

**EITEL-McCULLOUGH, INC.**  
SAN CARLOS, CALIFORNIA

**TENTATIVE DATA**  
**8350**  
**4CW50,000C**  
**RADIAL-BEAM**  
**POWER TETRODE**

The Eimac 8350/4CW50,000C is a ceramic-metal, water cooled power tetrode intended for use at the 50 to 150 kilowatt output power level. It is recommended for use as a Class-C rf amplifier or oscillator, a Class-AB, rf linear amplifier or a Class-AB, push-pull af amplifier or modulator. The 8350/4CW50,000C is also useful as a plate and screen modulated Class-C rf amplifier.

The water cooled anode is rated at 50 kilowatts of plate dissipation with low water flow requirements.

**GENERAL CHARACTERISTICS**

**ELECTRICAL**

Filament:	Thoriated Tungsten		
Voltage	- - - - -	10	volts
Current	- - - - -	300	amps
Amplification Factor (Grid-Screen) (average)	- - - - -	4.5	

Direct Interelectrode Capacitances, Grounded Cathode:

Input	- - - - -	430	uuf
Output	- - - - -	45	uuf
Feedback	- - - - -	2.3	uuf

Frequency for Maximum Ratings:	- - - - -	30	Mc
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**MECHANICAL**

Base	- - - - -	Special, graduated rings
Maximum Seal Temperature	- - - - -	250°C
Maximum Anode Core Temperature	- - - - -	250°C
Recommended Socket	- - - - -	Eimac, SK-1500
Operating Position	- - - - -	Vertical, base up or down
Maximum Dimensions:		
Height	- - - - -	16.5 inches
Diameter	- - - - -	8.02 inches
Cooling	- - - - -	Water and Forced air
Net Weight	- - - - -	60 pounds
Shipping Weight- (approximately)	- - - - -	85 pounds



**RADIO-FREQUENCY POWER AMPLIFIER OR OSCILLATOR**

Class-C Telegraphy or FM Telephony (Key-down conditions)

**MAXIMUM RATINGS**

DC PLATE VOLTAGE	- - -	20,000 MAX. VOLTS
DC SCREEN VOLTAGE	- - -	2500 MAX. VOLTS
DC PLATE CURRENT	- - -	15.0 MAX. AMPS
PLATE DISSIPATION	- - -	50,000 MAX. WATTS
SCREEN DISSIPATION	- - -	1750 MAX. WATTS
GRID DISSIPATION	- - -	500 MAX. WATTS

**TYPICAL OPERATION**

DC Plate Voltage	- - -	10	15	20	kV
DC Screen Voltage	- - -	750	750	750	volts
DC Grid Voltage	- - -	-420	-480	-540	volts
DC Plate Current	- - -	10.7	10.5	9.7	amps
DC Screen Current	- - -	2.25	2.1	1.65	amps
DC Grid Current	- - -	1.2	1.15	.89	amps
Peak RF Grid Voltage	- - -	680	740	790	volts
Driving Power	- - -	815	850	705	volts
Plate Dissipation	- - -	23	32	30	kW
Plate Output Power	- - -	84	124	165	kW

Note: Maximum plate voltage and plate current cannot be applied simultaneously without exceeding dissipation ratings.



PLATE-MODULATED RADIO-FREQUENCY POWER AMPLIFIER

Class-C Telephony (Carrier conditions except where noted)

MAXIMUM RATINGS

Table with 2 columns: Parameter and Value. Includes DC Plate Voltage (15,000 MAX. VOLTS), DC Screen Voltage (2000 MAX. VOLTS), DC Plate Current (15.0 MAX. AMPS), Plate Dissipation\* (33,000 MAX. WATTS), Screen Dissipation (1750 MAX. WATTS), and Grid Dissipation (500 MAX. WATTS).

