8460

REFLEX KLYSTRON

(MECHANICALLY TUNED)

DESCRIPTION

The 8460 (Bendix Type TK-106) is a ruggedized, low voltage, mechanically tuned, X-band reflex klystron oscillator designed for use in pulse or CW applications over the frequency range of 8.5 to 9.66 Gc/sec.

Although different in design and physical appearance, the 8460 is an exact electrical and mechanical retrofit for the 2K25 and in addition to its pulse capabilities, has equivalent or superior performance in all CW operating characteristics. It may be used interchangeably in existing 2K25 sockets with no equipment modification.

Of particular interest is the mechanical tuner design. As with the 2K25, tuning is accomplished by rotation of the drive nut located in the center of the tuner bows. However, unlike the 2K25, this motion is transmitted to the resonant cavity through a highly flexible diaphragm in the wall of the vacuum envelope, and there is no overstressing of the structure. Mechanical stops at both extremes of the tuning range prevent accidental damage to the structure by exceeding the mechanical tuning range. This design approach results in greatly extended tuning life (Specified tuner life 10,000 cycles minimum), ability to operate in applications requiring repetitive tuning, low temperature coefficient, reduced frequency variation with changes in ambient pressure, and minimal mechanical tuning hysteresis (repeatability of frequency vs. tuner setting).

The coaxial output of the tube is coupled into a standard 1" x ½" waveguide through a transducer, or launching section, such as that defined by Military Drawing 227-JAN or equivalent. The use of teflon as the coaxial insulator eliminates insulator breakage and removes the limitation on maximum coaxial line ambient temperature when using polystyrene.

A detailed description of the 8460 design features is available in Bendix Engineering Data Release Issue 44, File No. M-9, which describes the similar CW Bendix type TK-99/8294.

APPLICATION NOTES

Cooling: Convection cooling is normally sufficient. If the tube is to be operated in a small enclosure, care should be taken to insure adequate ventilation to prevent excessive bulb temperature that will decrease the normal life of the tube.

Output Load: The tube has been designed for operation into a matched load. When operation into a reactive load is necessary, adequate attenuation should be inserted between the load and the tube to limit the SWR at the tube and thus prevent impairment of performance.

Repeller Modes: The tube is designed for optimum operation in the repeller voltage mode defined in this data sheet, however, other modes exist at other repeller voltages and these may be used when desired. In design of AFC circuits these other modes must be considered to assure lock-in on the desired mode.

Safety Precautions: (1) Repeller voltage must always be negative, relative to the cathode. (2) Bulb should be at ground potential whenever the application permits. (3) Resonator voltage should not be applied without repeller voltage.

MAXIMUM RATINGS

(ABSOLUTE VALUES)

Resonator Voltage	350 Vdc
Reflector Voltage	—350 Vdc
Filament Voltage	6.3V ±8%
Cathode Current	37 ma D.C.
Heater-Cathode Voltage	100 Vdc

PHYSICAL CHARACTERISTICS

Dimensions:	Refer to outline drawing
Base:	Fits standard octal socket with #4 pin enlarged to 3/16"
Coupling to Waveguide:	Coaxial output fits standard 227-JAN tube mount or equivalent
Cooling:	Convection
Mounting Position:	Any
Cavity:	Integral
Bulb:	Metal

