

**E I M A C**  
 Division of Varian  
 S A N C A R L O S  
 C A L I F O R N I A

**3CV30,000A3**

**MEDIUM-MU  
 VAPOR-COOLED  
 POWER TRIODE**

The EIMAC 3CV30,000A3 is a vapor-cooled, ceramic-metal power triode designed primarily for use in industrial radio-frequency heating service. Its vapor-cooled anode is conservatively rated at 30 kilowatts of plate dissipation when mounted in an EIMAC BR-200 boiler.

Full input of 60 kilowatts is permissible up to 100 megahertz. Large reserve emission is available from its one kilowatt filament and the grid structure is rated at one ampere making this tube an excellent choice for severe applications.

It is also recommended as a grounded grid FM amplifier, a conventional plate-modulated amplifier or as a linear amplifier in new equipment designs.



**GENERAL CHARACTERISTICS**

**ELECTRICAL**

Filament: Thoriated-Tungsten	<i>Min.</i>	<i>Nom.</i>	<i>Max.</i>	
Voltage - - - - -		6.3		volts
Current - - - - -	152		172	amperes
Amplification Factor - - - - -		20		
Interelectrode Capacitances, Grounded Cathode:				
Grid-Filament - - - - -	48	58		pF
Plate-Filament - - - - -	1.2	1.5		pF
Grid-Plate - - - - -	30	38		pF
Frequency for Maximum Ratings - - - - -				100 MHz

**MECHANICAL**

Base - - - - -				Coaxial
Recommended Socket - - - - -				EIMAC SK-1310
Recommended Boiler - - - - -				EIMAC BR-200
Operating Position - - - - -				Vertical, base up
Cooling - - - - -				Vapor and Forced air
Maximum Operating Temperatures:				
Anode Flange - - - - -				200°C
Ceramic-to-metal Seals - - - - -				250°C
Maximum Dimensions:				
Height - - - - -				8.75 inches
Diameter - - - - -				7.5 inches
Net Weight - - - - -				18 pounds

**RF INDUSTRIAL OSCILLATOR**

Class-C (Filtered DC Power Supply)

MAXIMUM RATINGS

DC PLATE VOLTAGE - - - - -	10,000 VOLTS
DC PLATE CURRENT - - - - -	6.0 AMPS
DC GRID CURRENT - - - - -	1.0 AMP
PLATE INPUT POWER - - - - -	60 KW
PLATE DISSIPATION - - - - -	30 KW

TYPICAL OPERATION

DC Plate Voltage - - - - -	7000	10,000	volts
DC Plate Current - - - - -	6.0	6.0	amps
DC Grid Voltage - - - - -	-600	-800	volts
DC Grid Current - - - - -	.66	.315	amps
Peak Positive Grid Voltage - - - - -	.440	.360	volts
Driving Power - - - - -	.660	.365	watts
Plate Input Power - - - - -	.42	.60	kW
Plate Dissipation - - - - -	.12	.18	kW
Plate Output Power - - - - -	.30	.42	kW
Approximate Load Impedance - - - - -	600	750	ohms

**RADIO-FREQUENCY POWER AMPLIFIER  
PLATE-MODULATED**

Class-C

**MAXIMUM RATINGS**

DC PLATE VOLTAGE	-	-	-	-	7000 VOLTS
DC PLATE CURRENT	-	-	-	-	5.0 AMPS
PLATE DISSIPATION	-	-	-	-	20 KW
GRID DISSIPATION	-	-	-	-	500 WATTS

**TYPICAL OPERATION**

DC Plate Voltage	-	-	-	-	5000	7000	volts
DC Grid Voltage	-	-	-	-	-600	-820	volts
DC Plate Current	-	-	-	-	5.0	5.0	amps
DC Grid Current	-	-	-	-	600	600	mA
Driving Power	-	-	-	-	600	750	watts
Plate Output Power	-	-	-	-	17.8	27.5	kW

**RADIO-FREQUENCY  
LINEAR AMPLIFIER**Class-AB<sub>2</sub>**MAXIMUM RATINGS**

DC PLATE VOLTAGE	-	-	-	-	10,000 VOLTS
DC PLATE CURRENT	-	-	-	-	6.0 AMPS
PLATE DISSIPATION	-	-	-	-	30 KW
GRID DISSIPATION	-	-	-	-	500 WATTS

