



## APPLICATION (Continued)

for the free circulation of air. An Eimac HR-8 heat Dissipating Connector or equivalent is required on the plate terminal.

The maximum temperature at the plate seal must not exceed 225°C. A convenient accessory for measuring this temperature is "Tempilaq", a temperature-sensitive lacquer available from the Tempil Corporation, 132 W. 22nd St, New York 11, N. Y.

### ELECTRICAL

**Filament Operation**—For maximum tube life, the filament voltage, as measured at the base pins, should be the rated value of 10.0 volts. Variations must be kept within the range from 9.5 to 10.5 volts. In applications which require the diode to deliver high peak currents, it is important to maintain the filament voltage at the rated value. All four socket terminals should be used, putting two in parallel for each filament connection.

CAUTION SHOULD BE OBSERVED WHEN MEASURING RECTIFIER FILAMENT VOLTAGE, THE FILAMENT CIRCUIT MAY BE AT HIGH POTENTIAL.

The thoriated-tungsten filament of the 2-2000A reaches operating temperature in a fraction of a second after application of voltage. Plate voltage may be applied simultaneously with filament voltage.

**Plate Operation**—The plate of the 2-2000A operates at dull red color at the maximum plate dissipation rating of 1200 watts. The maximum peak inverse voltage rating of 75,000 volts should not be exceeded at any time.

**Performance**—The accompanying table shows some maximum performance capabilities of the 2-2000A when used as a power-supply rectifier.

Circuit Type	2-2000A MAXIMUM-PERFORMANCE CAPABILITIES			Capacitor-Input Filter		Choke-Input Filter	
	A-C Input Voltage (volts rms)	D-C Output Voltage (volts)	D-C Output Current (amperes)	D-C Output Voltage (volts)	D-C Output Current (amperes)	D-C Output Voltage (volts)	D-C Output Current (amperes)
Single-Phase, Half-Wave	26,500	31,500	0.600	.....	.....	.....	.....
Single-Phase, Full-Wave	26,500 <sup>1</sup>	31,500	1.20	23,800	1.50	.....	.....
Single-Phase, Bridge	53,000	63,000	1.20	47,600	1.50	.....	.....

<sup>1</sup>One-half the transformer secondary voltage.

**Maximum D-C Current Ratings**—Plate dissipation rather than peak current usually limits the d-c current which the 2-2000A is capable of delivering to the load. Because the plate dissipation associated with a given d-c current depends upon the amount of ripple and its wave-shape, circuit conditions will determine the maximum d-c current rating of the tube.

**Choke-Input Filter**—The maximum d-c current rating of the 2-2000A is 750 milliamperes when the load incorporates a choke-input filter with the "critical" value (or larger) of input inductance ( $L_0$  in Fig. 1):

$$L_0 = \frac{R_{eff}}{18.8f} \quad \text{for full-wave single-phase rectifiers,}$$

$$L_0 = \frac{R_{eff}}{75f} \quad \text{for half-wave three-phase rectifiers,}$$

$$L_0 = \frac{R_{eff}}{660f} \quad \text{for full-wave three-phase rectifiers,}$$

where:  $L_0$  = "critical" value of input inductance (henries),

$f$  = supply-line frequency (cycles per second),

$$R_{eff} = \frac{\text{Load voltage (volts)}}{\text{Load current (amps)}}$$

Choke-input filters are not normally used with single-phase half-wave rectifiers.

**Capacitor-Input Filter**—The 2-2000A is particularly suitable for power-supply applications demanding high voltage at low cur-

rent. Under these conditions capacitor-input filter circuits become desirable. The maximum d-c current rating of the 2-2000A when no input choke is incorporated in the filter depends upon the total series resistance of the capacitor-charging circuit relative to the effective load resistance seen by each tube. The circuit diagrams and tabulation in Fig. 2 are so arranged and labeled that this required series resistance may be found for a wide range of load conditions. This may be done by determining the value of the following quantities:

$E_c$  is the filter-input d-c voltage. While this is usually the entire load voltage, in the case of voltage multipliers it is the load voltage divided by the multiplication factor.

