EITEL-McCULLOUGH, INC.
SAN CARLOS, CALIFORNIA

7289 / 3CX100A5
8250 / 3CX100F5

HIGH-MU UHF TRIODES

The Eimac 7289/3CX100A5 and 8250/3CX100F5 are ceramic-and-metal planar UHF triodes intended to supersede 2C39 types. The 7289/3CX100A5 has a 6.0-volt heater, while the 8250/3CX100F5 has a 26.5-volt heater. They are manufactured to exacting dimensional tolerances to provide the greatest mechanical uniformity. Extended and critical electrical testing results in increased reliability and a minimum variation in electrical characteristics. Full ratings apply at altitudes up to 60,000 feet and they are capable of sustained, reliable operation at elevated temperatures.

The mechanical and electrical characteristics of these tubes make them desirable for grid isolation circuits in cavity devices. They will deliver 27 watts of useful power at 500 megacycles and at 2900 megacycles, 9.5 watts of useful power can be realized.

GENERAL CHARACTERISTICS

ELECTRICAL

		MIN.	NOM.	MAX.	
Cathode: Oxide-coated, Unipotential					
Heating time				60	Seconds
Heater					
3CX100A5 Voltage (see applications)			6.0		Volts
Current (E_f = 6.0 volts)		0.90		1.05	Amperes
3CX100F5 Voltage (see applications)			26.5		Volts
Current (E_f = 26.5 volts)		0.20		0.24	Amperes
Amplification Factor			100		
Transconductance (I_b = 70 milliamperes)			25,000		Micromhos
Direct Interelectrode Capacitance					
C_{gk}		5.6		7.0	$\mu\mu f$
C_{gp}		1.95		2.15	$\mu\mu f$
C_{pk}				0.035	$\mu\mu f$
Frequency for Maximum Ratings				2500	Megacycles

MECHANICAL

Terminals: Graduated Cylindrical Surfaces

Maximum Operating Temperatures

Ceramic to Metal Seals	250°C (300°C short term overload value)
Anode Core	250°C (300°C short term overload value)
Operating Position	Any
Cooling	Forced Air
Maximum Overall Dimensions	
Length	2.701 Inches Max.
Diameter	1.264 Inches Max.
Net Weight	2.5 Ounces
Shipping Weight (approx.)	7.0 Ounces

RADIO FREQUENCY POWER AMPLIFIER OR OSCILLATOR

MAXIMUM RATING (Per Tube)

DC PLATE VOLTAGE	1000 VOLTS MAX.
DC CATHODE CURRENT	0.125 AMP. MAX.
DC GRID VOLTAGE	—150 VOLTS MAX.
DC GRID CURRENT	0.050 AMP. MAX.
INSTANTANEOUS PEAK POSITIVE GRID VOLTAGE	30 VOLTS MAX.
INSTANTANEOUS PEAK NEGATIVE GRID VOLTAGE	—400 VOLTS MAX.
PLATE DISSIPATION	100 WATTS MAX.
GRID DISSIPATION	2 WATTS MAX.

TYPICAL OPERATION (Per Tube)

Power Amplifier Grounded-Grid (Key-down conditions)

	500 Mc	2500 Mc	2900 Mc	
DC PLATE VOLTAGE	800	900	1000	Volts
DC GRID VOLTAGE (approx.)	—20	—22	—9.5	Volts
DC PLATE CURRENT	80	90	100	Milliamp.
DC GRID CURRENT (approx.)	30	25	15	Milliamp.
DRIVING POWER (approx.)	6			Watts
USEFUL OUTPUT POWER	27	15	9.5	Watts

PLATE MODULATED RADIO FREQUENCY AMPLIFIER OR OSCILLATOR

MAXIMUM RATINGS (Per Tube)

DC PLATE VOLTAGE	600 VOLTS MAX.
DC CATHODE CURRENT	0.100 AMP. MAX.
DC GRID VOLTAGE	—150 VOLTS MAX.
DC GRID CURRENT	0.050 AMP. MAX.
INSTANTANEOUS PEAK POSITIVE GRID VOLTAGE	30 VOLTS MAX.
INSTANTANEOUS PEAK NEGATIVE GRID VOLTAGE	—400 VOLTS MAX.
PLATE DISSIPATION	70 WATTS MAX.
GRID DISSIPATION	2 WATTS MAX.

