



EITEL-McCULLOUGH, INC.
SAN CARLOS · CALIFORNIA

1500T

MEDIUM-MU TRIODE

•
**MODULATOR
OSCILLATOR
AMPLIFIER**

The Eimac 1500T is a medium-mu power triode intended for use as an amplifier, oscillator or modulator. It has a maximum plate-dissipation rating of 1500 watts and a maximum plate-voltage rating of 8000 volts at frequencies up to 40 Mc.

The 1500T in class-C r-f service will deliver up to 4500 watts plate power output with 85 watts driving power. Two 1500T's in class-B modulator service will deliver up to 7000 watts maximum-signal plate power output with 115 watts nominal driving power.

GENERAL CHARACTERISTICS

ELECTRICAL

Filament: Thoriated tungsten

Voltage - - - - - 7.5 volts

Current - - - - - 24.0 amperes

Amplification Factor (Average)

24

Direct Interelectrode Capacitances (Average)

Grid-Plate - - - - - 7.2 μmf

Grid-Filament - - - - - 9.9 μmf

Plate-Filament - - - - - 1.5 μmf

Transconductance ($i_b = 1.25 \text{ amp.}$, $E_b = 6000 \text{ v.}$) - - - - - 10,000 μmhos

MECHANICAL

Base - - - - - Special 4-pin

Basing - - - - - See outline drawing

Socket - - - - - Johnson type No. 124-214 or equivalent

Mounting Position - - - - - Vertical, base down or up

Cooling - - - - - Radiation and forced air

Maximum Temperature of Plate and Grid Seals - - - - - 225°C

Recommended Heat-Dissipating Connectors:

Plate - - - - - Eimac HR-8

Grid - - - - - Eimac HR-8

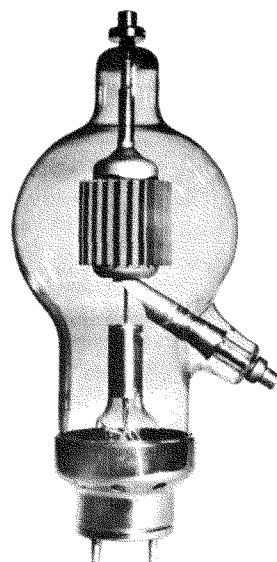
Maximum Overall Dimensions:

Length - - - - - 17.0 inches

Diameter - - - - - 7.13 inches

Net Weight - - - - - 3.0 pounds

Shipping Weight - - - - - 13 pounds



RADIO-FREQUENCY POWER AMPLIFIER AND OSCILLATOR

Class-C Telephony (Key-down conditions, one tube)

MAXIMUM RATINGS (Frequencies below 40 Mc.)

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

D-C PLATE CURRENT - - - - - 1.25 MAX. AMPS.

PLATE DISSIPATION - - - - - 1500 MAX. WATTS

GRID DISSIPATION - - - - - 125 MAX. WATTS

TYPICAL OPERATION (Frequencies below 40 Mc.)

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

D-C Grid Voltage - - - - - -375 -600 -500 volts

D-C Plate Current - - - - - 1.00 1.00 .860 amps

D-C Grid Current - - - - - .150 .165 .110 ma

Grid Dissipation* - - - - - .59 .61 .30 watts

Peak R-F Grid Input Voltage (approx.) - - - - - 850 1100 885 volts

Driving Power* - - - - - 115 160 85 watts

Plate Power Input - - - - - 5000 6000 6000 watts

Plate Dissipation - - - - - 1500 1500 1500 watts

Plate Power Output - - - - - 3500 4500 4500 watts

PLATE-MODULATED RADIO-FREQUENCY AMPLIFIER

Class-C Telephony (Carrier conditions, per tube)

MAXIMUM RATINGS (Frequencies up to 40 Mc.)

D-C PLATE VOLTAGE - - - - - 6500 MAX. VOLTS

D-C PLATE CURRENT - - - - - 1.00 MAX. AMPERE

PLATE DISSIPATION - - - - - 1000 MAX. WATTS

GRID DISSIPATION - - - - - 125 MAX. WATTS

TYPICAL OPERATION (Frequencies up to 40 Mc.)

