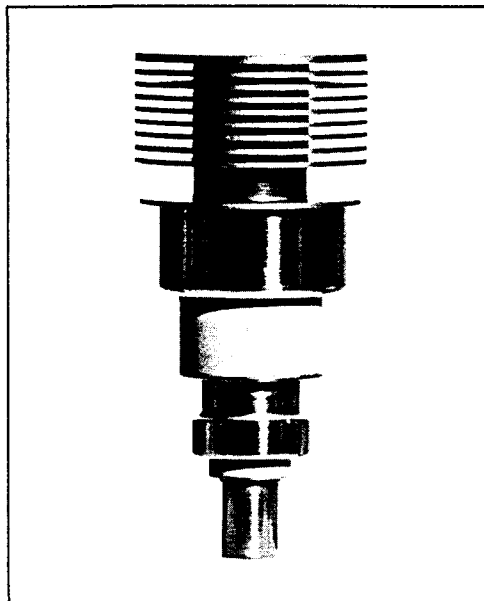




# ML-7289/ 3CX100A5

## UHF Planar Triode

CW or Pulsed  
3 Gc



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 ( $i_b = 70$ ma, $e_b = 600$ v) ..... | 25000 | $\mu$ mhos |
| 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  |
| 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† ..... | 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  |
| Instantaneous 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.

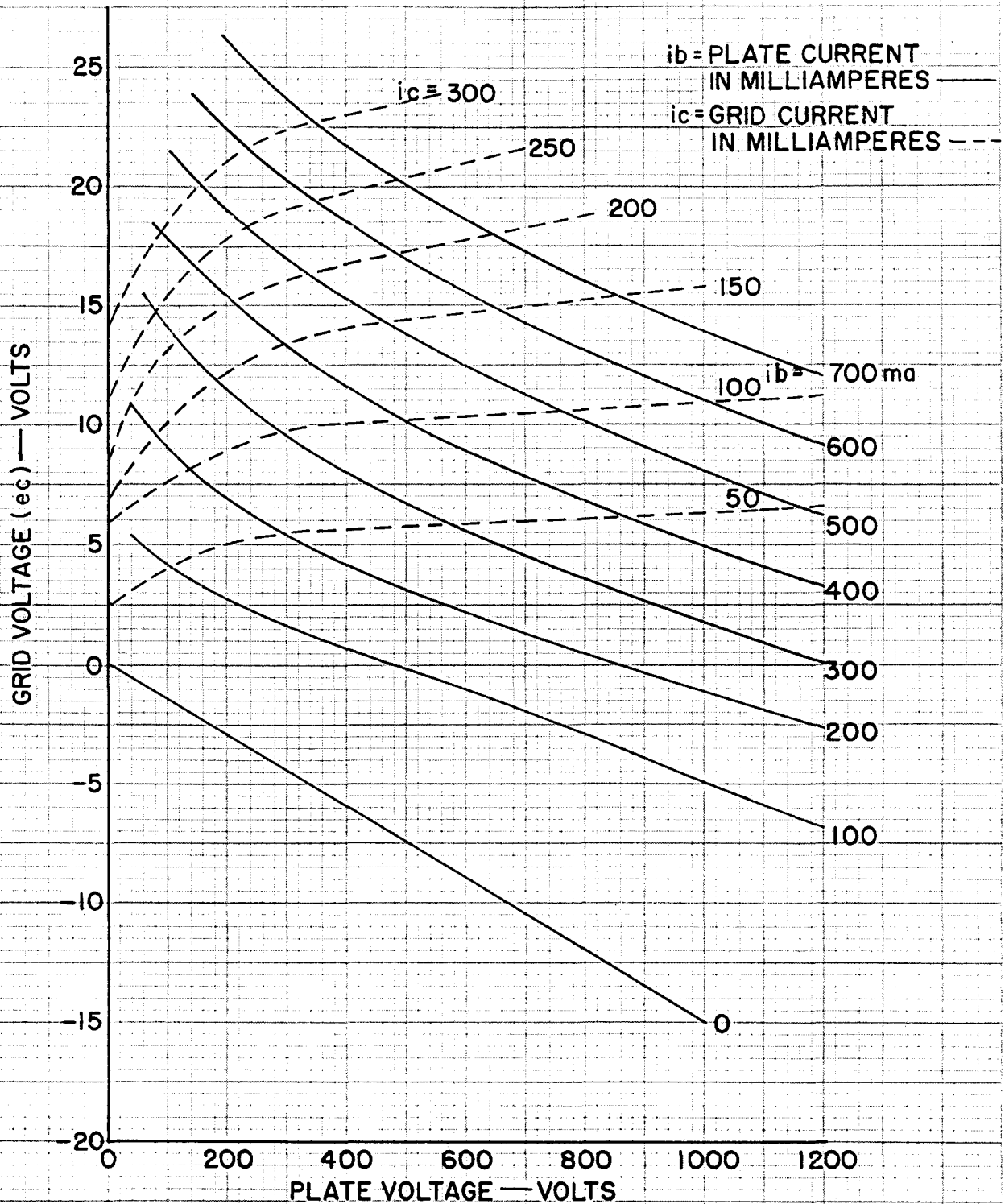
CHARACTERISTIC RANGE VALUES  
FOR EQUIPMENT DESIGN

