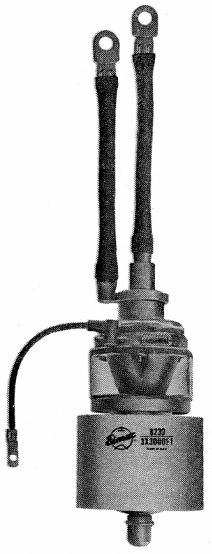
EITEL-McCULLOUGH, INC.
SAN CARLOS, CALIFORNIA

# 8239
# 3X3000F1

## LOW-MU TRIODE



The Eimac 8239/3X3000F1 is a low-mu forced-air cooled power triode intended for use as an audio amplifier or modulator. The maximum rated plate dissipation is 3000 watts.

Two 3X3000F1's in class-$AB_1$ audio service will deliver up to 10 kilowatts maximum-signal plate output power at 6000 plate volts without drawing grid current.

The 3X3000F1 is provided with "flying leads" for filament and grid connections.

## GENERAL CHARACTERISTICS

### ELECTRICAL

| | Min. | Nom. | Max. | |
|---|---|---|---|---|
| Filament: Thoriated Tungsten | | | | |
| Voltage | | 7.5 | | volts |
| Current | 49 | | 54 | amperes |
| Amplification Factor | 4.4 | | 5.6 | |
| Direct Interelectrode Capacitances (Average) | | | | |
| Grid-Plate | | 17 | | uufd |
| Grid-Filament | | 29 | | uufd |
| Plate-Filament | | 2.5 | | uufd |
| Transconductance ($I_b$ = 1.0 amp., $E_b$ = 3000 V) | | 11,000 | | umhos |
| Maximum Frequency | | | 30 | Mc |

### MECHANICAL

| | |
|---|---|
| Base | See outline drawing |
| Mounting Position | Vertical, base down or up |
| Cooling | Forced air |
| ▶ Maximum Temperatures: | |
| Grid and Filament Seals | 175°C |
| Anode Cooler Core | 250°C |
| Maximum Diameter | 4.16 inches |
| Net Weight | 7.5 pounds |
| Shipping Weight | 17 pounds |

### AUDIO FREQUENCY POWER AMPLIFIER OR MODULATOR

Class-$AB_1$

MAXIMUM RATINGS (Per tube)

| | | |
|---|---|---|
| DC PLATE VOLTAGE | 6000 MAX. | VOLTS |
| DC PLATE CURRENT | 2.5 MAX. | AMPERES |
| PLATE DISSIPATION | 3000 MAX. | WATTS |
| GRID DISSIPATION | 50 MAX. | WATTS |

*Adjust to stated Zero-Signal DC Plate Current. Can be expected to vary ±15%. Effective grid-circuit resistance must not exceed 200,000 ohms.

**At maximum signal without negative feedback.

TYPICAL OPERATION (Sinusoidal wave, two tubes)
Class $AB_1$

| | | | | |
|---|---|---|---|---|
| DC Plate Voltage | 4000 | 5000 | 6000 | volts |
| DC Grid Voltage (Approx)* | -860 | -1080 | -1300 | volts |
| Zero-Signal DC Plate Current | 500 | 400 | 335 | mA |
| Max-Signal DC Plate Current | 3.00 | 2.80 | 2.65 | amps |
| Effective Load, Plate-to-Plate | 2160 | 3320 | 4560 | ohms |
| Peak AF Grid Input Voltage (per tube) | 760 | 995 | 1250 | volts |
| Max-Signal Driving Power | 0 | 0 | 0 | watts |
| Max-Signal Plate Input Power | 12,000 | 14,000 | 16,000 | watts |
| Max-Signal Plate Dissipation (per tube) | 3000 | 3000 | 3000 | watts |
| Max-Signal Plate Output Power | 6000 | 8000 | 10,000 | watts |
| Total Harmonic Distortion** | 1.8 | 2.6 | 2.1 | percent |

▶ Change from data sheet dated 10-21-59

# APPLICATION

## MECHANICAL

**Mounting:** The 3X3000F1 must be mounted vertically with its base up or down at the convenience of the designer. The base is fitted with heavy filament leads to facilitate connections. These leads should be arranged to prevent mechanical stress on the filament structure. The grid is also fitted with a flying lead.

