TECHNICAL DATA

YC-236
HIGH-MU
POWER TRIODE

The Eimac YC-236 is a selected 8877/3CX1500A7 certified for use as a cathode driven Class B amplifier in FM transmitter applications. Sample testing is performed periodically in a 2 KW FM transmitter at the Eimac factory.

Low grid interception and high amplification factor combine to make the YC-236 drive power requirements exceptionally low for a tube of this power capacity.

GENERAL CHARACTERISTICS[1]

ELECTRICAL

Cathode: Oxide coated, Unipotential
- Heater Voltage..... 5.0 ± 0.25 V
- Current @ 5 Volts..... 10.5 A

Transconductance (Average):
- I_b = 1.0 Adc.....55,000 µmhos

Amplification Factor, Average..... 200

Direct Interelectrode Capacitances (grounded grid)[2]
- Cin.....38.5 pF
- Cout..... 10.0 pF
- Cgp..... 0.1 pF
- Ck-htr..... 9.7 pF

Frequency of Maximum Rating (CW)..... 250 MHz

MECHANICAL

Maximum Dimensions:
- Height..... 4.02 in; 102.16 mm
- Diameter..... 3.38 in; 85.85 mm

Net Weight..... 25 oz; 708.8 gm

Operating Position..... Any

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

Cooling ..... Forced Air

Base.....Special, 7-pin

Recommended Air System Socket
- Grounded Grid..... SK-2210

Recommended Air Chimney (teflon).....SK-2216

[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.

ISO 9001 Certified
Made in U.S.A.

Communications & Power Industries
Eimac division

TYPICAL OPERATION (88-108 MHz)
Measured Values Class B, Cathode Driven

Plate Voltage	4000	Vdc
Cathode Voltage[1,2]	+20	Vdc
Plate Current	0.85	Adc
Grid Current[2]	25	mAdc
Driving Power[2]	50	Watts
Useful Power Output[3]	2000	Watts
Efficiency[4]	59	%
Power Gain[4]	16	dB

ABSOLUTE MAXIMUM RATINGS:

DC Plate Voltage	4000	Volts
DC Plate Current	1.0	Ampere
Plate Dissipation	1500	Watts
Grid Current*	100	mA
Grid Dissipation	20	Watts

* In tuned FM transmitter

[1] For measured case, idling anode current was set for 10 mAdc.
[2] Approximate. Maximum grid current of a new tube is less than 50 mA in a tuned transmitter.
[3] Approximate, delivered to the load.
[4] For measured case; may vary from tube to tube.

RANGE VALUES FOR EQUIPMENT DESIGN

	Min.	Max.	
Heater: Current at 5.0 Volts	9.5	11.5	Amperes
Cathode Warm-up Time	180	---	Seconds
Interelectrode Capacitance[1] (Grounded Grid Circuit)			
Input	36.0	41.0	pF
Output	9.2	11.2	pF
Feedback	---	0.2	pF

[1] In Shielded Fixture

APPLICATION

MOUNTING - The YC-236 may be mounted in any position.

SOCKET - The grid of the YC-236 terminates in the cylindrical grid ring about the base of the tube. This may be contacted by multiple clips or flexible finger stock. Connections to the heater and cathode are made via the 7-pin base.

COOLING - The maximum temperature limit for external tube surfaces and the anode core is 250°C. Tube life is prolonged if these areas are maintained at lower temperatures. For full 1500 watts anode dissipation 35.0 cfm of air is required at a back pressure of 0.41" H_2O hold tube temperature below 225°C with 50°C ambient temperature at sea level. At frequencies higher than 30 MHz, or a high altitudes, the air quantity must be increased. The data shown is based on airflow in the base-to-anode direction.

