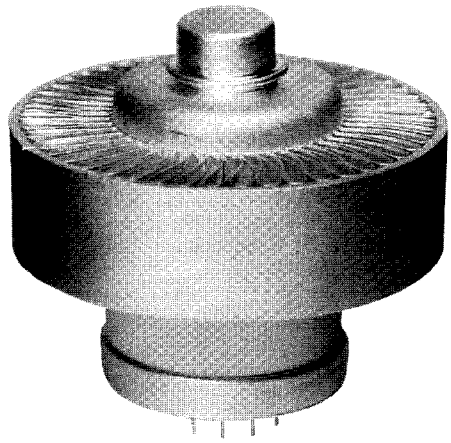


TECHNICAL DATA

FM BROADCAST POWER TRIODE 3CPX800A7

The Eimac 3CPX800A7 is a ceramic/metal power triode available for use as a radio-frequency amplifier in FM broadcast 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 3CPX800A7. The slightly longer ceramic improves the maximum plate voltage capability while maintaining the same tuning characteristics as the 3CX800A7.

GENERAL CHARACTERISTICS[1]

ELECTRICAL

Cathode: Oxide Cathode, Unipotential
- Voltage ..... 13.5 V
- Current ..... 1.5 A

Amplification Factor, (approximate) 200

Direct Interelectrode Capacitances (grounded grid)[2]
- Cin ..... 25.5 pF
- Cout ..... 6.1 pF
- Cpk ..... 0.04 pF

Highest Frequency for Maximum Ratings (CW) ..... 500 MHz

MECHANICAL

Maximum Dimensions:
- Height ..... 2.425 in ; 61.59 mm
- Diameter ..... 2.530 in ; 64.26 mm

Net Weight ..... 12 oz ; 340 gm

Operating Position ..... Any

Maximum Operating Temperature:
- Ceramic/Metal Seals ..... 250°C
- Anode Core ..... 250°C

Cooling ..... Forced Air

Base ..... Large Wafer Elevenar 11-pin with Ring

Recommended Socket SK-1900

Recommended Air Chimney SK-1906

Recommended Chimney Clamp Ring SK-1916

[1] Characteristics and operating values are based upon performance tests. These figures may change without notice as the result of additional data or product refinement. CPI Eimac Division should be consulted before using this information for final equipment design.

[2] Capacitance values are for a cold tube as measured in a special shielded fixture in accordance with Electronic Industries Association Standard RS-191.

RADIO FREQUENCY LINEAR AMPLIFIER
Class AB, Grounded Grid

MAXIMUM RATINGS:

DC Plate Voltage	3,500	Volts
DC Plate Current	0.600	Amperes
Plate Dissipation	800	Watts
Grid Dissipation	4.0	Watts

TYPICAL OPERATION, CW (to 110 MHz)

DC Plate Voltage	3200	V
Cathode Bias Voltage	18	V
Plate Current	430	mA
Grid Current[1]	25	mA
Driving Impedance	55	Ω
Resonant Load Impedance	2850	Ω
Driving Power, typical	23	W
Output Power[1]	900	W
Power Gain, typical	16	dB

1. Approximate Values.

NOTE: TYPICAL OPERATION data are obtained from direct measurement or by calculation from published characteristic curves. Adjustment of the rf grid voltage to obtain the specified plate current at the specified bias and plate voltages is assumed. If this procedure is followed, there will be little variation in output power when the tube is changed, even though there may be some variation in grid current. The grid current which results when the desired plate current is obtained is incidental and varies 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 grid voltage is applied.

