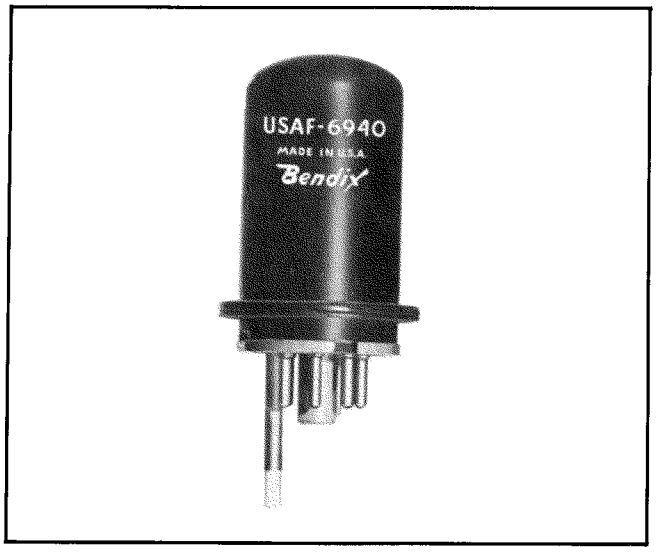
6940
Bendix Type TK-58

REFLEX KLYSTRON

(THERMALLY TUNED)



MAXIMUM RATINGS

(ABSOLUTE VALUES)

Resonator Voltage	350 volts D.C.
Reflector Voltage	—350 volts D.C.
Filament Voltage	6.3 ± 8% volts
Gun Cathode Current	32 ma. D.C.
Diode Plate Dissipation	*see note below
Diode Voltage	—350 volts D.C.
Heater-Cathode Voltage	±100 volts D.C.

*Note: Power inputs as high as 16.5 watts may be applied to the diode when the frequency of the klystron is above 8500. Tuner power in excess of 10 watts may permanently damage the tuning structure, if applied when the tube is tuned below 8500 Mc.

TYPICAL OPERATING CONDITIONS

Frequency	8500 to 9660 Mc./sec.
Resonator Voltage	300 volts D.C.
Reflector Voltage @ 9660 Mc./sec.	—95 to —145 volts D.C.
Filament Voltage	6.3 ± 8% volts
Gun Cathode Current	32 mA D.C. (max.)
Tuner Diode Current	5 to 36 ma (D.C.)
Tuner Diode Voltage	170 to 275 volts D.C.

DESCRIPTION

The 6940 (Bendix® Type TK-58) Tube is a ruggedized low voltage thermally tuned X-band reflex klystron, designed for use as a CW power-source over the frequency range of 8500 to 9660 Mc./sec. Thermal tuning of the klystron is accomplished by means of a diode included within the vacuum envelope, the plate of which comprises one wall of the klystron cavity. As diode voltage, and hence current, is increased, expansion of the plate results in corresponding changes in the klystron cavity gap spacing causing the tube to tune. The tuning speed over the required frequency range does not exceed a maximum of 3 seconds. The 6940 is similar to the 6116, but has special characteristics limiting spectrum width and spectrum continuity under adverse load conditions.

With the exception of the diode tuner, the 6940 may be considered a ruggedized version of the 2K45 with equivalent outline dimensions and electrical characteristics.

The ruggedization feature of the tube permits it to be operated under severe vibration environments without sacrifice of frequency stability. Under vibration conditions of 10g acceleration at 50 cycles, the maximum frequency variation is ±1.3 Mc./sec.

The tube has coaxial output as shown in the accompanying photograph and outline drawing, and is coupled to the waveguide circuit through a transducer identical to that used for the type 2K45 and 2K25 klystrons. Details of this transducer can be found in the Military Number 227-JAN specification sheet.

PHYSICAL CHARACTERISTICS

- *Base:* Small octal 8-pin, B8-21, Low Loss Phenolic Wafer, Modified for coaxial output lead as shown on outline drawing.
- *Coupling to Wave Guide:* Coaxial output fits standard transducer per 227 JAN.
- *Cooling:* Convection.
- *Mounting Position:* Any.
- *Cavity:* Integral with tube.
- *Bulb:* Metal.

