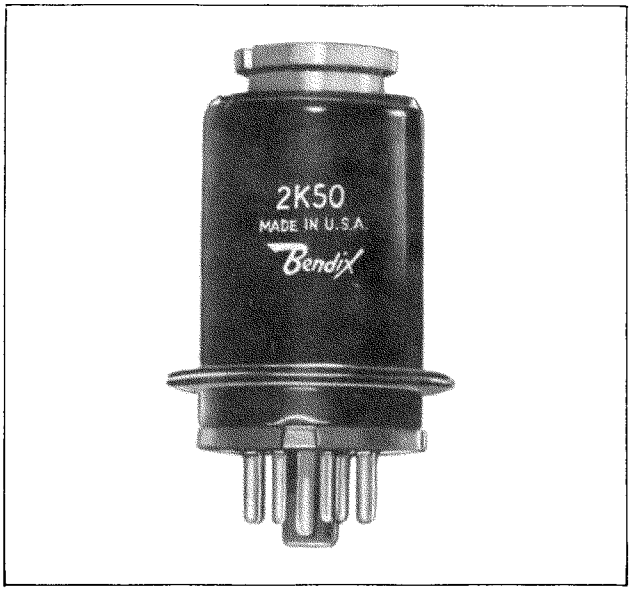
2K50
Bendix Type TK-4

REFLEX KLYSTRON

(THERMALLY TUNED)



MAXIMUM RATINGS

(ABSOLUTE VALUES)

Resonator Voltage	330 Vdc
Reflector Voltage	—150 Vdc
Tuner Grid Voltage	—50 Vdc
Filament Voltage	6.3 ± 8% V
Gun Cathode Current	28 mAdc
Tuner Cathode Current	10 mAdc
Altitude	10,000 ft.

PHYSICAL CHARACTERISTICS

- *Dimensions:* Refer to the outline drawing.
- *Base:* Small Octal 8-Pin, B8-21, Low Loss Phenolic Wafer.
- *Coupling to Wave Guide:* Direct, by means of an insulating fitting. (See Typical Adapter Assembly Drawing.)
- *Cooling:* Convection.
- *Mounting Position:* Any.
- *Cavity:* Silver Plated Steel.
- *Bulb:* Metal.
- *Output Window:* Low Loss glass.

DESCRIPTION

The 2K50 Reflex Klystron (Bendix Red Bank Type TK-4) is a thermally tuned K band reflex oscillator. The tube is designed for use as a CW oscillator over the range of 23.5 kMc/sec. to 24.5 kMc/sec. The tube is thermally tuned over this frequency range by varying the grid bias voltage of a triode section incorporated in the metal envelope. The plate of this triode section is attached to the klystron structure and thermal expansion of the plate caused by variations of plate current is transmitted to the klystron section causing a change of gap spacing and a corresponding frequency change.

The wave guide coupling is accomplished by means of a tapered wave guide which couples to the cavity through a non-resonant iris. The guide tapers in the narrow dimension only, from the iris to a circular output window. External to the tube there is an insulating fitting which permits the tube to be coupled directly to the guide by means of a coupling (see Typical Adaptor Assembly drawing). This construction makes it possible to operate the shell of the tube at a different potential from that of the guide.

APPLICATION NOTES

The 2K50 is unique in that its thermal tuning feature allows it to be tuned remotely by circuitry as in applications where direct mechanical tuning is impossible because of space limitations or inaccessibility. The type of thermal tuner employed in the 2K50 tends to be self compensating for ambient temperature changes, a factor which is highly desirable for most applications. In addition, the speed of the thermal tuner is remarkable. The tube will tune the prescribed frequency range from 23,500 Mc/sec. to 24,500 Mc/sec. in 1.2 to 2.6 seconds and, near the middle of the range, tuning speeds of 600 to 800 Mc/sec./sec. are obtained.

In addition to its application in radar circuitry, the 2K50 is finding wide application in microwave test gear and portable microwave spectroscopic equipment where ease and speed of tuning are desirable.