The tube must be protected from severe shock and vibration during shipment and operation.

**Cooling:** Sufficient forced air cooling must be provided to maintain seal temperature at 175° C or below. Air-flow must be started when filament power is applied and it is advisable to continue air-cooling for two minutes after all voltages are removed.

The table below lists minimum air-flow requirements to maintain tube temperatures below 175° C with air flowing in both the base-to-anode and anode-to-base directions. This tabulation presumes air at 25° C and sea level. A separate supply of approximately six cubic feet per minute, directed into the filament structure is also required to maintain rated filament seal temperatures. This is best accomplished using a small diameter insulating tubing directed into the stem, between the filament seals.

| | MINIMUM COOLING AIR-FLOW REQUIREMENTS | | | |
|---|---|---|---|---|
| | BASE-TO-ANODE FLOW | | ANODE-TO-BASE FLOW | |
| Plate Dissipation (Watts) | AIR-FLOW (CFM) | PRESSURE DROP (inches of water) | AIR-FLOW (CFM) | PRESSURE DROP (inches of water) |
| 1000 | 14 | 0.1 | 20 | 0.1 |
| 2000 | 37 | 0.3 | 61 | 0.8 |
| 3000 | 74 | 1.0 | 122 | 3.0 |

**Note:**
An extra 425 watts have been added to these plate dissipation figures in preparing this tabulation, to compensate for grid and filament dissipation.

For operation at high altitudes or higher ambient temperatures, these quantities should be increased. In all cases it is suggested that actual temperatures be measured to insure adequate cooling.

## ELECTRICAL

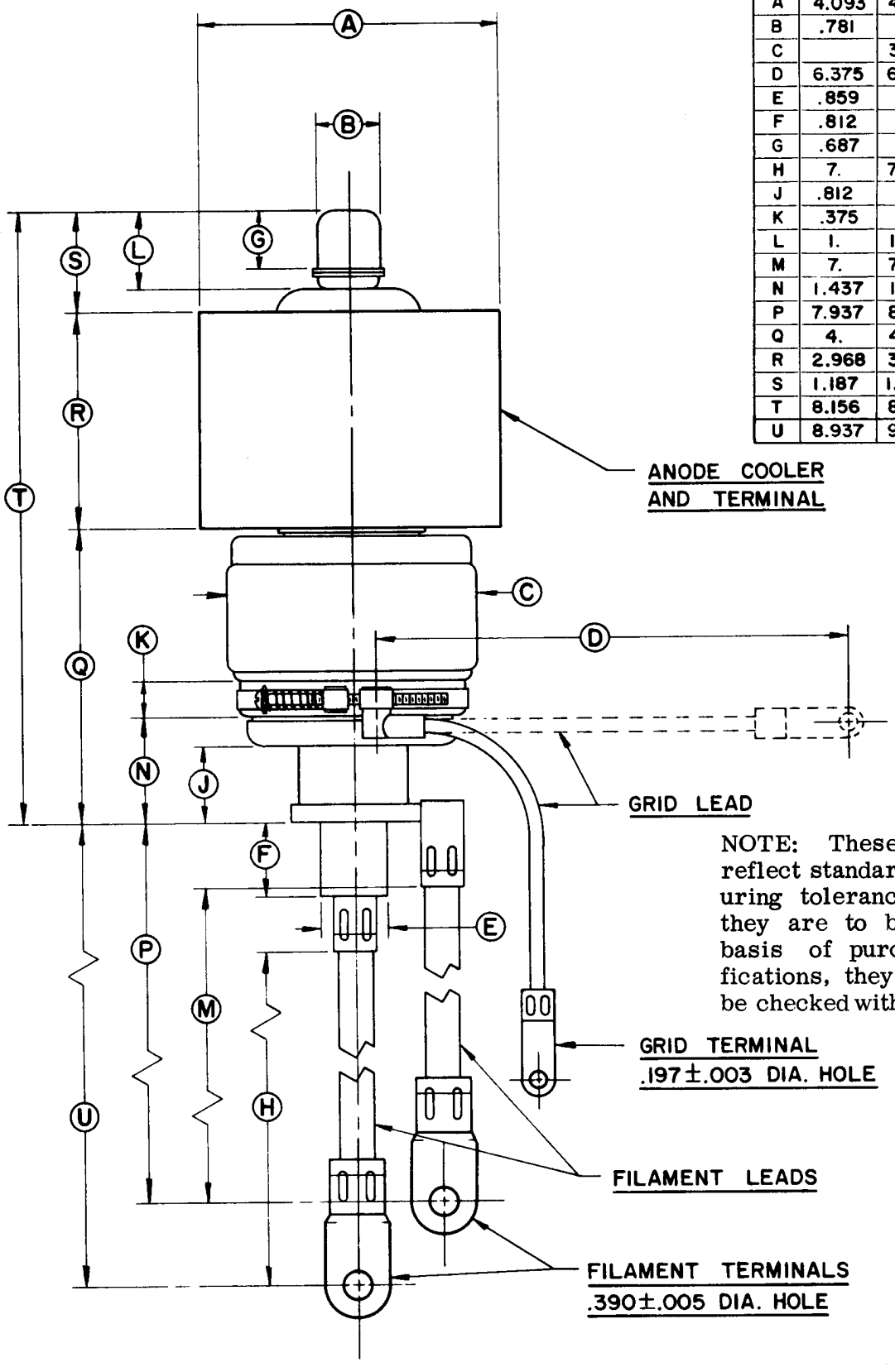
**Filament:** The rated filament voltage for the 3X3000F1 is 7.5 volts and should not exceed this value by more than five percent if maximum tube life is to be realized. Reduction of filament voltage to about 7.2 volts will actually enhance tube life and provision should be made for this adjustment where the lower emission can be tolerated.

