# Eimac.

#### TECHNICAL DATA

# 450TH HIGH-MU TRIODE

MODULATOR OSCILLATOR AMPLIFIER

The Eimac 450TH is a high-mu power triode having a maximum plate dissipation rating of 450 watts, and is intended for use as an amplifer, oscillator and modulator. It can be used at its maximum ratings at frequencies as high as 40 Mc.

Cooling of the 450TH is accomplished by radiation from the plate, which operates at a visible red color at maximum dissipaton, and by means of air circulation around the envelope.

	BENE	RAL	CH	ARA	ACT	ERI	STIC	S											
ELECTRICAL																	1	AL	
Filament: Thoriated tungsten																	1 6		
Voltage	-	-	-	-	-	-	-	•	•	•		7.5	vo				- 1		
Current Note: Dual connections		- -L :::-	-	۔ امیط	-	-	- استاست	- .:4L:_		-			mper				A		
basing diagram). Corresponding distribution of filament and R-F	ng soc	ket te	rmina	ls mu	are ist b	e co	nnecte	d in	paralle	ase el to	pro	vide	brob	er			Simo	F 450	H
Amplification Factor (Avera		-	-	-	-	-	-	-	-	-	-	-		38				111	11.77
Direct Interelectrode Capacit Grid-plate												E /			`			K	1/
Grid-Filament -		-		-	-	-	-	-	:	:	-		) <sub>ԱԱ</sub> ք ԱԱք			,	VI.		7
Plate-Filament	•	-	-	-		-	-	-	-	-	-		$\mu \mu$						
Transconductance ( $i_b = 500$ m			) v.)	-	-	-	-	-	-	-	-	6650	$\mu$ mh	os					
Frequency for maximum ratio	ngs	-	-	-	-	-	-	•	-	-	-	4	40 M	c.					
MECHANICAL																		4	
Base	•	•	-	-	-	-	-	-	Speci	al 4	pin,	No.	. 500	2 B					
Basing	-	-	-	-	•	-	-	-	-	-			e 4A						
Mounting	-	-	-	•	-	-	-		Vertic	-				•					1
				-		-	-		adiatio										
Note: Adequate ventilat do not exceed 200°C under ope					st be	pro	vided	so t	hat the	\$ \$0	ais ai	nd e	nveloţ	9			Mines	17.00	
Socket	-				ا ا ا	or N	ational	Тур	e No.	хм!	50 or	equ	ivaler	ıt.			1	V	
Recommended Heat Dissipat								′'				,							
Plate	• •	-	-	-	-	-	-	-	-	-	-	-	-	-	-				ac HR-8
Grid Note: The grid terminal	•	-	•	٠.				•	•	-		-		-	٠.				ac HR-8
tyle 450TH having .098" diam hat it may be removed from nector. (See outline drawing.)	eter g the gr	id ter	minal	s, an	adap	oter	pin is	prov	ided w	ith	the r	newer	r tube	s. T	his ad	apt	er pin	is thr	eaded so
Maximum Overall Dimensions	:																		
																		12.7	25 1
Length	-	-	-	-	-		-	-	-	-			-	-	-				25 inches 25 inches
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GRID DISSIPATION - - - -

80 MAX. WATTS

## RADIO FREQUENCY POWER AMPLIFIER AND OSCILLATOR

ITFICAL OPERATION, PER TUBE
D-C Plate Voltage 3000 4000 5000 Volts
D-C Grid Voltage 175 - 200 - 300 Volts
D-C Plate Current 500 450 450 Ma.
D-C Grid Current 95 85 90 Ma.
Peak R-F Grid Input Voltage 400 410 570 Volts
Driving Power (approx.) 35 35 46 Watts
Grid Dissipation 21 18 24 Watts
Plate Power Input 1500 1800 2250 Watts
Plate Dissipation 450 450 Watts
Plate Power Output 1050 1350 1800 Watts
*The figures show actual measured tube performance and do not allow for
circuit losses.

#### APPLICATION

#### MECHANICAL

Mounting—The 450TH must be mounted vertically, base up or base down. Flexible connecting straps should be provided from the grid and plate terminals to the external grid and plate circuits. The tube must be protected from severe vibration and shock.

Cooling—Provision should be made for ample circulation of air around the 450TH. In the event that the design of the equipment restricts natural circulation, the use of a small fan or centrifugal blower to provide additional cooling for the tube will aid in obtaining maximum tube life. Special heat-dissipating connectors (Eimac HR-8) are available for use on the plate and grid terminals. These connectors help to prolong tube life by reducing the temperature of the seals.

#### ELECTRICAL

Filament Voltage—For maximum tube life the filament voltage, as measured directly at the filament pins, should be the rated value of 7.5 volts. Unavoidable variations in fialment voltage must be kept within the range from 7 03 to 7.88 volts. All four socket terminals should be used, putting two in parallel for each filament connection.

Bias Voltage—Although there is no maximum limit on the bias voltage which may be used on the 450TH, 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.

Grid Dissipation-The power dissipated by the grid of the

450TH must not exceed 80 watts. Grid dissipation may be calculated from the following expression:

$$P_{g} = e_{cpm}I_{c}$$

where  $P_g = Grid$  dissipation,

e<sub>cmp</sub>=Peak positive grid voltage, and

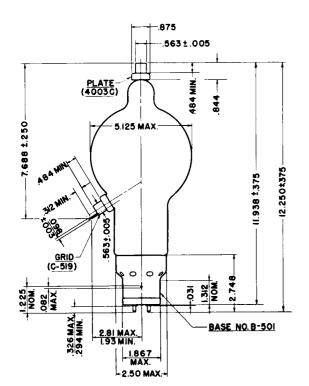
 $I_c = D-c$  grid current.

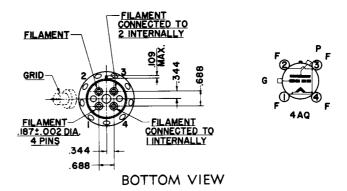
e<sub>cmp</sub> may be measured by means of a suitable peak voltmeter connected between filament and grid.¹ In equipment in which the plate loading varies widely, such as oscillators used for radio-frequency heating, care should be taken to make certain that the grid dissipation does not exceed the maximum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

Plate Voltage—Except in very special applications, the plate supply voltage for the 450TH 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.

Plate Dissipation—Under normal operating conditions, the power dissipated by the plate of the 450TH should not be allowed to exceed 450 watts. At this dissipation the brightness temperature of the plate will appear a visible red color. The value of this color is somewhat effected by light from the filament as well as from external sources. Plate dissipation in excess of the maximum rating is permissible for short periods of time, such as during tuning procedures.

<sup>1</sup>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.





NOTE:—The grid terminal on the new 450TH and TL type tube is now .563" in diameter. To accommodate existing equipment which uses the 450TH or TL tubes with the old style .098" grid terminal, an adapter pin is provided. This adapter pin, if not needed, may be removed by unscrewing.



### 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 3000, 4000, and 5000 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  $P_{\rm p}$ .

Points A, B, and C are identical to the typical Class C operating conditions shown on the first page under 3000, 4000, and 5000 volts respectively.

