



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.





4CW50,000C

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

Class-C Telephony (Carrier conditions except where noted)

MAXIMUM RATINGS

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
GRID DISSIPATION	- - -	500 MAX. WATTS

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

TYPICAL OPERATION

DC Plate Voltage	- - -	10	12.5	15	kV
DC Screen Voltage	- - -	750	750	750	volts
Peak AF Screen Voltage (For 100% modulation)	- - -	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
Plate Output Power	- - -	60	83.5	110	kW

**AUDIO-FREQUENCY AMPLIFIER
OR MODULATOR**Class-AB₁**MAXIMUM RATINGS (Per Tube)**

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

* Per Tube

**Approximate value

TYPICAL OPERATION (Two Tubes)

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
Max-Signal Plate					
Output Power	- -	114	170	250	kW

RADIO-FREQUENCY LINEAR AMPLIFIERClass-AB₁**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

*Approximate value

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

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
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.

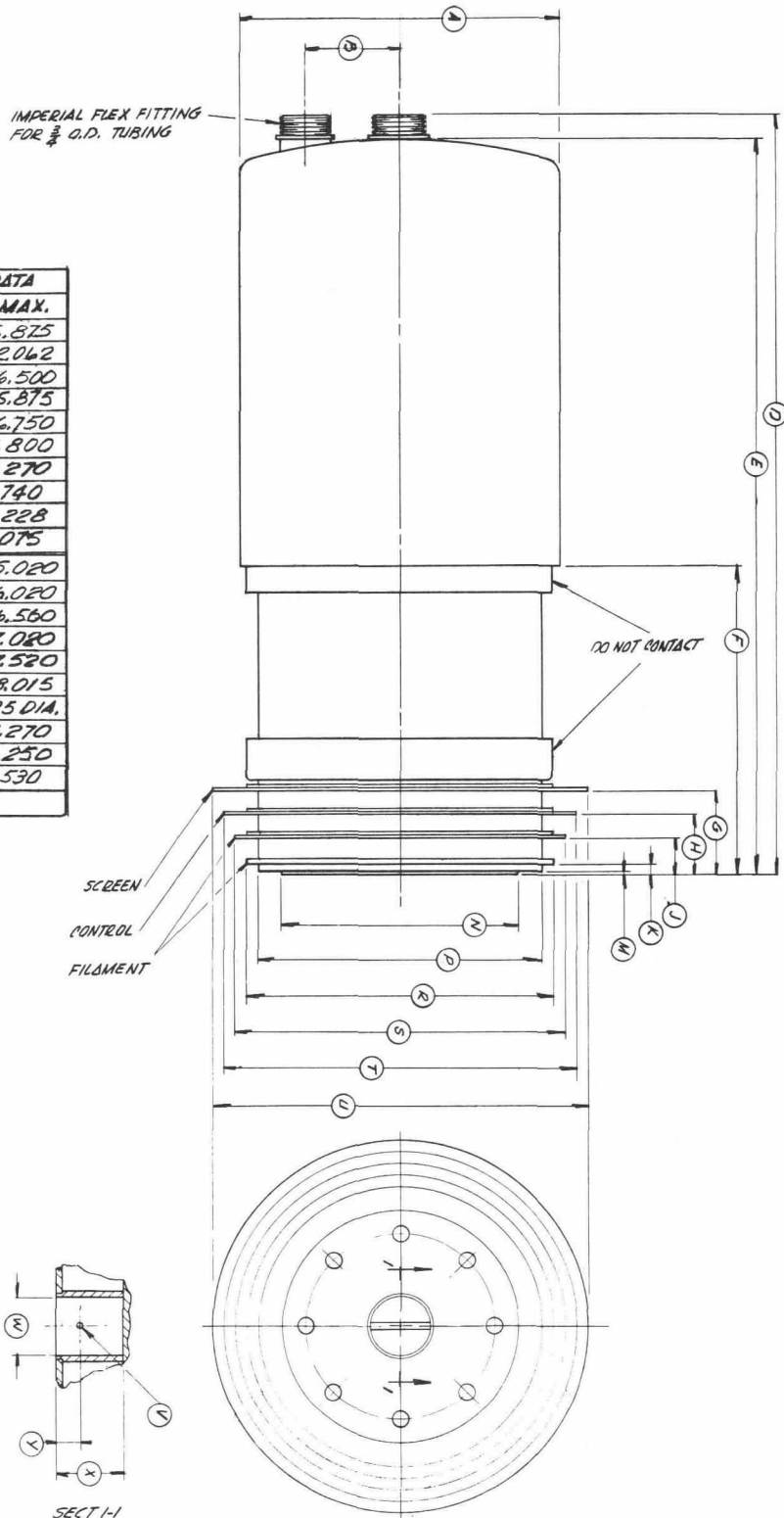
CONTROL-GRID OPERATION — The 4CW50,000C control grid has a maximum dissipation rating of 500 watts. Grid dissipation is the product of dc grid current and peak positive grid voltage. Precautions should be observed to avoid exceeding this rating. The grid bias and driving power should be kept near the 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	2.062
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	7.020
T	7.480	7.520
U	7.975	8.015
V		.135 DIA.
W	1.250	1.270
X		1.250
Y	.490	.530

