



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

D-2013
TRAVELING
WAVE TUBE

T E N T A T I V E

DESCRIPTION:

THE D-2013 IS A 5 WATT CW 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. THE TUBE IS SUITABLE FOR EITHER CW OR PULSE SERVICE.

ELECTRICAL INFORMATION:

HEATER VOLTAGE	6.3 ($\pm 10\%$)	VOLTS
HEATER CURRENT	2.3	AMPERES
MAXIMUM FREQUENCY	9600	MC
MINIMUM FREQUENCY	8000	MC
MINIMUM COLD TRANSMISSION LOSS	50	DB
CAPACITANCE		
CONTROL ELECTRODE TO ALL OTHER ELEMENTS	10	UUFD
ALL GUN ELEMENTS TO SHELL	4.8	UUFD
SMALL SIGNAL VS GAIN CHARACTERISTIC (SEE CURVE, SHEET 4)		
POWER GAIN WITHIN 6 DB OF SMALL SIGNAL GAIN AT ANY FREQUENCY FROM 8.0 TO 9.6 KMC		
NOISE FIGURE	35	DB MAX.

ELECTRICAL RATINGS, ABSOLUTE VALUES:

MAXIMUM ANODE VOLTAGE (NOTE 1)	3400	VOLTS
MAXIMUM SHELL CURRENT (NOTE 2)	3	MA
MAXIMUM COLLECTOR VOLTAGE (NOTE 3)	3500	VOLTS
MAXIMUM COLLECTOR DISSIPATION (NOTE 4)	200	WATTS
MAXIMUM CONTROL ELECTRODE VOLTAGE (NOTE 5)	-250	VOLTS

MECHANICAL INFORMATION:

TYPE OF CATHODE	OXIDE IMPREGNATED UNIPOTENTIAL	
BASE, SMALL SHELL DUODECAL, 5 PIN	JEDEC DESIGNATION B5-57	
TYPE OF ENVELOPE	METAL	
MAGNETIC FIELD STRENGTH (NOMINAL)	1300	GAUSS
LENGTH OF MAGNETIC FIELD	6.75	INCHES UNIFORM
MOUNTING POSITION	ANY	
WEIGHT (NOT INCLUDING SOLENOID)	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)	70	CFM

TYPICAL OPERATION AS POWER AMPLIFIER:

ANODE VOLTAGE	3200	VOLTS
SHELL CURRENT	1	MA
COLLECTOR VOLTAGE	3300	VOLTS
COLLECTOR CURRENT	50	MA
CONTROL ELECTRODE VOLTAGE	-15	VOLTS
POWER OUTPUT	5	WATTS MINIMUM
GAIN	33	DB MIN.
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 POTNETIAL 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. THIS CURRENT SHOULD BE MINIMIZED AND MUST BE LESS THAN THE MAXIMUM RATING. IT IS DESIRABLE TO MONITOR THE CURRENT FROM SHELL TO GROUND DURING OPERATION AND IT IS RECOMMENDED THAT OVERLOAD PROTECTION BE PROVIDED TO REMOVE HIGH VOLTAGE IF THE SHELL CURRENT EXCEEDS 3 MA.

NOTE 3: IT IS GENERALLY RECOMMENDED THAT THE COLLECTOR BE OPERATED AT 50 TO 100 VOLTS POSITIVE WITH RESPECT TO SHELL, AND THE POTENTIAL DIFFERENCE BETWEEN COLLECTOR AND SHELL BE LIMITED TO 300 VOLTS MAXIMUM.

NOTE 4: FORCED AIR COOLING OF COLLECTOR 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 200 WATTS, A MINIMUM AIR FLOW OF 70 CFM THROUGH THE COOLING FINS IS REQUIRED.

NOTE 5: THE CONTROL ELECTRODE VOLTAGE IS ADJUSTED FOR MAXIMUM BEAM TRANSMISSION (COLLECTOR CURRENT/CATHODE CURRENT).