**Grid Operation:** The grid dissipation rating of the 3X3000F1 is 50 watts. This is the product of the peak positive grid voltage and average dc grid current. When tubes are used in parallel in amplifier or modulator service, provision should be made for individual adjustment of bias voltage, in order to match the tubes. In practice, individual adjustment of drive voltage will not be necessary.

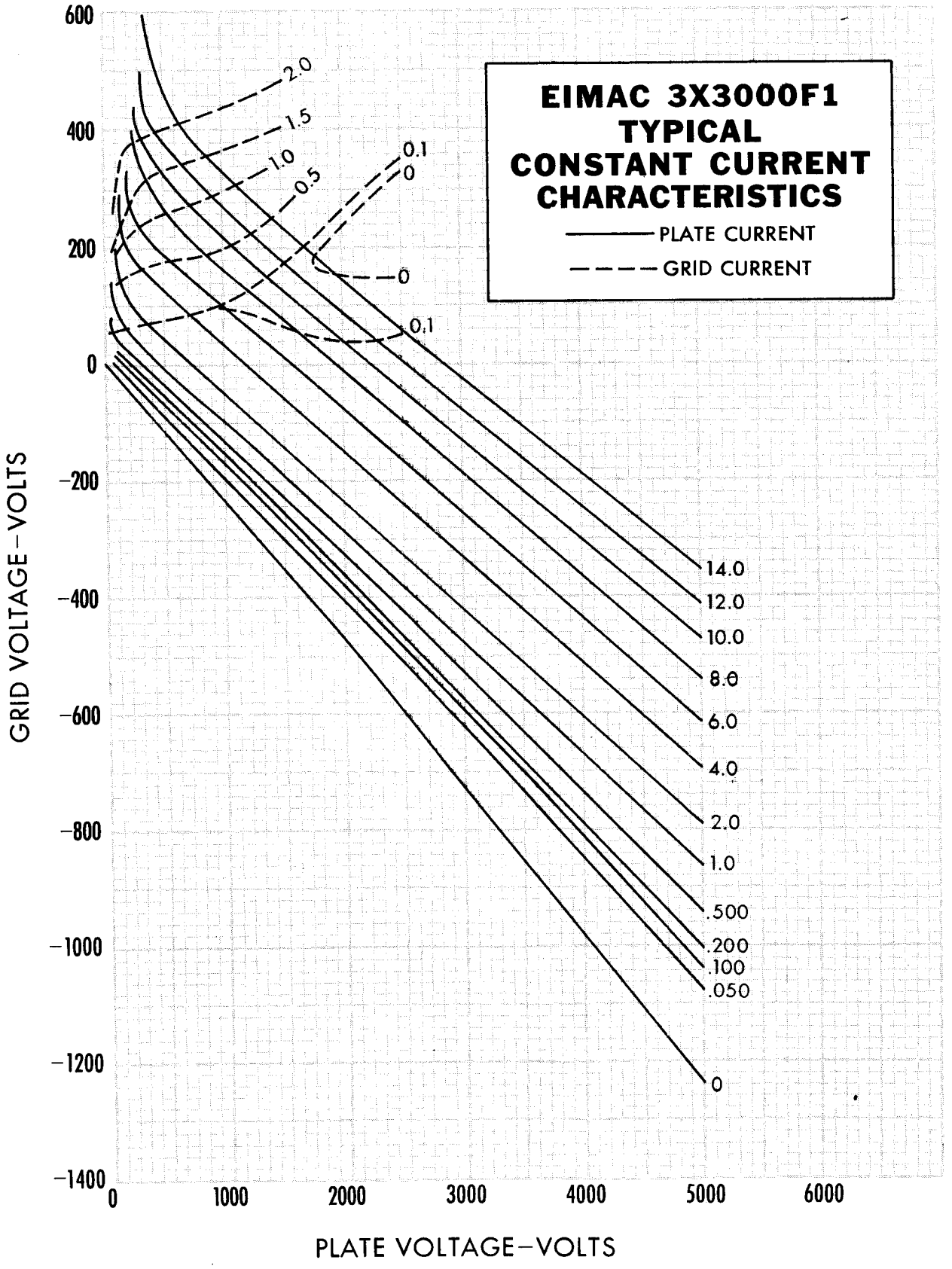
**Special Applications:** If it is desired to operate the tube under conditions widely different from those given here, write to Power Grid Tube Marketing, Eitel-McCullough, Inc., 301 Industrial Way, San Carlos, California, for information and recommendations.

DIMENSIONS IN INCHES

| DIMENSIONAL DATA | | | |
|---|---|---|---|
| REF. | MIN. | MAX. | NOM. |
| A | 4.093 | 4.156 | |
| B | .781 | .843 | |
