EITEL-McCULLOUGH, INC.

SAN BRUNO, CALIFORNIA

1500T

MEDIUM-MU TRIODE

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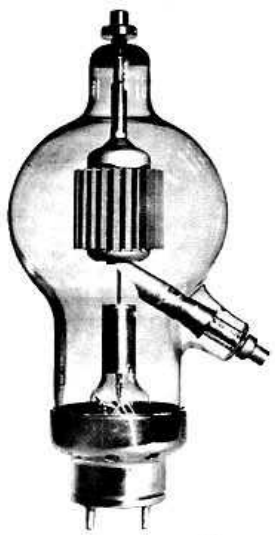
MODULATOR
OSCILLATOR
AMPLIFIER

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 $\mu\mu$f
Grid-Filament	9.9 $\mu\mu$f
Plate-Filament	1.5 $\mu\mu$f
Transconductance (i_b = 1.25 amp., E_b = 6000 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 Telegraphy (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 Voltage[1]	—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 Voltage[2]	—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.
[1]Bias should be obtained by means of an adjustable grid-leak resistor.
[2]Adjust 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 2½ 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 2½ cu. ft. per min.

One type of socket provides a ¼ inch diameter pipe for the air inlet to the base. With this type of socket a static pressure of 5½ inches of water is required at the pipe to obtain the necessary 2½ 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:

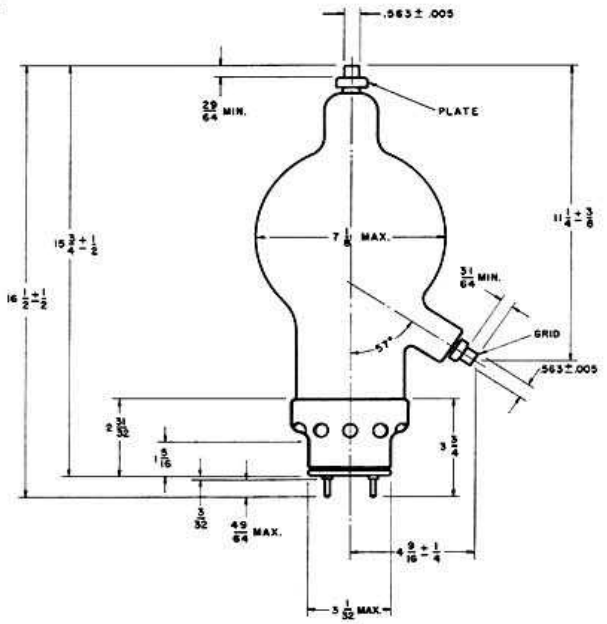
$$P_g = e_{cmp} I_c$$

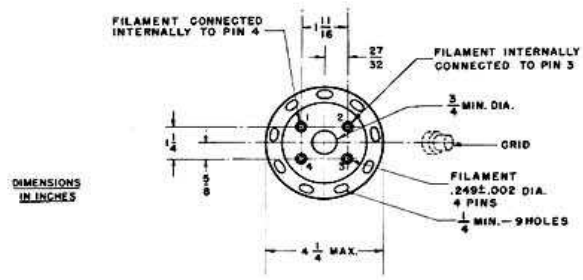
where P_g=Grid dissipation,
e_{cmp}=Peak positive grid voltage, and
I_c=D-c grid current.

e_{cmp} may be measured by means of a suitable peak voltmeter connected between filament and grid.[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—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.

[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.