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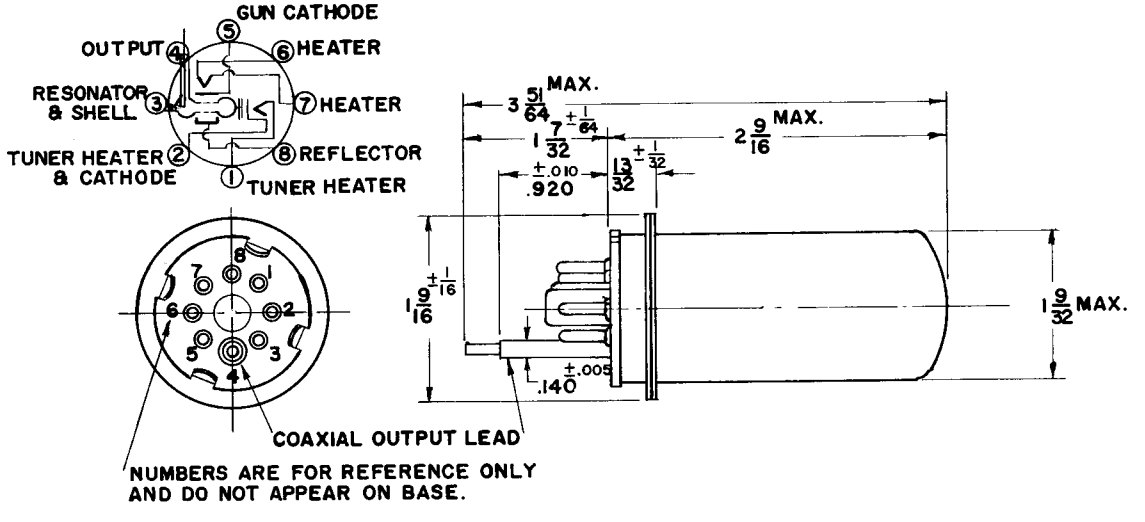
(THERMALLY TUNED)

Bendix Type TK-58 — 6940

ELECTRICAL CHARACTERISTICS & TEST CONDITIONS

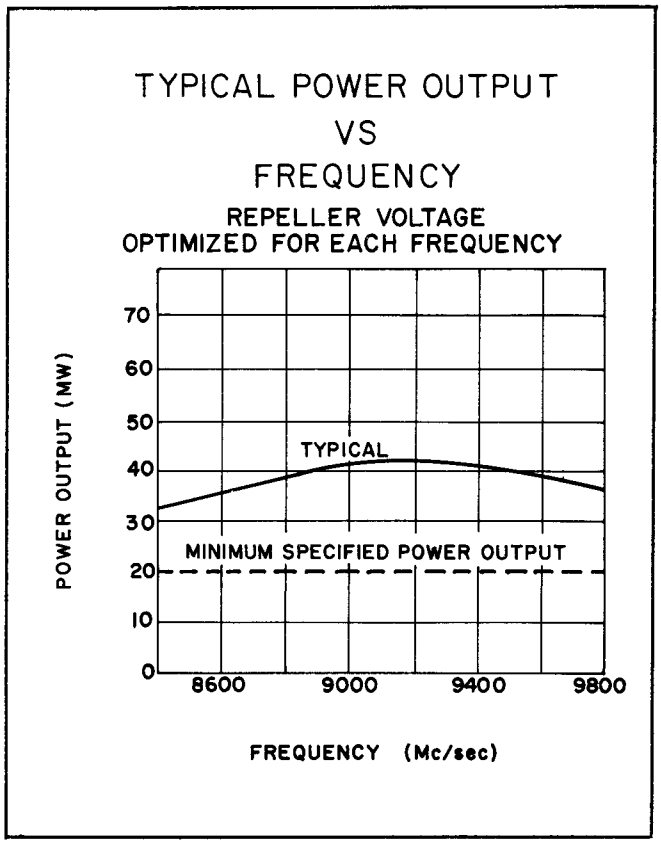
Test Conditions and Specification Limits