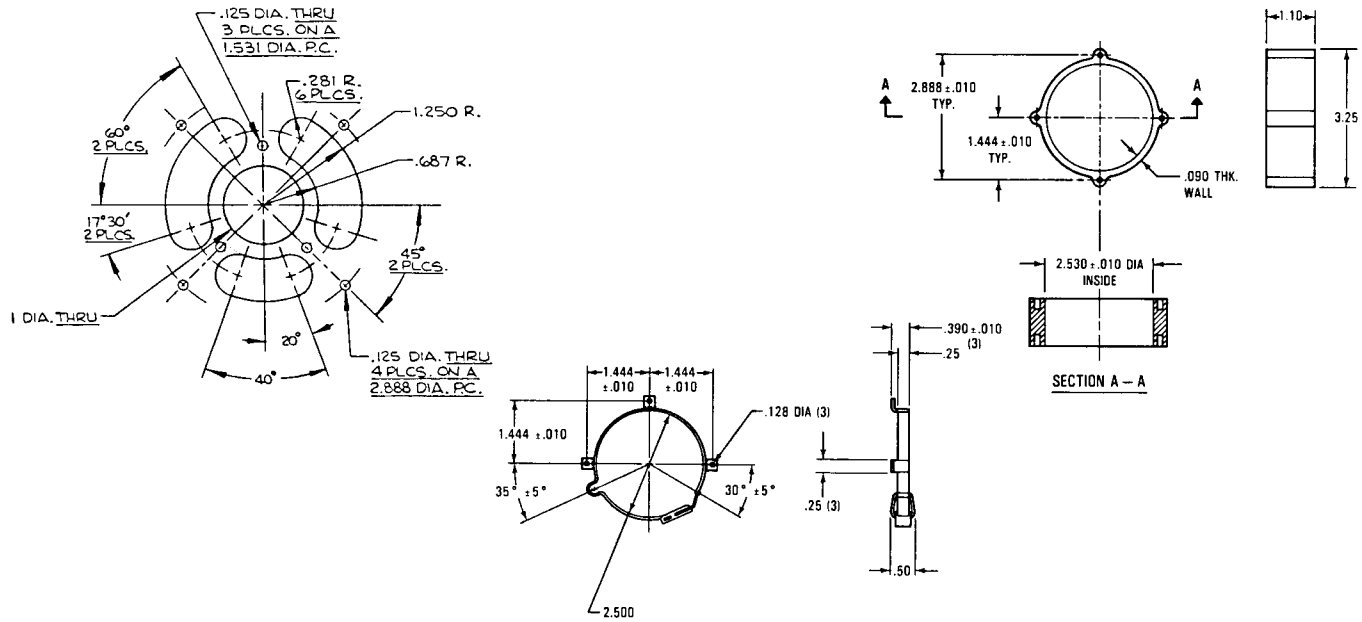


Figure 1 - Mounting Plate, Chimney SK-1906 and Clamp SK-1916, for SK-1900 Socket Assembly

APPLICATION

MOUNTING & SOCKETING - The 3CPX800A7 may be operated in any position. If it is to be operated in an inverted position (anode down) or horizontal position the SK-1906 clamp assembly should be used for reliable retention. The SK-1906 chimney is provided with four 4-40 tapped holes at one end for chassis mounting and four more 4-40 tapped holes at the other end for optional SK-1916 mounting. The combination of the SK-1906 with the optional SK-1916 clamp makes a rigid mounting assembly for the 3CPX800A7. Outline drawings of the SK-1906 air chimney and the clamp assembly are shown in Fig. 1.

COOLING - Sufficient forced-air cooling must be provided to maintain the anode core and seal temperatures at a safe operating value. Cooling data are shown for incoming cooling air at 25°C and 50°C, and represent the minimum requirements to limit tube temperatures to 225°C. The pressure drop figures are approximate and are for the mounting-plate (shown in Fig. 1), socket tube and chimney combination as would be the case with pressurized-compartment mounting, where air is required to pass through the chassis slots and the anode cooler to the outside of the cabinet.

Cooling Air at 25°C

Plate Dissipation (Watts)	SEA LEVEL		5,000 FEET	
	Air Flow (CFM)	Pressure Drop (In. of Water)	Air Flow (CFM)	Pressure Drop (In. of Water)
400	6	.09	7	.10
600	11	.20	14	.23
800	19	.50	23	.57

Cooling Air at 50°C

Plate Dissipation (Watts)	SEA LEVEL		5,000 FEET	
	Air Flow (CFM)	Pressure Drop (In. of Water)	Air Flow (CFM)	Pressure Drop (In. of Water)
400	8	.10	10	.12
600	16	.31	19	.35
800	27	.79	23	.88

Some air from the pressurized compartment passes by the socket for base cooling. This mounting technique is effective in the HF region but rf leakage through the slots may cause amplifier instability or regeneration in the VHF region. Screening the holes or use of waveguide-beyond-cutoff (honeycomb) air vents may be required in the VHF region.