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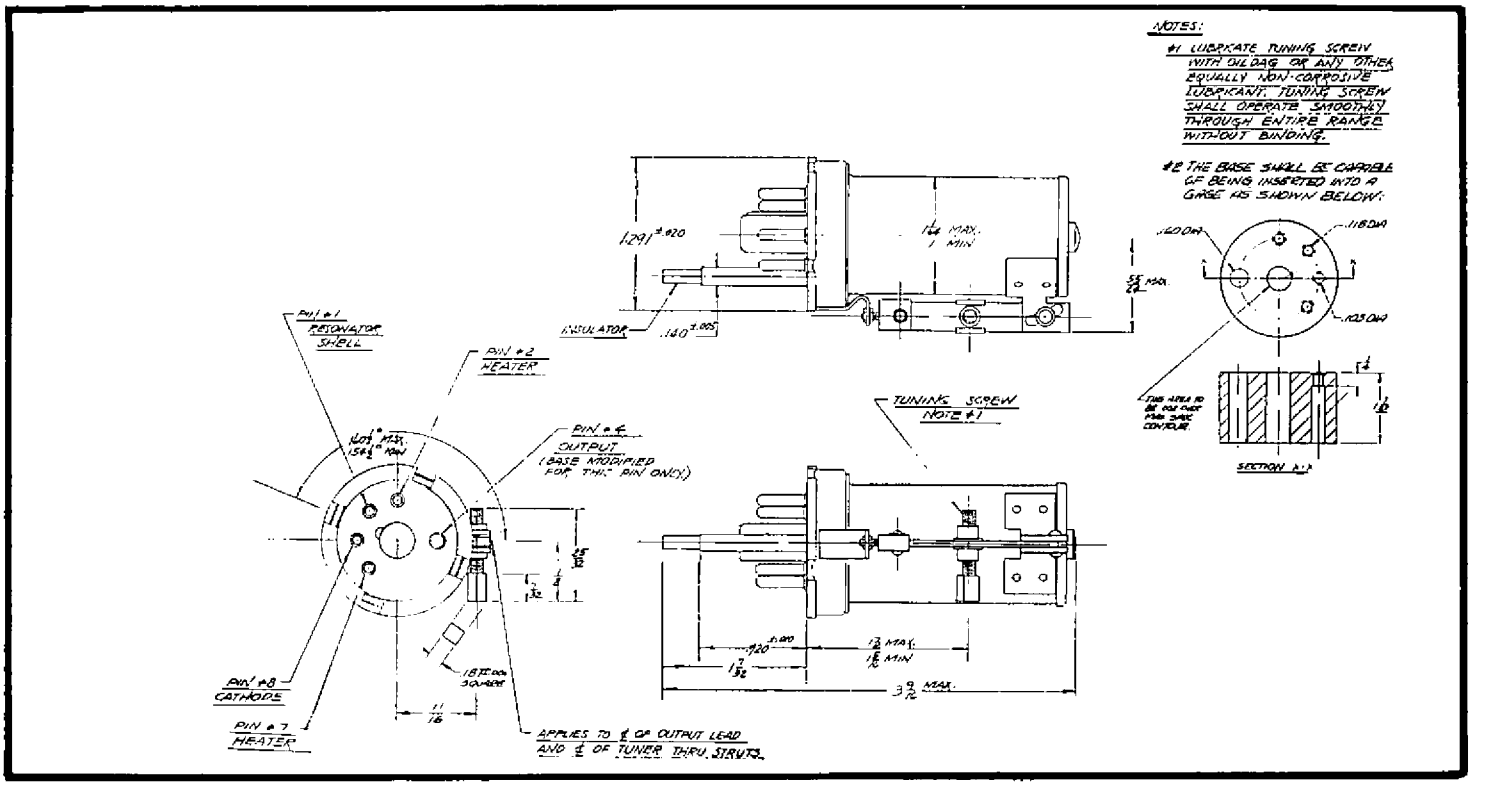
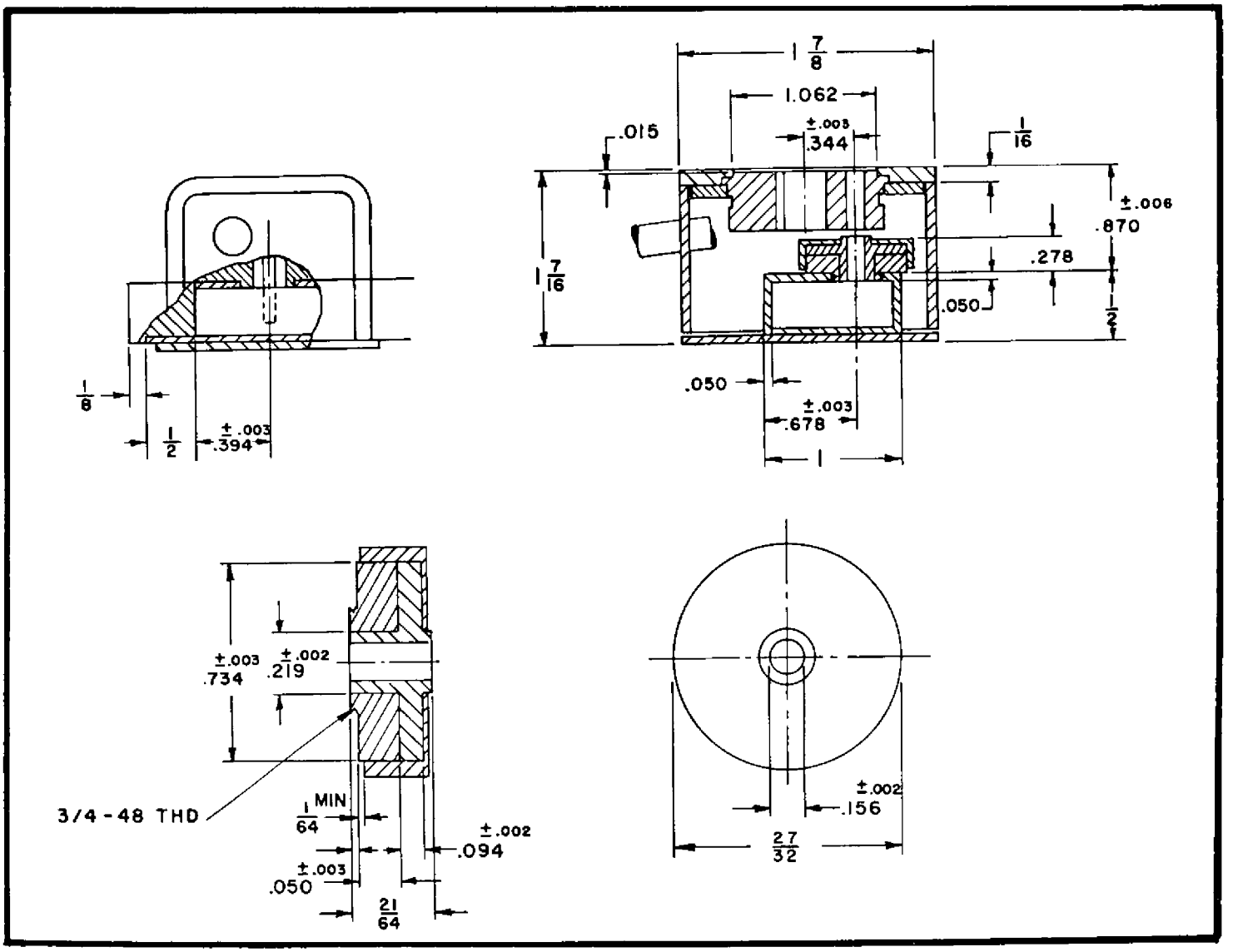
ELECTRICAL CHARACTERISTICS & TEST CONDITIONS

