

TENTATIVE DATA

EITEL-McCULLOUGH, Inc.
SAN BRUNO, CALIFORNIA

4X150A

POWER TETRODE

SUPERCEDES DATA SHEET DATED 4-15-47

The Eimac 4X150A is an extremely compact external-anode tetrode intended for use as a radio-frequency amplifier or oscillator at frequencies well into the uhf region or as an amplifier in any service requiring a high-gain tube capable of delivering high-power output at low plate voltage. Although it is capable of withstanding relatively high plate voltages, the 4X150A operates well at plate voltages of 400 to 500 volts, making it particularly well suited for high-power mobile applications. The combination of a high ratio of transconductance to capacitance and a maximum plate dissipation capability of 150 watts makes the tube an excellent wide-band amplifier for video applications.

The 4X150A is based in a manner which allows it to be used with a ceramic loktal socket. The base pins are arranged for maximum convenience in using the tube with either coaxial or linear tank circuits at uhf. To provide maximum circuit isolation at these frequencies, the screen is terminated in a contact ring located between the anode and the base. For low-frequency applications, a base pin is provided for the screen termination.

A single 4X150A operating in a coaxial amplifier circuit will deliver as high as 140 watts useful output at 500-Mc.

GENERAL CHARACTERISTICS**ELECTRICAL**

Cathode: Coated Unipotential

Heater Voltage - - - - - 6.0 volts

Heater Current - - - - - 2.6 amperes

Minimum Heating Time - - - - - 30 seconds

Screen-Grid Amplification Factor (Average) - - - - 5.0

Direct Interelectrode Capacitances (Average)

Grid-Plate (without shielding) - - - - - 0.02 $\mu\text{mf.}$ Input - - - - - 16.1 $\mu\text{mf.}$ Output - - - - - 4.7 $\mu\text{mf.}$ Transconductance ($i_b=250$ ma., $e_b=500$ v., $E_{c2}=250$ v. - 12,000 μmhos **MECHANICAL**Cooling - - - - - Forced Air¹

Mounting Position - - - - - Any

Maximum Overall Dimensions

Length - - - - - 2.47 inches

Diameter - - - - - 1.63 inches

Maximum Seated Height - - - - - 1.91 inches

Net Weight - - - - - 5.2 ounces

Shipping Weight (average) - - - - - 1.6 pounds

RADIO FREQUENCY POWER AMPLIFIER OR OSCILLATOR

Class-C Telephony or FM Telephony

MAXIMUM RATINGS: (Frequencies up to 500-Mc.)

D-C PLATE VOLTAGE	1250 MAX. VOLTS
D-C SCREEN VOLTAGE	300 MAX. VOLTS
D-C GRID VOLTAGE ²	-250 MAX. VOLTS
D-C PLATE CURRENT	250 MAX. MA.
PLATE DISSIPATION ¹	150 MAX. WATTS
SCREEN DISSIPATION	15 MAX. WATTS
GRID DISSIPATION	2 MAX. WATTS

TYPICAL OPERATION

Single tube, frequencies below 165-Mc.

D-C Plate Voltage	600	750	1000	1250	volts
D-C Plate Current	200	200	200	200	ma.
D-C Screen Voltage	250	250	250	250	volts
D-C Screen Current	37	37	31	20	ma.
D-C Grid Voltage	-75	-80	-80	-90	volts
D-C Grid Current	11	11	10	11	ma.
Peak R-F Grid Voltage (Approx.)	91	96	95	106	volts
Driving Power (Approx.)	1.0	1.1	1.0	1.2	watts
Power Input	120	150	200	250	watts
Power Output	85	110	150	195	watts
Heater Voltage	6.0	6.0	6.0	6.0	volts

Single tube, 500-Mc. (Coaxial cavity)³

D-C Plate Voltage	600	800	1000	1250	volts
D-C Plate Current	170	200	200	200	ma.
D-C Screen Voltage	250	250	250	280	volts
D-C Screen Current	6	7	7	5	ma.
D-C Grid Voltage	-110	-110	-110	-115	volts
D-C Grid Current	6	10	11	10	ma.
Driver Output Power (Approx.)	15	20	25	30	watts
Power Input	102	160	200	250	watts
Power Output	50	96	122	140	watts
Heater Voltage	5.2	5.2	5.2	5.2	volts

HIGH-LEVEL-MODULATED RADIO FREQUENCY AMPLIFIER

Class-C Telephony (Carrier conditions)

MAXIMUM RATINGS (Frequencies up to 500-Mc.)