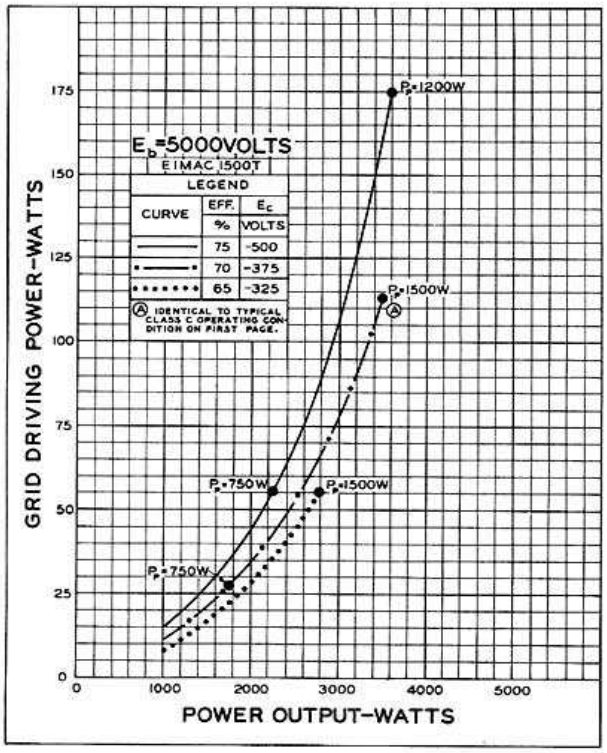


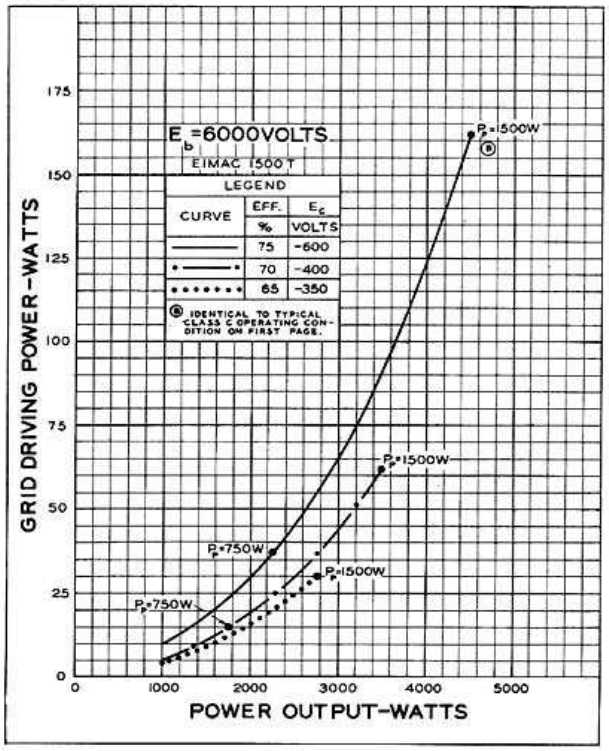
▶ Indicates change from sheet dated 4-1-53

