

FEDERAL TELEPHONE AND RADIO COMPANY
A Division of International Telephone and Telegraph Corporation

TRAVELING WAVE TUBE REGISTRATION

Reservation No. 6867 Manufacturer's Designation: X-259
Reservation Date: January 25, 1956 Data Bureau Designation: 6867

General Characteristics

The 6867 all metal envelope traveling wave tube employing a helical type wave propagating structure is for intermediate power amplifier operation in the 8500 to 9600 mc frequency range. The power output is approximately 100 milliwatts and the tube is forced air cooled. It is designed for CW service. The matching circuit in 50 ohm coaxial line is used. The matching circuit is integral with the tube. A uniform magnetic field is used to control the electron beam. This is not integral with the tube.

Electrical Ratings, Absolute Values

Heater Voltage	6.3 ($\pm 10\%$) volts
Heater Current	0.85 amperes
Maximum Anode Voltage (Note 1)	1500 volts
Maximum Shell Current (Note 2 and Note 6)	3 ma
Maximum Collector Voltage (Note 3)	1600 volts
Maximum Collector Dissipation (Note 4)	25 watts
Maximum Focussing Electrode Voltage (Note 5)	-250 volts

Electrical Information

Maximum Frequency	9600 mc
Minimum Frequency	8500 mc
Minimum Cold Transmission Loss	50 db

Mechanical Information

Type of Cathode	Oxide Coated Unipotential
Base, Small Shell Duodecal, 5 Pin, JETEC Designation	B5-57
Type of Envelope	Metal
Magnetic Field Strength	1300 gauss
Length of Magnetic Field	5.25 inches uniform
Mounting Position	Any
Weight (not including Magnet)	1 pound, 4 ounces
R-F Input and Output Impedance and Type Conductor	50 ohm coax with Type N Jack UG-23B/U
Type of Cooling	Forced Air
Maximum Glass Temperature	160°C
Cooling Air Required (See Note 4)	5 CFM

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Typical Operation as Intermediate Power Amplifier

Center Frequency	9000 mc
Anode Voltage	1400 volts
Shell Current	2 ma
Collector Voltage	1500 volts
Collector Current	8 ma
Focussing Electrode Voltage (Note 5)	-15 volts
Power Output	100 milliwatts
Bandwidth	8.5 to 9.6 kmc
Gain over Bandwidth (Small Signal)	30 db
Gain over Bandwidth (Power)	25 db
Duty Cycle	
R-F	Variable to 1.0
Beam	1.0

- Note 1: All voltages shown are with respect to cathode. Anode and helix are connected internally to the shell. The shell is normally operated at ground potential and the d-c connection is made to the shell of the solenoid.
- Note 2: The shell current is the difference between the cathode current and collector current. Since this current in general should be minimized, it may be desirable to measure the current from shell to ground. It is desirable that overload protection be provided so that if shell current exceeds 3 ma, high voltage is removed.
- Note 3: It is generally desirable to operate the collector at 100 volts positive with respect to shell, and potential difference between collector and shell should be limited to 300 volts maximum.
- Note 4: Forced air cooling of collector is required for average collector power in excess of 10 watts. As the collector power is increased, the air flow required increases. At the maximum collector power of 25 watts, a minimum air flow of 5 cfm through the cooling fins is required.
- Note 5: The focussing electrode voltage is adjusted for maximum beam transmission (collector current/cathode current). It may further be used as a gain control or for introducing modulation.

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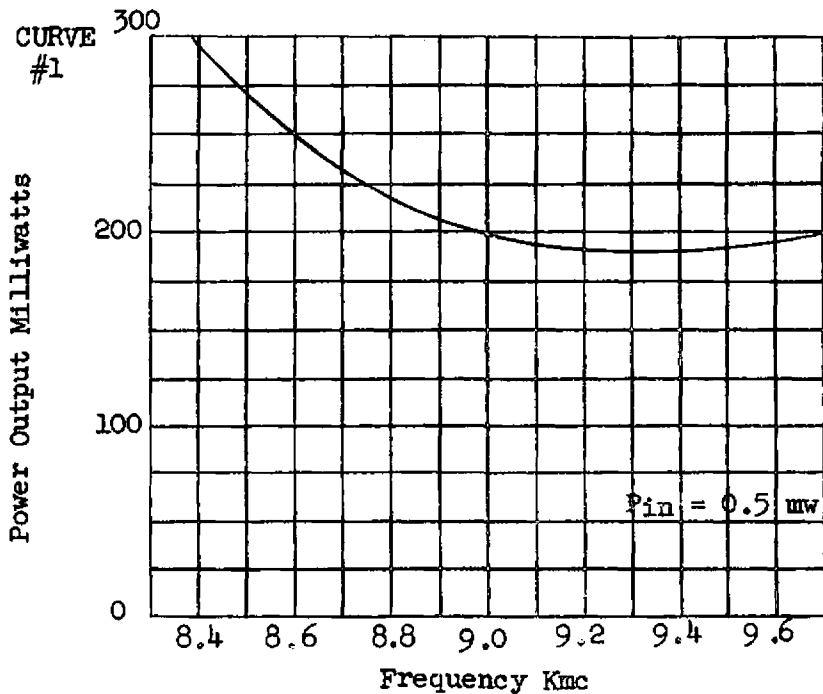
Note 6: In some cases, it may be necessary to rotate the tube in the solenoid to the point giving best transmission.

