

### EITEL-McCULLOUGH, INC. CARLOS, CALIFORNIA

# 8243

MEDIUM-MU POWER TRIODE

The Eimac 8243/3W5000F3 is a water-cooled, medium-mu power triode intended for amplifier, oscillator or modulator service. It has a maximum plate dissipation rating of 5000 watts and is capable of high output at relatively low plate voltages. A single 3W5000F3 will deliver a radio frequency plate power-output of 7500 watts at a plate voltage of 4000 volts.

The tube is equipped with flexible filament and grid leads which simplifies socketing and equipment design for industrial and communication frequencies below 30 Mc.

NOTE: The 824313W 5000F3 is a water-cooled version of the air-cooled 82511

NOTE: The 8243/3W5000F3 is a water-cooled vers 3X2500F3.  The 8243/3W5000F3 should be used where water cooli	ng is preferred and for	
industrial applications or installations where reserve anode dis	ssipation is desired.	
GENERAL CHARACTERISTIC	S	
Filament: Thoriated tungsten	Min. Nom. Max.	
Voltage		
Current	7.5 volts 49 54 amperes	
Maximum allowable starting current	West Message	
Amplification Factor (Average)	100 amperes	
Direct Interelectrode Capacitances (Average)	20	
Grid-Plate	17.8 24.2 μμ	8243
Grid-Filament	29.2 40.2 μμf	Eimat 3w5000F3
Plate-Filament	0.60 1.20 μμξ	
Transconductance ( $I_b = 830 \text{ ma}, E_b = 3000v$ )	20.000 µmhos	10000000000000000000000000000000000000
Frequency for Maximum Ratings	30 mc	The
MECHANICAL		
Base	see drawing	
Mounting	<ul> <li>vertical, base down or up</li> </ul>	(A)
Length (Does not include filament connectors) -	12.56 inches	
Diameter	3.63 inches	
Net Weight	4.8 pounds	
Shipping Weight (Average)	<ul> <li> 15 pounds</li> <li>Water and forced air</li> </ul>	
RADIO FREQUENCY POWER AMPLIFIER OR OSCILLATOR	TYPICAL OPERATION (Frequencies below 30 Mc., per tube)	
THE PROPERTY OF A PARTY OF THE	D C Plate Voltage	4000 5000 6000 volts
(Frequencies below 30 Mc.)	D-C Plate Current	2.5 2.5 2.08 amps
Class-C FM or Telegraphy	D-C Grid Voltage	—300 —450 —500 volts
(Key-down conditions, per tube)	D-C Grid Current	245 265 180 ma
MANAGE BATTAGE	Peak R-F Grid Input Voltage -	580 750 765 volts
MAXIMUM RATINGS	Driving Power (approx.) -	142 197 136 watts
D-C PLATE VOLTAGE 6000 MAX. VOLTS	Grid Dissipation	68 78 46 watts
D-C PLATE CURRENT 2.5 MAX. AMPS PLATE DISSIPATION 5000 MAX WATTS	Plate Power Input	10,000 12,500 12,500 watts
	Plate Dissipation	2500 2500 2500 watts
GRID DISSIPATION 150 MAX. WATTS	Plate Power Output	7500 10,000 10,000 watts
PLATE MODULATED RADIO FREQUENCY AMPLIFIER	TYPICAL OPERATION (Frequencies below 30 Mc., per tube)	Tende V. Styres 18
CONTRACTOR	D C Plate Voltage	4000 4500 5000 volts
(Frequencies below 30 Mc.)	D-C Plate Current	1.67 1.55 1.45 amps
Class-C Telephony	Total Bias Voltage	-450 -500 -550 volts
(Carrier conditions, per tube)	Fixed Bias Voltage	-230 -325 -410 volts
MAXIMUM RATINGS	Grid Resistor	1500 1500 1400 ohms 150 120 100 ma
- Committee of the Comm	Peak R-F Grid Input Voltage -	150 120 100 ma 680 720 760 volts
	Driving Power (approx.) -	102 86 76 watts
D-C PLATE CURRENT 2.0 MAX. AMPS	Grid Dissipation	35 26 21 watts
PLATE DISSIPATION 3350 MAX. WATTS	Plate Power Input Plate Dissipation	6670 6970 7250 watts 1670 1670 1670 watts
		TOTO WATTS

Plate Dissipation

Plate Power Output

5300

5000

5580

watts

- 150 MAX. WATTS

GRID DISSIPATION

#### **AUDIO FREQUENCY POWER AMPLIFIER** AND MODULATOR

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

MAXIMUM RATINGS

D-C PLATE VOLTAGE 6000 MAX. VOLTS

MAX-SIGNAL D-C PLATE

2.5 MAX. AMPS

CURRENT, PER TUBE PLATE DISSIPATION, PER TUBE - 5000 MAX. WATTS

TYPICAL OPERATION (ST	. 1			i i	1 11
TYPICAL OPERATION (Sinuso					
D-C Plate Voltage			5000		volts
D-C Grid Voltage <sup>1</sup>	-	-150	-190	-240	volts
Zero-Signal D-C Plate Current	+ -	0.6	0.5	0.4	amp
Max-Signal D-C Plate Curren	t	4.0	3.2	3.0	amp
Effective Load, Plate to Plate	- (	2200	3600	4650	ohm:
Peak A-F Grid Input Voltage					
(per tube)*		340	360	390	volts
Max-Signal Peak Driving Power	*	340	230	225	watt
Max-Signal Nominal Driving					
Power*	-	170	115	113	watt
Max-Signal Plate Output Pow	rer	11,000	11,000	13,000	watt
*Approximate values.					
<sup>1</sup> Adjust to give listed zero-signal	pla	e current.			

