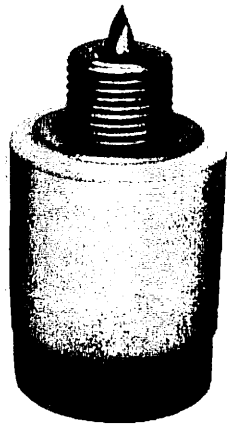
T E N T A T I V E

Y-820
PLANAR

TRIODE



The Y-820 planar triode has been specifically designed for high voltage, series regulator or switch tube (modulator) service. This compact, rugged design is provided with solder tabs to minimize input capacitance which improves rise and fall times that can be achieved with this tube, as well as to facilitate installation. The tube can be mounted in optional operating positions and is capable of sustaining vibration and shock.

GENERAL CHARACTERISTICS1

ELECTRICAL

Cathode: Oxide Coated, Unipotential	
Heater Voltage	6.3 ± 5% Volts
Heater Current at 6.3 Volts	2.25 Amperes
Cathode Heating Time	300 sec.
Amplification Factor (Average)	650
(Cut-off)3	400

Direct Interelectrode Capacitance2 (Grounded Cathode):	
Cin	16 pF
Cout (Max.)	0.03 pF
Cgp	1.7 pF

1Characteristics and operating values are based upon performance tests. These figures may change without notice as the result of product refinement. Varian Power Grid and X-Ray Tube Products should be consulted before using this information in final equipment design.

2Capacitance values are for a cold tube. When the cathode is heated to the proper temperature, the grid/cathode capacitance will increase from the cold value by approximately 1 pF due to thermal expansion of the cathode.

3Measured with one milliampere plate current and a plate voltage of 20 KVdc.

(Effective October 25, 1991)

RANGE VALUES FOR EQUIPMENT DESIGN

	Min.	Max.	
Heater Current at 6.3 Volts	2.05	2.50	Amperes
Cathode Warm-up Time	300	--	Sec
Interelectrode Capacitance2 (Grounded Cathode Connection):			
Cin	--	18	pF
Cout	--	0.03	pF
Cgp	--	2.0	pF

ENVIRONMENTAL

Shock, 11 ms, non-operating	50 G
Vibration, all axes	10 G

PULSE MODULATOR AND PULSE AMPLIFIER SERVICE

ABSOLUTE MAXIMUM RATINGS: (Refer to notes on next page)

DC Plate Voltage	25 Kilovolts3
Peak Plate Voltage	30 Kilovolts
DC Grid Voltage	-150 Volts
Pulse Duration	6 μ Seconds5
Duty	.0033

INSTANTANEOUS PEAK GRID/CATHODE VOLTAGE:

Grid Negative to Cathode	-500 Volts
Grid Positive to Cathode	100 Volts
Pulse Cathode Current	12 Amperes
DC Plate Current	150 Milliamperes
DC Grid Current	45 Milliamperes

DISSIPATION:

Plate (Conduction or Convection Cooling):	400 Watts4
Grid Dissipation	2 Watts

MECHANICAL

Maximum Overall Dimensions:

Length	2.825 in; 71.76 mm
Diameter	1.330 in; 33.78 mm
Net Weight	4.59 oz; 130 gm
Operating Position	Any

Maximum Operating Temperature:

Ceramic/Metal Seals	90°C1
Anode Core	90°C
Cooling	Conduction, in oil with appropriate heat sink

1The maximum operating temperature shown is for standard transformer oil and avoids boiling of the oil. If other insulating media with high boiling temperatures are used, higher temperatures are possible to a maximum of 250°C.

2Capacitance values are for a cold tube.

325 kV in oil. When using the tube in air without any insulating medium, maximum plate voltage is 15 kV. Higher voltages up to 20 kV may be permissible in specially designed circuits.

4When using the tube without a special heat sink or cooling arrangement, the anode dissipation in transformer oil is 85 watts maximum. The maximum plate dissipation of 750 watts can be achieved in FC77 dielectric coolant when using cooling adapter No. 164084.

5For applications using longer pulse duration and/or higher duty cycle, consult the nearest Varian Power Grid and X-Ray Tube Products Business Unit or the Product Manager, Varian, Salt Lake City, Utah, 84104, telephone (801) 972-5000.