This tube has been designed primarily for operation in the 8500 to 9600 mc frequency range. Useful power and gain exist over a larger frequency range. Additional information for specific applications can be obtained from the Vacuum Tube Engineering Department.

Standard solenoids for this tube type are available and solenoids designed for specific applications can be supplied.

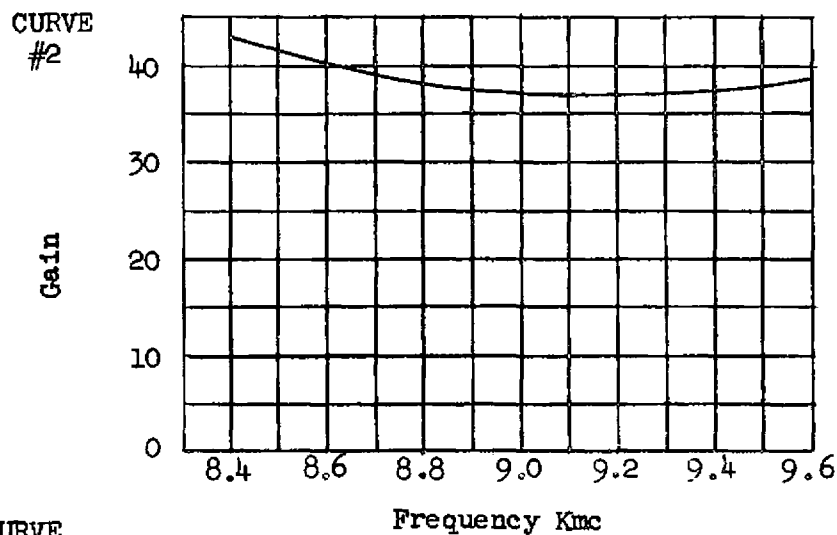
WARNING: Precautions must be taken to insure that high voltage is not applied in the absence of magnetic field otherwise the tube may be damaged.

TYPICAL CHARACTERISTIC CURVES - TWT F-6867



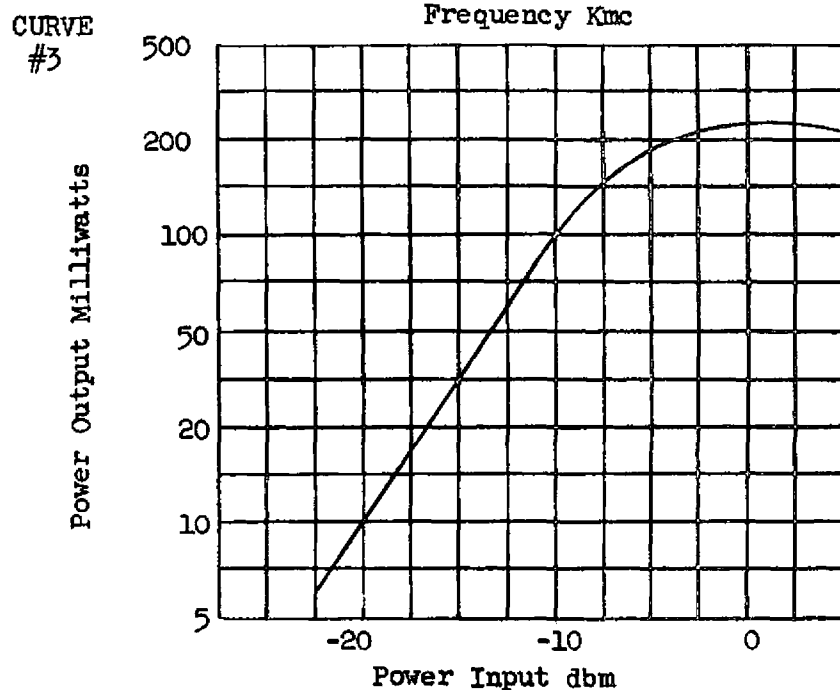
Power Output vs. Frequency

Voltage adjusted for maximum power output at $f = 9.0 \text{ kmc}$ and $P_{in} = 0.5 \text{ mw}$ (approx. 1400 volts)