$I_p$  is the d-c current per tube. This is the entire load current only in the case of the simple half-wave rectifier or half- or full-wave multiplier. In the case of full-wave center-tapped or bridge rectifiers,  $I_p$  is half the load current.

$R_c$  is the total charging-circuit resistance. A certain minimum value of charging-circuit resistance is necessary to limit the peak value of current to which the tubes will be subjected under given load conditions. This required minimum depends upon the d-c current per tube ( $I_p$ ), and has been tabulated in Fig. 2 as a percentage of the effective load resistance per tube ( $E_c/I_p$ ). The total charging-circuit resistance involves the internal resistance of the rectifier tube,  $R_p$ , the added series resistor,  $R_s$ , and the equivalent internal resistance of the a-c voltage supply,  $R_i$ .

$R_p$  is the plate resistance of the 2-2000A, which may be taken as 400 ohms.

$R_i$  is the equivalent internal resistance of the supply. This may be taken as the regulation of the high-voltage supply expressed as a decimal multiplied by the load resistance used in measuring this regulation.

$R_s$  is the series resistor which must be inserted in the charging circuit to bring the total charging-circuit resistance up to the required minimum. Its value may be found from the formula associated with each of the circuits of Fig. 2. This resistor must be inserted in such a position in the circuit that it protects all tubes.

Tubes may be operated in parallel to increase the output capability in a given circuit. When two tubes are placed in parallel at each place where one is shown in the circuits of Fig. 2, the plate resistance ( $R_p$ ) will be half as great and the maximum allowable load current twice as great as indicated.

**Peak Inverse Voltage**—The peak inverse voltage rating of the 2-2000A is 75,000 volts. In single-phase power supply rectifier circuits the peak inverse voltage to be used in design is the peak a-c supply voltage (1.41 times  $E_{rms}$  in Fig. 2) in the case of bridge circuits, and twice this value in the case of half- and full-wave rectifiers and voltage multipliers. Peak inverse voltage in three-phase operation depends upon the circuit employed, and will be found listed in the handbooks.

**Special Applications**—The ratings given for capacitor-input filter circuits assume values of input capacitance large enough to hold the ripple to a low value. In special applications where a larger percent ripple is tolerable, and filter capacitance is low, the 2-2000A is capable of larger d-c output currents.

As a unidirectional conductor in d-c circuits where the current is continuous and the percent ripple is moderate, the maximum current rating of the 2-2000A is 1500 milliamperes.

The plate characteristic curve for the 2-2000A serves as a guide to special applications. The maximum plate dissipation rating of 1200 watts, the maximum peak inverse voltage rating of 75,000 volts, and the maximum peak plate current of 12 amperes must not be exceeded.

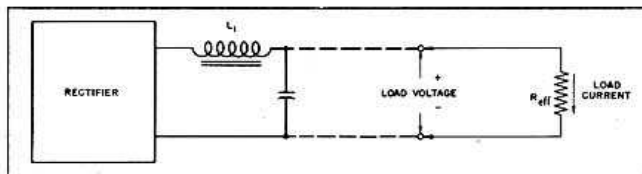
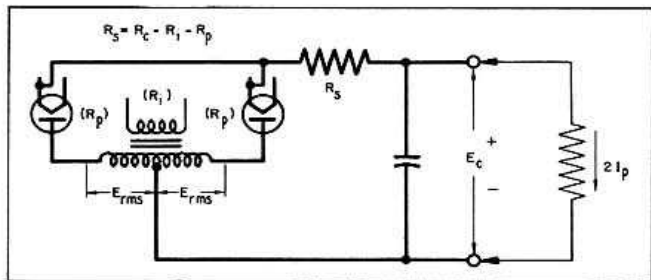
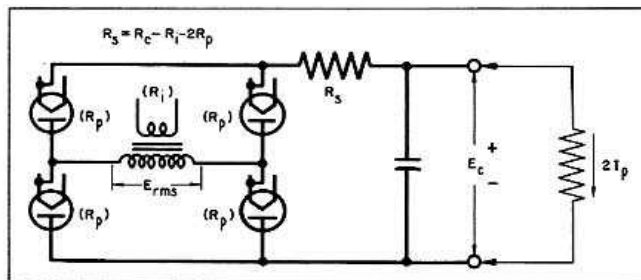


