



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

D-2014
TRAVELING
WAVE TUBE

DESCRIPTION:

THE D-2014 IS A 1 KILOWATT PULSE TRAVELING WAVE AMPLIFIER TUBE HAVING 33 DB GAIN AND 8000 TO 9600 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. DUTY CYCLES UP TO .005 AND PULSE LENGTHS UP TO 10 MICROSECONDS CAN BE USED. SMALL SIGNAL GAIN (± 13 DBM INPUT) VARIATIONS WITHIN THE BAND DO NOT EXCEED ± 2 DB. POWER GAIN (1.0 KW OUTPUT) IS WITHIN 6 DB OF SMALL SIGNAL GAIN.

A CONTROL GRID SUITABLE FOR GRID PULSING IS PROVIDED.

ELECTRICAL INFORMATION:

HEATER VOLTAGE	6.3 ($\pm 5\%$)	VOLTS
HEATER CURRENT	5.2	AMPERES
MAXIMUM FREQUENCY (NOTE 1)	9600	MC
MINIMUM FREQUENCY (NOTE 1)	8000	MC
MINIMUM TRANSMISSION LOSS AT GRID BIAS = -200 VOLTS	60	DB
CAPACITANCE CONTROL GRID TO ALL OTHER ELEMENTS	13	UUFD

ELECTRICAL RATINGS, ABSOLUTE VALUES:

MAXIMUM ANODE VOLTAGE (NOTE 2)	12,000	VOLTS
MAXIMUM SHELL CURRENT	1.5	AMPERE PEAK
MAXIMUM COLLECTOR DISSIPATION (NOTE 3)	180	WATTS AVERAGE
MAXIMUM R-F INPUT POWER	10	WATTS AVERAGE
MAXIMUM R-F OUTPUT POWER	10	WATTS AVERAGE
MAXIMUM DUTY CYCLE	.005	
MAXIMUM PULSE WIDTH	10	U SECONDS
MAXIMUM CATHODE CURRENT	3.0	AMPERES PEAK
MAXIMUM GRID VOLTAGE NEGATIVE	-300	VOLTS
POSITIVE (NOTE 4)	± 450	VOLTS
MAXIMUM GRID CURRENT	.27	AMPERES PEAK

MECHANICAL INFORMATION:

TYPE OF CATHODE BASE	OXIDE IMPREGNATED UNIPOTENTIAL MOLDED SILICONE RUBBER BASE WITH FLYING LEADS	
TYPE OF NEVELOPE	METAL	
MAGNETIC FIELD STRENGTH	2400	GAUSS
LENGTH OF MAGNETIC FIELD	6.75	INCHES UNIFORM
MOUNTING POSITION	ANY	
WEIGHT OF TUBE	1 LB.	7 OZ.
R-F CONNECTIONS	TYPE N JACK	UG-23 B/U
TYPE OF COOLING		FORCED AIR
AIR FLOW ON COLLECTOR RADIATOR (NOTE 3)	300	CFM
MAXIMUM GLASS TEMPERATURE	160	°C

TYPICAL OPERATION AS POWER AMPLIFIER:

CENTER FREQUENCY	9000	MC
ANODE VOLTAGE (NOTE 2)	9600	VOLTS
CATHODE CURRENT	1.8	AMPERES PEAK
POWER OUTPUT (AT CENTER FREQUENCY)	1.8	KW PEAK
BANDWIDTH	8.0 TO 9.6	KMC
GAIN (NOTE 5)	33	DB MIN.
DUTY	.001	
PULSE WIDTH	2.0	U SECONDS
GRID BIAS (FOR CUT-OFF)	-100	VOLTS
GRID VOLTAGE DURING PULSE (NOTE 6)	350	VOLTS
GRID CURRENT DURING PULSE	0.1	AMPERE PEAK

NOTE 1: USEFUL GAIN AND POWER OUTPUT EXISTS BELOW 8000 MC AND ABOVE 9600 MC AND CAN BE UTILIZED BY ADJUSTING ANODE VOLTAGE TO OPTIMIZE THE FREQUENCY RANGE DESIRED. HOWEVER, BANDWIDTH CANNOT BE EXTENDED BOTH UPWARD AND DOWNWARD SIMULTANEOUSLY AND MAXIMUM GAIN AND POWER OUTPUT OUTSIDE THE NORMAL BANDWIDTH WILL BE LOWER THAN RATED VALUES.

NOTE 2: ALL VOLTAGES SHOWN ARE WITH RESPECT TO CATHODE. ANODE AND HELIX ARE CONNECTED INTERNALLY TO THE SHELL. THE CENTER CONDUCTOR COAX. TERMINALS HAVE AN INTERNAL DC CONNECTION TO SHELL. THE SHELL IS NORMALLY OPERATED AT GROUND POTENTIAL AND CONNECTION IS MADE TO THE SHELL OF THE SOLENOID.

NOTE 3: FORCED AIR COOLING IS REQUIRED WHEN AVERAGE COLLECTOR POWER IS IN EXCESS OF 10 WATTS. AS THE COLLECTOR POWER IS INCREASED, THE AIR FLOW REQUIRED INCREASES. AT THE MAXIMUM COLLECTOR POWER OF 150 WATTS, A MINIMUM AIR FLOW OF 30 CFM THROUGH THE COOLING FINS IS REQUIRED.

NOTE 4: POSITIVE VOLTAGE MUST NOT BE APPLIED TO THE GRID IN THE ABSENCE OF ANODE VOLTAGE.

NOTE 5: THIS GAIN IS OBTAINED OVER THE 8.0 TO 9.6 KMC BANDWIDTH AT 1 KW POWER OUTPUT. SMALL SIGNAL GAIN IS WITHIN 6 DB OF THE POWER GAIN AT ANY PARTICULAR FREQUENCY.

NOTE 6: THE POSITIVE GRID VOLTAGE PULSE SHOULD BE THE MINIMUM CONSISTENT WITH NORMAL POWER OUTPUT.

SPECIAL NOTE:

MISMATCH UP TO AND INCLUDING A SHORT CIRCUIT IN INPUT OR OUTPUT LINES WILL NOT CAUSE OSCILLATION.

GENERAL OPERATING INSTRUCTIONS:

1. HEATER WARM UP OF 2 MINUTES BEFORE APPLYING HIGH VOLTAGE IS RECOMMENDED.
2. HIGH VOLTAGE MUST NOT BE APPLIED IN THE ABSENCE OF PROPER GRID BIAS AND MAGNETIC FIELD. POSITIVE GRID PULSE VOLTAGE MUST NOT BE APPLIED IN THE ABSENCE OF HIGH VOLTAGE.
3. INITIAL ADJUSTMENTS SHOULD BE DONE AT LOW DUTY CYCLE (LESS THAN .001) TO PREVENT TUBE DAMAGE DUE TO HIGH SHELL (INTERCEPTION) CURRENT.

ADDITIONAL INFORMATION FOR SPECIFIC APPLICATIONS CAN BE OBTAINED FROM THE:

ELECTRON TUBE APPLICATIONS SECTION
ITT COMPONENTS DIVISION
POST OFFICE BOX 7065
ROANOKE, VIRGINIA



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TYPICAL P_{OUT} VS. P_{IN} CHARACTERISTICS