Cooling must be applied before or simultaneously with electrode voltages, including the heater, and may be removed simultaneously with them. In all cases temperature of the anode and the ceramic/metal seals is the limiting factor, and the designer is encouraged to use temperature-sensitive paint or other temperature sensing devices in connection with any equipment design before the layout is finalized. It should also be noted that it is not good practice to operate at, or close to, the absolute maximum temperature rating for the ceramic/metal seals. Where long life and consistent performance are factors cooling in excess of minimum requirements is normally beneficial.

ELECTRICAL

ABSOLUTE MAXIMUM RATINGS - Values shown for the 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 serviceability of the tube may be impaired. In order not to exceed absolute maximum 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 the absolute values will never be exceeded under any usual conditions of supply-voltage variation, load variation, or manufacturing variation in the equipment itself. It does not necessarily follow that combinations of absolute maximum ratings can be attained simultaneously.

HEATER/CATHODE OPERATION – The rated heater voltage for the 3CPX800A7 is 13.5 volts, as measured at the base of the tube, and variations should be restricted to plus or minus 0.6 volt for long life and consistent performance.

CATHODE WARMUP TIME – In normal service it is recommended the heater voltage be applied for a minimum of three minutes before anode voltage and rf drive voltage are applied, to allow for proper conditioning of the cathode surface.

INPUT CIRCUIT – When the 3CPX800A7 is operated as 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.

FAULT PROTECTION – All power tubes operate at voltages which can cause severe damage in the event of an arc, especially in cases where large amounts of power supply stored energy are involved. Some means of protection is advised in all cases, and it is recommended that a series resistor be used in the lead from the power supply to the anode circuit to limit peak current and help dissipate the energy in the event of a tube or circuit arc. A resistance of 50 Ohms, with at least a 25 W rating, in the plate power supply positive lead will help protect the tube in the event of an arc.

VHF OPERATION - The base pin connections to the grid may be used at frequencies to 30 MHz. Above 30 MHz the use of a grid contact collet is recommended.

INTERELECTRODE CAPACITANCE – The actual internal interelectrode capacitance of a tube is influenced by many variables in most applications, such as stray capacitance to the chassis, capacitance added by the socket used, stray capacitance between tube terminals, and wiring effects. To control the actual capacitance values within the tube, as the key component involved, the industry and the Military Services use a standard test procedure as described in Electronic Industries Association Standard RS-191. This requires the use of specially constructed test fixtures which effectively shield all external tube leads from each other and eliminates any capacitance reading to "ground". The test is performed on a cold tube. Other factors being equal, controlling internal tube capacitance in this way normally assures good interchangeability of tubes over a period of time, even when the tube may be made by different manufacturers. The capacitance values shown in the manufacturer's technical data, or test specifications, normally are taken in accordance with Standard RS-191.

The equipment designer is therefore cautioned to make allowance for the actual capacitance values which will exist in any normal application. Measurements should be taken with the socket and mounting which represent approximate final layout if capacitance values are highly significant in the design.

HIGH VOLTAGE – The 3CPX800A7 operates at voltages which can be deadly, and the equipment must be designed properly and operating precautions must be followed. Equipment must be designed so that 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 the primary circuits of the power supplies and to discharge high-voltage condensers 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.

RF RADIATION – Avoid exposure to strong rf fields even at relatively low frequency. Absorption of rf energy by human tissue is dependent on frequency. Under 300 MHz most of the energy will pass completely through the human body with little attenuation or heating affect. Public health agencies are concerned with hazard even at these frequencies. OSHA (Occupational Safety and Health Administration) recommends that prolonged exposure to rf radiation should be limited to 10 milliwatts per square centimeter.

HOT SURFACES – Air-cooled surfaces and other parts of tubes can reach temperatures of several hundred degrees C and cause serious burns if touched for several minutes after all power is removed.

SPECIAL APPLICATIONS – If it is desired to operate this tube under conditions widely different from those given here, write to the Application Engineering Dept., CPI Eimac Division, 301 Industrial Road, San Carlos, Calif. 94070 for information and recommendations.

OPERATING HAZARDS

Proper use and safe operating practices with respect to power tubes are the responsibility of equipment manufacturers and users of such tubes. All persons who work with and are exposed to power tubes, or equipment that utilizes such tubes, must take precautions to protect to protect themselves against possible serious bodily injury. DO NOT BE CARELESS AROUND SUCH PRODUCTS.

The operation of this tube may involve the following hazards, any one of which, in the absence of safe operating practices and precautions, could result in serious harm to personnel.