\*Corresponds to 50,000 watts at 100 percent sinewave modulation

TYPICAL OPERATION

Table with 4 columns: Parameter, Value 1, Value 2, Value 3. Includes DC Plate Voltage (10, 12.5, 15 kV), DC Screen Voltage (750, 750, 750 volts), Peak AF Screen Voltage (705, 675, 745 volts), DC Grid Voltage (-490, -500, -510 volts), DC Plate Current (7.4, 8.15, 8.95 amps), DC Screen Current (1.2, 1.4, 1.55 amp), DC Grid Current (.470, .650, .790 amp), Peak RF Grid Voltage (670, 710, 730 volts), Grid Driving Power (315, 460, 570 watts), Plate Dissipation (14, 18.5, 24 kW), and Plate Output Power (60, 83.5, 110 kW).

AUDIO-FREQUENCY AMPLIFIER OR MODULATOR

Class-AB<sub>1</sub>

MAXIMUM RATINGS (Per Tube)

Table with 2 columns: Parameter and Value. Includes DC Plate Voltage (20,000 MAX. VOLTS), DC Screen Voltage (2500 MAX. VOLTS), DC Plate Current (15.0 MAX. AMPS), Plate Dissipation (50,000 MAX. WATTS), Screen Dissipation (1750 MAX. WATTS), and Grid Dissipation (500 MAX. WATTS).

\* Per Tube

\*\*Approximate value

TYPICAL OPERATION (Two Tubes)

Table with 4 columns: Parameter, Value 1, Value 2, Value 3. Includes DC Plate Voltage (10, 15, 20 kV), DC Screen Voltage (1.5, 1.5, 1.5 kV), DC Grid Voltage (-280, -320, -360 volts), Max-Signal Plate Current (18.4, 16.4, 17.3 amps), Zero-Signal Plate Current (6.0, 4.0, 3.0 amps), Max-Signal Screen Current\*\* (.780, .550, .500 amp), Zero-Signal Screen Current (0, 0, 0 amps), Peak AF Driving Voltage\* (260, 300, 340 volts), Driving Power (0, 0, 0 watts), Load Resistance, Plate-to-Plate (1140, 1980, 2590 ohms), Max-Signal Plate Dissipation\* (35, 38, 48 kW), and Max-Signal Plate Output Power (114, 170, 250 kW).

RADIO-FREQUENCY LINEAR AMPLIFIER

Class-AB<sub>1</sub>

MAXIMUM RATINGS

Table with 2 columns: Parameter and Value. Includes DC Plate Voltage (20,000 MAX. VOLTS), DC Screen Voltage (2500 MAX. VOLTS), DC Plate Current (15.0 MAX. AMPS), Plate Dissipation (50,000 MAX. WATTS), Screen Dissipation (1750 MAX. WATTS), and Grid Dissipation (500 MAX. WATTS).

\*Approximate value

TYPICAL OPERATION, Peak-Envelope or Modulation-Crest Conditions.

Table with 4 columns: Parameter, Value 1, Value 2, Value 3. Includes DC Plate Voltage (10, 15, 20 kV), DC Screen Voltage (1.5, 1.5, 1.5 kV), DC Grid Voltage (-280, -320, -360 volts), Max-Signal Plate Current (9.2, 8.2, 8.65 amps), Zero-Signal Plate Current (3.0, 2.0, 1.5 amp), Max-Signal Screen Current\* (.390, .275, .250 amp), Peak RF Grid Voltage (260, 300, 340 volts), Driving Power (0, 0, 0 watts), Plate Dissipation (35, 38, 48 kW), Plate Output Power (57, 85, 125 kW), and Resonant Load Impedance (570, 990, 1295 ohms).

NOTE: "TYPICAL OPERATION" data are obtained by calculation from published characteristic curves and confirmed by direct tests. No allowance is made for circuit losses of any kind. Adjustment of the RF grid drive to obtain the specified plate current at the specified grid bias, screen voltage, and plate voltage is assumed. If this procedure is followed, there will be little variation in output power when tubes are changed, even though there may be some variations in grid and screen currents. The grid and screen currents which result when the desired plate current is obtained are incidental and vary from tube to tube. These current variations cause no difficulty so long as the circuit maintains the correct voltage in the presence of the variations in current. If grid bias is obtained principally by means of a grid resistor, the resistor must be adjustable to obtain the required bias voltage when the correct RF driving voltage is applied.