TEST	CONDITIONS	SYMBOL	LIMITS MIN.	LIMITS MAX.	UNITS
PRODUCTION TESTS:					
Total Reflector Current:	Er = −150 Vdc t = 120 sec. (min)	Ir:	—	5.0	μAdc
Reflector Leakage:	Er = −150 Vdc	Ir:	—	3.0	μAdc
Reflector Gas Current:	Er = −150 Vdc	Ir:	—	1.0	μAdc
Cathode Current (1):	Er = −150 Vdc	Ikl:	—	32	mAdc
Reflector Voltage:	Er (Mode A)/Max. Po @ 9660 ±0.3% Mc.	Er:	−95	−145	Vdc
Thermal Tuning Range:	Ef_1 and Ef_2 = 5.8 V Er (Mode A) Thermal Tuning (1)	Max. F:	9660	—	Mc
	Thermal Tuning (2)	Min. F:	—	8500	Mc
Bump:	Ef = 5.8; Er (Mode A)/Max. Po @ 9660 ±0.3% Mc.	Po/Po	—	0.10	
Emission (1):	Ef = 5.8; Er = −150 Vdc	Ik1/Ik1:	—	0.15	
Emission (2):	Ef = 5.8; Ik2 = 20 mA	Ik2/Ik2:	—	0.10	
Thermal Tuning Time (1):	F = 9660 to 8500 Mc.	t:	1.0	3.0	sec.
Thermal Tuning Time (2):	F = 8500 to 9660 Mc.	t:	1.0	3.0	sec.
Power Output:	Ef = 5.8; F from 8500 to 9660 Mc.	Po:	20	—	mW
Spectrum Width:	F = 9265 ±5 Mc.; Mod. Volt. = 0.3 ±0.02 volts pk to pk 1350 ±20 cps	sw	.65	1.5	Mc
Mode Breakup:	F = 9280 Mc.; Volt. = 10 v pk to pk (approx.)			Mode to be continuous	
DESIGN TESTS:					
Electrode Insulation:	300 Vdc Tube Cold	Rk1-rs:	2.0	—	Meg.
		Rk2-rs:	2.0	—	Meg.
		RF1-rs:	2.0	—	Meg.
Heater Current (1):		If1:	465	570	mA
Heater Current (2):		If2:	720	880	mA
Insulation:	Eh-Kl = ±45 Vdc	IhK1:	—	100	μAdc
Tuner Diode Voltage:	@ 8500 ±0.3% Mc. 9660 ±0.3% Mc.	ED:	See Graph	—	—
Tuner Diode Current:	@ 8500 ±0.3% Mc. 9660 ±0.3% Mc.	Ik2:	See Graph	—	—
Vibration:	No Voltage 10g; t = 120 sec.; F = 50 cps	—	—	—	—