TYPICAL OPERATION CLASS AB2 (Two Tubes)

Modulator service for 4000 and 5000 volt operation, to modulate one or two tubes, as shown under "Plate Modulated Radio Frequency Amplifier" (Page 1)

D-C Plate Voltage D-C Grid Voltage	•	4000	5000	4000	5000	volts
(approx.)* -	2	—155	-200	-145	-190	volts
Zero-Signal D-C Plate	0			127725	2.2	
Current		0.4	0.4	0.6	0.5	amps
Max-Signal D-C Plate	9					
Current	-	1.35	1.13	2.70	2.26	amps
Effective Load, Plate						
to Plate		6600	10,000	3300	5000	ohms
Peak A-F Grid Input Voltage (per tube)		240	275	285	310	volts
Max-Signal Peak Driving Power	-	42	40	134	118	watts
Max-Signal Nominal D	rivina					
Power (approx.)	-	21	20	67	59	watts
Max-Signal Plate						
Power Output	23	3700	4000	7400	8000	watts
Will Modulate one Tu						malij
R-F Final Input of	*	6670	7250			watts
Will Modulate two to R-F Final Input of				13,340	14,500	watts
Contraction of the Contraction						

<sup>\*</sup>Adjust to give stated zero-signal 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 INFORMATON AND RECOMMENDATIONS

## **APPLICATION**

Cooling-Minimum recommended water-flow rate and pressure drop values for different water-inlet temperatures and plate dissipations are tabulated on the opposite page. The outlet water temperature must not exceed a maximum of 70° C under any conditions. The inlet water pressure must not exceed a maximum of 60 pounds per square inch.

The grid-terminal contact surface and adjacent glass must be cooled by forced air. The quantity, velocity and direction must be adjusted to limit the maximum seal temperature to 150° C.

The filament stem structure also requires forced-air cooling. A minimum of 6 cubic feet per minute must be directed into the space between the inner and outer filament contacting surfaces.

Air and water flow must be started before filament power is applied and maintained for at least five minutes after the filament power has been removed.

Filament Voltage—The filament voltage, as measured directly at the tube, should be 7.5 volts with maximum allowable variations due to line fluctuation of from 7.12 to 7.87 volts.

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 from a grid resistor, 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 3W5000F3 should not exceed 6000 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.

In Class-C FM or Telegraphy service, a 0.1 henry choke, shunted by a spark gap, should be series connected between the plates of the amplifier tubes and the high voltage plate supply capacitor to offer protection from transients and surges. In plate modulated service, where a plate modulation transformer is used, the protective choke is not normally required.

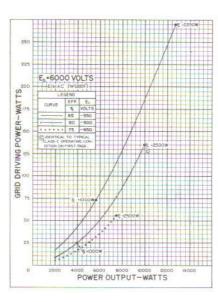
Grid Dissipation—The power dissipated by the grid of the 3W5000F3 must never exceed 150 watts. Grid dissipation may be calculated from the following expression

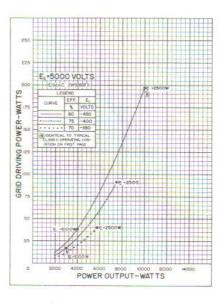
 $P_g = e_{cmp} I_c$ where Pg-Grid dissipation, e<sub>cmp</sub>=Peak positive grid voltage, and I = D-C grid current

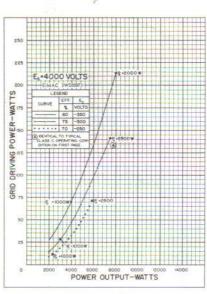
ecmp may be measured by means of a suitable peak voltmeter connected between filament and grid. Any suitable peak v.t.v.m. circuit may be used.

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.



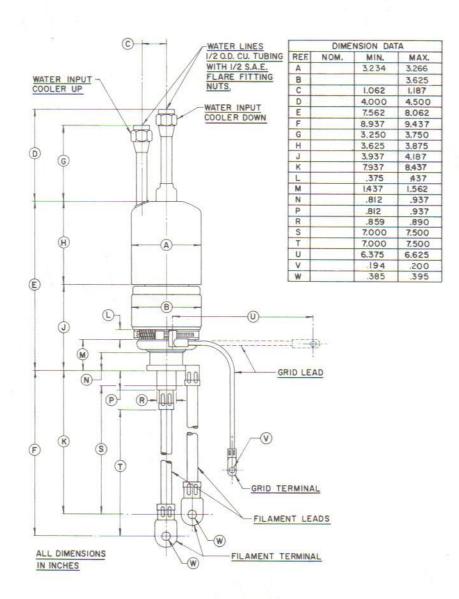






► Indicates change from sheet dated 8-26-58

MINIMUM WATER COOLING REQUIREMENTS								
Water Inlet Temp. (°C)	Plate Dissipation							
	2 KW		3 KW		4 KW		5 KW	
	Flow Rate GPM	Pressure Drop PSI	Flow Rate GPM	Pressure Drop PSI	Flow Rate GPM	Pressure Drop PSI	Flow Rate GPM	Pressure Drop PSI
20	1.7	0.68	2.6	1.3	3.9	2.3	5.6	3.9
30	2.3	1.1	3.2	1,7	4.5	2.8	6.2	4.5
40	3.0	1.6	3.8	2.2	5.3	3.5	6.9	5.3
50	3.9	2.3	4.7	3.0	6.0	4.3	7.7	6.1



#### 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 4000, 5000 and 6000 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 4000, 5000 and 6000 volts respectively.