TYPICAL OPERATION (Per Tube)
500 Mc, Grounded-Grid, Carrier Conditions.

DC PLATE VOLTAGE	600 Volts
DC GRID VOLTAGE (approx.)	—15 Volts
DC PLATE CURRENT	65 Milliamp.
DC GRID CURRENT (approx.)	35 Milliamp.
DRIVING POWER (approx.)	5 Watts
USEFUL CARRIER POWER OUTPUT	16 Watts

APPLICATION

MECHANICAL

Mounting — The 3CX100A5 and 3CX100F5 may be operated in any position. They should be firmly held in place by spring-finger collets bearing on the terminal surfaces. In use the tubes should seat against the under side of the anode-terminal flange which is on the plane of reference for longitudinal dimensions. In applications involving severe shock and vibration, the tubes may be clamped in place by applying a suitable clamping device to the anode-terminal flange. It is recommended that no other portion of the tube be subjected to clamping forces.

Connections — The terminals of each tube are in the form of concentric cylinders of graduated diameters so that they may be conveniently used with coaxial tuning devices. Spring-fingered collets should be used to make contact with the anode, grid, cathode and heater terminals. Adequate contact area and spring pressure should be provided to minimize heating and to prevent erratic circuit performance at the higher frequencies. Non-contacting or intermittently-contacting collet fingers will cause troublesome circuit behavior, especially at very-high and ultra-high frequencies. Electrode contact surfaces should be kept clean and free of oxide coatings.

Cooling — Sufficient cooling must be provided for the anode and body seals to maintain operating temperatures below the rated maximum values:

Ceramic to Metal Seals	250°C	(300°C short term overload value)
Anode Core	250°C	(300°C short term overload value)

At sea level, with an inlet air temperature of 20°C (68°F), 12.5 cubic feet per minute of air flow is required to cool the anode at 100 watts plate dissipation when the air cowling as illustrated is used. Operation at higher altitudes or with higher inlet temperatures requires increased volumes of flow to obtain equivalent cooling. When using the anode cowling as illustrated here, it is necesary to provide additional facilities for seal cooling.

It should be borne in mind that operating temperature is the sole criterion of cooling effectiveness, regardless of the coolant type, flow rate or coolant temperature. One method of measuring the surface temperatures is the use of temperature sensitive lacquer, such as "Tempilaq." This product can be obtained from the Tempil Corp., 132-34 West 22nd Street, New York 11, New York. When temperature sensitive materials are used, extremely thin applications must be used to avoid interference with the transfer of heat from the tube to the air stream, which would cause inaccurate indications.

ELECTRICAL

Heater Operation — The rated heater voltage for the 3CX100A5 is 6.0 volts, and for the 3CX100F5 26.5 volts. The working voltage should be selected from the table below. The heater voltage for each type should be maintained within plus or minus of 5% of its intended value to minimize variations in circuit performance and to obtain maximum tube life.

At frequencies above approximately 1000 megacycles, transit time effects begin to influence the cathode temperature. The amount of driving power diverted to heating the cathode by back-bombardment will depend upon the frequency, the plate current and driving power being supplied to the tube. If the conditions of operation result in appeciable cathode back-heating, it may be necessary to start dynamic tube operation at normal heater voltage followed by a reduction of heater voltage to the proper value. The following table is intended as a general guide in this respect.

Mc	3CX100A5 Ef	3CX100F5 Ef
Up to 1000	6.0	26.5
1000 to 2000	5.5	24.3
2000 and above	5.0	22.1

The heater of the 3CX100A5 must not be operated at less than 4.5 volts in any case, nor should the heater of the 3CX100F5 be operated at less than 20.0 volts in any case.