THE Bendix CORPORATION
Red Bank DIVISION, EATONTOWN, NEW JERSEY

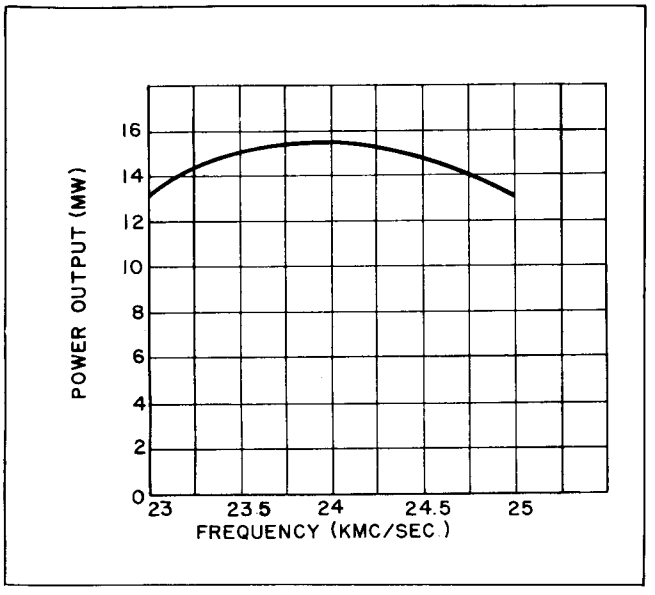
Publication No. R410-6 (Supersedes Pub. No. R310-5)

Printed in U.S.A.

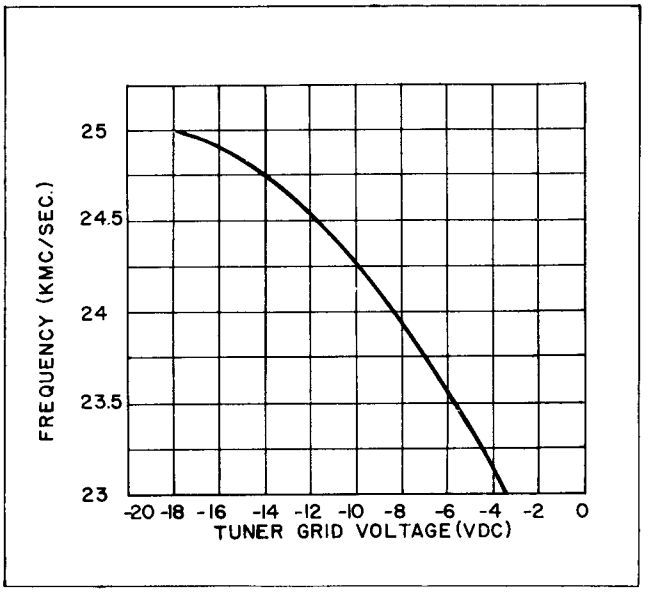
REFLEX KLYSTRON
(THERMALLY TUNED)

