



ELECTRON TUBE DEPARTMENT ■ COMPONENTS DIVISION
INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION, CLIFTON, NEW JERSEY

**F-6658
TRAVELING
WAVE TUBE**

TENTATIVE

DESCRIPTION:

The F-6658 is a 1 to 5 watt CW traveling wave amplifier tube having 30 db gain and 1700 to 4000 mc frequency range. It is constructed in a rugged metal envelope with a helix type slow wave structure. The integral matching circuit is in 50 ohm coaxial line and is provided with type "N" connectors. The tube is self aligning in the external solenoid which is required to provide a uniform magnetic field. A convergent beam gun and oxide impregnated cathode are used. A control grid suitable for use as a gain control is provided. The tube is suitable for either CW or pulse service, utilizing the full bandwidth or portions of it. It is also suitable for frequency shifting, such as serrodyne operation.

ELECTRICAL RATINGS, ABSOLUTE VALUES:

Heater Voltage	6.3 ($\pm 10\%$)	volts
Heater Current	2.5	amperes
Maximum Anode Voltage (Note 1)	1250	volts
Maximum Shell Current (Note 2)	5	ma
Maximum Collector Voltage (Note 3)	1550	volts
Maximum Collector Dissipation (Note 4)	100	watts
Maximum Control Electrode Voltage (Note 5)	-250	volts

ELECTRICAL INFORMATION:

Maximum Frequency	4000	mc
Minimum Frequency	1700	mc
Minimum Cold Transmission Loss	50	db
Capacitance		
Control Electrode to all other Elements	12	μmfd
All Gun Elements to Shell	4.5	μmfd

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MECHANICAL INFORMATION:

Type of Cathode	Oxide Impregnated Unipotential
Base, Small Shell Duodecal, 5 Pin	JEDEC Designation B-5-57
Type of Envelope	Metal
Magnetic Field Strength (Nominal)	750 gauss
Length of Magnetic Field	6.75 inches uniform
Mounting Position	Any
Weight (not including Magnet)	1 pound, 7 ounces
R-F Connections	50 ohm coax with Type N Jack UG-23B/U
Type of Cooling	Forced Air
Glass Temperature	160°C max.
Cooling Air Required (Note 4)	10 cfm

TYPICAL OPERATION AS POWER AMPLIFIER:

Anode Voltage	1000 volts
Shell Current	3 ma
Collector Voltage	1100 volts
Collector Current	47 ma
Control Electrode Voltage	0 volts
Power Output (see Curves)	1 watt
Gain (see Curves)	30 db nominal
Duty Cycle	
R-F	Variable to 1.0
Beam	1.0

TYPICAL OPERATION AS LINEAR AMPLIFIER:

(Input powers less than -10 dbm)

Anode Voltage	900 volts
Shell Current	2.0 ma
Collector Voltage	1000 volts
Collector Current	40 ma
Control Electrode Voltage	0 volts
Gain (see Curves)	35 db nominal
Noise Figure	30 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 approximate 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 is desirable to measure the current from shell to ground. It is recommended that overload protection be provided to remove high voltage if the shell current exceeds 5 milliamperes.
- Note 3: It is generally desirable to operate the collector at 100 to 200 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 100 watts, a minimum air flow of 10 cfm through the cooling fins is required.
- Note 5: This electrode is a remote cutoff grid, suitable for use as a gain control providing approximately 30 db control range but is not suitable for low level pulsing of the beam. It is recommended that, where feasible, provision should be made to operate the tube with small voltage on this electrode (-5 to -10 volts) as this permits operation of the tube at approximately optimum conditions with very low interception (shell current). It may also be operated fixed at cathode potential, if desired.

OPERATING PROCEDURE:

- (1) Insert tube in solenoid, secure in place with stops provided, make connections.
- (2) Turn on cooling air, solenoid voltage (adjust to approximately 750 gauss), heater voltage, collector voltage (if used), control electrode voltage (if used).
- (3) Raise high voltage to desired value, readjusting magnetic field if necessary to obtain minimum shell current. At no time should shell current exceed 5 ma.
- (4) After initial set up as above, tube voltages may be applied simultaneously; however, it is recommended that heater voltage, solenoid voltage, and cooling air be supplied at least 2 minutes before applying high voltage. Observance of the 5 ma maximum limit for shell current is essential to prevent tube damage.