Cathode Operation — The oxide-coated unipotential cathode in these tubes must be protected against excessively high emission currents. For all types of operation the maximum rated dc current is 125 milliamperes. The cathode and one side of the heater are connected together internally.

It is recommended that the rated heater voltage be applied for a minimum of 30 seconds before other operating voltages are applied. Tube perfomance will become stabilized 60 seconds after the heater voltage is applied.

Control Grid Operation — Grid dissipation must not exceed the rated maximum 2.0 watts grid dissipation power.

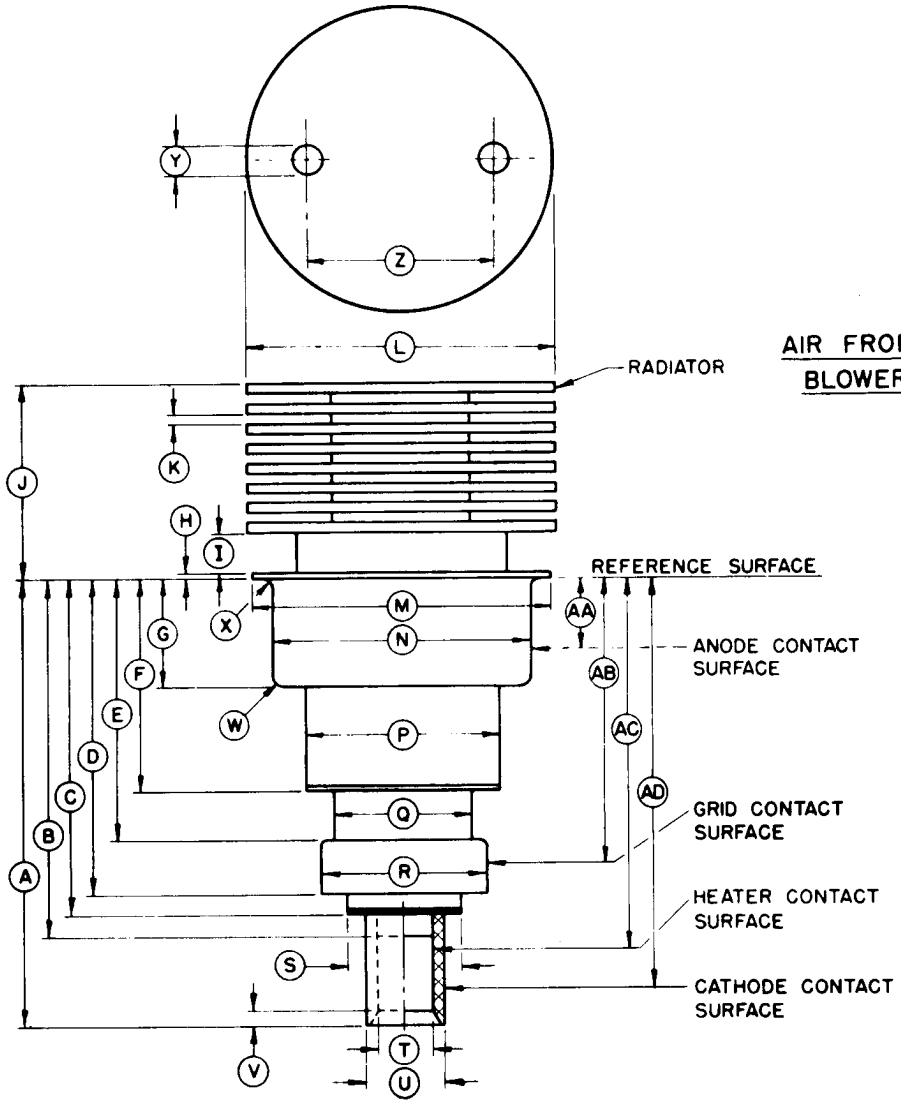
At operating frequencies near 500 megacycles, the driving power necessary for maximum output is in the order of 6 watts and as the operating frequency is increased the driving power requirements increase. Most of this increased driving power is absorbed in circuit losses other than grid dissipation, however, so that the grid dissipation will increase very little.