2K50
Bendix Type TK-4

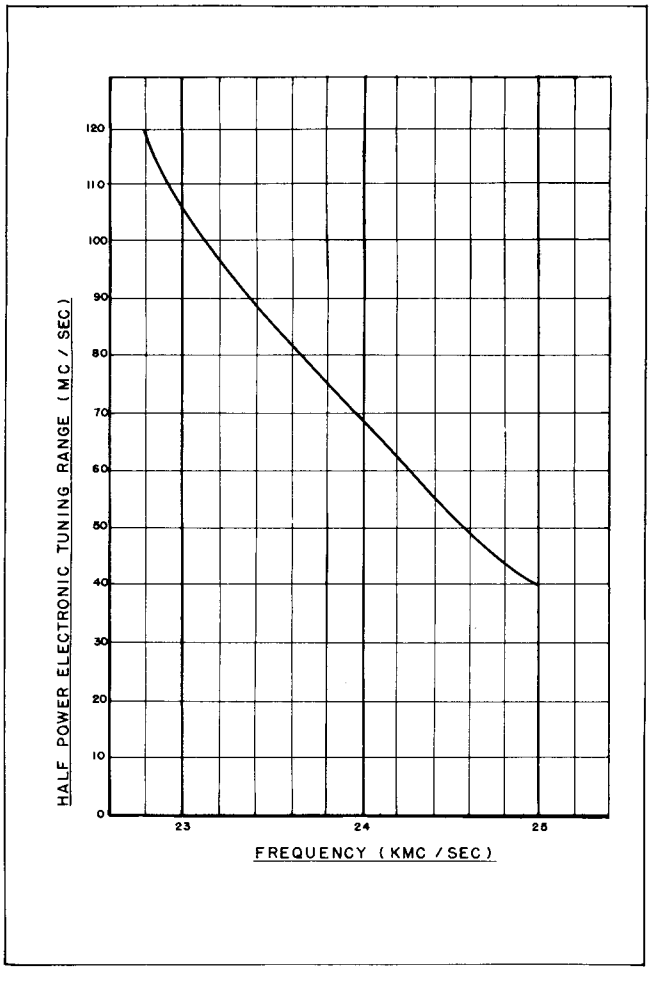
AVERAGE CHARACTERISTICS



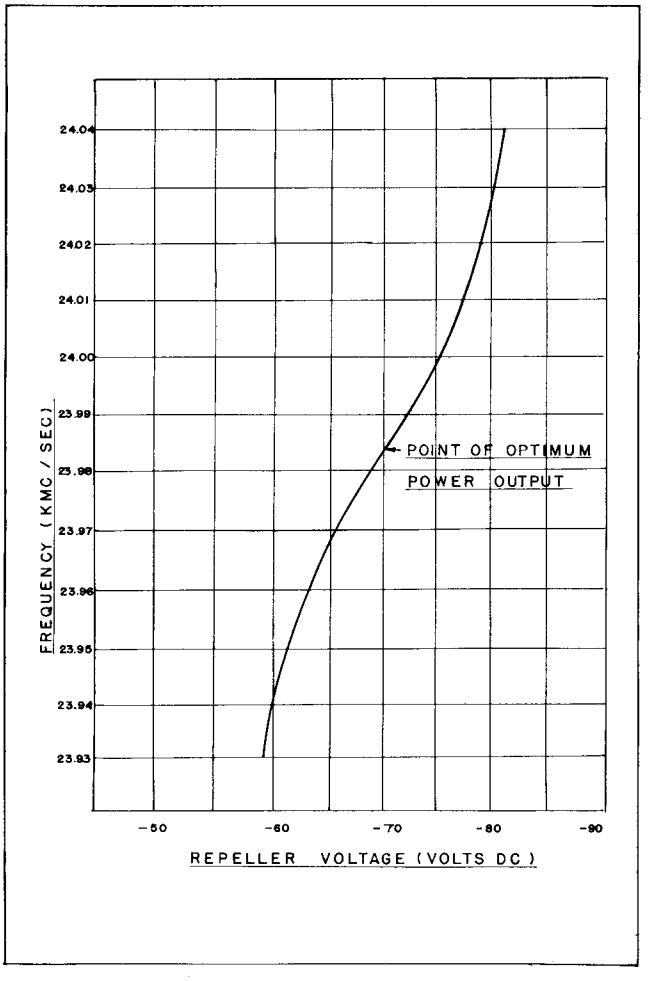
POWER OUTPUT VS. FREQUENCY
(REPELLER VOLTAGE OPTIMIZED
FOR EACH FREQUENCY)



FREQUENCY VS. TUNER GRID
VOLTAGE



VARIATION OF HALF POWER ELECTRONIC
TUNING RANGE WITH FREQUENCY



VARIATION OF FREQUENCY
WITH REPELLER VOLTAGE

REFLEX KLYSTRON
(THERMALLY TUNED)