APPLICATION

ELECTRICAL

X-RAY RADIATION HAZARD - High vacuum tubes operating at voltages higher than 15 kV produce progressively more dangerous x-ray radiation as the voltage is increased. This tube, operating at its rated voltages and currents, is a potential x-ray hazard. Only limited shielding is afforded by the tube envelope.

Moreover, the x-ray radiation level may increase significantly with aging and gradual deterioration, due to leakage paths or emission characteristics as they are affected by the high voltage. X-ray shielding must be provided on all sides of a tube operating at these voltages to provide adequate protection throughout the tube's life. The amount of shielding required will vary with tube usage and therefore is beyond Varian's control.

Periodic checks on the x-ray level should be made and the tube should never be operated without adequate shielding in place. Lead glass attenuates x-rays and is available for viewing windows. If there is any doubt as to the adequacy of shielding, an expert in this field should be sought to perform an x-ray survey of the equipment.

Useful information on this subject can be found in Reports 33 and 39 of the National Council on Radiation Protection, 7910 Woodmont Ave., Suite 1016, Bethesda, MD 20814; telephone (301) 657-2652.

Operation of high voltage equipment with interlock switches rendered inoperative and cabinet doors open in order to better locate an equipment malfunction can result in serious x-ray exposure.

The amount of x-ray radiation is dependent upon the particular tube operating conditions. When tested per EIA TEPAC Publication #181, the maximum radiation measured 12 inches from the tube surface is 8.2 R/Min.

ABSOLUTE MAXIMUM RATINGS - Values shown for each type of service are based on the "absolute system" and are not to be exceeded under any service conditions. These ratings are limiting values outside which the serviceability of the tube may be impaired. In order not to exceed absolute ratings, the equipment designer has the responsibility of determining an average design value for each rating below the absolute value of that rating by a safety factor so that the absolute values will never be exceeded under any usual conditions of supply voltage variation in the equipment itself. It does not necessarily follow that combinations of absolute maximum ratings can be attained simultaneously.

HOT SURFACES - When the tube is used in air and air cooled, external surfaces of the tube may reach temperatures up to 200 degrees C and higher. Aside from the anode, the cathode insulator and cathode/heater surfaces especially, may reach the high temperatures. All hot surfaces may remain hot for an extended time after the tube is shut off. To prevent serious burns, take care to avoid any bodily contact with these surfaces both during, and for a reasonable cool-down period after tube operation.

HEATER VOLTAGE - One of the most important factors affecting planar tube life and ultimate performance is heater voltage. The heater voltage value indicated under GENERAL CHARACTERISTICS/ELECTRICAL is the nominal value used when evaluating the tube during the manufacturing process. Optimum heater voltage for a specific use may, or may not be, the same value. Due to the many possible applications, no general definition of optimum heater voltage can be made. Many applications require lower heater voltage to assure the longest possible tube life. When the heater of a planar triode is energized by a dc source, its useful life is always shorter than with equivalent ac operation. Heater life under dc conditions is extended by connecting the common heater/cathode terminal to the positive side of the heater supply. If the heater is electrically insulated from the cathode circuit, optimum heater life under dc conditions can be achieved by operating the heater at a negative potential with respect to the cathode.

CAUTION-HIGH VOLTAGE - Normal operating voltages used with this tube are hazardous. The equipment must be designed properly and operating precautions followed. Design all equipment so no one can come in contact with high voltages. All equipment must include safety enclosures for high voltage circuits and terminals, with interlock switches to open primary circuits of the power supply and to discharge high voltage capacitors whenever access doors are opened. Interlock switches must not be bypassed or cheated to allow operation with access doors open. Always remember that HIGH VOLTAGE CAN KILL.

FAULT PROTECTION - It is good practice to protect the tube from internal damage caused by an internal arc which may occur at high anode voltage.