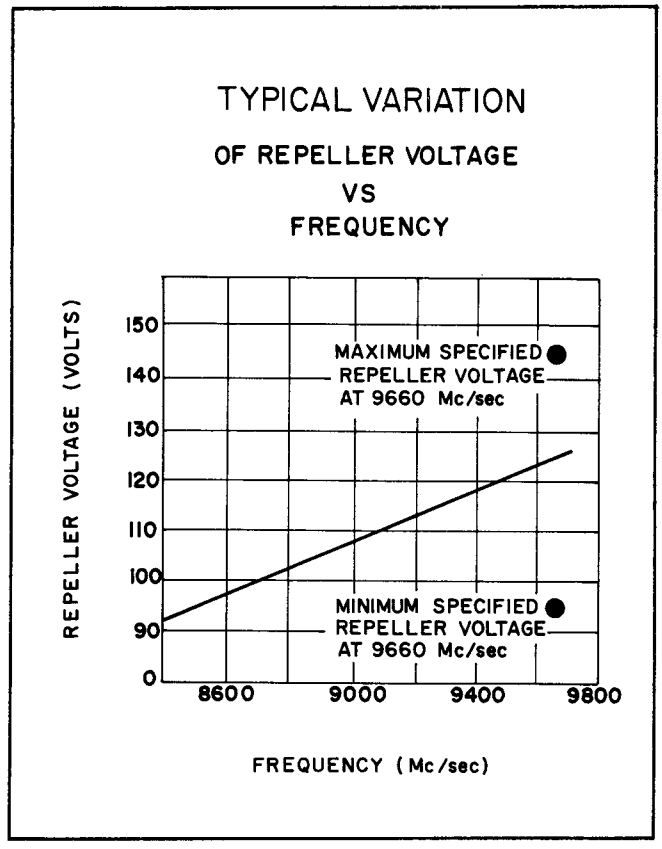


OUTLINE DRAWING

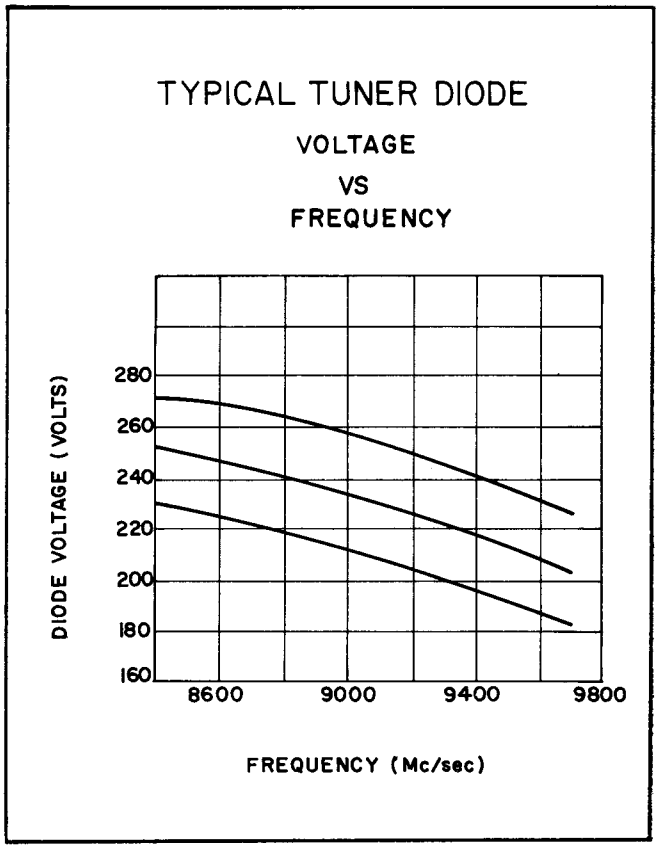
AVERAGE CHARACTERISTICS



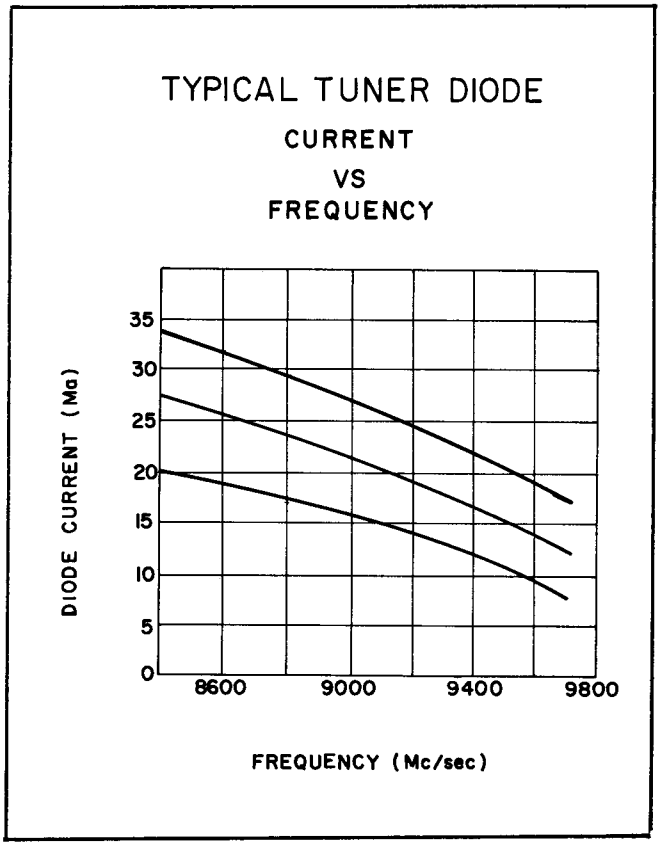
POWER OUTPUT VS FREQUENCY
