EITEL-McCULLOUGH, INC.
SAN CARLOS, CALIFORNIA

8160
3CX10,000A7

HIGH-MU POWER TRIODE

The Eimac 8160/3CX10,000A7 is a ceramic and metal power triode intended to be used as a zero-bias Class-B amplifier in audio or radio-frequency applications. Operation with zero grid bias offers circuit simplicity by eliminating the bias supply. In addition, grounded-grid operation is attractive since a power gain as high as twenty times can be obtained with the 8160/3CX10,000A7.

GENERAL CHARACTERISTICS

ELECTRICAL

	Min.	Nom.	Max.	
Filament: Thoriated-Tungsten				
Voltage	–	7.5		volts
Current	94		104	amperes
▶ Amplification Factor	–	200		

Direct Interelectrode Capacitances:	Min.	Nom.	Max.
Grid-Filament	50.0		62.0 uuf
Grid-Plate	32.0		40.0 uuf
Plate-Filament	–	–	0.3 uuf

Frequency for Maximum Ratings	–	–	160 Mc.

MECHANICAL

Base	–	–	Coaxial
Recommended Socket	–	–	Eimac SK-1300
Operating Position	–	–	Vertical, base up or down
Cooling	–	–	Forced air
Maximum Operating Temperatures:			
Anode Core	–	–	250° C
Ceramic-to-Metal Seals	–	–	250° C
Maximum Dimensions:			
Height	–	–	8.75 inches
Diameter	–	–	7.05 inches
Net Weight	–	–	12 pounds

RADIO-FREQUENCY LINEAR AMPLIFIER GROUNDED-GRID, CLASS B

MAXIMUM RATINGS	
DC PLATE VOLTAGE	7000 MAX. VOLTS
DC PLATE CURRENT	5.0 MAX. AMPS
PLATE DISSIPATION	12 MAX. KW
GRID DISSIPATION	500 MAX. WATTS

*Approximate Values

TYPICAL OPERATION, Single-Tone Conditions

DC Plate Voltage	7000	7000 volts
Zero-Sig DC Plate Current*	0.60	0.60 amp
Max-Sig DC Plate Current	3.72	5.00 amps
Max-Sig DC Grid Current	0.71	1.00 amp
Driving Impedance	35	32 ohms
Resonant Load Impedance	1020	745 ohms
Max-Sig Driving Power	885	1540 watts
Peak Envelope Plate Output Power	17,700	24,200 watts
Power Gain	20.0	15.7 times

▶ Indicates change from sheet dated 6-15-62.

AUDIO-FREQUENCY AMPLIFIER OR MODULATOR CLASS B, GRID DRIVEN

MAXIMUM RATINGS (Per Tube)

DC PLATE VOLTAGE	7000 MAX. VOLTS
DC PLATE CURRENT	5.0 MAX. AMPS
PLATE DISSIPATION	12 MAX. KW
GRID DISSIPATION	500 MAX. WATTS

*Approximate Value

TYPICAL OPERATION, Two Tubes, Sinusoidal Wave

DC Plate Voltage	7000	7000 volts
DC Grid Voltage	0	0 volts
Zero-Sig DC Plate Current*	1.20	1.20 amps
Max-Sig DC Plate Current	7.50	10.0 amps
Max-Sig DC Grid Current	1.50	2.06 amps
Driving Power	315	560 watts
Peak AF Driving Voltage (Per Tube)	250	310 volts
Load Resistance, Plate-to-Plate	2000	1520 ohms
Max-Sig Plate Output Power	35,600	47,700 watts

RADIO-FREQUENCY LINEAR AMPLIFIER
CARRIER CONDITIONS, GROUNDED-GRID

MAXIMUM RATINGS

DC PLATE VOLTAGE	7000 MAX. VOLTS
DC PLATE CURRENT	5.0 MAX. AMPS
PLATE DISSIPATION	12 MAX. KW
GRID DISSIPATION	500 MAX. WATTS

*Approximate Value
**Modulation Crest Conditions

TYPICAL OPERATION

DC Plate Voltage	7000 volts
DC Grid Voltage	0 volts
Zero-Sig DC Plate Current*	0.60 amp
DC Plate Current	2.40 amps
DC Grid Current	0.25 amp
Driving Impedance**	32 ohms
Peak Driving Voltage**	310 volts
Driving Power	330 watts
Plate Output Power	5650 watts