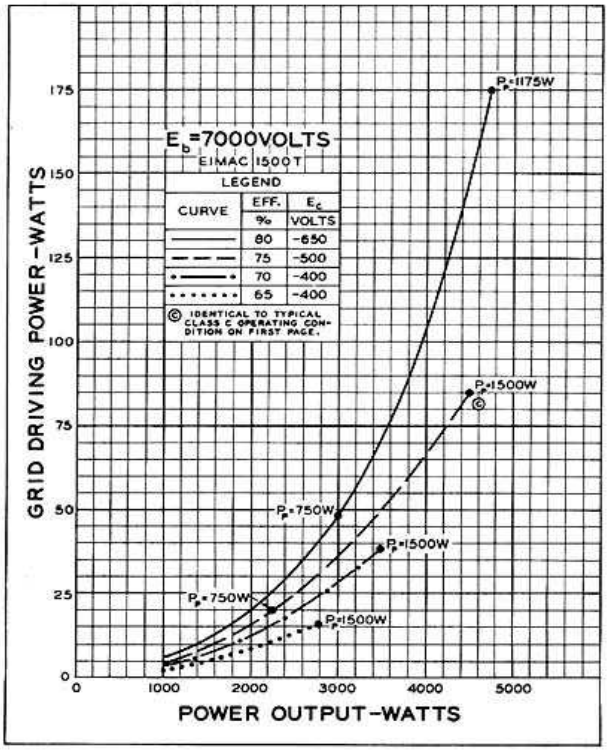
DRIVING POWER vs. POWER OUTPUT

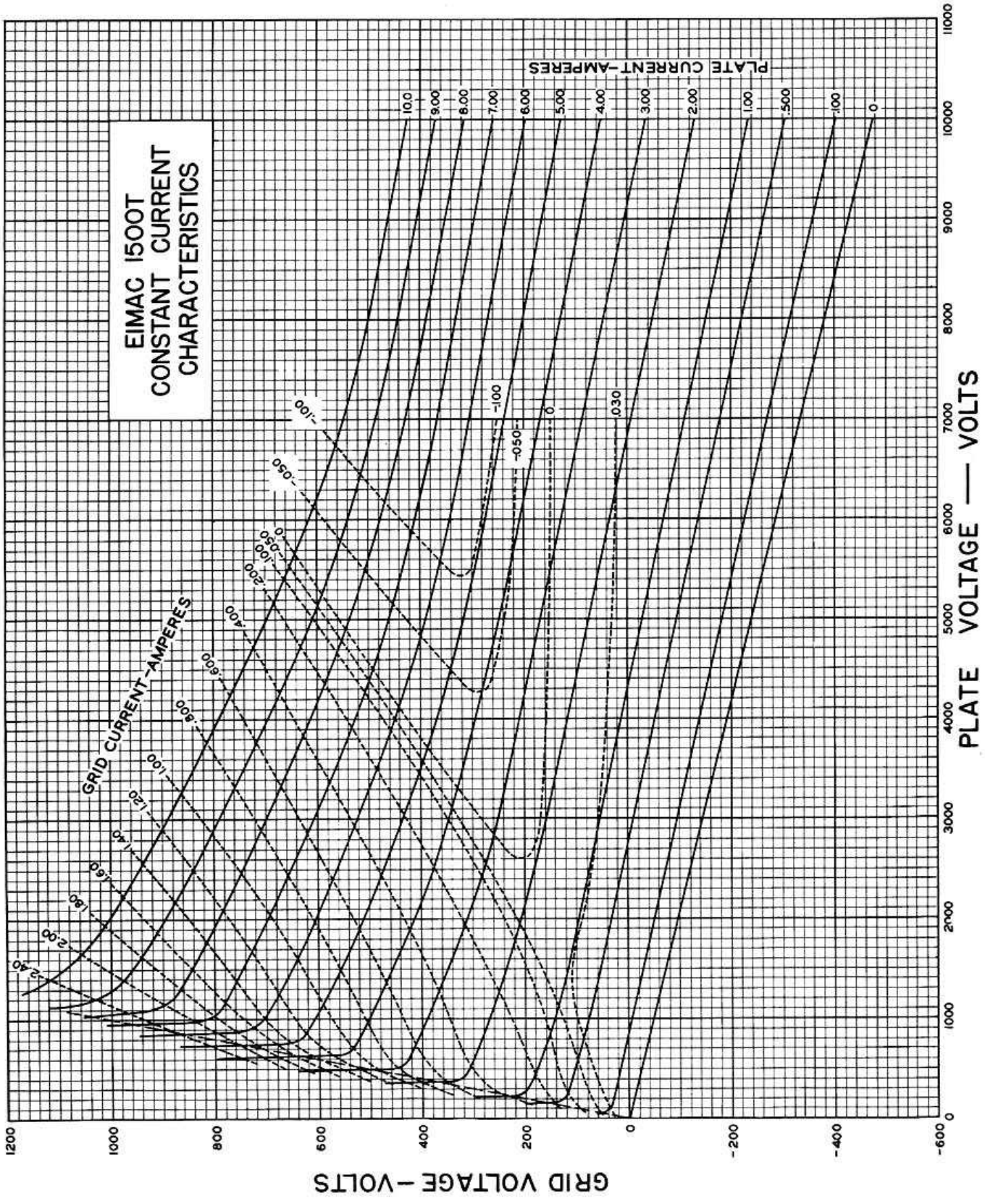
The three charts on this page show the relationship of plate efficiency, power output and approximate grid driving power at plate voltages of 5000, 6000, and 7000 volts. These charts show combined grid and bias losses only. The driving power and power output figures do not include circuit losses. The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

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.








EIMAC 1500T
CONSTANT CURRENT
CHARACTERISTICS
PLATE CURRENT-AMPERES
10.0
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
.500
.100
0
-100
-050
0
.030
-100
-050
0
.050
.100
.200
.400
.600
.800
1.00
1.20
1.40
1.60
1.80
2.00
2.40
GRID CURRENT-AMPERES
PLATE VOLTAGE — VOLTS
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
11000
GRID VOLTAGE — VOLTS
1200
1000
800
600
400
200
0
-200
-400
-600