HIGH VOLTAGE – Normal operating voltages can be deadly. Remember that HIGH VOLTAGE CAN KILL.

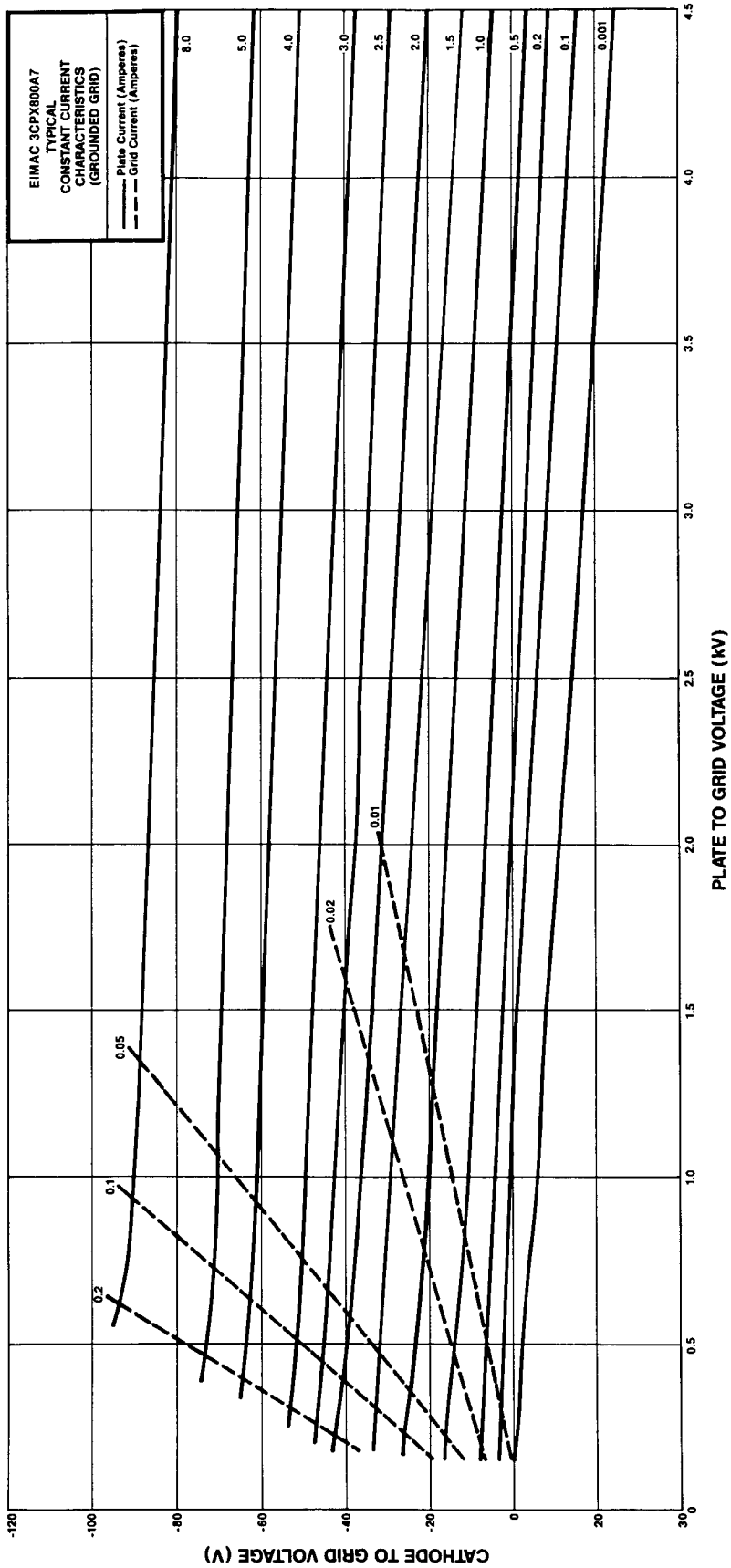
LOW-VOLTAGE HIGH-CURRENT CIRCUITS - Personal jewelry, such as rings, should not be worn when working with filament contacts or connectors as a short circuit can produce very high current and melting, resulting in severe burns.

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 EFFECTED.