2K50
Bendix Type TK-4

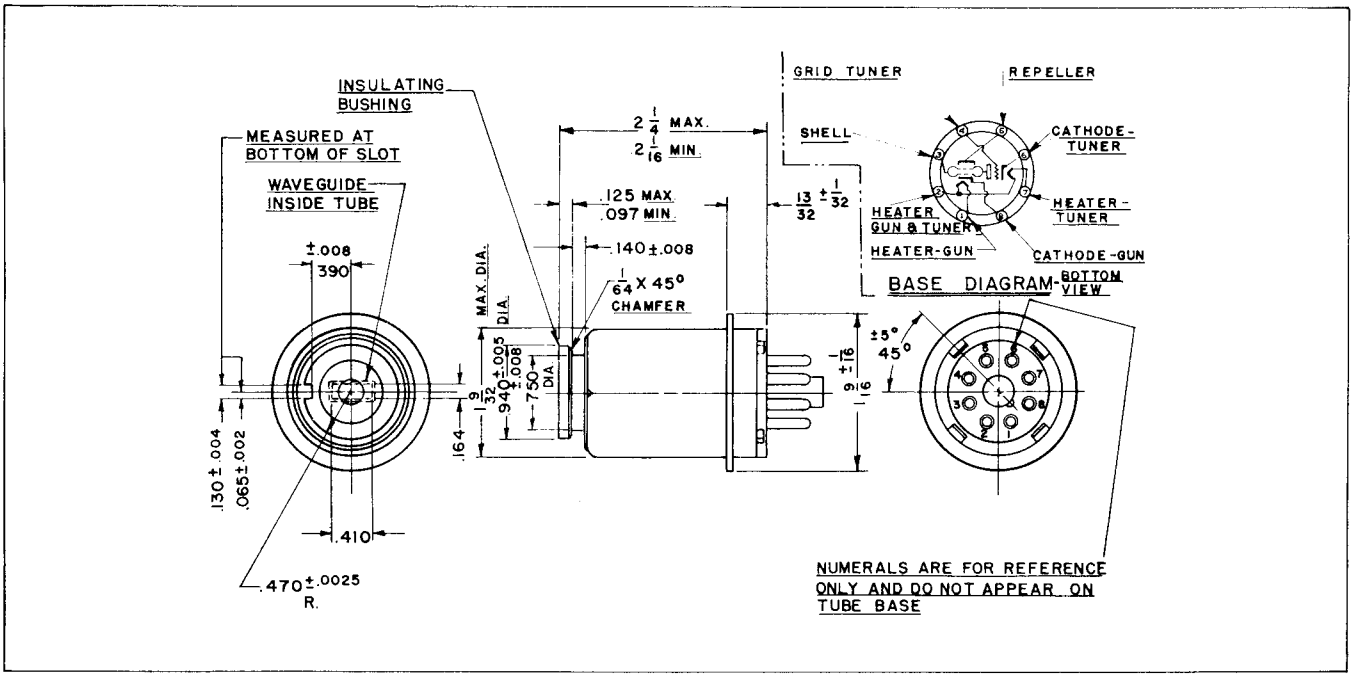
ELECTRICAL CHARACTERISTICS & TEST CONDITIONS