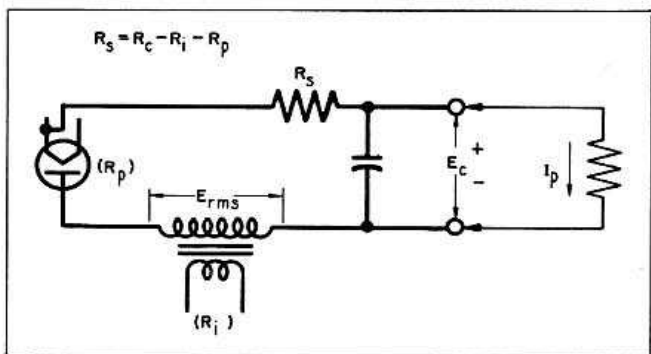
Fig. 1. Rectifier with Choke-Input Filter



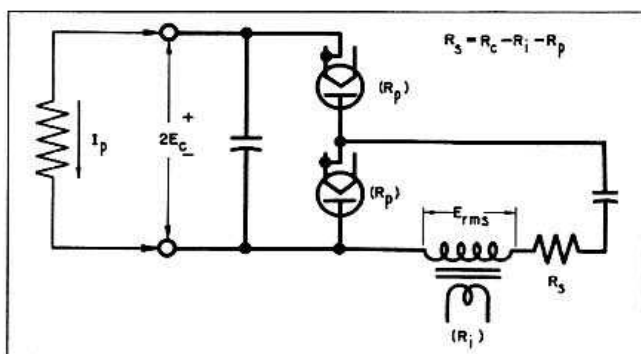
a. Full-Wave Center-Tapped Rectifier



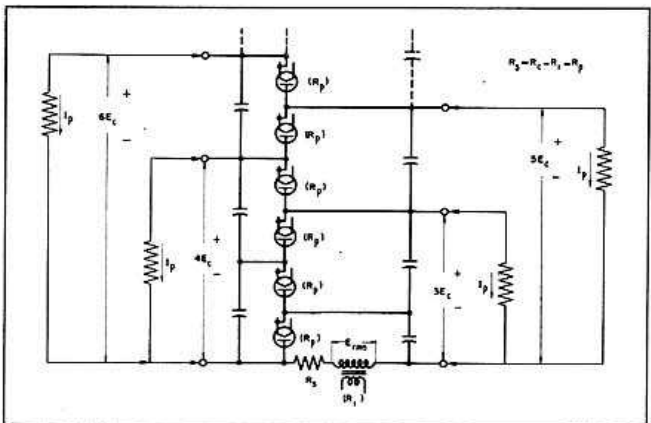
b. Full-Wave Bridge Rectifier



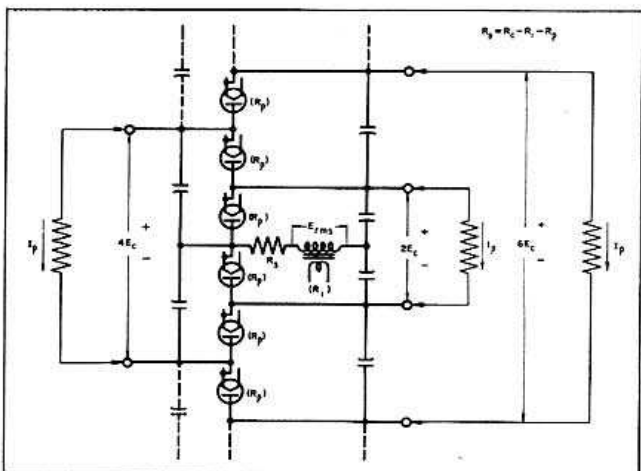
c. Half-Wave Rectifier



d. Half-Wave Voltage Doubler



e. Half-Wave Voltage Multiplier (with common ground when  $R_s$  is inserted on the "high" side of  $E_{rms}$ )



f. Full-Wave Voltage Multiplier

Eimac 2-2000A Maximum D-C Current Ratings for R-C Filter Applications						
D-C Plate Current ( $I_p$ )	550	600	650	700	750	milliamperes per tube
Total Charging-Circuit Resistance ( $R_c$ )	1.1	2.1	3.8	7.0	13	percent of Effective Load Resistance per Tube ( $E_c/I_p$ )
A-C Supply Voltage ( $E_{rms}$ )	0.80	0.84	0.90	1.00	1.16	times Filter-Input D-C Voltage ( $E_c$ )
Peak Inverse Voltage ( $1/2$ these values for circuit b.)	2.3	2.4	2.6	2.8	3.3	times Filter-Input D-C Voltage ( $E_c$ )