RADIO-FREQUENCY POWER AMPLIFIER OR OSCILLATOR, CLASS C

MAXIMUM RATINGS

DC PLATE VOLTAGE	7000 MAX. VOLTS
DC PLATE CURRENT	4.0 MAX. AMPS
PLATE DISSIPATION	10 MAX. KW
GRID DISSIPATION	500 MAX. WATTS

TYPICAL OPERATION

DC Plate Voltage	7000 volts
DC Plate Current	4.0 amps
DC Grid Voltage	-230 volts
DC Grid Current	775 mA
Peak RF Grid Voltage	555 volts
Grid Driving Power	430 watts
Plate Output Power	21.3 kW

PLATE-MODULATED RF POWER AMPLIFIER

MAXIMUM RATINGS

DC PLATE VOLTAGE	5500 MAX. VOLTS
DC PLATE CURRENT	3.0 MAX. AMPS
PLATE DISSIPATION	6.5 MAX. KW
GRID DISSIPATION	500 MAX. WATTS

TYPICAL OPERATION

DC Plate Voltage	5000 volts
DC Plate Current	3.0 amps
DC Grid Voltage	-200 volts
DC Grid Current	775 mA
Peak RF Grid Voltage	490 volts
Grid Driving Power	380 watts
Plate Output Power	11.9 kW

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

APPLICATION

Mounting— The 3CX10, 000A7 must be operated vertically base up or base down. The tube must be protected from severe vibration and shock.

Cooling— The maximum temperature rating for the external surfaces of the 3CX10, 000A7 is 250°C. Sufficient forced-air cooling must be provided to keep the temperature of the anode core and the temperature of the ceramic-metal seals below 250°C. Tube life is usually prolonged if these areas are maintained at temperatures below this maximum rating. Minimum air-flow requirements to maintain anode-core and seal temperatures below 225°C with an inlet-air temperature of 50°C are tabulated below. The use of these air-flow rates through the recommended socket/chimney and tube combination in the base-to-anode direction provides effective cooling of the tube.

	Sea Level		10, 000 Feet	
Plate** Dissipation (Watts)	Air Flow (CFM)	Pressure Drop (Inches of Water)	Air Flow (CFM)	Pressure Drop (Inches of Water)
4000	85	0.18	125	0.25
6000	145	0.38	210	0.55
8000	215	0.68	315	0.99
10,000	295	1.08	430	1.60
12,000	390	1.62	565	2.35