REPELLER VOLTAGE OPTIMIZED FOR EACH FREQUENCY



REPELLER VOLTAGE VS FREQUENCY

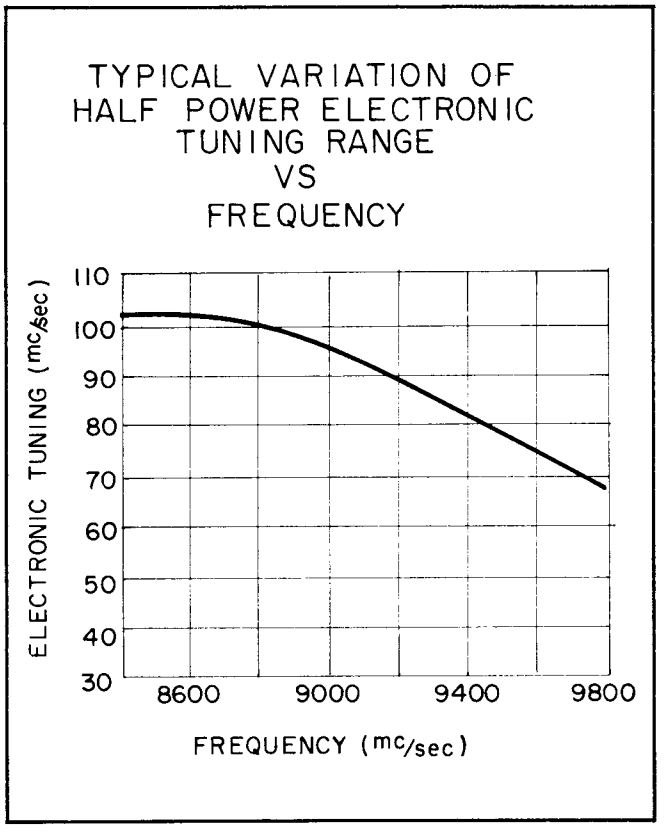


TUNER DIODE VOLTAGE VS FREQUENCY

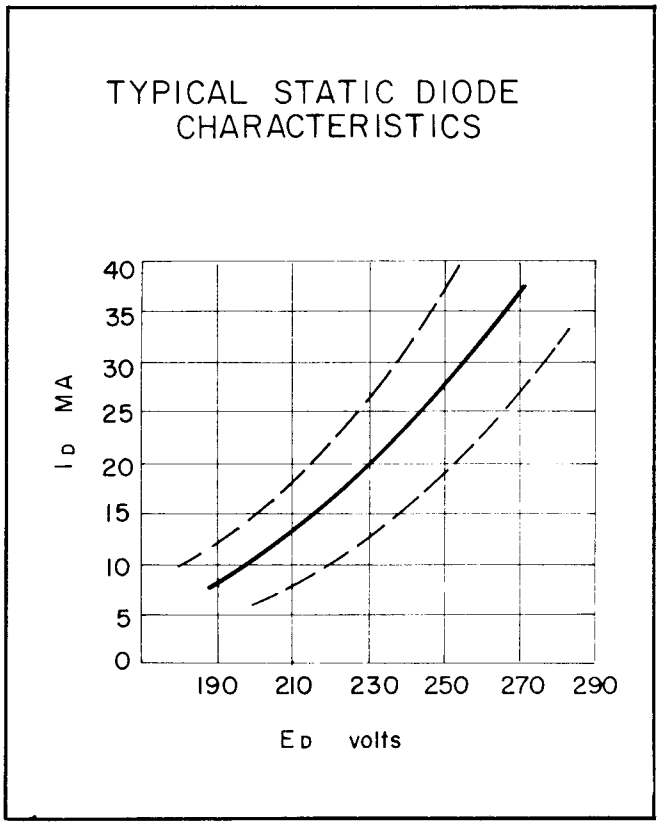