# APPLICATION

## MECHANICAL

**MOUNTING** — The 4CW50,000C must be operated with its axis vertical. The base of the tube may be down or up at the convenience of the circuit designer.

**SOCKET** —The Eimac SK-1500 socket is recommended for use with the 4CW50,000C. Base cooling is accomplished by directing 50-100 CFM of air horizontally into the socket from the side. Temperature of the ceramic-metal seals must be limited to 250°C.

**COOLING** —Anode cooling is accomplished by circulating water through the integral anode-water jacket. A new more efficient design assures adequate cooling with low water flow rates. The table below lists minimum cooling water requirements at various dissipation levels.

Plate Dissipation* (kilowatts)	Water Flow GPM
20	7.2
30	10.2
40	12.9
50	15.2

\*Since the power dissipated by the filament represents about 3000 watts and since grid-plus screen dissipation can, under some conditions, represent another 2250 watts, allowance has been made in preparing this tabulation for an additional 5250 watts dissipation.

The cooling table above assumes a water temperature rise of 20°C. Under no circumstances should the outlet water temperature exceed 70°C. Inlet water pressure should not exceed 75 psi. The pressure drop across the anode at full flow is less than 5 psi.

When the tube is mounted in the anode-up position, cooling water must enter the anode-water jacket through the outer connector; the outlet being the center connector; when the tube is mounted in an inverted position (base up) these connections are reversed, that is, the inlet connection is on the center water fitting and the water outlet is connected to the outer anode fitting.

Water flow must be started before applying any voltages to the tube. Water-flow and water temperature interlock switches are suggested for incorporation in any system to prevent tube damage due to inadequacy of flow. It is not necessary to continue water flow after the removal of all power.

## ELECTRICAL

**FILAMENT OPERATION** —The rated filament voltage for the 4CW50,000C is 10.0 volts. Filament voltage, as measured at the socket, should be maintained at this value to obtain maximum tube life. In no case should it be allowed to deviate by more than plus or minus 5 percent from the rated value.

**ELECTRODE DISSIPATION RATINGS** — The maximum dissipation ratings for the 4CW50,000C must be respected to avoid damage to the tube. An exception is the plate dissipation, which may be permitted to rise above the rated maximum during brief periods, such as may occur during tuning.

**PLATE DISSIPATION** — The plate-dissipation rating for the 4CW50,000C is 50,000 watts for most applications, but for Class C plate modulated applications, the maximum allowable dissipation is 33,000 watts for carrier conditions.