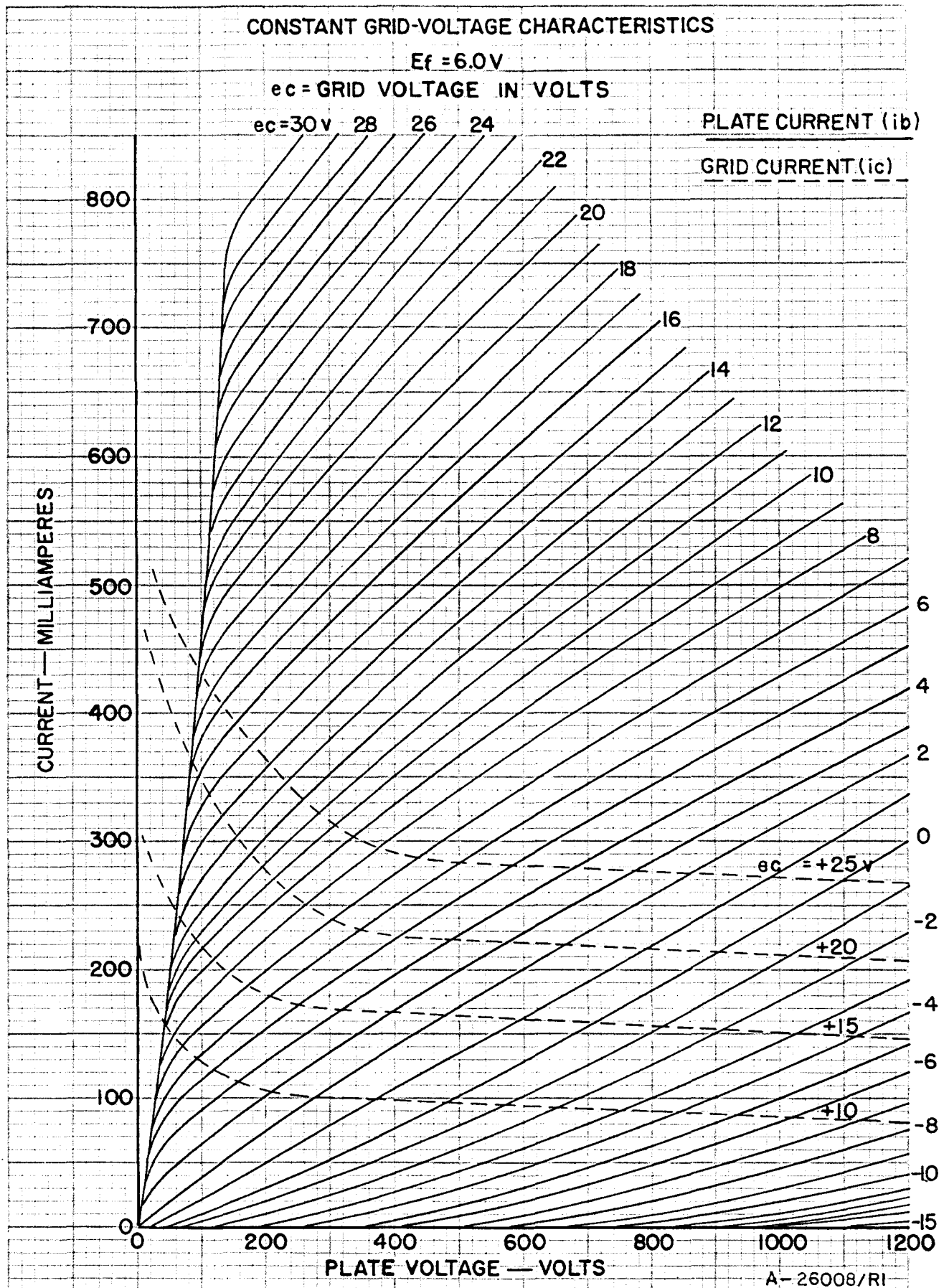
|                                                                                  | Min. | Max. |    |
|----------------------------------------------------------------------------------|------|------|----|
| Filament Current at 6.0 volts .....                                              | .90  | 1.05 | 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.                        |      |      |    |