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 1300 GAUSS), HEATER VOLTAGE, COLLECTOR VOLTAGE (IF USED), CONTROL ELECTRODE VOLTAGE (APPROXIMATELY -20 VOLTS).
3. RAISE HIGH VOLTAGE TO DESIRED VALUE, ADJUSTING SOLENOID VOLTAGE AND CONTROL ELECTRODE VOLTAGE FOR MAXIMUM COLLECTOR CURRENT, AND OBSERVING CARE NOT TO EXCEED 3 MA SHELL CURRENT. IT MAY BE NECESSARY TO ROTATE THE TUBE IN THE SOLENOID TO THE POINT GIVING BEST TRANSMISSION.
4. THE ABOVE PROCEDURE IS NOT REQUIRED AFTER INITIAL SET UP; HOWEVER, HEATER VOLTAGE SHOULD BE APPLIED ONE MINUTE BEFORE APPLYING HIGH VOLTAGE, AND PROPER MAGNETIC FIELD AND CONTROL ELECTRODE VOLTAGE MUST BE APPLIED BEFORE APPLYING HIGH VOLTAGE. OBSERVANCE OF THE 3 MA MAXIMUM LIMIT ON SHELL CURRENT IS ESSENTIAL TO PREVENT TUBE DAMAGE.
5. HEATER WARM UP OF 2 MINUTES BEFORE APPLYING HIGH VOLTAGE IS RECOMMENDED.

STANDARD SOLENOIDS TO OPERATE THIS TUBE ARE AVAILABLE, AND SOLENOIDS DESIGNED FOR PARTICULAR APPLICATIONS CAN BE SUPPLIED.

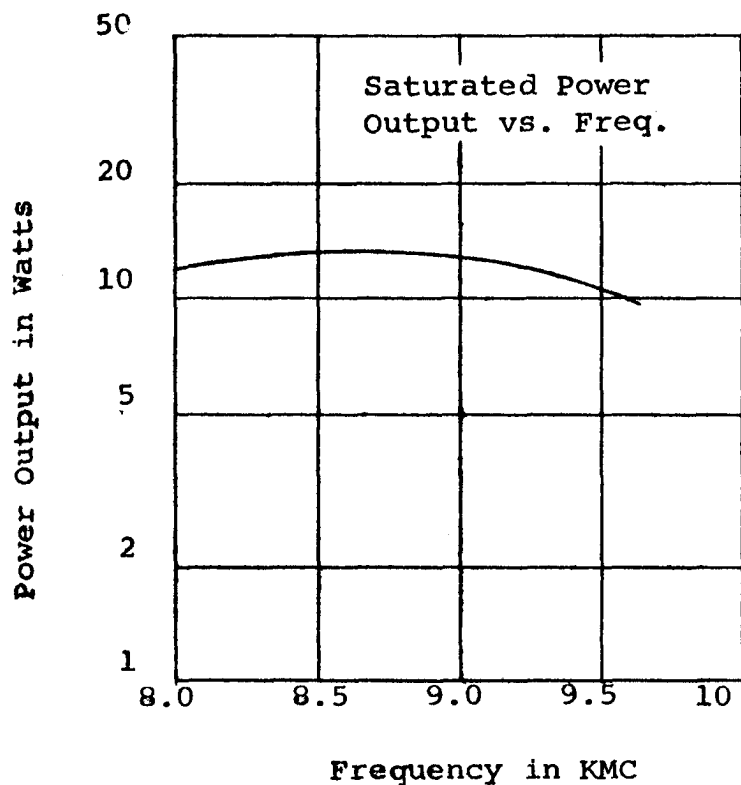
ADDITIONAL INFORMATION FOR SPECIFIC APPLICATIONS CAN BE OBTAINED FROM THE:

ELECTRON TUBE APPLICATIONS SECTION
ITT COMPONENTS DIVISION
Post Office Box 7065
ROANOKE, VIRGINIA



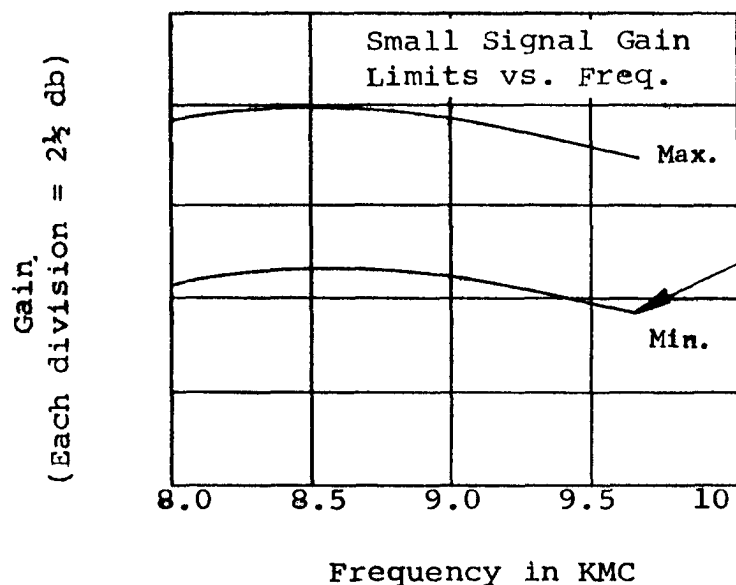
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TYPICAL CHARACTERISTICS