TUNER DIODE CURRENT VS FREQUENCY

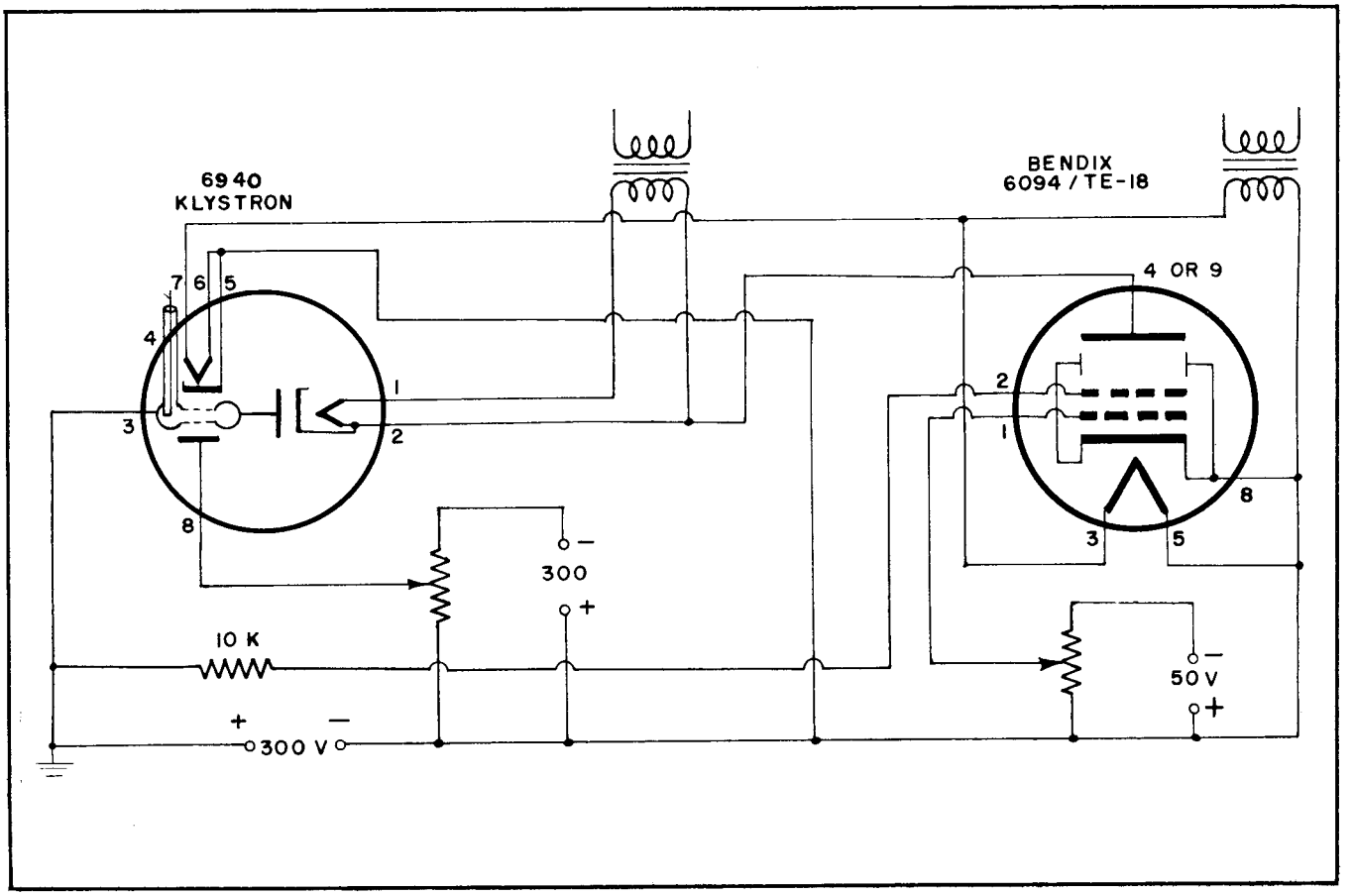
AVERAGE CHARACTERISTICS



HALF POWER ELECTRONIC TUNING RANGE VS FREQUENCY



STATIC DIODE CHARACTERISTICS



CONTROL CIRCUIT FOR TUNING DIODE