Test Conditions and Specification Limits

TEST PRODUCTION TESTS:	CONDITIONS	SYMBOL	LIMITS MIN.	LIMITS MAX.	UNITS
Cathode Current		Ik	–	32	mAdc
Change in Cathode Current	Ef=6.3 to 5.8V; t=120;	Δ Ik/Ik	–	15	%
Power Output	Er/Max Po; F=8500 to 9660 Mc	Po	20	–	mW
Reflector Voltage (1):	Mode A; F=9660 ± 0.3% Mc	Er	–143	–200	Vdc
Total Reflector Current	Er= –150 Vdc	Ir	–	7.0	μAdc
Reflector Lkg. Current:	Er= –150 Vdc	Ir	–	5.0	μAdc
Reflector Gas Current:	Er= –150 Vdc	Ir	–	2.0	μAdc
Dimensions:	See Outline Drawing				
DESIGN TESTS:					
Heater Cathode Lkg.	Ehk= ±45 Vdc	Ihk:	–	100	μAdc
Heater Current	Ef= 6.3 V.	If	410	470	mA
Insulation of Electrodes:	300 Vdc; Tube Cold	Rkrs:	2.0	–	Megs
		Rhrs:	2.0	–	Megs
Bump	Er/Max Po	Δ Po/Po	–	± 10	%
Electronic Tuning:	Er/±50% Max Po; F=9370 Mc ± 0.3%	Δ F	35	–	Mc
Hysteresis: (1)	Er/Max Po	Ratio		.25	
PULSED OPERATION:					
Output Pulse Duration	Er/Max Po; F=8900 ± .03% Mc Input tp=.27 μsec; prr=2000; eo=30 mv	tp	.22	–	μsec
Output Pulse Delay	Er/Max Po; F=8900 ± .03% Mc Input tp=.27 μsec; prr=2000; eo=30 mv	td	–	.07	μsec
QUALIFICATION APPROVAL TESTS:					
Tuner Mechanical Fatigue	F=8500–9660–8500 Mc		10,000	–	Cycles