Test Conditions and Specification Limits

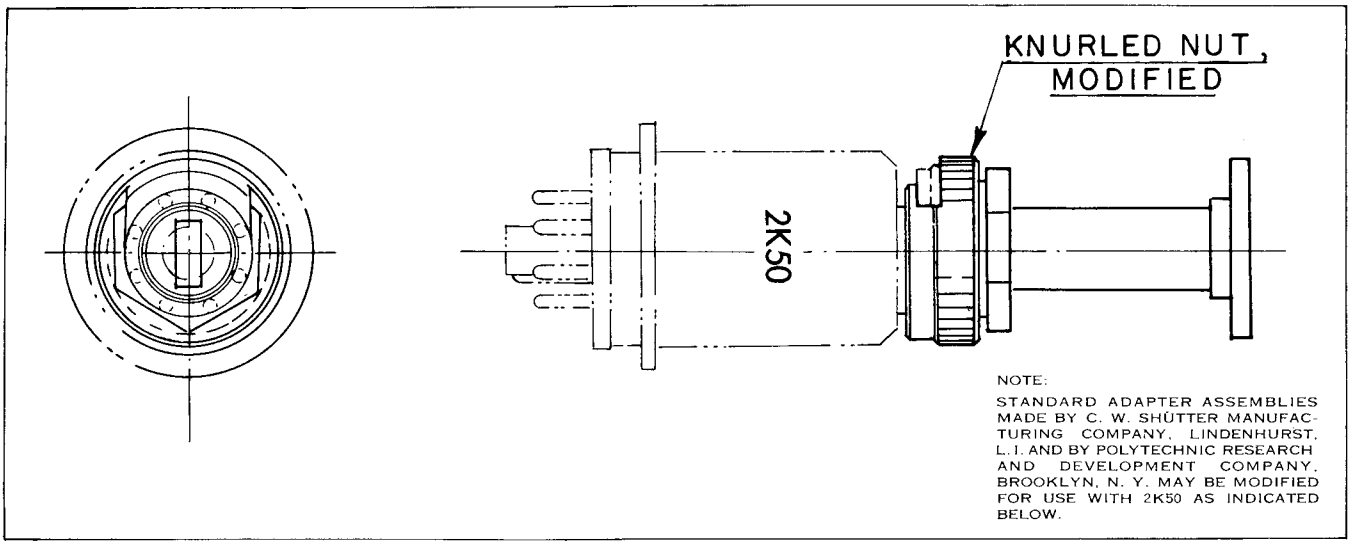
TEST	CONDITIONS	SYMBOL	LIMITS MIN.	LIMITS MAX.	UNITS
PRODUCTION TESTS					
Reflector Leakage Current	Er = —100 Vdc	Ir	—	5	uAdc
Reflector Gas Current	Er = —100 Vdc	Ir	—	2	uAdc
Grid Current	Ec = —10 Vdc	Ic	—	2	uAdc
Gun Cathode Current	Er = —50 to —100 Vdc Tube Non-Oscillating	Ik_1	—	22	mAdc
Tuner Cathode Current	Ec = 0 Vdc	Ik_2	—	10	mAdc
Thermal Tuning Range (1)	Er/Max. Po; Ec = 0 Vdc	F_1	—	23216	Mc
Thermal Tuning Range (2)	Er/Max. Po; Ec = — 30 Vdc	F_2	24751	—	Mc
Bump	Er/Max. Po	△Po/Po	—	10%	
Power Output	F = 23504 Mc } VSWR = 1.2 max.	Po	8.5	—	mW
	F = 23984 Mc } VSWR = 1.2 max.	Po	10	—	mW
	F = 24464 Mc } VSWR = 1.2 max.	Po	8.5	—	mW
Tuner Grid Voltage	Er/Max. Po	Ec	—3	—16	Vdc
Thermal Tuning	F = 23504 to 24,464 Mc	△Ec	—3	—10	Vdc
	Er/Max. Po				
Reflector Voltage		Er	—40	—110	Vdc
Emission Activity (Gun)	Ef = 5.8 V	$△Ik_1/Ik_1$	—	15%	
Emission Activity (Tuner)	Ef = 5.8 V	$△Ik_2/Ik_2$	—	15%	
DESIGN TESTS					
Electrode Insulation	500 v; Tube Cold	$R(k_1\text{-Res.})$	20	—	Meg.
		$R(k_2\text{-Res.})$	20	—	Meg.
		R(f-Res.)	20	—	Meg.
Heater Cathode Leakage	Ehk_1 = ± 45 Vdc.	Ihk_1	—	100	uAdc
	Ehk_2 = ± 45 Vdc	Ihk_2	—	100	uAdc
Heater Current		$If_1 + If_2$	705	805	mA
Thermal Tuning Time		t	1.2	2.6	sec.
Electronic Tuning	Er/50% Max. Po	F	55	125	Mc
Hysteresis			—	5%	

GENERAL TEST CONDITIONS:

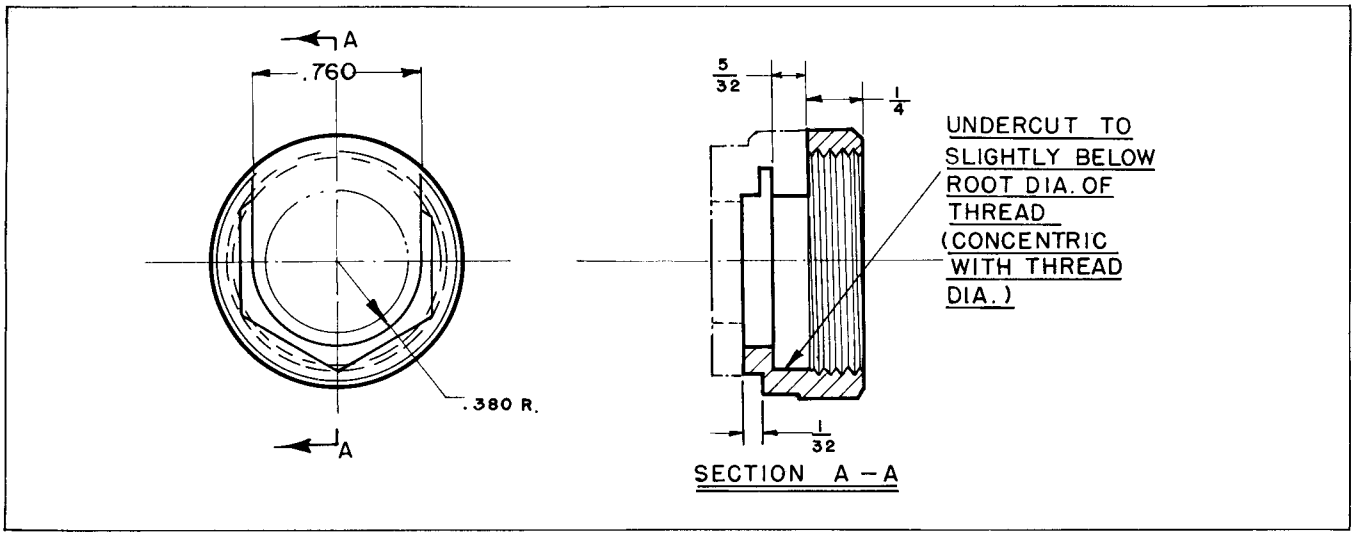
Ef.	Eres.	Er	Ec	F
6.3 volts	+300 Vdc	—20 to —130 Vdc	0 to —30 Vdc	23984 ± .3% Mc