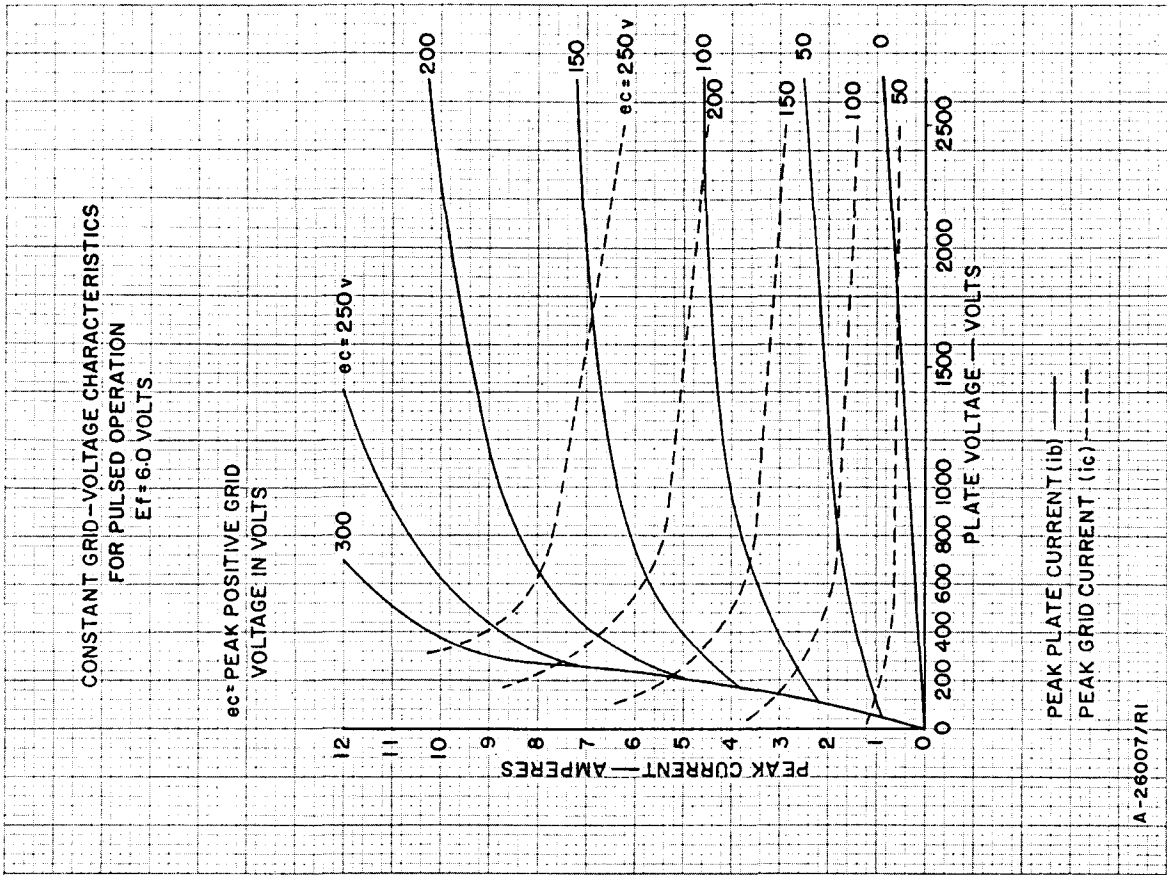
