

EITEL-McCULLOUGH, INC.
SAN BRUNO, CALIFORNIA

3W10000A3

VHF

POWER TRIODE

The Eimac 3W10000A3 is a high power, water cooled, external-anode transmitting triode having a maximum plate dissipation capability of 10 kilowatts. As a power amplifier the tube will operate efficiently at frequencies up to 250 Mc. A single 3W10000A3 operating as a television linear amplifier will deliver a synchronizing power-output of 5.5 kilowatts at 216 Mc. with a 5-Mc. bandwidth.

The coaxial terminal arrangement of the tube is ideally suited for use in cavity circuits. The cathode is a unipotential, indirectly heated, thoriated tungsten cylinder of rugged construction.

GENERAL CHARACTERISTICS

ELECTRICAL

Cathode: Indirectly heated thoriated tungsten (Note 1)

Voltage, normal	-	-	-	-	-	-	-	-	-	1550	Volts	D.C.
Current, normal	-	-	-	-	-	-	-	-	-	1.6	Amps.	D.C.

Filament: Thoriated tungsten helix (Note 2)

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Direct Interelectrode Capacitances (Average)

Grid-Plate Capacitances (Average)										
Grid-Plate	-	-	-	-	-	-	-	-	-	30 $\mu\mu\text{f}$
Grid-Cathode	-	-	-	-	-	-	-	-	-	65 $\mu\mu\text{f}$
Plate-Cathode	-	-	-	-	-	-	-	-	-	3.5 $\mu\mu\text{f}$

Transconductance ($i_b = 3.3$ amp., $E_b = 3000$ v.)	-	-	-	-	-	-	-	55,000 μmhos
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MECHANICAL

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RADIO FREQUENCY POWER AMPLIFIER

Class-B Linear Amplifier-Television Service

MAXIMUM RATINGS (per tube)

D-C PLATE VOLTAGE	-	-	-	5 MAX. KILOVOLTS
D-C PLATE CURRENT	-	-	-	10 MAX. AMPS.
PLATE DISSIPATION	-	-	-	10 MAX. KILOWATTS
GRID DISSIPATION	-	-	-	100 MAX. WATTS

TYPICAL OPERATION (Per tube, 5-Mc. Bandwidth, 216 Mc.)

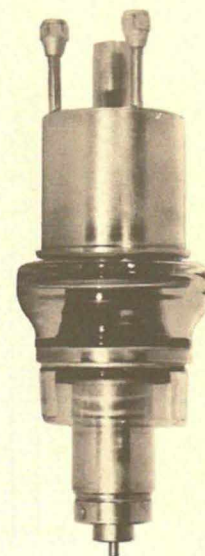
Peak Synchronizing Level						
Load Impedance	-	-	-	-	560	280 Ohms
Effective Length of Plate Line	-	-	-	Quarter		Half Wave
D-C Plate Voltage	-	-	-	-	3250	2600 Volts
D-C Plate Current	-	-	-	-	4.25	6.0 Amps.
D-C Grid Voltage	-	-	-	-	-190	-160 Volts
D-C Grid Current	-	-	-	-	400	680 Ma.
Plate Power Input	-	-	-	-	13.8	15.6 Kw.
Plate Power Output	-	-	-	-	5.5	5.5 Kw.

Black Level

D-C Plate Current (approx.)	-	-	3.18	4.5	Amps.
Plate Power Input	-	-	10.3	11.7	Kw.
Plate Dissipation	-	-	7.2	8.6	Kw.
Plate Power Output	-	-	3.1	3.1	Kw.
D-C Grid Voltage	-	-	-190	-160	Volts
D-C Grid Current	-	-	80	260	Ma.

Note 1: Cathode Heating Power—The cathode of the 3W10000A3 is a unipotential thoriated tungsten cylinder which is heated by electron bombardment of its inner surface. Bombardment is obtained by using the cylindrical cathode as the anode of a diode. A helical filament is mounted on the axis of the cathode cylinder to supply the bombarding electrons. A D.C. potential difference of approximately 1550 volts is applied between the inner filament and the cathode cylinder and

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the recommended cathode heating power of 2500 watts is obtained with approximately 1550 volts D.C. and 1.6 amperes.

The inner filament is designed to operate under space charge limited conditions so that the cathode temperature may be varied by changing voltage applied between the inner filament and the cathode cylinder. Since the cathode is connected to the negative of the main plate supply, the inner filament may be at considerable negative potential with respect to ground. The filament transformer supplying the heating for the inner filament should be adequately insulated for this voltage.

Note 2: Filament Voltage and Regulation—The nominal value of filament voltage necessary for sufficient emission to start heating of the cathode is 8 volts. Once the cathode has reached operating temperature, heat is returned to the inner filament by radiation. Therefore, after the cathode power is applied, the inner filament voltage should be reduced to approximately 7 volts.

When the inner filament is first heated, the initial in-rush current must be limited to 40 amperes maximum. The current drawn by the filament at 8 volts, with the cathode cold, is about 25 amperes. After the cathode has reached temperature and the filament voltage has been reduced to 7 volts, the filament current drawn is approximately 15 amperes.

Note 3: Cooling—The water-cooled anode requires 2.1 gallons of cooling water per minute at an inlet pressure of 30 pounds per square inch, above discharge head, for the rated 10 Kw of plate dissipation. The outlet water temperature should not exceed 70°C.

The grid-terminal contact ring and adjacent glass must be cooled by high velocity air. The quantity, velocity and direction must be arranged to limit the maximum seal temperature to 175°C.

The cathode and filament-stem also require forced-air cooling. A minimum of 10 cubic feet per minute must flow through the three air holes in the center of the base of the tube to cool the glass parts supporting the filament. A minimum of 25 cubic feet per minute must flow up the outside of the two-inch diameter cathode contacting surface and into the space between this lead and the glass seal. The maximum safe operating temperature of the glass seal is 175°C. The air inside the cathode-lead cools only the filament assembly and does not cool the two-inch diameter cathode contacting surface.

Both air and water flow must be started before filament and cathode power are applied and maintained for at least one minute after the filament and cathode power have been switched off.

TENTATIVE DATA