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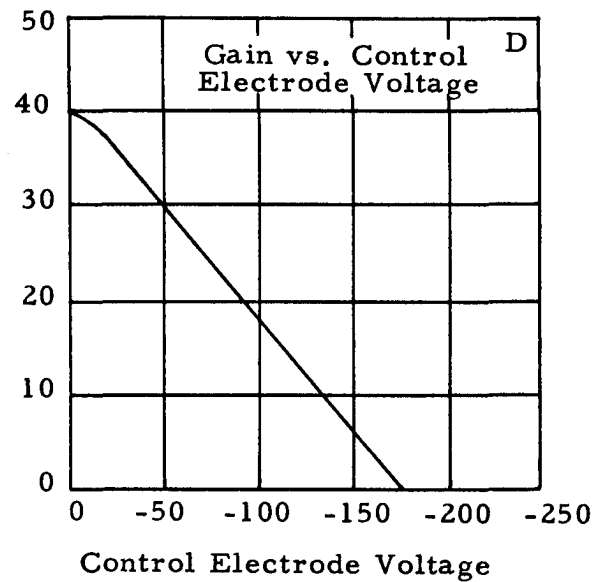
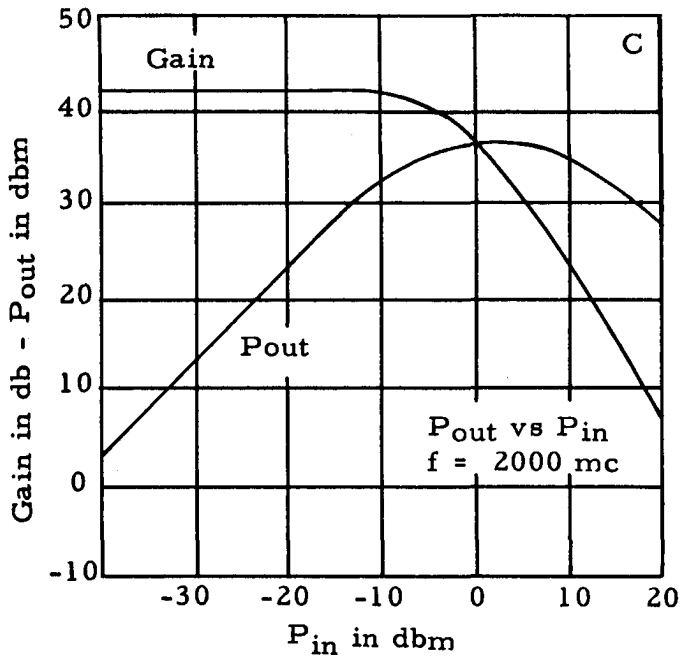
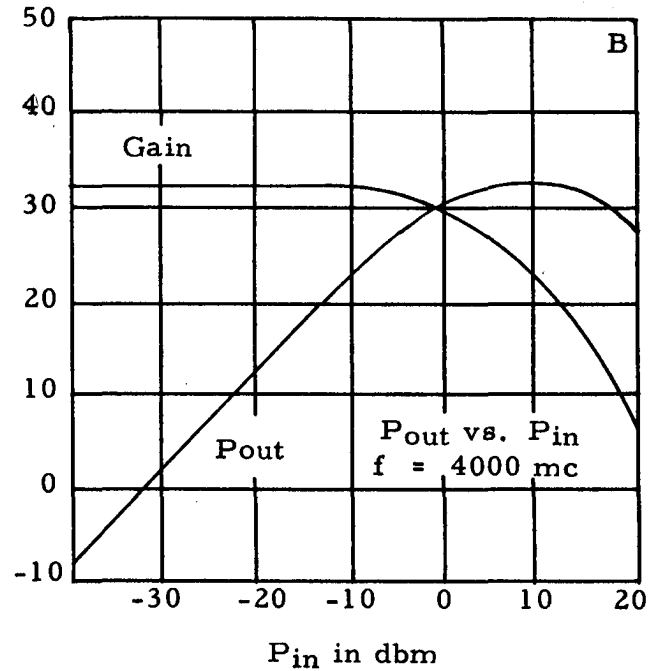
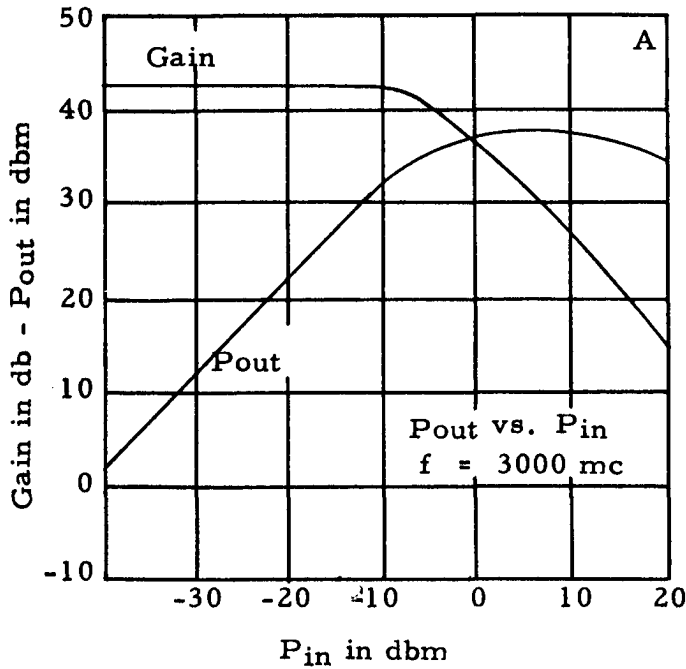
The data presented here is representative of operation of this type as an amplifier with maximum bandwidth and does not indicate the maximum performance obtainable under specific conditions, particularly narrower bandwidths.