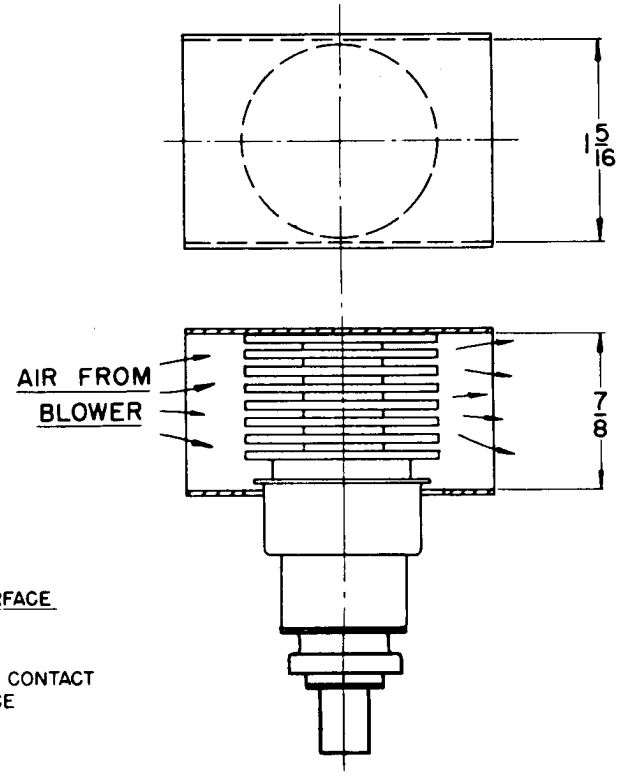
The maximum rated dc grid voltage is —150 volts and the grid may be driven to a maximum of 30 peak volts positive or to —400 peak volts negative.

The grid bias required by various individual tubes may vary between limits approximately 50% above and below the center value, and means should be provided in the equipment to accommodate such variation.

Plate Operation — The maximum rated plate dissipation power is 100 watts. In plate modulated applications, the carirer plate dissipation power must be limited to 70 watts to avoid exceeding the plate dissipation rating with 100% sine wave modulation.

