

EITEL-McCULLOUGH, INC.

SAN BRUNO, CALIFORNIA

2000T

MEDIUM-MU TRIODE
•
MODULATOR
OSCILLATOR
AMPLIFIER

The 2000T is a medium-mu, high-vacuum transmitting triode intended for amplifier, oscillator and modulator service. It has a maximum plate dissipation rating of 2000 watts. Cooling of the 2000T is accomplished by radiation from the plate, which operates at a visibly red temperature at maximum dissipation, and by means of forced air circulation around the envelope and at the seals.

GENERAL CHARACTERISTICS

ELECTRICAL

Filament: Thoriated tungsten

Voltage - - - - - 10.0 volts

Current - - - - - 25.0 amperes

Amplification Factor (Average) - - - - - 23

Direct Interelectrode Capacitances (Average)

Grid-Plate - - - - - 8.5 $\mu\text{fd.}$

Grid-Filament - - - - - 12.7 $\mu\text{fd.}$

Plate-Filament - - - - - 1.7 $\mu\text{fd.}$

Transconductance ($i_b = 1.75 \text{ amp.}$, $E_b = 6000 \text{ v.}$, $E_c = -95 \text{ v.}$) 11,000 μmhos

MECHANICAL

Base - - - - - Special 4-pin, No. 5006B

Basing - - - - - RMA type 4BD

Cooling - - - - - Radiation and forced air

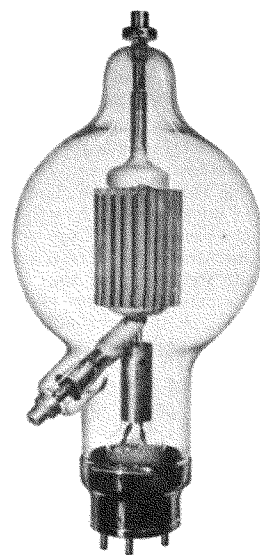
Maximum Overall Dimensions:

Length - - - - - 17.75 inches

Diameter - - - - - 8.125 inches

Net weight - - - - - 3.5 pounds

Shipping weight (Average) - - - - - 8.5 pounds



RADIO FREQUENCY POWER AMPLIFIER AND OSCILLATOR

Class-C Telegraphy (Key-down conditions, 1 tube)

MAXIMUM RATINGS (Frequencies below 40 Mc.)

D-C PLATE VOLTAGE - - - - - 8000 MAX. VOLTS

D-C PLATE CURRENT - - - - - 1.75 MAX. AMPS.

PLATE DISSIPATION - - - - - 2000 MAX. WATTS

GRID DISSIPATION - - - - - 150 MAX. WATTS

TYPICAL OPERATION (Frequencies below 40 Mc.)

D-C Plate Voltage - - - - - 5000 6000 7000 volts

D-C Grid Voltage - - - - - -350 -500 -600 volts

D-C Plate Current - - - - - 1.35 1.35 1.15 amps

D-C Grid Current - - - - - 175 165 120 ma.

Grid Dissipation - - - - - 79 78 43 watts

Peak R-F Grid Input Voltage (approx.) 900 1050 1060 volts

Driving Power, (approx.) - - - - - 140 160 115 watts

Plate Power Input - - - - - 6670 8000 8000 watts

Plate Dissipation - - - - - 2000 2000 2000 watts

Plate Power Output - - - - - 4670 6000 6000 watts

AUDIO FREQUENCY POWER AMPLIFIER AND MODULATOR

Class-B (Sinusoidal wave, two tubes unless otherwise specified)

MAXIMUM RATINGS

D-C PLATE VOLTAGE - - - - - 8000 MAX. VOLTS

MAX-SIGNAL D-C PLATE CURRENT, PER TUBE - 1.75 MAX. AMPS.

PLATE DISSIPATION, PER TUBE - - - - - 2000 MAX. WATTS

GRID DISSIPATION, PER TUBE - - - - - 150 MAX. WATTS

TYPICAL OPERATION

D-C Plate Voltage - - - - - 5000 6000 7000 volts

D-C Grid Voltage - - - - - -180 -230 -290 volts

Zero-Signal D-C Plate Current - - - - - 480 400 350 ma.

Max-Signal D-C Plate Current - - - - - 2.00 1.88 1.86 amps.

Effective Load, Plate-to-Plate - - - - - 4900 6650 8500 ohms

Peak A-F Grid Input Voltage (per tube) 470 525 590 volts

Max-Signal Avg. Driving Power (approx.) 50 60 75 watts

Max-Signal Peak Driving Power - - - - - 178 184 212 watts

Max-Signal Plate Dissipation (per tube) - 2000 1875 2000 watts

Max-Signal Plate Power Output - - - - - 6000 7500 9000 watts

APPLICATION

MECHANICAL

Mounting—The 2000T must be mounted vertically, base up or base down. Flexible connecting straps should be provided between the grid and plate terminals and the external grid and plate circuits. The tube must be protected from severe vibration and shock.