OUTLINE DIMENSIONS — 8460



BROADBAND COAX TO WAVEGUIDE TRANSDUCER

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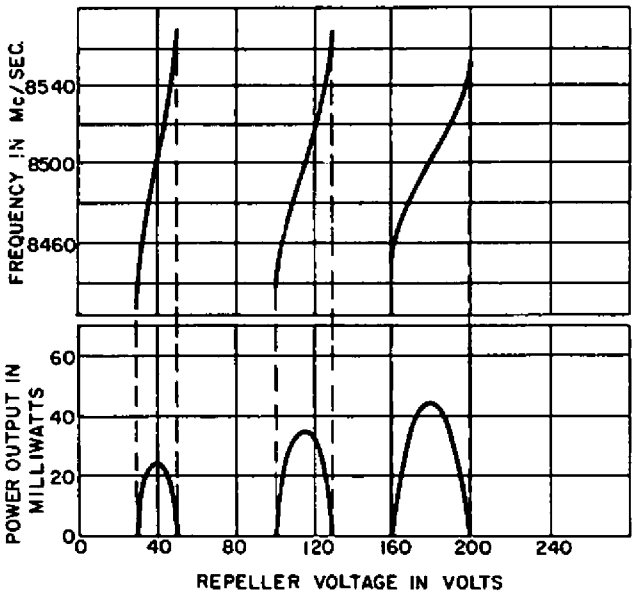
AVERAGE CHARACTERISTICS

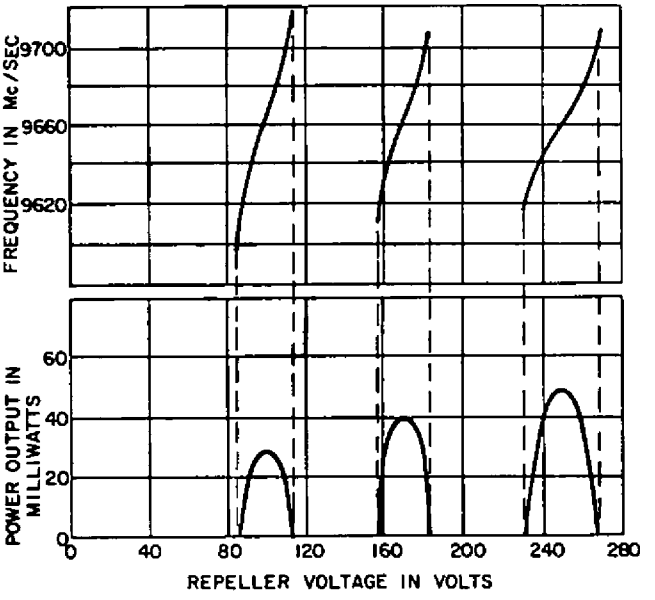
POWER OUTPUT AND FREQUENCY
VS REPELLER VOLTAGE

8460

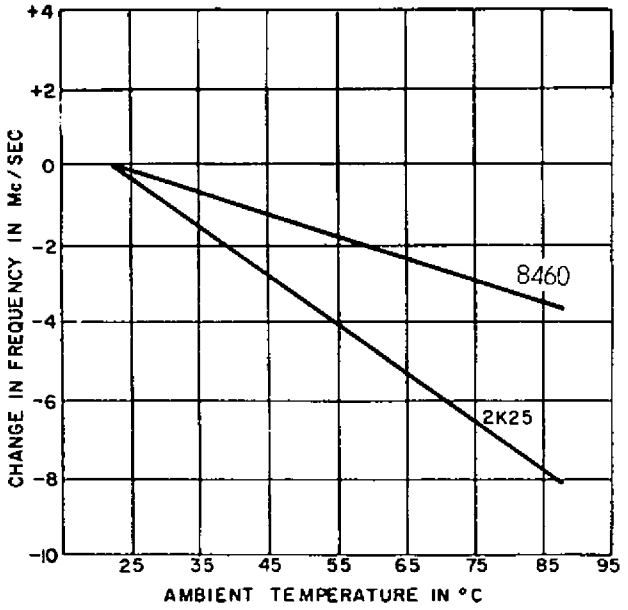


POWER OUTPUT AND FREQUENCY
VS REPELLER VOLTAGE

8460



COMPARATIVE
FREQUENCY CHANGE
VS AMBIENT TEMPERATURE
(MEASUREMENT MADE AT 9370 Mc/SEC)



COMPARATIVE
FREQUENCY CHANGE
VS AMBIENT PRESSURE