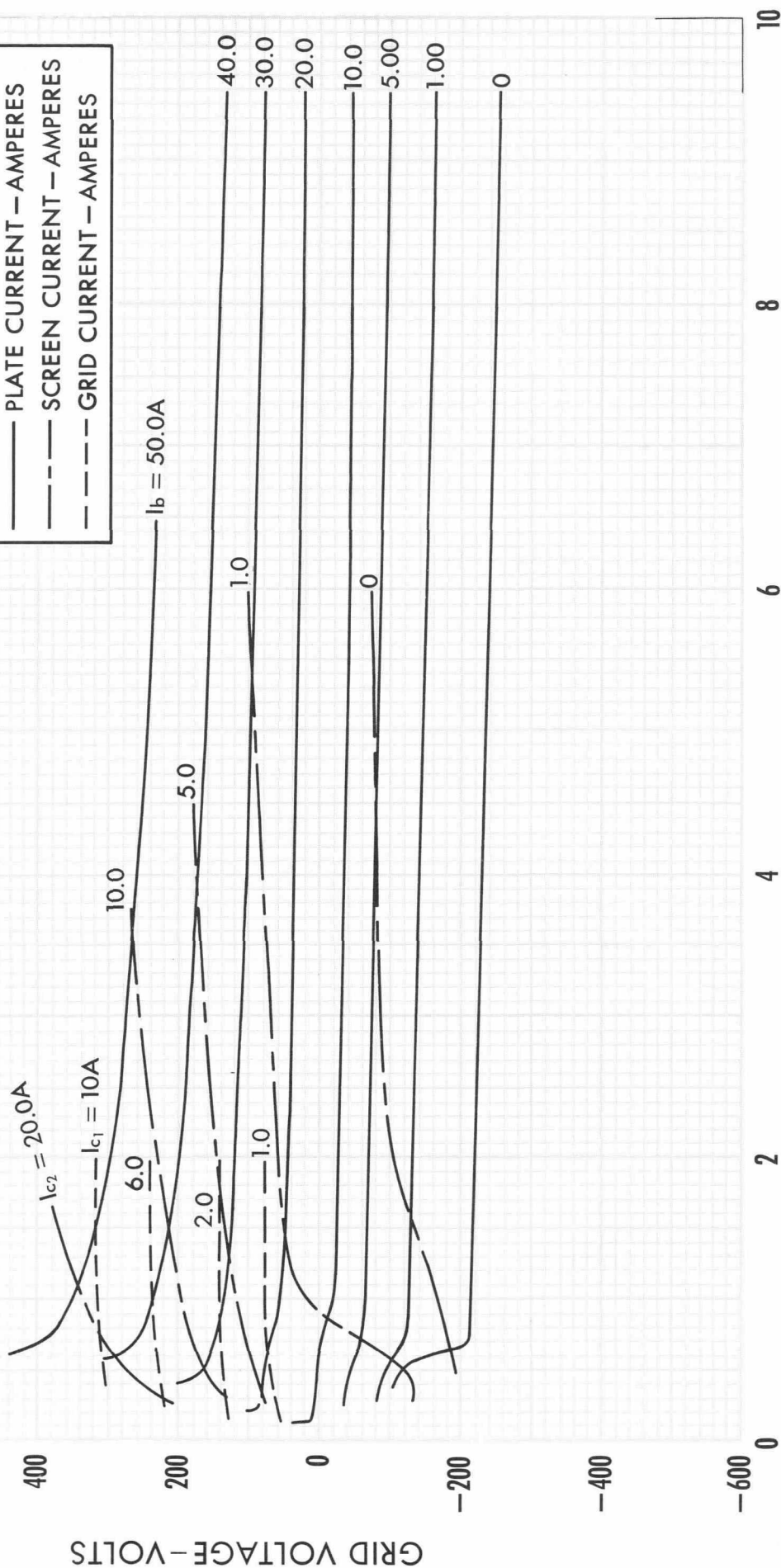




EIMAC 4CW50,000C TYPICAL CONSTANT CURRENT CHARACTERISTICS

SCREEN VOLTAGE = 750 VOLTS

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





4CW50,000C