D-C Plate Voltage - - - - - 4000 5000 6000 volts

D-C Grid Voltage¹ - - - - - -450 -550 -650 volts

D-C Plate Current - - - - - .750 .700 .665 ma

D-C Grid Current* - - - - - .85 .75 .70 ma

Peak R-F Grid Voltage - - - - - 860 950 1050 volts

Driving Power* - - - - - .68 .67 .70 watts

Grid Dissipation* - - - - - .30 .26 .25 watts

Plate Power Input - - - - - 3000 3500 4000 watts

Plate Dissipation - - - - - 1000 1000 1000 watts

Plate Power Output - - - - - 2000 2500 3000 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 - - - - - 1.25 MAX. AMPS.

PLATE DISSIPATION, PER TUBE - - - - - 1500 MAX. WATTS

GRID DISSIPATION, PER TUBE - - - - - 125 MAX. WATTS

TYPICAL OPERATION

D-C Plate Voltage - - - - - 4000 5000 6000 volts

D-C Grid Voltage² - - - - - -95 -145 -190 volts

Zero-Signal D-C Plate Current - - - - - .500 .400 .330 ma

Max-Signal D-C Plate Current - - - - - 1.88 1.72 1.65 amps

Effective Load, Plate-to-Plate - - - - - 4150 6150 8200 ohms

Peak A-F Grid Input Voltage (per tube) - - - - - 485 535 570 volts

Max-Signal Avg. Driving Power* - - - - - .95 105 115 watts

Max-Signal Plate Dissipation - - - - - 1500 1500 1450 watts

Max-Signal Plate Power Output - - - - - 4500 5600 7000 watts

*Approximate values.

¹Bias should be obtained by means of an adjustable grid-leak resistor.

²Adjust to give stated Zero-Signal D-C Plate Current.

IF IT IS DESIRED TO OPERATE THIS TUBE UNDER CONDITIONS WIDELY DIFFERENT FROM THOSE GIVEN UNDER "TYPICAL OPERATION", POSSIBLY EXCEEDING THE MAXIMUM RATINGS GIVEN FOR CW SERVICE, WRITE EITEL-McCULLOUGH, INC., FOR INFORMATION AND RECOMMENDATIONS.



APPLICATION

MECHANICAL

Mounting—The 1500T must be mounted vertically, base up or base down. Flexible leads should be provided between the grid and plate terminals and the external grid and plate circuits. The tube must be protected from vibration and shock.

Cooling—Forced-air cooling is required on the envelope and also in the base of the tube. Envelope cooling may be accomplished by locating an ordinary 8- or 10-inch fan about one foot from the tube and directing the air at the middle of the envelope.

Base cooling requires an air flow of $2\frac{1}{2}$ cu. ft. per min. directed up through the bottom of the base toward the filament press. The base of the tube is provided with a 1-inch diameter hole for this purpose. If a socket is used with a 1-inch diameter matching hole and the manifold is of the same diameter, a static pressure of less than 0.1 inch of water is required at the manifold to provide the $2\frac{1}{2}$ cu. ft. per min.

One type of socket provides a $\frac{1}{4}$ inch diameter pipe for the air inlet to the base. With this type of socket a static pressure of $5\frac{1}{2}$ inches of water is required at the pipe to obtain the necessary $2\frac{1}{2}$ cu. ft. per min. volume.

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 7.125 and 7.875 volts. All four socket terminals should be used by employing two for each connection to filament supply. See base diagram and outline drawing.

Bias Voltage—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 resistor, suitable protective means must be provided to prevent excessive plate dissipation in the event of loss of excitation. The grid-leak resistor should be adjustable to facilitate maintaining the bias voltage and plate current at the desired values from tube to tube.

Grid Dissipation—The power dissipated by the grid of the 1500T must not exceed 125 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.