| C | | 3.625 | |
| D | 6.375 | 6.625 | |
| E | .859 | .890 | |
| F | .812 | .937 | |
| G | .687 | .812 | |
| H | 7. | 7.500 | |
| J | .812 | .937 | |
| K | .375 | .437 | |
| L | 1. | 1.125 | |
| M | 7. | 7.500 | |
| N | 1.437 | 1.562 | |
| P | 7.937 | 8.437 | |
| Q | 4. | 4.125 | |
| R | 2.968 | 3.031 | |
| S | 1.187 | 1.437 | |
| T | 8.156 | 8.593 | |
| U | 8.937 | 9.437 | |




NOTE: These dimensions reflect standard manufacturing tolerances. Where they are to be made the basis of purchase specifications, they should first be checked with the factory.


EIMAC 3X3000F1
TYPICAL
CONSTANT CURRENT
CHARACTERISTICS
PLATE CURRENT
GRID CURRENT
600
400
200
0
−200
−400
−600
−800
−1000
−1200
−1400
0
1000
2000
3000
4000
5000
6000
GRID VOLTAGE−VOLTS
PLATE VOLTAGE−VOLTS
2.0
1.5
1.0
0.5
0.1
0
0
0.1
14.0
12.0
10.0
8.0
6.0
4.0
2.0
1.0
.500
.200
.100
.050
0