Plate Dissipation (Watts)	SEA LEVEL		10,000 FEET	
	Air Flow (CFM)	Pressure Drop (In. of Water)	Air Flow (CFM)	Pressure Drop (In. of Water)
500	7.5	0.10	11.0	0.15
1000	22.5	0.20	32.5	0.29
1500	35.0	0.41	51.0	0.60

HEATER OPERATION - The rated heater voltage for the YC-236 of 5.0 volts, as measured at the socket, should be maintained at this value to obtain optimum performance and maximum tube life. In no case should the voltage be allowed to deviate from 5.0 volts by more than plus or minus five percent (5%).

INPUT CIRCUIT - When the YC-236 is operated as a cathode driven rf amplifier, the use of a resonant circuit in the cathode is recommended. For best results with a single ended amplifier, it is suggested that the cathode tank circuit operate with a "Q" of 2 or more.

ZERO-BIAS OPERATION - Operation at zero-bias is not recommended with plate potentials over 3000 volts, since plate dissipation may be exceeded. Higher plate voltage may be used with proper protective bias.

FAULT PROTECTION - All power tubes operate at voltages which can cause severe damage in the event of an internal arc, especially in those cases where large amounts of stored energy or follow-on current are involved. Some means of protection is advised in all cases, and it is recommended