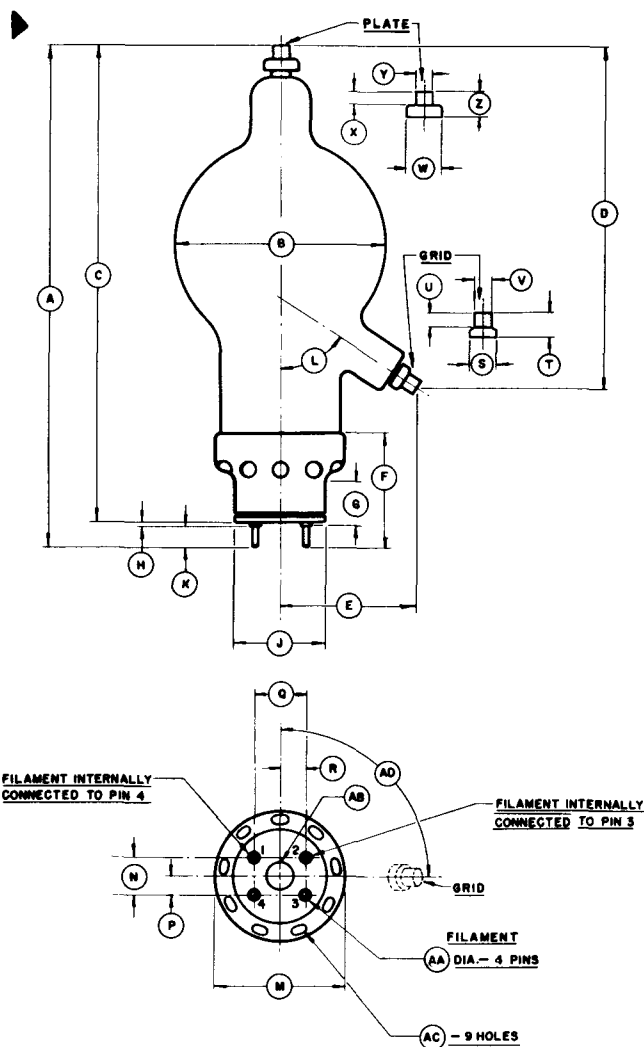
e_{cmp} may be measured by means of a suitable peak voltmeter connected between filament and grid. In equipment in which the plate loading varies widely, such as oscillators used for radio-frequency heating, care should be taken to make certain that the grid dissipation does not exceed the maximum rating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

Plate Dissipation—The plate is a red-orange color when dissipating 1500 watts. Under normal operating conditions, the power dissipated by the plate of the 1500T should not be allowed to exceed the maximum rating. Plate dissipation in excess of the maximum rating is permissible for short periods of time, such as during tuning procedures.

DIMENSION DATA		
REF.	MIN.	MAX.
A	16.000	17.000
B		7.125
C	15.250	16.250
D	10.875	11.625
E	4.313	4.813
F	3.750	
G	1.313	
H	.094	
J		3.031
K	.731	.763
L	37°	87°
M		4.250
N	1.250	

P	.625	
Q	1.688	
R	.844	
S	.875	
T	.812	
U	.484	
V	.558	.568
W	1.125	
X	.453	
Y	.558	.568
Z	.797	
AA	.249	.251
AB	.750 DIA.	
AC	.250 DIA.	
AD	80°	100°