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





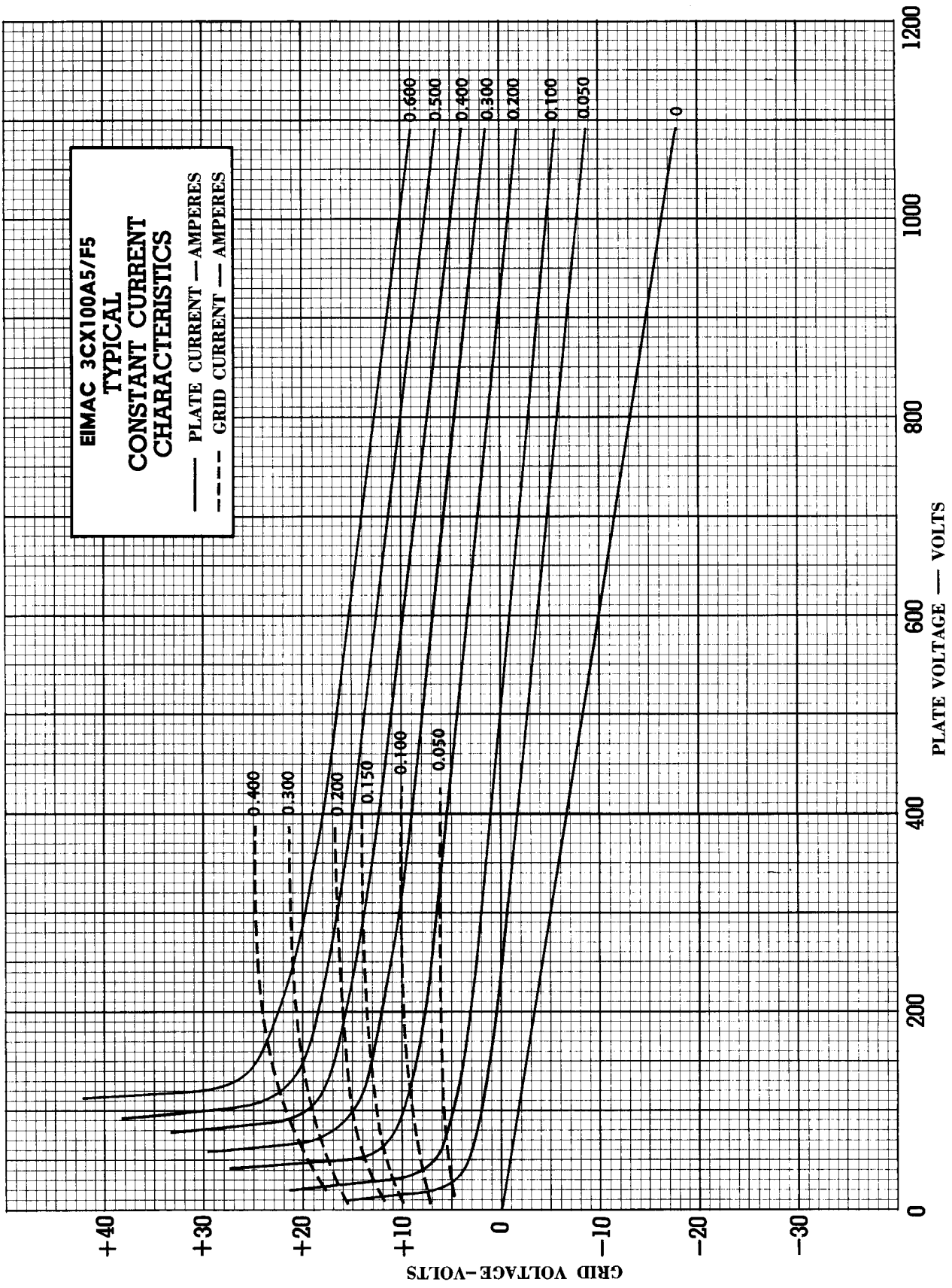
RECOMMENDED COWLING FOR FORCED-AIR COOLING OF ANODE

REF.	NOM.	MIN.	MAX.
A		1.815	1.875
B			1.534
C			1.475
D		1.289	1.329
E		1.085	1.135
F		.880	.920
G		.462	.477
H			.040
I		.125	.185
J		.766	.826
K		.025	.046
L		1.234	1.264
M		1.180	1.195
N		1.025	1.035
P		.772	.792
Q		.541	.561
R		.655	.665
S			.545
T		.213	.223
U		.315	.325
V			.086
W			.100
X			.035
Y		.105	.145
Z		.650	.850
AA		.035	.361
AB		1.185	1.265
AC		1.534	1.728
AD		1.475	1.815

NOTES:

1. The total indicated runout of the anode contact surface and the grid contact surface with respect to the cathode contact surface shall not exceed .020.

2. The total indicated runout of the heater contact surface with respect to the cathode contact surface shall not exceed .012.


EIMAC 3CX100A5/F5
TYPICAL
CONSTANT CURRENT
CHARACTERISTICS
—— PLATE CURRENT — AMPERES
- - - - GRID CURRENT — AMPERES
0.600
0.500
0.400
0.300
0.200
0.100
0.050
0
0.400
0.300
0.200
0.150
0.100
0.050
+40
+30
+20
+10
0
−10
−20
−30
0
200
400
600
800
1000
1200
GRID VOLTAGE—VOLTS
PLATE VOLTAGE — VOLTS