**TYPICAL OPERATION**

DC Plate Voltage	-	-	-	-	7000	10,000	volts
DC Grid Voltage*	-	-	-	-	-250	-400	volts
Zero-Sig Plate Current	-	-	-	-	2.0	2.0	amps
Max-Sig DC Plate Current	-	-	-	-	6.0	6.0	amps
Max-Sig DC Grid Current	-	-	-	-	375	333	mA
Peak RF Grid Voltage	-	-	-	-	530	700	volts
Driving Power	-	-	-	-	200	240	watts
Plate Output Power	-	-	-	-	26.4	41	kW

\*Adjust to give specified zero-signal dc plate current.

Note: "TYPICAL OPERATION" data are obtained by calculation from published characteristic curves. No allowance for circuit losses has been made.

**APPLICATION****ELECTRICAL**

**Filament**—The rated filament voltage for the 3CV30,000A3 is 6.3 volts. Filament voltage, as measured at the socket, must be maintained at 6.3 volts plus or minus five percent for maximum tube life and consistent performance.

**Control Grid Operation** — The grid current rating is one ampere dc. This value should not be exceeded for more than very short periods such as during tuning and over-current protection in the grid circuit should be provided. Ordinarily it will not be necessary to operate with more than 0.4 to 0.6 amperes grid current to obtain reasonable efficiency. In industrial heating service with varying loads, grid current should be monitored continuously with a dc current meter. The maximum grid dissipation rating is 500 watts.

**Plate Operation** — The maximum plate input power rating is 60 kilowatts at 10,000 volts and 6.0 amperes dc. This rating applies for Class C amplifier or oscillator service and for Class AB

applications. When used as a plate modulated rf amplifier, input is reduced to 7000 volts at 5.0 amperes dc. Maximum input may be exceeded for short periods during tuning without exceeding plate dissipation ratings.

Plate over-current protection should be provided to remove plate voltage quickly in the event of an overload or an arc-over at the load. In addition current limiting power supply resistors should be used. These precautions are especially important in industrial service with its wide variations in loading.

Spark gaps from plate to ground should be used to prevent transient voltages from flashing across the tube envelope during any fault conditions.

**Special Application**—If it is desired to operate this tube under conditions widely different from these given here, write to Power Grid Tube Marketing Department, EIMAC Division of Varian, 301 Industrial Way, San Carlos, California, for information and recommendations.

**MECHANICAL**

*Mounting* — The 3CV30,000A3 must be mounted vertically, base up in an EIMAC BR-200 boiler. It is very important that the boiler tube assembly be mounted vertically, the water be maintained at the suggested level, and that the flange of the tube makes a vapor-tight seal against the rubber “O” ring and boiler.

*Sockets*—The EIMAC SK-1310 socket is available for use with the 3CV30,000A3. Filament and grid connection are made to this socket.

*Cooling* — Cooling is accomplished by immersion of the anode in a distilled water-filled BR-200 boiler. The energy dissipated at the anode causes the water to boil and be converted into steam. Steam is carried away by convection to the condenser where it is cooled and condenses into water. Condensate is then returned to the boiler.

The boiling action maintains the anode surface temperature at approximately 100°C. In a properly designed system (such as the 3CV30,000A3 and BR-200) it unlikely that anode surface temperature will ever exceed 125°C — well below the rated maximum for the tube — even