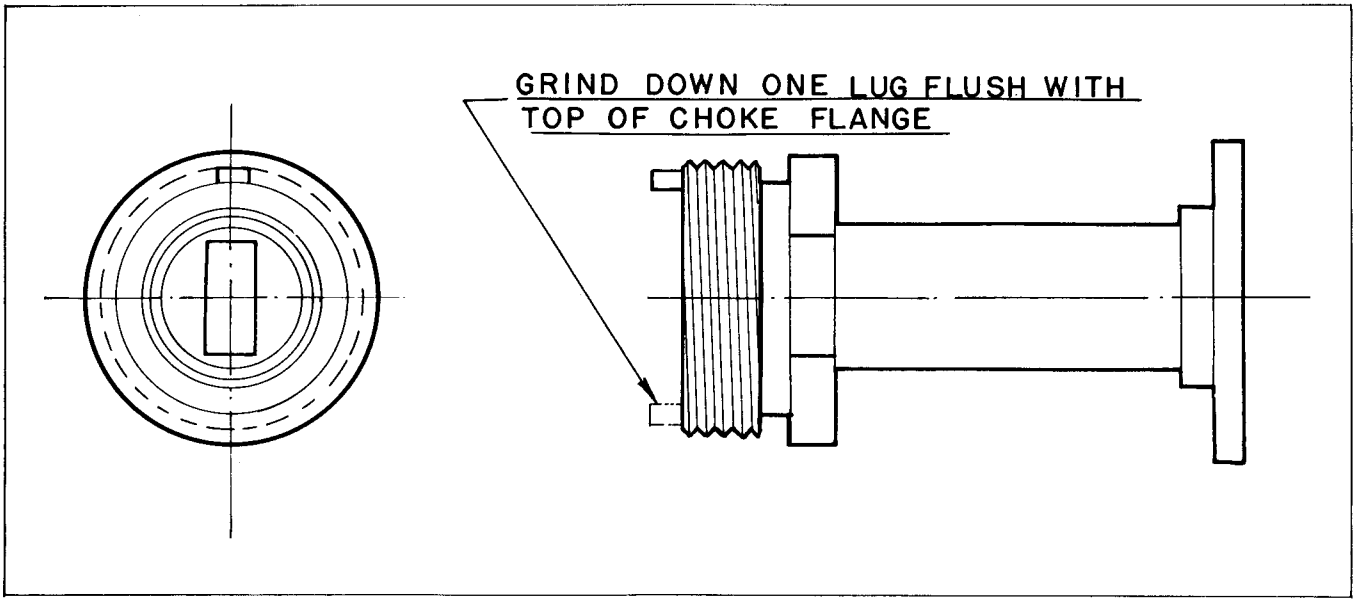
OUTLINE DRAWING



TYPICAL ADAPTER ASSEMBLY FOR COUPLING THE 2K50 TO RG-53/U WAVEGUIDE



STANDARD KNURLED NUT — MODIFIED AS SHOWN



STANDARD WAVEGUIDE ADAPTER — MODIFIED AS SHOWN