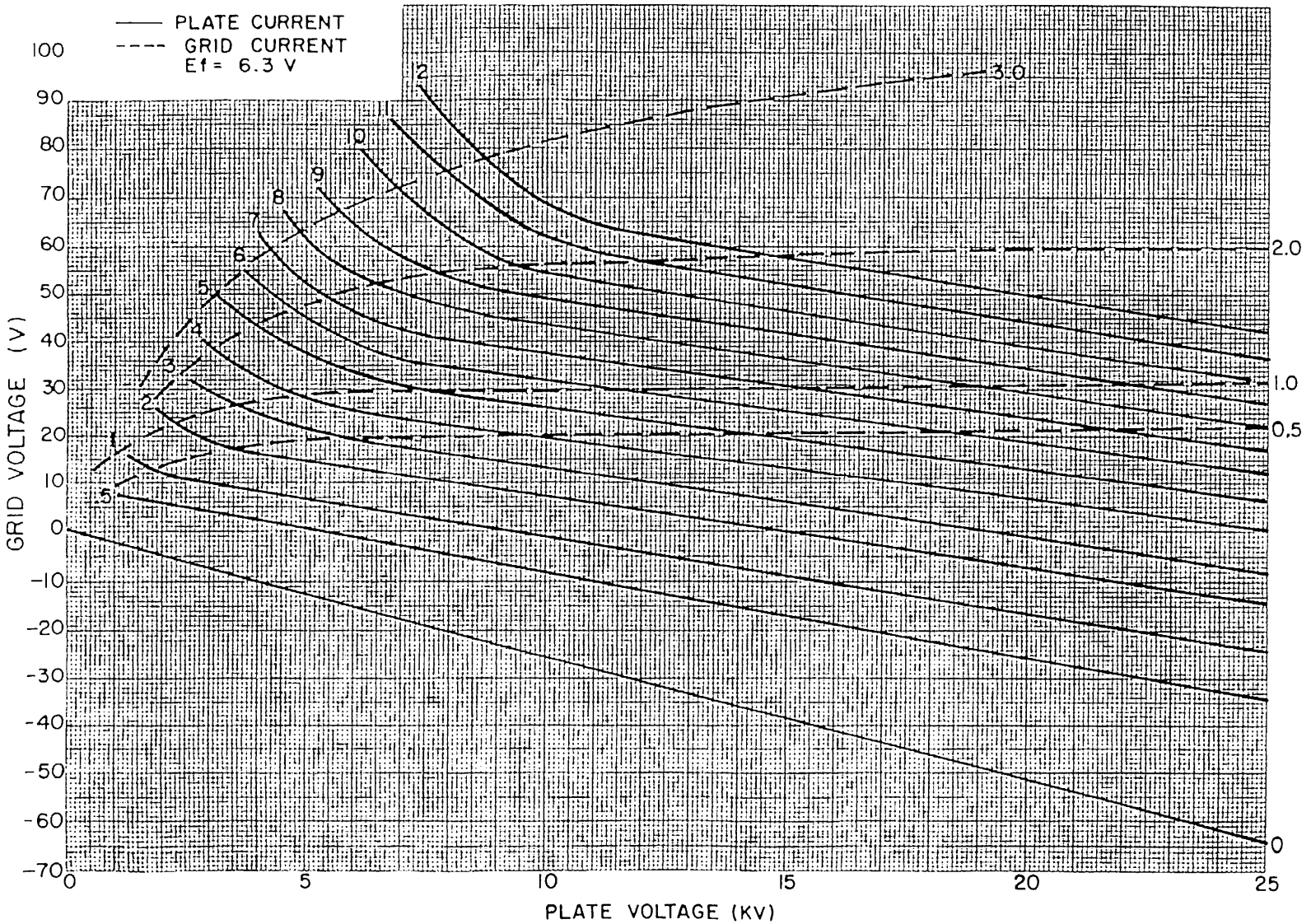
RF RADIATION - Exposure to strong rf fields should be avoided, even at relatively low frequencies. The dangers of rf radiation are more severe at UHF and microwave frequencies and can cause serious bodily and eye injuries. CARDIAC PACEMAKERS MAY BE AFFECTED.

MECHANICAL - The cathode, grid flanges and anode should not be altered in any way such as by machining or filing since the vacuum seal could be damaged. Maximum torque applied to the flanges during installation should not exceed 15 inch pounds.

SPECIAL APPLICATIONS - If it is desired to operate this tube under conditions different from those given here, write to Varian, 1678 South Pioneer Road, Salt Lake City, UT 84104, telephone (801) 972-5000 for information and recommendations.