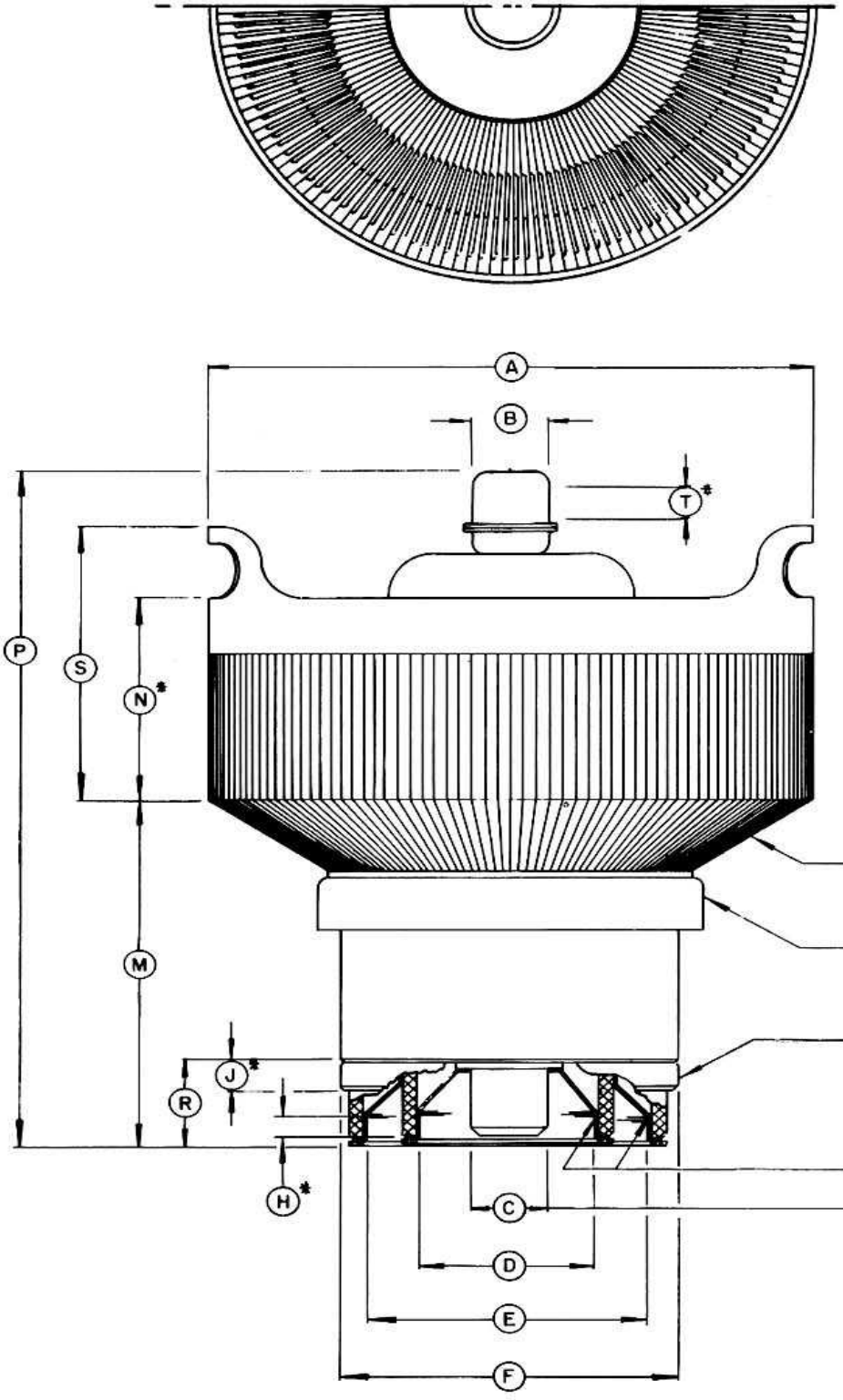
**Since the power dissipated by the filament is about 750 watts and since grid dissipation can, under some circumstances, represent another 500 watts, allowance has been made in preparing this tabulation for an additional 1250 watts dissipation.

Input Circuit— When the 3CX10, 000A7 is operated as a grounded-grid rf amplifier, the use of a resonant tank in the cathode circuit is recommended in order to obtain greatest linearity and power output. For best results with a single-ended amplifier it is suggested that the cathode tank circuit operate at a "Q" of two or more.

Class-C Operation— Although specifically designed for class-B service, the 3CX10, 000A7 may be operated as a class-C power amplifier or oscillator or as a plate-modulated radio-frequency power amplifier. The zero-bias characteristic of the 3CX10, 000A7 can be used to advantage in class-C amplifiers by employing only grid-leak bias. If driving power fails plate dissipation is then kept to a low value because the tube will be operating at the normal static zero-bias conditions.