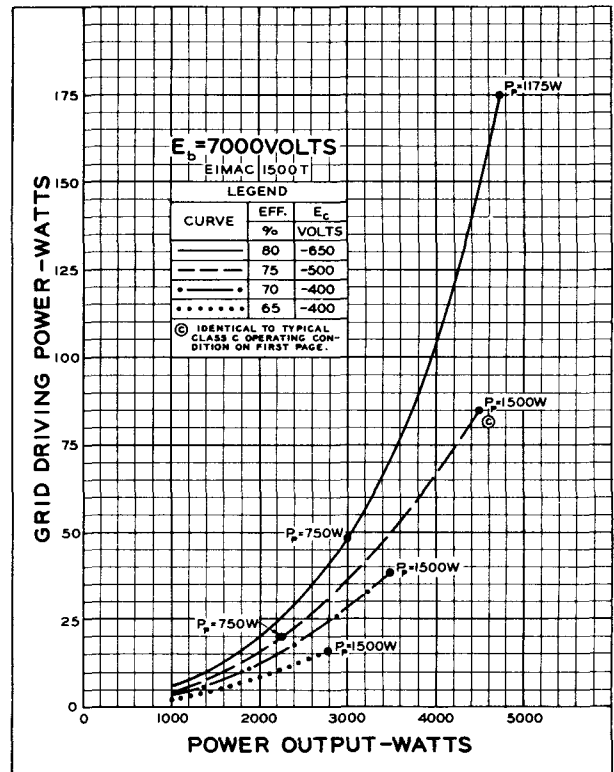
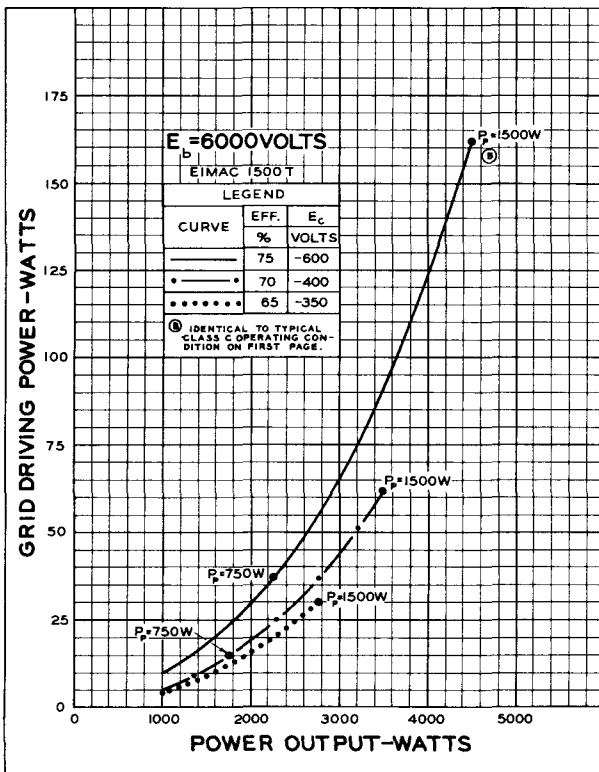
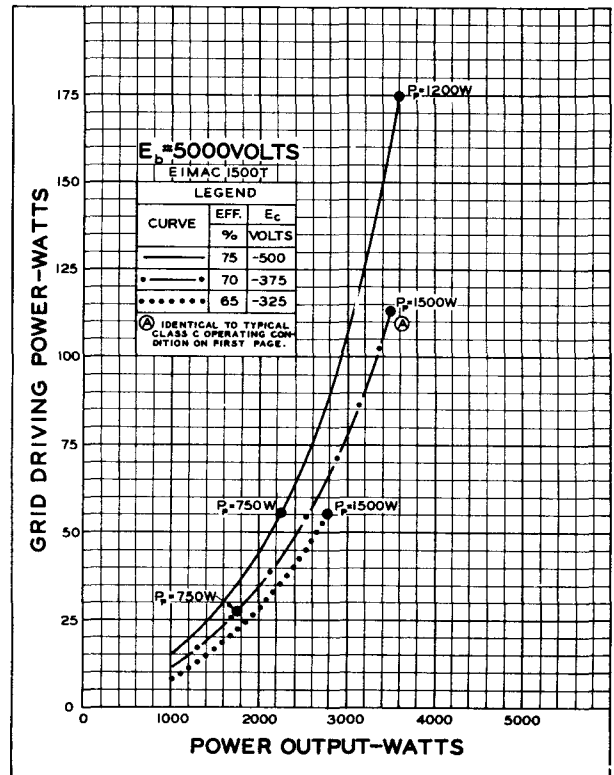
DIMENSIONS IN INCHES



DRIVING POWER vs. POWER OUTPUT

The three charts on this page show the relationship of plate efficiency, power output and approximate 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.





1500T