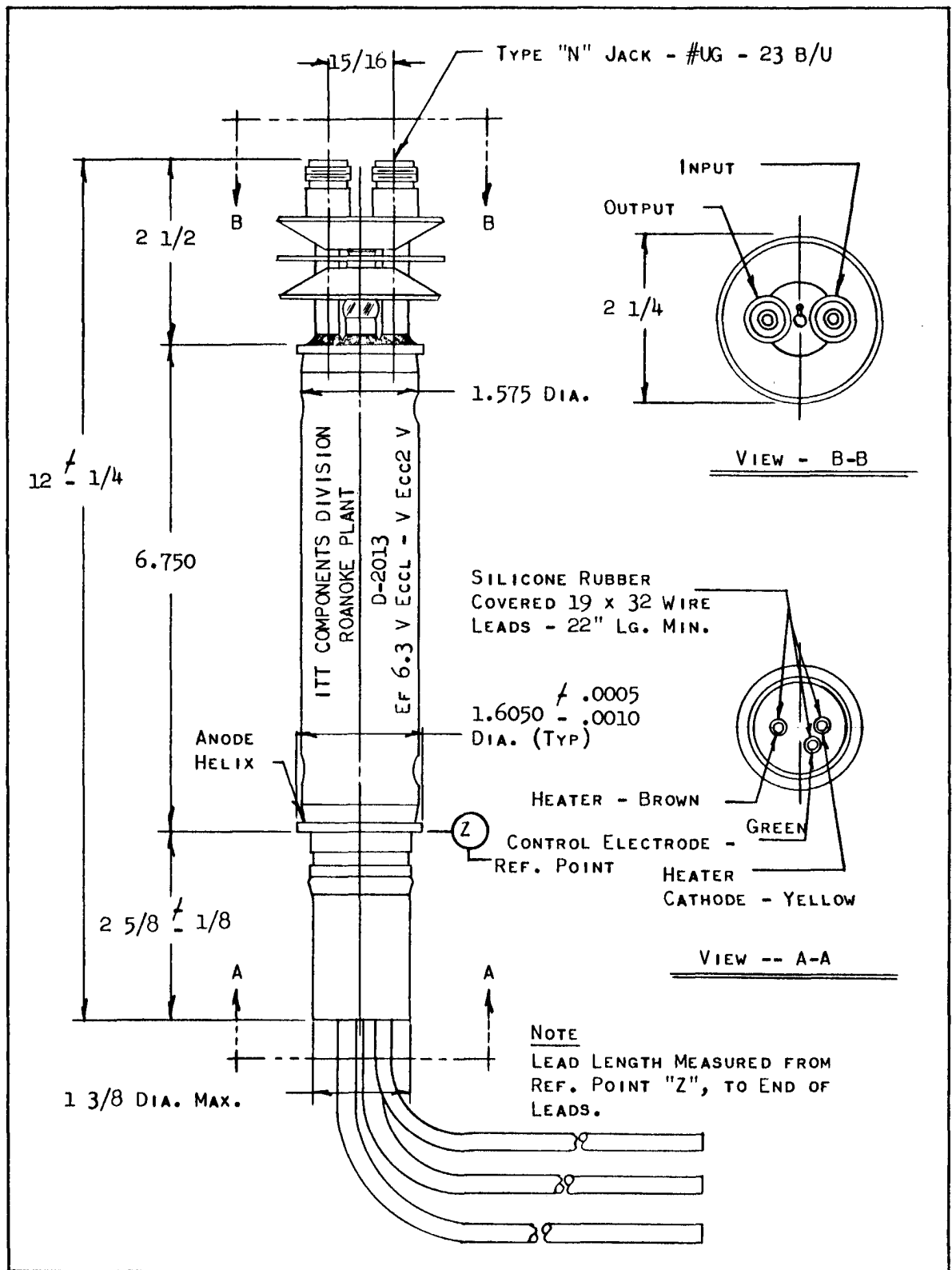


Magnetic field and control electrode voltage set for best transmission.

Voltage set at approximately 3200 volts.



This point 9.6 KMC
33 db or greater.



OUTLINE - D-2013