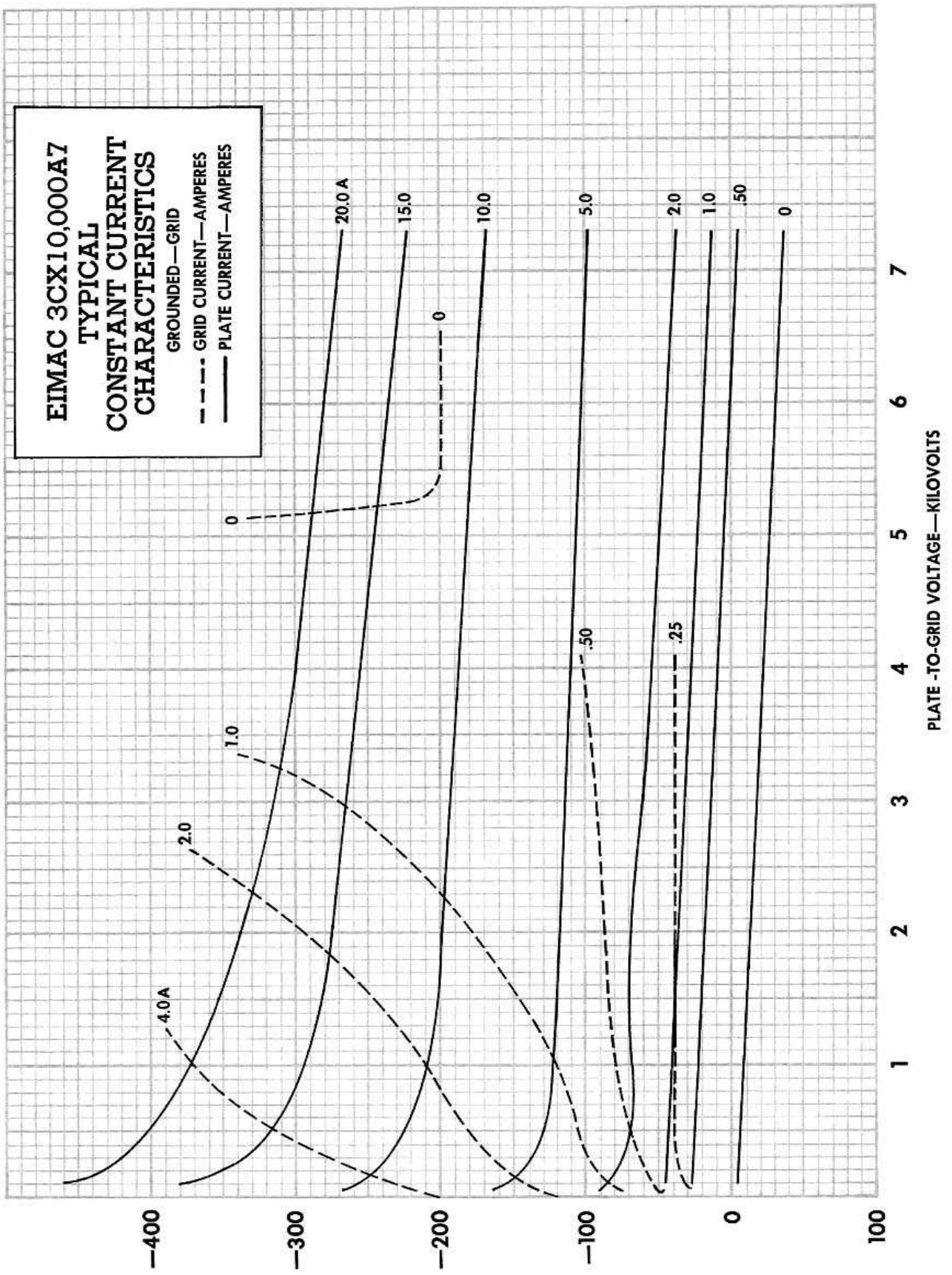
Filament Operation— The rated filament voltage for the 3CX10, 000A7 is 7.5 volts. Filament voltage, as measured at the socket, should be maintained at this value to obtain maximum tube life. In no case should it be allowed to deviate from the rated value by more than plus or minus five percent.