D-C PLATE VOLTAGE	1000 MAX. VOLTS
D-C SCREEN VOLTAGE	300 MAX. VOLTS
D-C GRID VOLTAGE ²	-250 MAX. VOLTS
D-C PLATE CURRENT	200 MAX. MA.
PLATE DISSIPATION	100 MAX. WATTS
SCREEN DISSIPATION	15 MAX. WATTS
GRID DISSIPATION	2 MAX. WATTS

¹ At 150 watts plate dissipation a minimum flow of 5.6 cubic feet of air per minute must be passed through the plate cooler. The pressure drop across the cooler at this flow equals 0.26" of water. Forced air cooling of the base terminal assembly must be provided. In no case should the temperature of the base seals be allowed to exceed 150 degrees C.

² Maximum permissible grid circuit resistance 25,000 ohms.

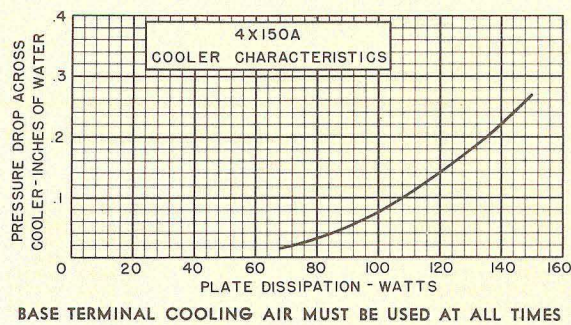
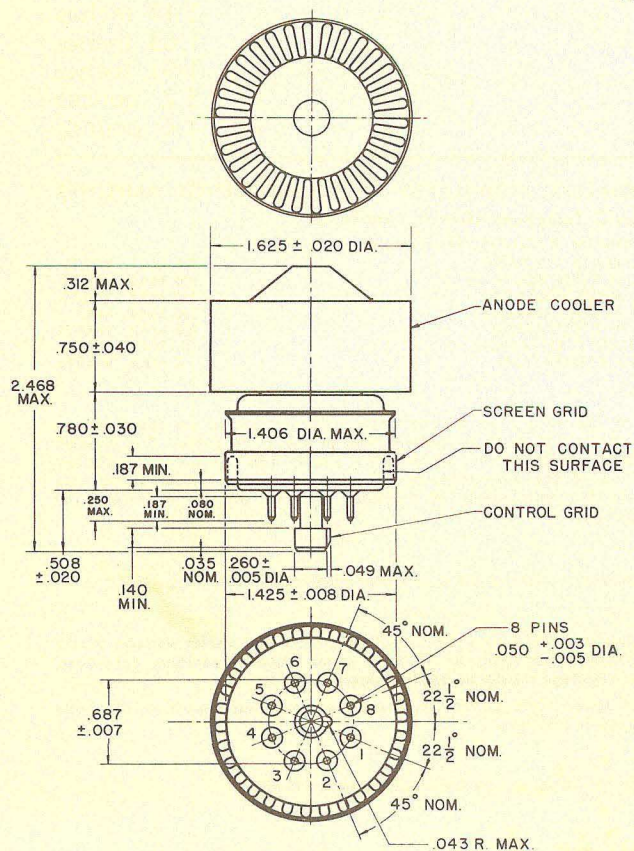
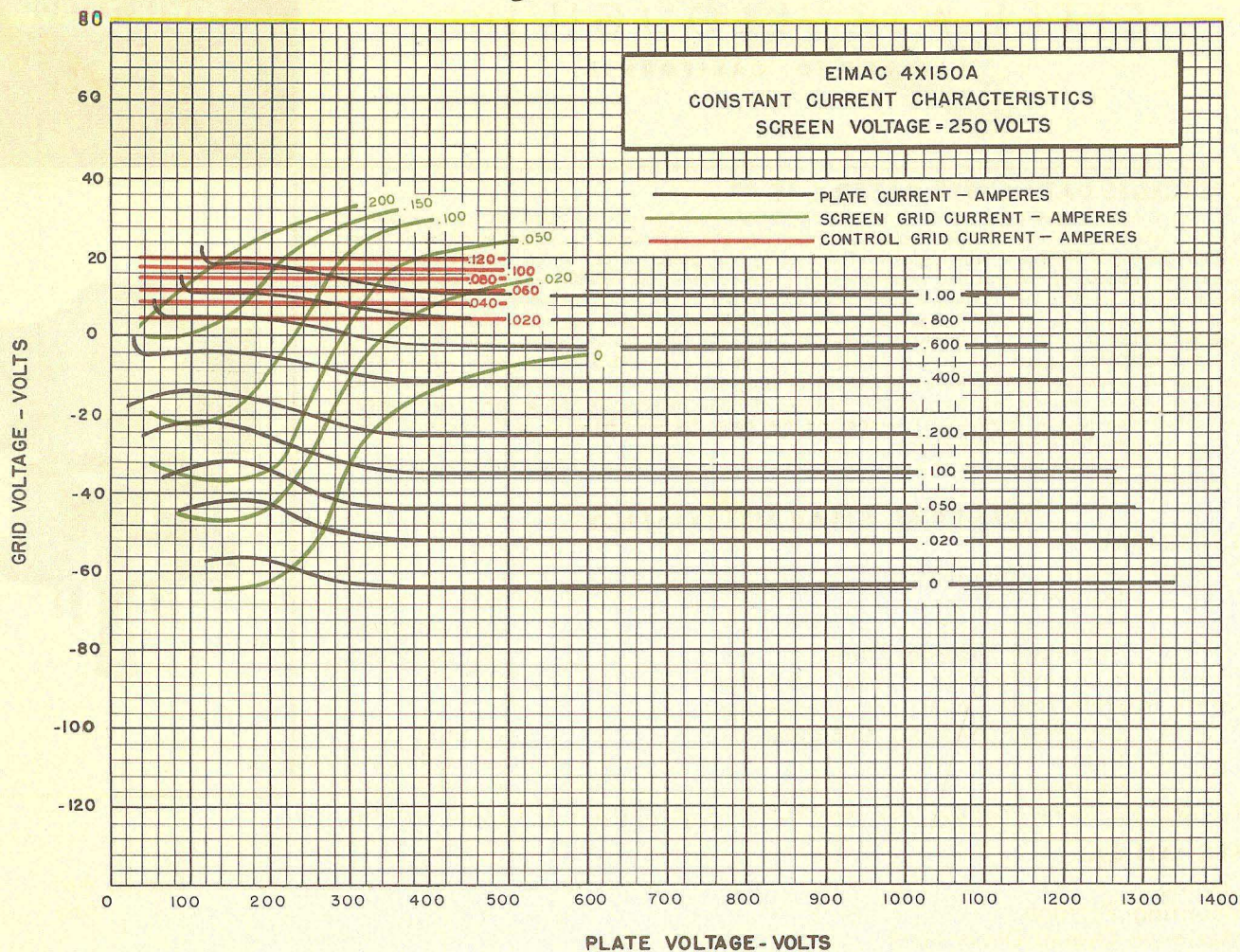
³ Due to transit time back heating effects, the heater voltage should be reduced at UHF. At 500-Mc., under typical operating conditions, heater voltage should be approximately 5.2 volts.