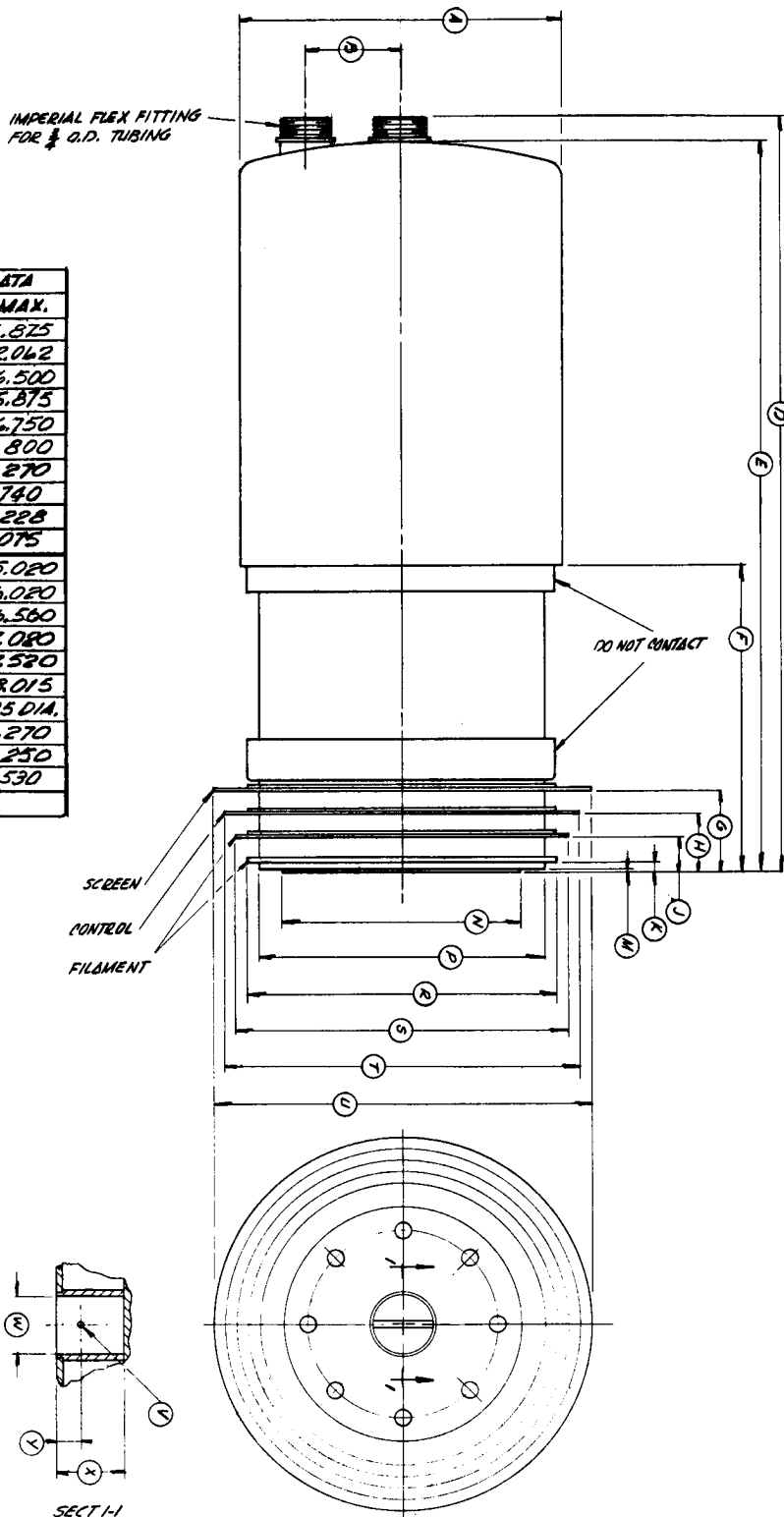
**CONTROL-GRID OPERATION** — The 4CW50,000C control grid has a maximum dissipation rating of 500 watts. Grid dissipation is the product of dc grid current and peak positive grid voltage. Precautions should be observed to avoid exceeding this rating. The grid bias and driving power should be kept near the values shown in the "Typical Operation" sections of the data sheet whenever possible. The maximum grid circuit resistance should not exceed 100,000 ohms per tube.

**SCREEN-GRID OPERATION** — The power dissipated by the screen of the 4CW50,000C must not exceed 1750 watts. Screen dissipation, in cases where there is no ac applied to the screen, is the simple product of the screen voltage and the screen current. If the screen voltage is modulated, the screen dissipation will depend upon loading, driving power, and carrier screen voltage.

Screen Dissipation is likely to rise to excessive values when the plate voltage, bias voltage, or plate load are removed with filament and screen voltages applied. Suitable protective means must be provided to limit the screen dissipation to 1750 watts in the event of circuit failure.

**SPECIAL APPLICATIONS** — If it is desired to operate this tube under conditions widely different from those given here, write to the Power Grid Tube Marketing Department, Eitel-McCullough, Inc., 301 Industrial Way, San Carlos, California for information and recommendations.

DIMENSION DATA		
REF.	MIN.	MAX.
A	6.750	6.875
B	1.968	2.042
D	16.000	16.500
E	15.500	15.875
F	6.500	6.750
G	1.750	1.800
H	1.220	1.270
J	.690	.740
K	.188	.228
M	.045	.075
N	4.980	5.020
P	5.980	6.020
R	6.510	6.560
S	6.980	7.080
T	7.480	7.520
U	7.975	8.015
V		135 DIA.
W	1.250	1.270
X		1.250
Y	.490	.530