Cooling—The envelope and seals of the 2000T require artificial cooling. An ordinary 8- or 10-inch fan located one foot from the tube will provide sufficient air for cooling the envelope. The air should be directed at the tube in a manner which will allow the most uniform cooling of the envelope. The grid and plate seals each require a minimum flow of two cubic feet of air per minute. The air for the grid seal is fed through the grid connector. A special connector (Eimac HR-9) is available for this purpose. A special heat-dissipating connector (Eimac HR-8) is also available for use on the plate terminal. A minimum flow of two cubic feet of air per minute must likewise be supplied to the filament seals through the hole at the center of the base. Suitable electrical interlocks should be provided to remove the plate and filament voltages in the event that the supply of cooling air is interrupted.

ELECTRICAL

Filament Voltage—The filament voltage, as measured directly at the filament pins, should be between 9.5 and 10.5 volts.

Bias Voltage—Although there is no maximum limit on the bias voltage which may be used on the 2000T there is little advantage in using bias voltages in excess of those given under "Typical Operation," except in certain very specialized applications. Where bias is obtained by a grid

leak, suitable protective means must be provided to prevent excessive plate dissipation in the event of loss of excitation.

Plate Voltage—The plate supply voltage for the 2000T should not exceed 8000 volts. In most cases there is little advantage in using plate-supply voltages higher than those given under "Typical Operation" for the power output desired.

Grid Dissipation—The power dissipated by the grid of the 2000T must not exceed 150 watts. Grid dissipation may be calculated from the following expression:

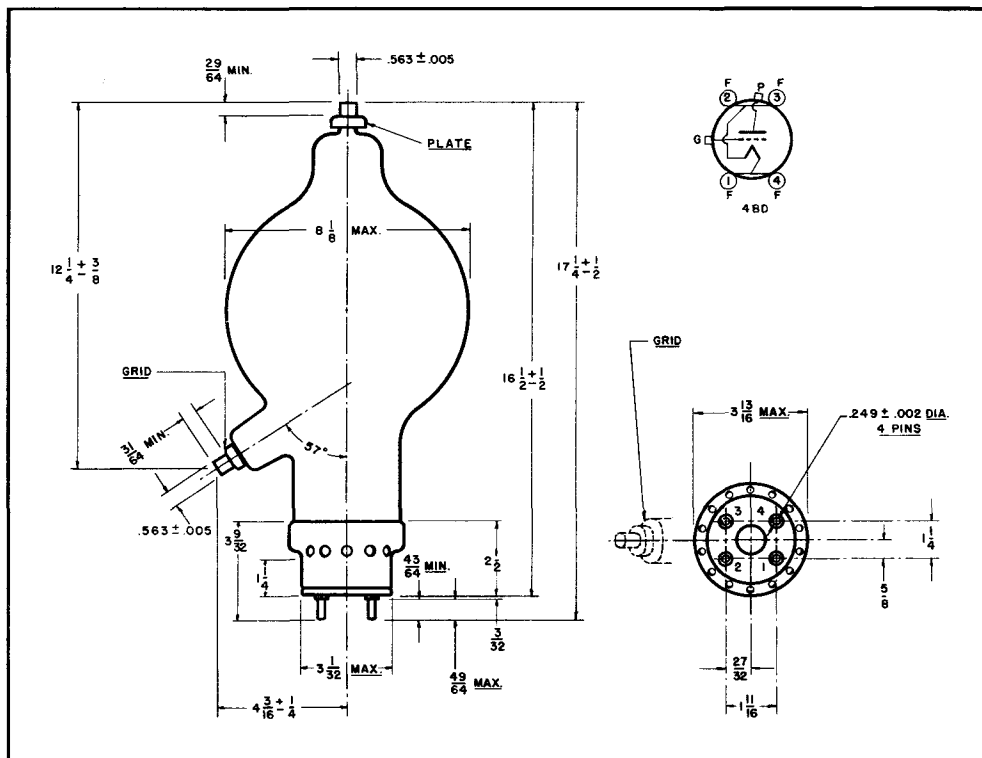
$$P_g = e_{cmp} I_c$$

where P_g = Grid dissipation,
 e_{cmp} = Peak positive grid voltage, and
 I_c = D-c grid current.

e_{cmp} may be measured by means of a suitable peak voltmeter connected between filament and grid.¹ In equipment in which the plate loading varies widely, such as oscillators used for radio-frequency heating, care should be taken to make certain that the grid dissipation does not exceed the maximum rating under any condition of loading.

Plate Dissipation—Under normal operating conditions, the power dissipated by the plate of the 2000T should not be allowed to exceed 2000 watts. Plate dissipation in excess of the maximum rating is permissible for short periods of time, such as during tuning procedures.

¹ For suitable peak v.t.v.m. circuits see, for instance, "Vacuum Tube Ratings," Eimac News, January, 1945. This article is available in reprint form on request.



DRIVING POWER vs. POWER OUTPUT

The three charts on this page show the relationship of plate efficiency, power output and grid driving power at plate voltages of 5000, 6000, and 7000 volts. These charts show combined grid and bias losses only. The driving power and power output figures do not include circuit losses. The plate dissipation in watts is indicated by P_p .

Points A, B, and C are identical to the typical Class C operating conditions shown on the first page under 5000, 6000, and 7000 volts respectively.