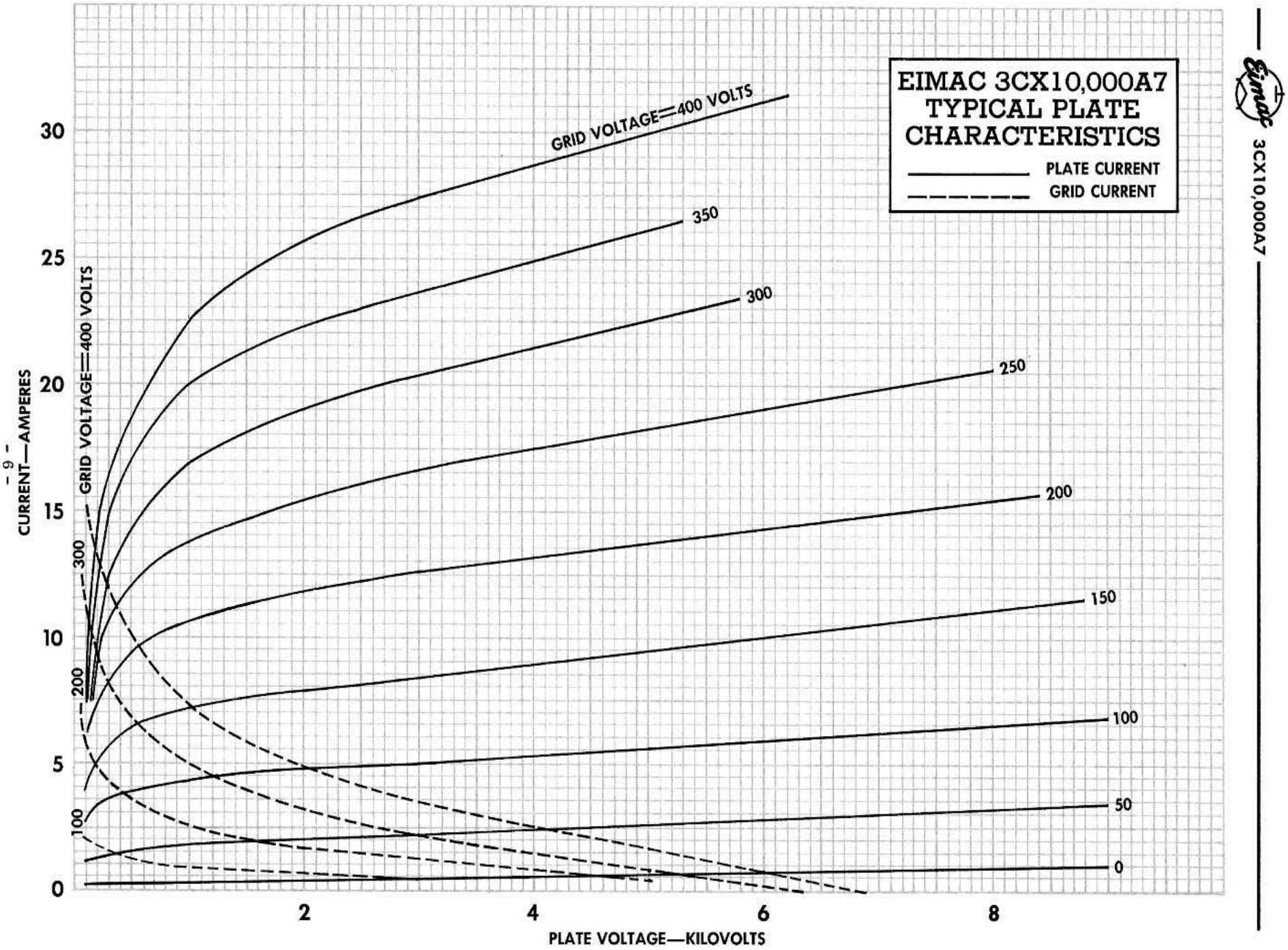
Special Applications— If it is desired to operate this tube under conditions widely different from those given here, write to Power Grid Tube Marketing, Eitel-McCullough, Inc., 301 Industrial Way, San Carlos, California, for information and recommendations.



DIMENSION DATA			
REF.	NOM.	MIN.	MAX.
A		6.928	7.050
B		.855	.895
C		.720	.760
D		1.896	1.936
E		3.133	3.173
F		3.792	3.832
H		.188	
J		.188	
M		3.950	4.300
N		2.412	2.788
P		8.250	8.750
R		.986	1.050
S		3.412	3.788
T		.375	

*CONTACT SURFACE
ALL DIMENSIONS IN INCHES


EIMAC 3CX10,000A7
TYPICAL
CONSTANT CURRENT
CHARACTERISTICS
GROUNDED—GRID
GRID CURRENT—AMPERES
PLATE CURRENT—AMPERES
20.0 A
15.0
10.0
5.0
2.0
1.0
.50
0
0
1.0
2.0
4.0A
.50
.25
—400
—300
—200
—100
0
100
1
2
3
4
5
6
7
FILAMENT-TO-GRID VOLTAGE—VOLTS
PLATE -TO-GRID VOLTAGE—KILOVOLTS


EIMAC 3CX10,000A7
TYPICAL PLATE
CHARACTERISTICS
PLATE CURRENT
GRID CURRENT
GRID VOLTAGE=400 VOLTS
350
300
250
200
150
100
50
0
CURRENT—AMPERES
PLATE VOLTAGE—KILOVOLTS
0
5
10
15
20
25
30
2
4
6
8