# EIMAC 4CW50,000C TYPICAL CONSTANT CURRENT

## CHARACTERISTICS

SCREEN VOLTAGE = 750 VOLTS

— PLATE CURRENT — AMPERES

- - - SCREEN CURRENT — AMPERES

- - - - GRID CURRENT — AMPERES

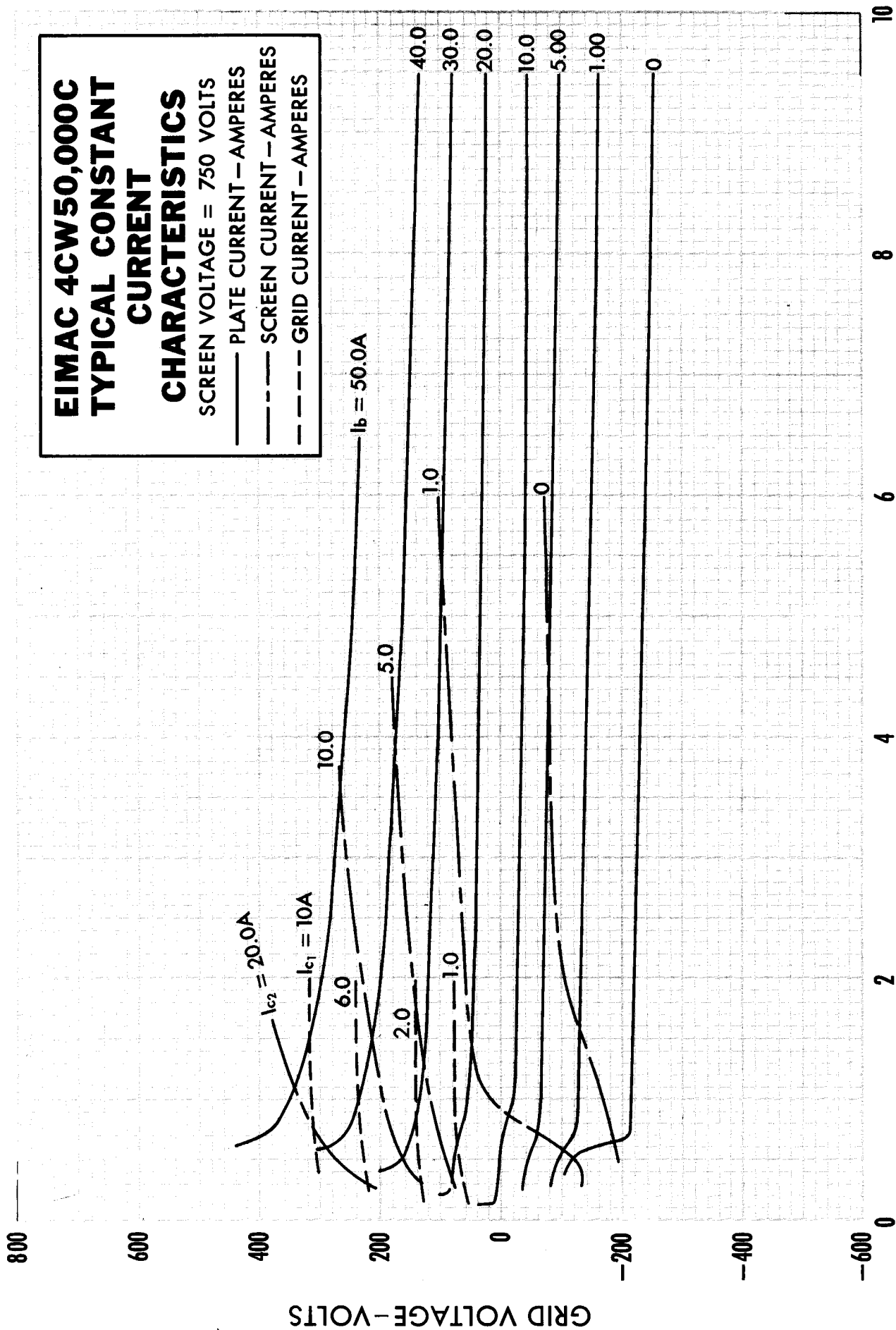


PLATE VOLTAGE — KILOVOLTS