At lower plate current or lower frequency less reduction of heater voltage is required.

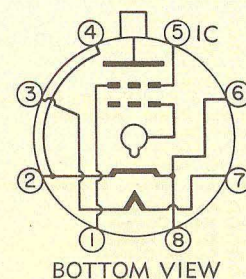
Indicates change from sheet dated 4-15-47.

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TENTATIVE DATA



- PIN NO. 1 SCREEN GRID
 " " 2 CATHODE
 " " 3 HEATER
 " " 4 CATHODE
 " " 5 I.C. (DO NOT USE FOR EXTERNAL CONNECTION)
 " " 6 CATHODE
 " " 7 HEATER
 " " 8 CATHODE
 CENTER PIN CONTROL GRID



4X150A 4000 AIR SYSTEM SOCKET

The Eimac 4X150A/4000 air system socket was developed in order to provide adequate air cooling of the Eimac 4X150A tetrode. In addition the air-system socket makes possible improved circuit arrangements in high frequency applications.

AIR COOLING SYSTEM

The air stream is introduced into the socket from the underside and cools the grid, cathode and screen seals. It then flows over the glass envelope and through the anode cooler.

The air-system socket may be used in two types of circuit construction:

(1) **In co-axial line circuits.** The air system socket is mounted on the coaxial input line and air may be introduced by pressurizing the input cavity, the walls of the output cavity confine the flow and force it through the anode cooler.

(2) **In chassis construction.** A pressurized chamber below the socket is required. Such a chamber or closed chassis is commonly employed for electrical shielding and only slight modifications should be necessary to make it serve also for air cooling. For confining the air above the chassis a special "Pyrex" glass chimney is available to direct the air flow through the anode cooler.

In both constructions the required cooling air is 6 cubic feet per minute at a pressure of 0.75 inches of water.

SCREEN BYPASS CAPACITOR

A screen bypass capacitor with a capacitance of 3750 $\mu\mu\text{f}$ is built into the socket flange. The metal portions of the socket provide the connections to the screen and cathode terminals of the socket, thereby reducing the lead inductance to a minimum.

CAUTION: Holes must not be drilled through the socket flange to avoid damaging the bypass capacitor.

GRID CONNECTION

The grid terminal is on the center line of the socket and is provided with a threaded hole for direct connection to a coaxial grid line, or a terminal lug.

MOUNTING

With coaxial line cavities the air-system socket may be mounted directly on the end of the coaxial input line. The lower skirt of the socket fits directly over a cylinder of 1 $\frac{5}{8}$ " outside diameter, and four mounting holes are provided.

For chassis mounting a 2 $\frac{1}{4}$ " diameter hole should be cut into the deck and the socket secured by the three mounting clips provided. **DO NOT DRILL THROUGH THE SOCKET FLANGE.**

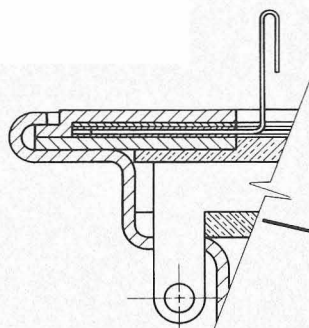
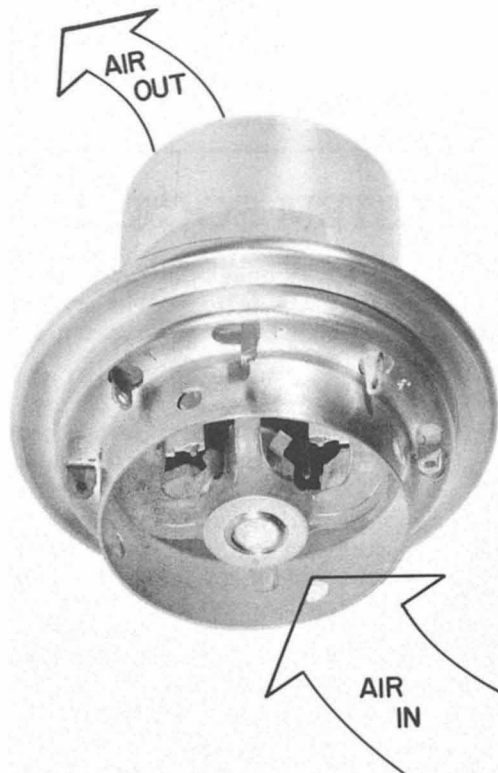
In circuits where the cathode of the tube is not at ground potential, or chassis potential, provision must be made to insulate the air-system socket from the chassis. This may be done by placing an insulating ring between the socket flange and chassis and also insulating the mounting clips from the flange.

MATERIAL

The insulating material used in the construction of the socket has very low R-F losses to well above 800 Mc. and is mechanically strong, non-porous, non-hydroscopic, and unaffected by high temperatures.

The contact fingers are of beryllium copper and all metal parts are silver plated to reduce R-F losses.





SECTION THRU SCREEN
GRID BY-PASS CAPACITOR

*6-32 THREAD FOR
CONTROL GRID
CONNECTION

CONNECTION NO.	1	SCREEN GRID
"	2	CATHODE
"	3	HEATER
"	4	CATHODE
"	5	NO CONNECTION
"	6	CATHODE
"	7	HEATER
"	8	CATHODE

DIMENSIONS
IN INCHES