that a series resistor be used in the anode circuit (20 to 50 ohms) to limit peak current and provide a means of dissipating the energy in the event of a tube or circuit arc. For an oxide-cathode tube such as the YC-236, a maximum of 4 joules total energy should be permitted to be dumped into an internal arc. Amounts in excess of this may permanently damage the cathode or the grid structure. Additional information is found Eimac's Application Bulletin #17 titled "FAULT PROTECTION," available on request.

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.

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.

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.

HIGH VOLTAGE - The YC-236 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.

SPECIAL APPLICATIONS - If it is desired to operate this tube under conditions widely different from those given here, contact the Application Engineering Dept., CPI Eimac Division, 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.

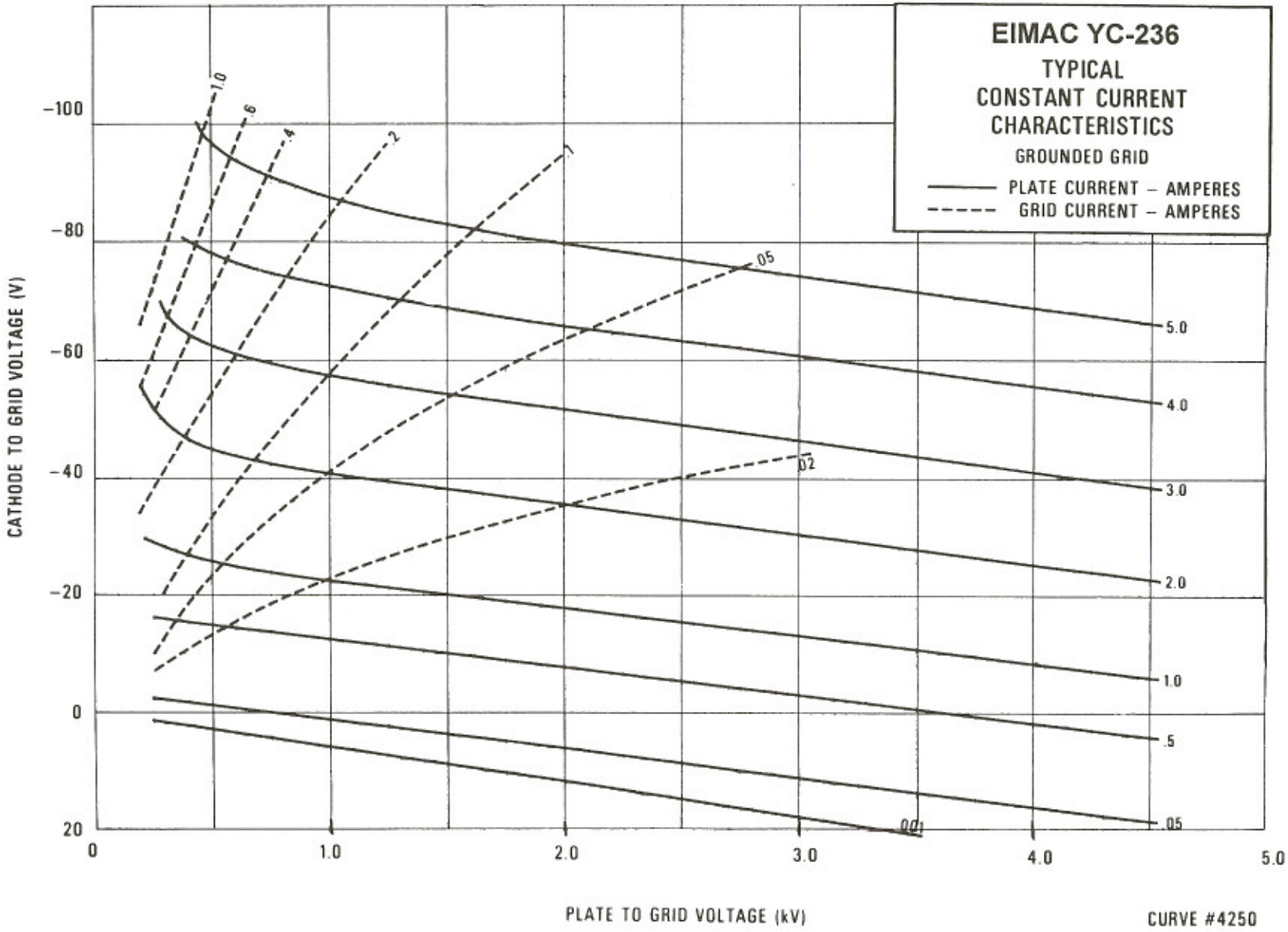
LOW-VOLTAGE HIGH-CURRENT CIRCUITS - Personal jewelry, such as rings, should not be worn when working with filament contacts or connectors as a short circuit can produce very high current and melting, resulting in severe burns.