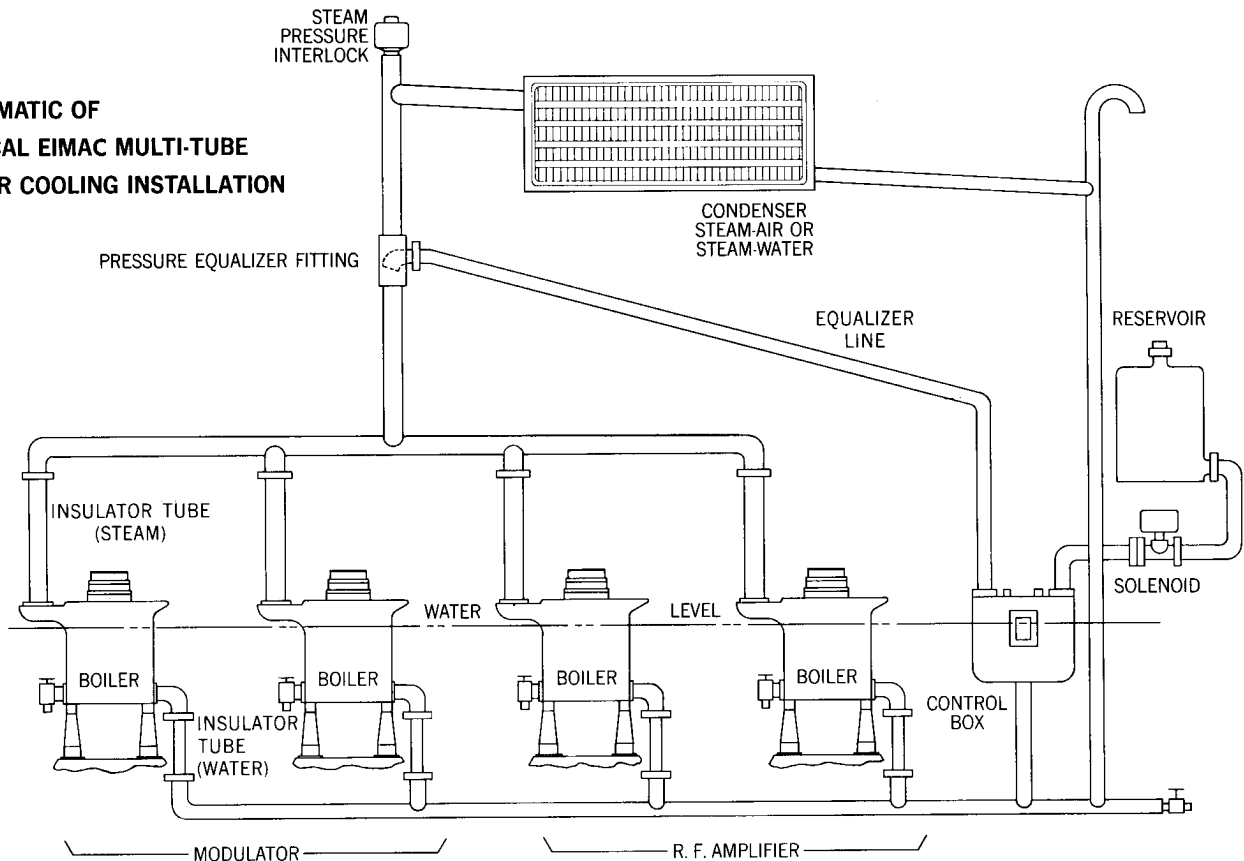
at full plate dissipation levels.