Standard solenoids to operate this tube are available, and solenoids designed for particular applications can be supplied.

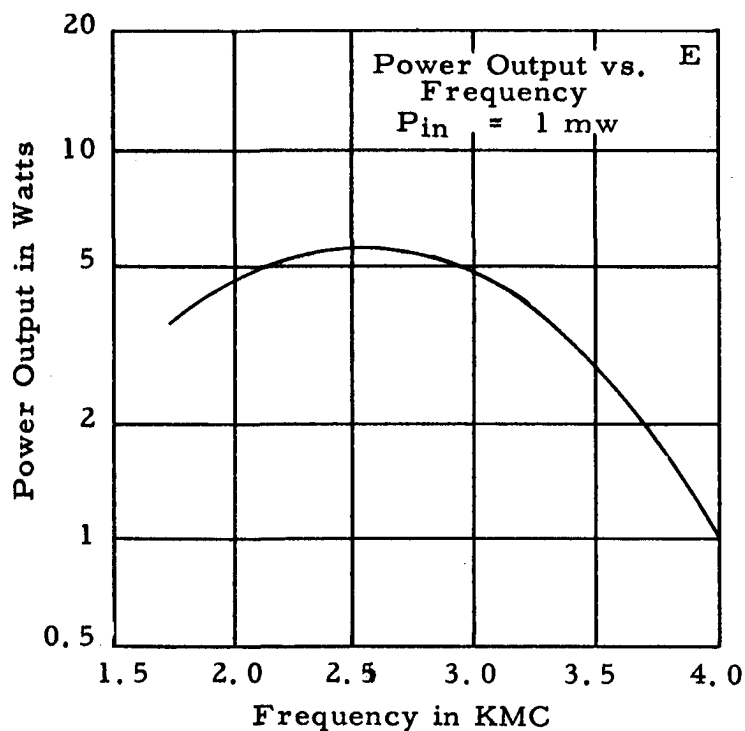
Additional information for specific applications can be obtained from the

Electron Tube Applications Section
ITT Components Division
Box 7065
ROANOKE, VIRGINIA

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS



All curves shown with magnetic field set for minimum shell current in range of 600 to 750 gauss.

Curves A, B, C, and E voltage is set for maximum P_{out} at $f = 4.0 \text{ KMC}$, $P_{in} = \text{mw}$ (approx. 1000 volts).

Curve D shows typical shape and range of control electrode characteristic.

Curve F voltage is set for maximum gain at $f = 4.0 \text{ KMC}$, $P_{in} = -20 \text{ dbm}$ (approx. 900 volts).