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.

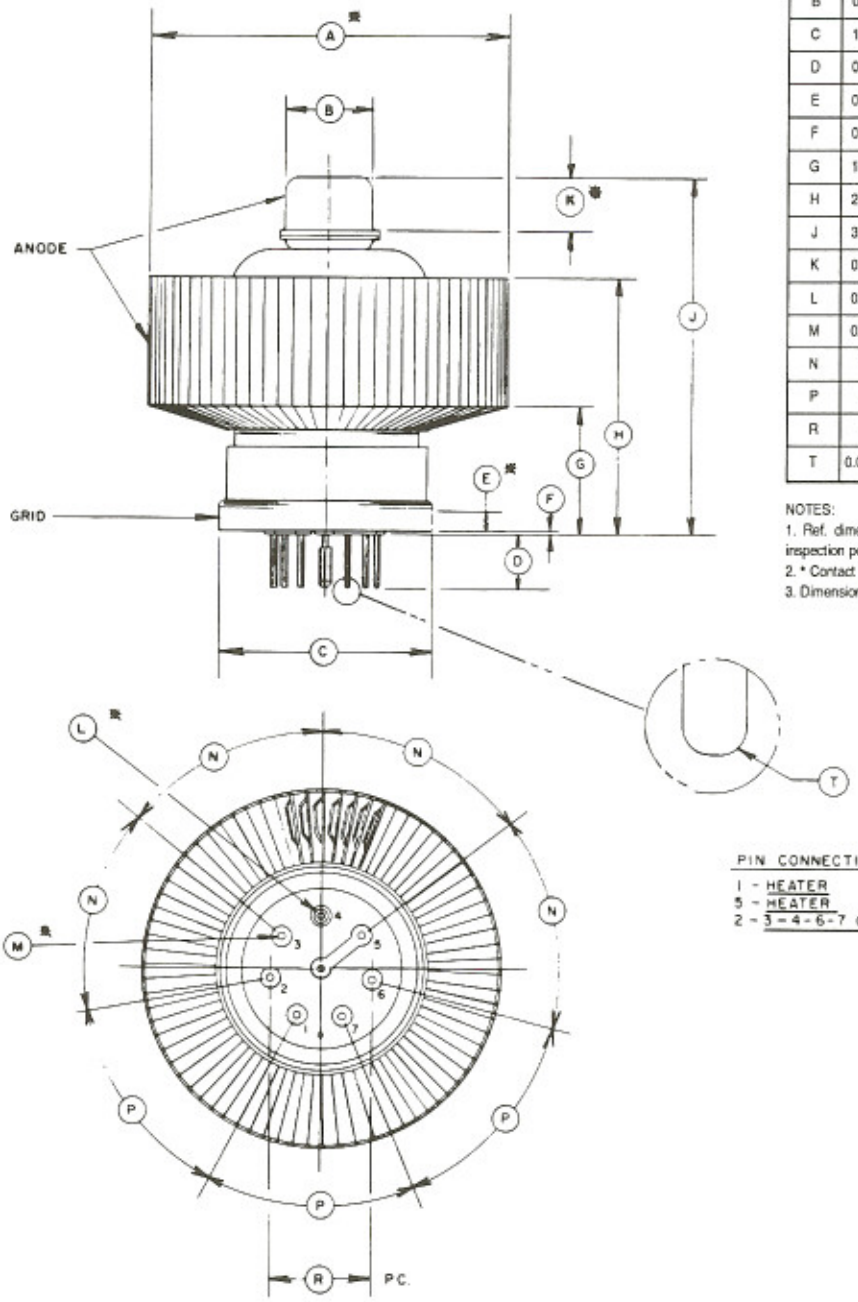
HOT WATER – Water used to cool tubes may reach scalding temperatures. Touching or rupture of the cooling system can cause serious burns.

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 YC-236
TYPICAL
CONSTANT CURRENT
CHARACTERISTICS
GROUNDED GRID
PLATE CURRENT – AMPERES
GRID CURRENT – AMPERES
CATHODE TO GRID VOLTAGE (V)
-100
-80
-60
-40
-20
0
20
1.0
.6
.4
.2
.1
.05
.02
.01
5.0
4.0
3.0
2.0
1.0
.5
.05
0
1.0
2.0
3.0
4.0
5.0
PLATE TO GRID VOLTAGE (kV)
CURVE #4250

YC-236



DIMENSIONAL DATA						
	INCHES			MILLIMETERS		
DIM.	MIN.	MAX.	REF.	MIN.	MAX.	REF.
A	3.350	3.380	---	85.09	85.85	---
B	0.810	0.820	---	20.57	20.83	---
C	1.995	2.015	---	50.67	51.18	---
D	0.438	0.562	---	11.13	14.27	---
E	0.235	---	---	5.97	---	---
F	0.000	0.040	000	0.00	1.02	---
G	1.100	1.225	---	27.94	31.12	---
H	2.300	2.425	---	58.42	61.60	---
J	3.250	3.420	---	82.55	86.87	---
K	0.470	0.530	---	11.94	13.46	---
L	0.120	0.127	---	3.05	3.23	---
M	0.056	0.062	---	1.42	1.57	---
N	---	---	51°	---	---	51°
P	---	---	52°	---	---	52°
R	---	---	1.000	---	---	25.40
T	0.020R	---	---	0.51R	---	---

NOTES:
1. Ref. dimensions are for info. only & are not required for inspection purposes.
2. * Contact Surface
3. Dimension T applies to all but center pin.

PIN CONNECTIONS
1 - HEATER
5 - HEATER
2 - 3 - 4 - 6 - 7 CATHODE

CPI
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