Fig. 2 Eimac 2-2000A basic R-C Circuits (for any one of the indicated loads)

$R_i$  = Equivalent resistance of voltage source

$R_p$  = 400 ohms (200 ohms for two tubes in parallel)

PLATE CURRENT--AMPERES

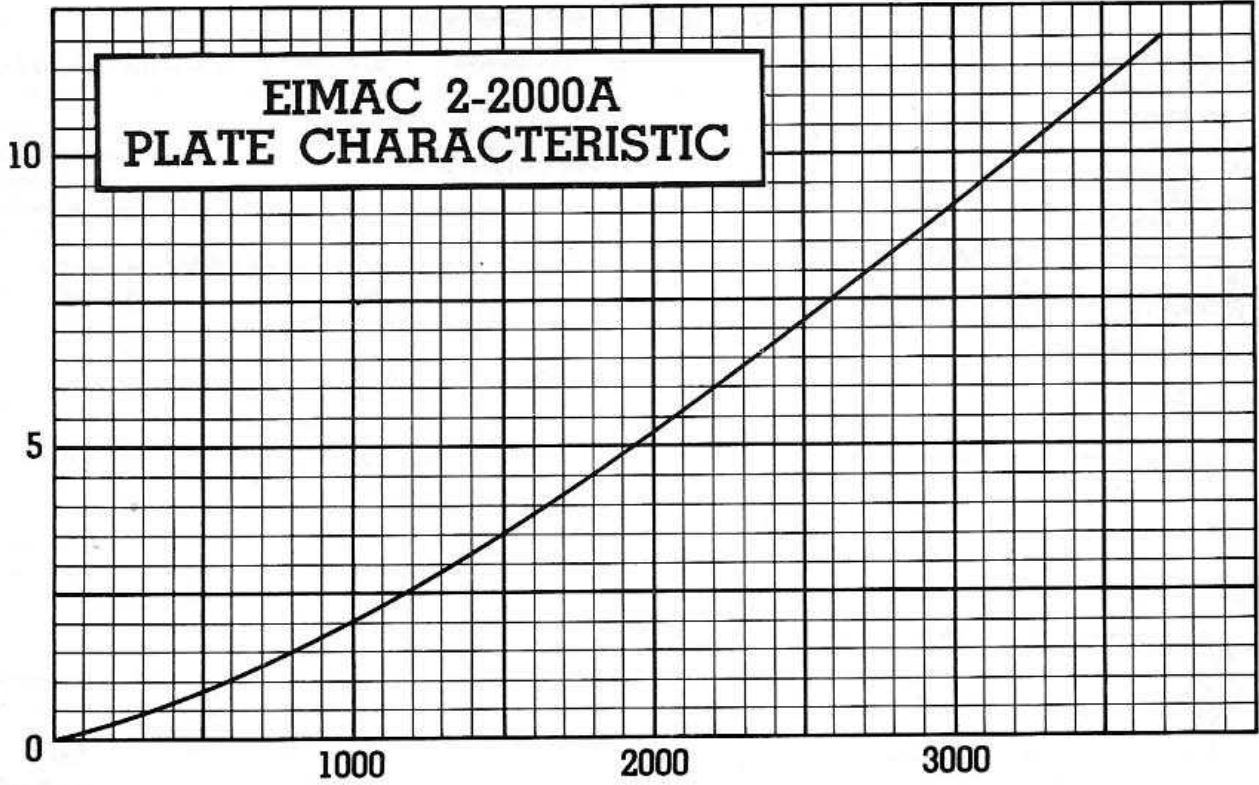


PLATE VOLTAGE--VOLTS