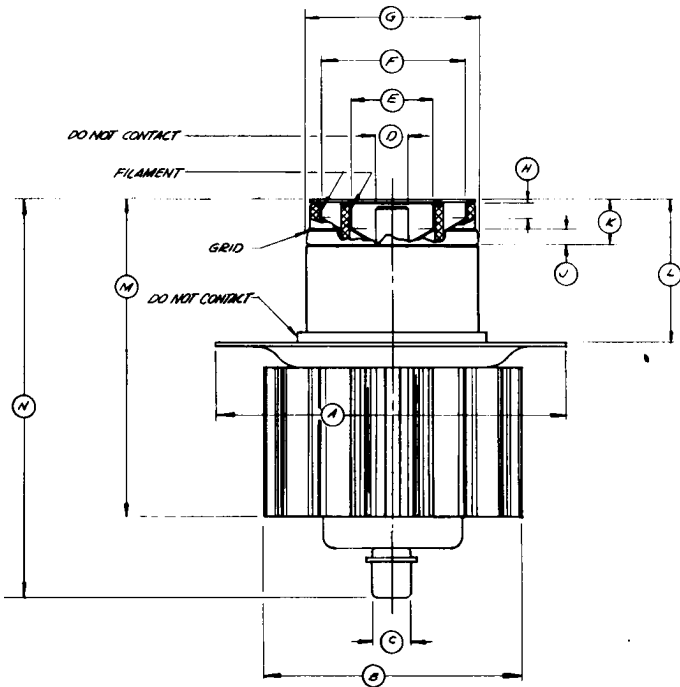
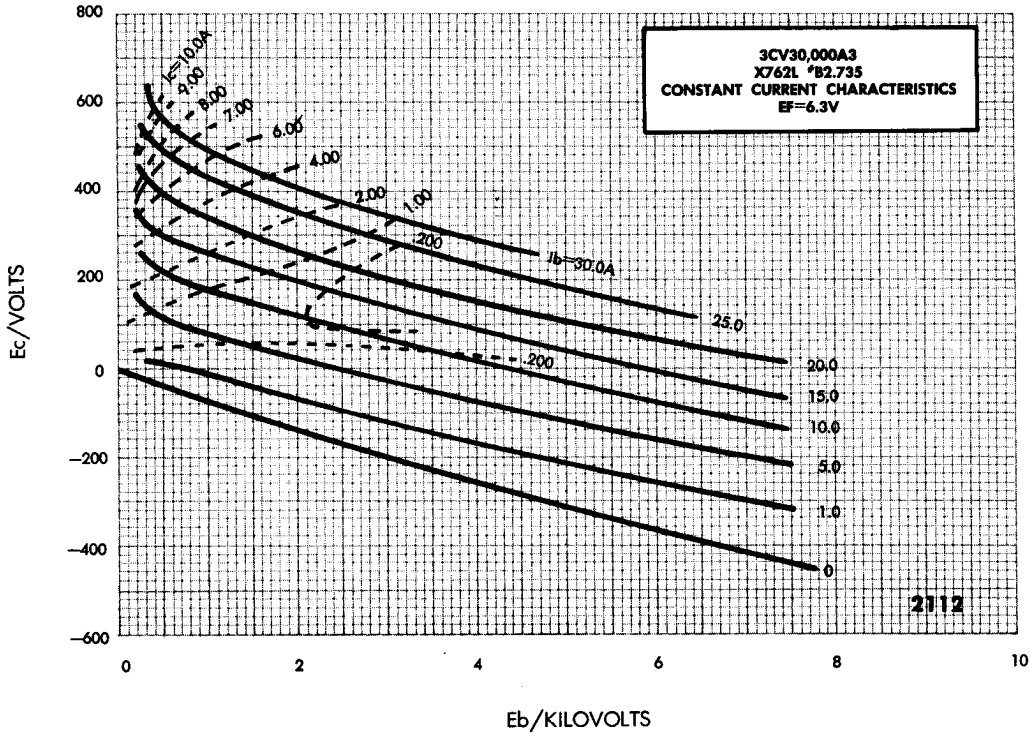
The water in the boiler must be maintained at a constant level, just below the top of the anode fins. This level is marked on the boiler. A recommended system for assuring constant water level is shown in the system diagram below. This system incorporates an EIMAC CB-202 Control Box to sense water level and a small reservoir to supply make-up water on demand. In the event of a drop in system water level, a switch is closed in the control box, energizing a solenoid water valve in the line from the reservoir. When the make-up water brings the system back to the proper level, the switch is opened, de-energizing the solenoid valve. A second switch in the CB-202 Control Box senses a lower, danger level and can be used to actuate an alarm or shut down the system.

For reliable operation, it is essential that the Control Box be mounted so that the level sensed is the actual level in the boiler.

Separate cooling of the tube base is required and is accomplished by directing 100 CFM of cooling air into the base structure from the top of the socket.

**SCHEMATIC OF  
TYPICAL EIMAC MULTI-TUBE  
VAPOR COOLING INSTALLATION**





DIMENSIONS IN INCHES

DIMENSIONAL DATA

REF.	MIN.	MAX.	NOM.
A			7.750
B			5.812
C	.855	.895	
D	.720	.760	
E	1.896	1.936	
F	3.133	3.173	
G	3.792	3.832	
H	.188		
J	.188		
K	.986	1.050	
L			3.062
M	6.920	6.990	
N	8.250	8.750	
P			.510