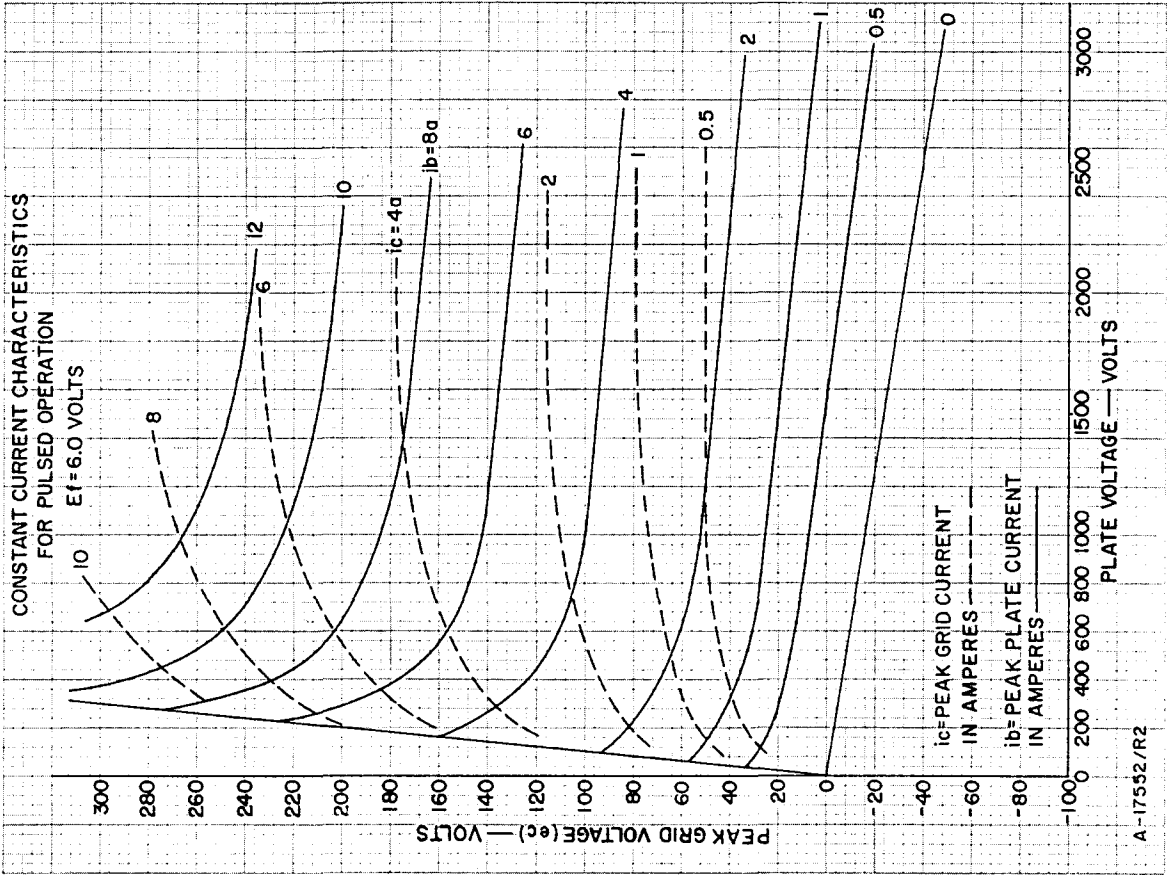
## APPLICATION NOTES