EIMAC 4CW50,000C TYPICAL CONSTANT CURRENT CHARACTERISTICS

SCREEN VOLTAGE = 1500 VOLTS

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

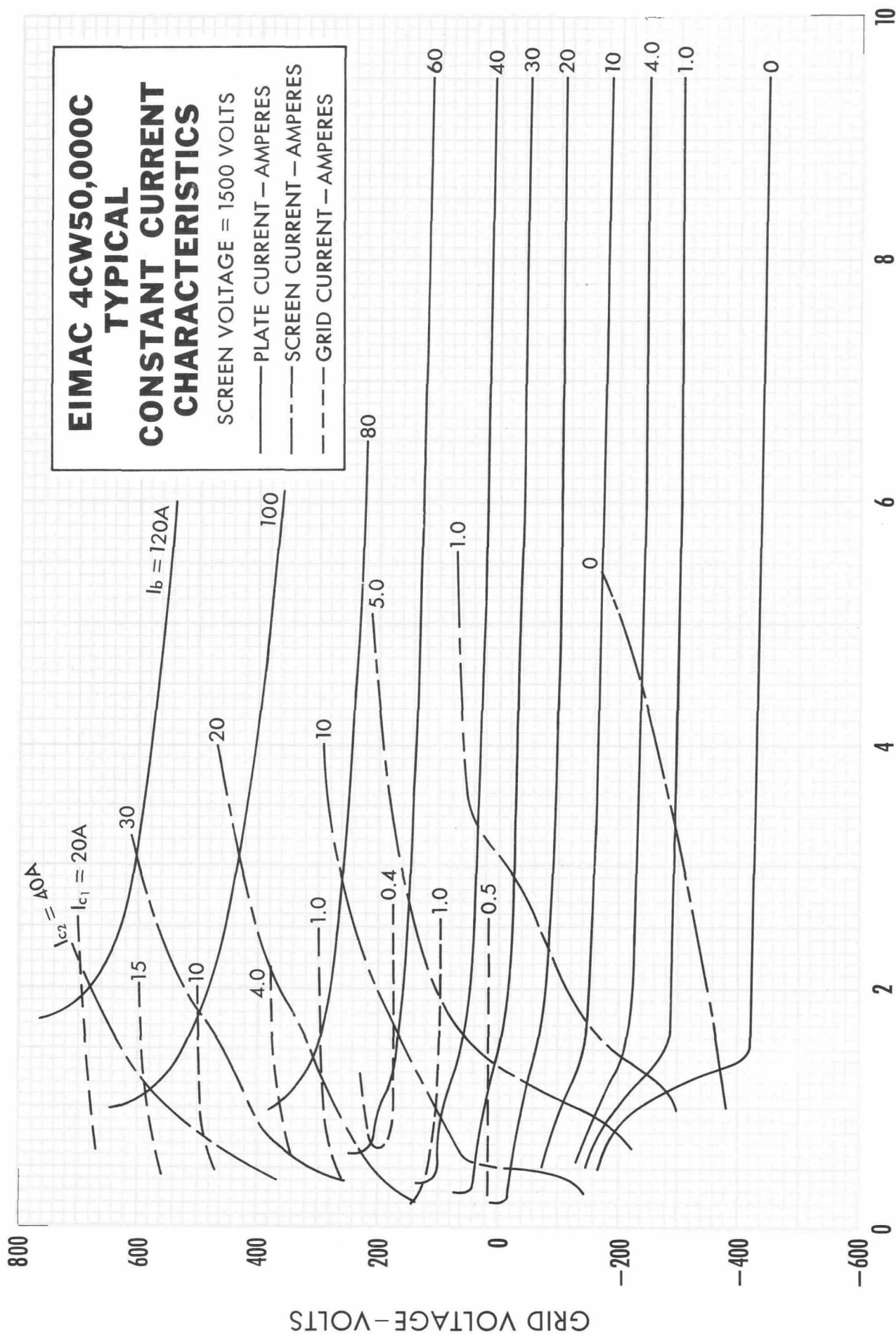


PLATE VOLTAGE — KILOVOLTS