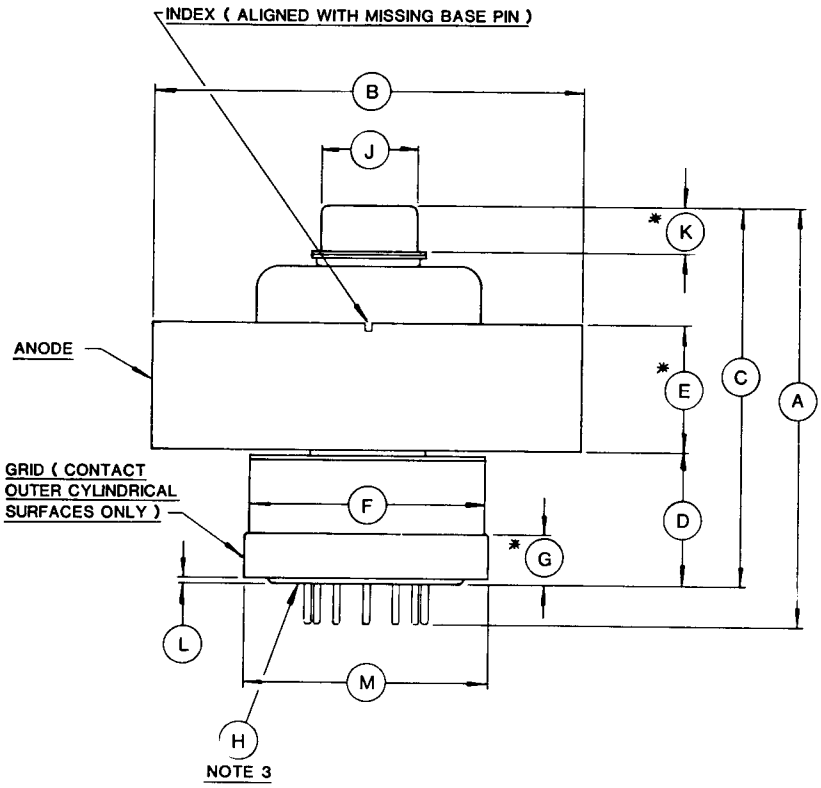
HOT WATER – Water used to cool tubes may reach scalding temperatures. Touching or rupture of the cooling system can cause serious burns.

HOT SURFACES – Surfaces of tubes can reach temperatures of several hundred °C and cause serious burns if touched for several minutes after all power is removed.

Please review the detailed Operating Hazards sheet enclosed with each tube, or request a copy from CPI, Eimac Division Application Engineering at 650/592-1221.


EIMAC 3CPX800A7
TYPICAL
CONSTANT CURRENT
CHARACTERISTICS
(GROUNDED GRID)
Plate Current (Amperes)
Grid Current (Amperes)
8.0
5.0
4.0
3.0
2.5
2.0
1.5
1.0
0.5
0.2
0.1
0.001
0.05
0.1
0.2
0.02
0.01
-120
-100
-80
-60
-40
-20
0
20
30
0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
CATHODE TO GRID VOLTAGE (V)
PLATE TO GRID VOLTAGE (kV)

DIMENSIONAL DATA						
	INCHES			MILLIMETERS		
DIM	MIN.	MAX	REF.	MIN.	MAX	REF
A	2.340	2.633		59.44	66.88	
B	2.485	2.515		63.12	63.88	
C	2.152	2.352		54.66	59.74	
D	.786	.906		19.96	23.01	
E	.710	.790		18.03	20.07	
F		1.406			35.71	
G	.187			4.75		
H	BASE: E11-81 (JEDEC DESIGNATION)					
J	.559	.573		14.20	14.55	
K	.240			6.10		
L			.027			.69
M	1.417	1.433		35.99	36.40	



NOTES:

1. REF. DIMENSIONS ARE FOR INFO ONLY & ARE NOT REQUIRED FOR INSPECTION PURPOSES.
2. (*) CONTACT SURFACES.
3. BASE IS BASIC JEDEC EXCEPT CERAMIC WAFER IS INSIDE SHELL.

PIN No. 1 CATHODE
PIN No. 2 CATHODE
PIN No. 3 CATHODE
PIN No. 4 GRID
PIN No. 5 HEATER
PIN No. 6 HEATER
PIN No. 7 GRID
PIN No. 8 CATHODE
PIN No. 9 CATHODE
PIN No. 10 CATHODE
PIN No. 11 GRID