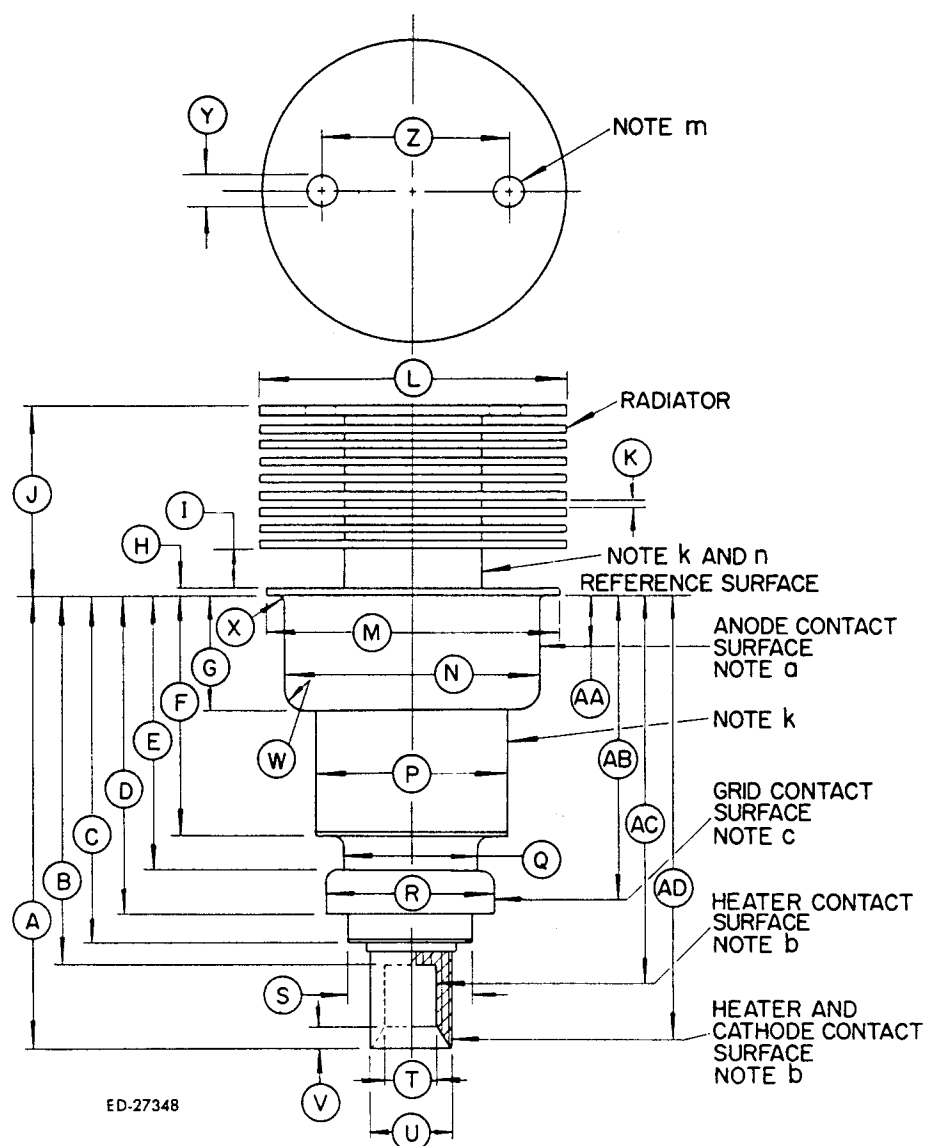
Before designing equipment for use with these tubes and before installing tubes in equipment, refer to the general information given in the Machlett publication entitled *Application Notes, UHF Tubes — General*.

## CONSTANT CURRENT CHARACTERISTICS

 $E_f = 6.0V$ 







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

- The total indicated runout of the anode contact surface with respect to the cathode contact surfaces will not exceed .020 inch.
- The total indicated runout of the cathode contact surface with respect to the heater contact surfaces will not exceed .012 inch.
- The total indicated runout of the grid contact surface with respect to the cathode contact surface will not exceed .020 inch.
- Do not clamp or locate on this surface.
- Hole provided for tube extractor through the top fin only.
- 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

**THE MACHLETT LABORATORIES, INC.**

An Affiliate of Raytheon Company

SPRINGDALE



CONNECTICUT