MA-2425

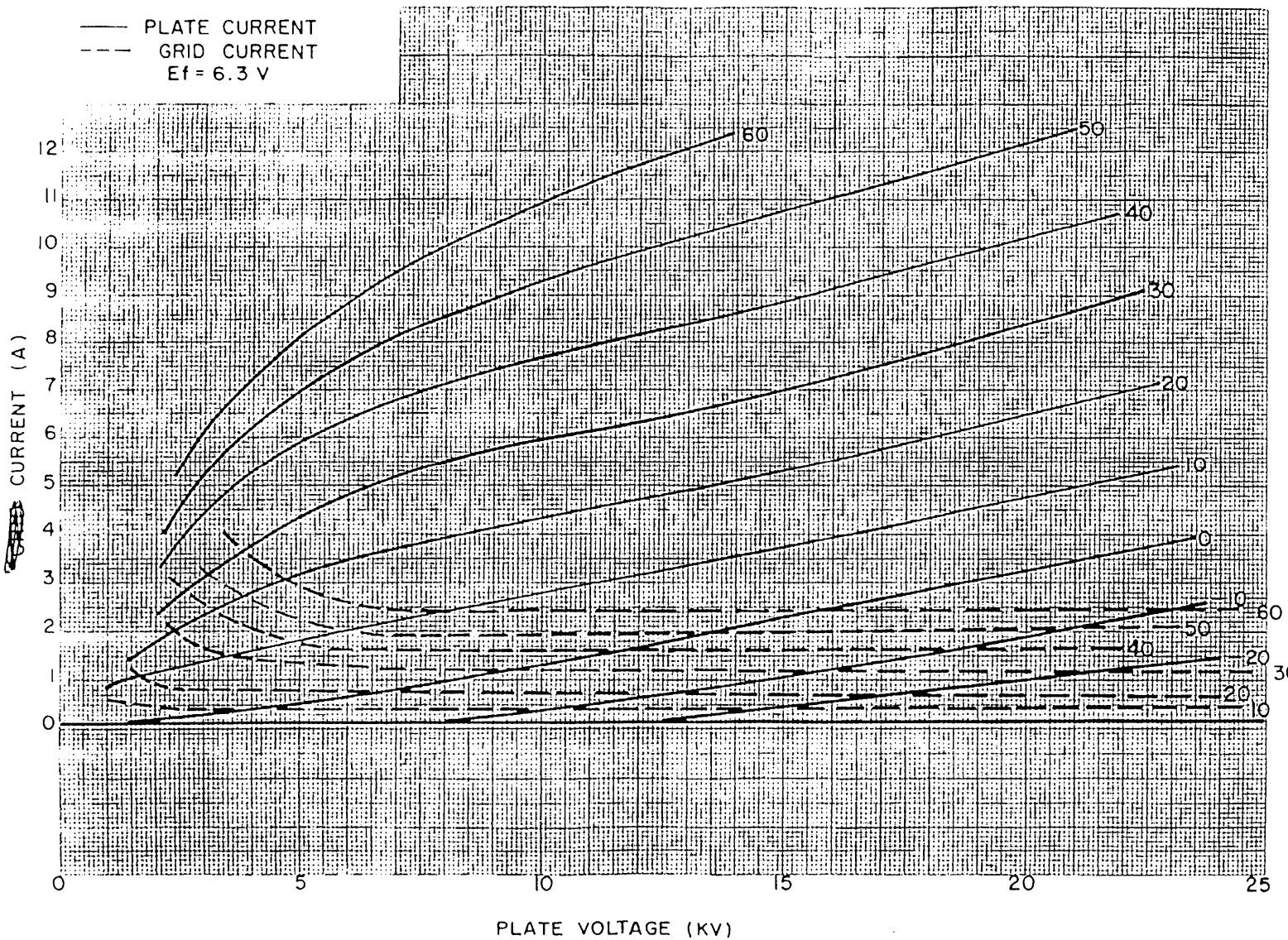
CONSTANT CURRENT CHARACTERISTICS Y-820



Y820

MA-2836

CONSTANT GRID VOLTAGE CHARACTERISTICS Y-820



Y820

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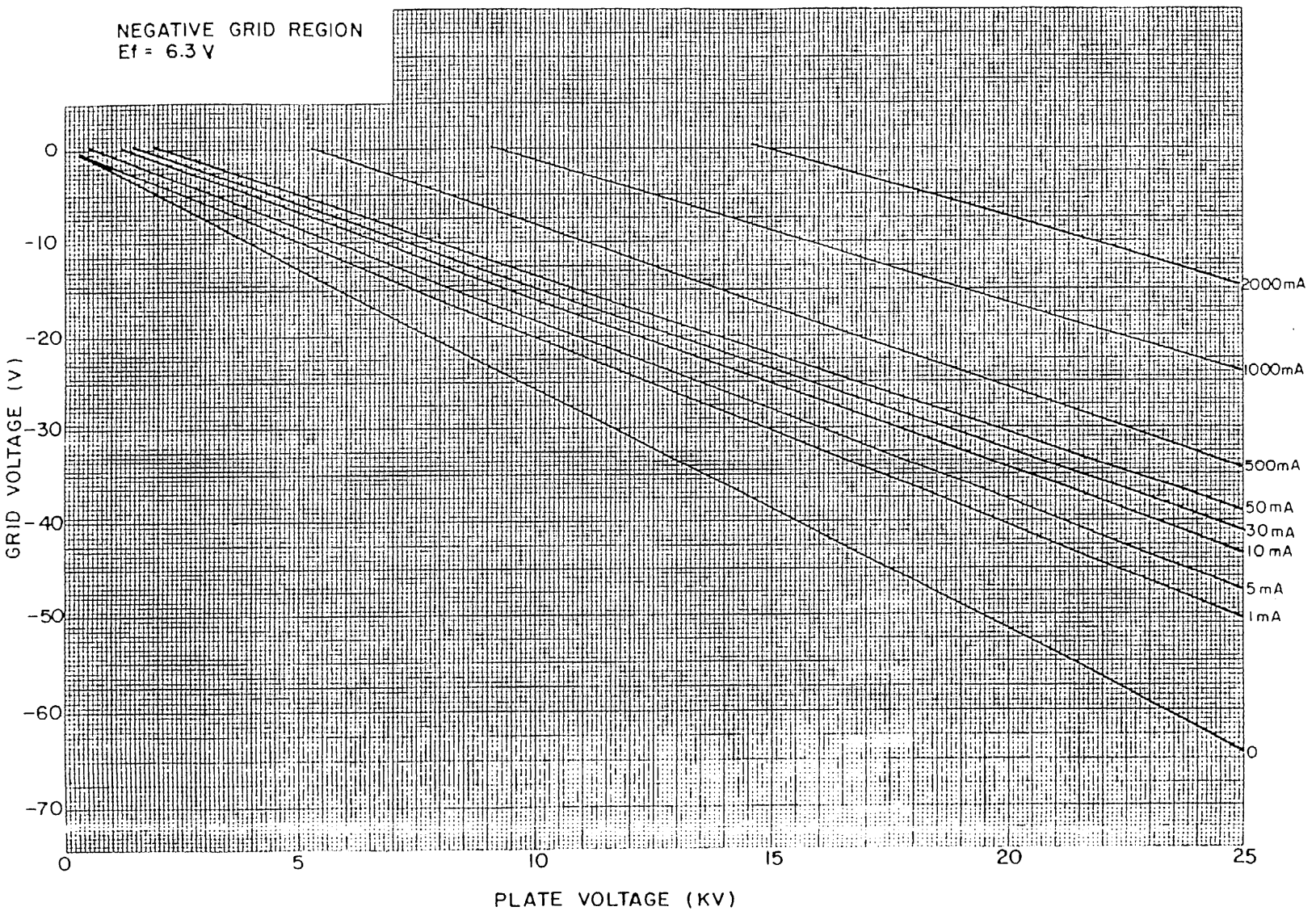
CONSTANT PLATE CURRENT CHARACTERISTICS Y-820



Eimac Y820

DIMENSIONAL DATA				
	INCHES		MILLIMETERS	
REF.	MIN.	MAX.	MIN.	MAX
A	1.275	1.330	32.385	33.782
B	.100	.250	2.54	6.35
C	.450	.600	11.43	15.24
D	1.225	1.325	31.115	33.655
E	.375	.450	9.525	11.43
F	.100	.200	2.54	5.08
G	.640	.725	16.256	18.415
H	1.200	1.300	30.48	33.02
J	.090	.100	2.286	2.54
K	70°	110°