Gain vs. Frequency

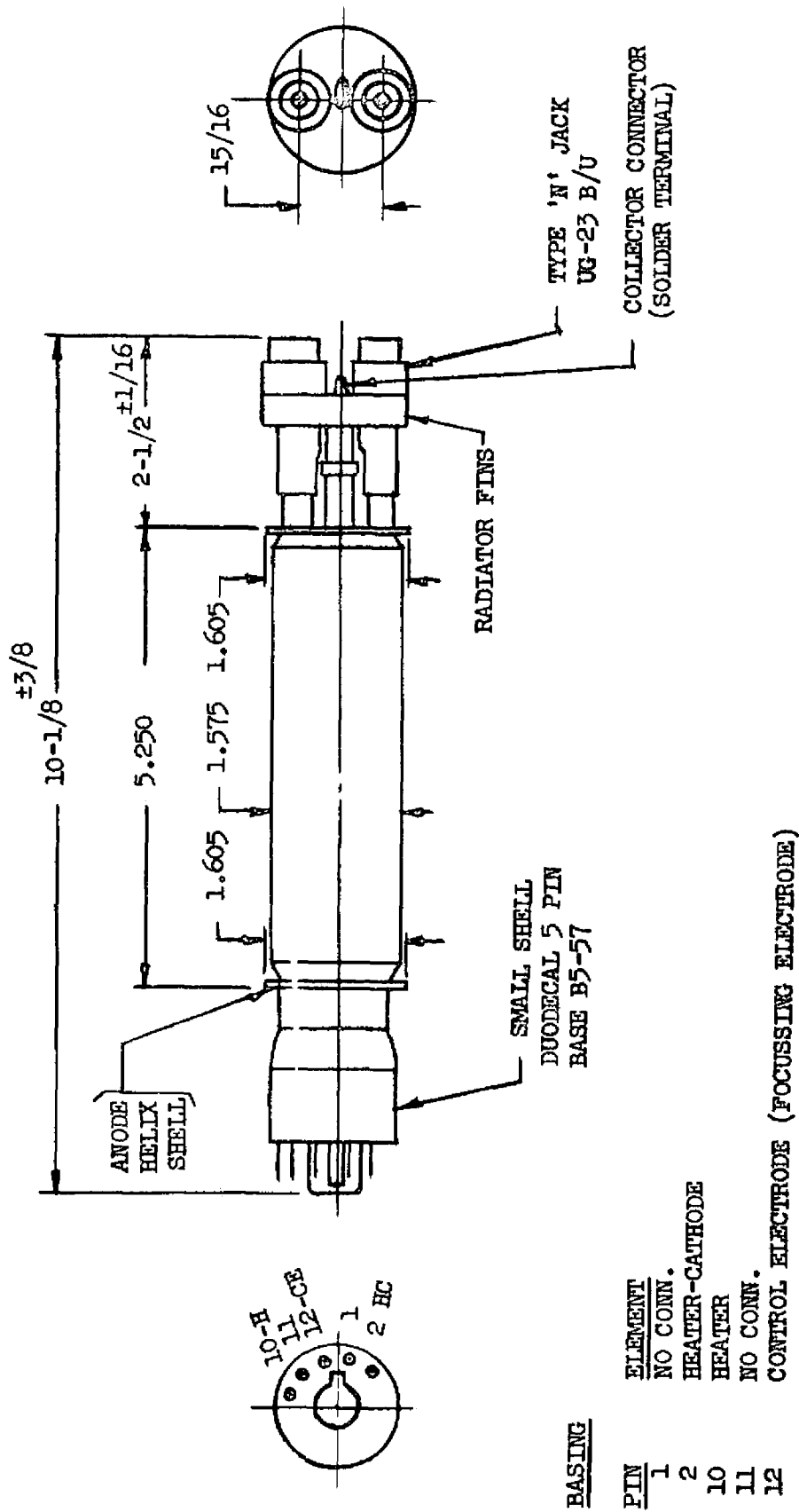
Voltage adjusted for maximum gain at $f = 9.0 \text{ kmc}$ and $P_{in} = -30 \text{ dbm}$ (approx. 1250 volts)



Power Output vs. Power Input

At $f = 9.0 \text{ kmc}$ and voltage approx. 1400 volts

ALL DATA SHOWN WITH MAGNETIC FIELD ADJUSTED FOR BEST TRANSMISSION IN THE RANGE 900 - 1300 GAUSS.



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