4CW50,000C

# EIMAC 4CW50,000C TYPICAL CONSTANT CURRENT CHARACTERISTICS

SCREEN VOLTAGE = 1500 VOLTS

- PLATE CURRENT — AMPERES
- - - SCREEN CURRENT — AMPERES
- - - - GRID CURRENT — AMPERES

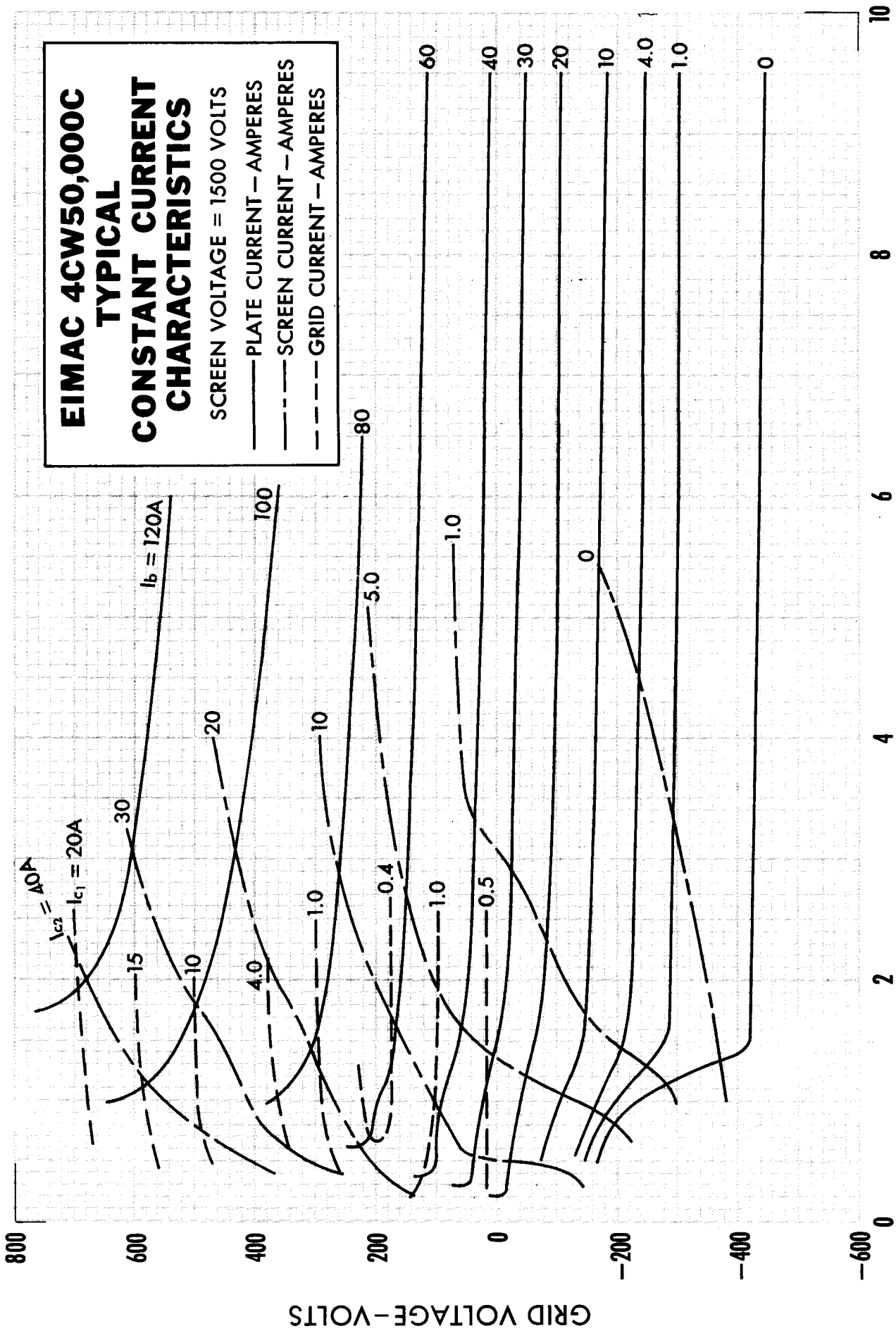


PLATE VOLTAGE — KILOVOLTS