

Ferranti

KLYSTRON

A rugged wide band Reflex Klystron for use as a Local Oscillator. Designed for low voltage operation and to provide extreme stability and reliability under the most severe environmental conditions. Other features are low noise and small 'warm up' frequency drift. Intended for convection cooling with free air circulation. It is a direct replacement for American Type VA201B.

PHYSICAL DATA.

Dimensions	...	...	...	...	See Drawings on Page 3.
Output Connection	...	...	...	...	Boits to UG-39/U flange or UG-40A/U choke for W.G.16
Mounting Position	...	...	...	...	Any
Weight	...	...	...	...	6 oz. (170 gm.) approx.
Electrode Connections	...	...	...	...	Moulded flying leads.

FREQUENCY RANGE.

Mechanical Tuning Range	...	...	...	...	8500-9655 Mc/s
A single screw tuner covers the tuning frequency range in approximately $4\frac{1}{2}$ turns. For tuner screw settings see the graph on Page 6. The average tuner torque is 30 oz./in. (max. 50 oz./in.).					
Clockwise rotation reduces the frequency.					

HEATER.

Heater Voltage	...	...	...	...	6.3 volts
Heater Current	...	...	...	...	$1.2 \pm 10\%$ amps

RATINGS. (All ratings are 'Absolute')

Max. Heater Voltage	...	...	...	...	6.9 volts
Min. Heater Voltage	...	...	...	...	5.7 volts
Max. Resonator Voltage	...	...	...	...	350 volts
Max. Resonator Current	...	...	...	...	60 mA
Max. Neg. Reflector Voltage	...	...	...	...	-500 volts
Max. Reflector Current	...	...	...	...	10 μ A
Max. V_{h-k}	...	...	...	...	45 volts
Max. Vibration	...	...	...	...	20 g
Max. Shock (short duration)	...	...	...	...	150 g
Max. Altitude for operation	...	...	...	...	60,000 ft
*Max. Body Temperature	...	...	...	...	200 °C

CHARACTERISTICS AND TYPICAL OPERATION.

Frequency Range	...	8500-9655	...	Mc/s
Heater Voltage	...	6.3	...	volts
Load	...	Matched	...	...
Resonator Voltage	...	250	300	volts
Mode	...	$6\frac{1}{2}$	$5\frac{1}{2}$	...
		Min.	Max.	
†Reflector Voltage	...	-40	-120	volts
Resonator Current	...	—	45	mA
Reflector Current	...	—	10	μ A
Power Output	...	12	66	mW
‡Electronic Tuning Range	...	30	—	Mc/s
§Electronic Tuning Rate	...	1.0	—	Mc/s / °C
Temperature Coefficient	...	-100	+50	kc/s / °C
Heater Voltage Coefficient	...	—	1.5	Mc/s / volt

*Reliability will be seriously impaired if this temperature is exceeded.

†See Graph on Page 4.

‡Measured at half power point.

§At mode peak.

CHARACTERISTICS AND TYPICAL OPERATION (Cont.)

*Noise	...	...	...	$<3 \times 10^{-14}$ W / Mc/s / mW
†Tuner Resetting Accuracy (max. $\Delta F.$)	...	...	...	1 Mc/s
‡Tuner Side Thrust (max. $\Delta F.$)	...	...	...	0.5 Mc/s

Vibration.

The max. peak to peak frequency variation from vibration of 20-1000 c.p.s. at 10g. is 0.2 Mc/s.

Shock.

The maximum frequency deviation due to shock of 150g. is 1.5 Mc/s.

NOTES ON OPERATION.

Mounting.

The klystron should be securely bolted to the mating waveguide flange. Normally the resonator (tube body) is operated at earth potential; when operated with the resonator above earth potential suitable insulation should be provided between the tube and waveguide flanges.

Applied Voltages.

It is important that the circuit in which a new klystron is being installed is thoroughly checked before the application of any voltages.

All quoted voltages are relative to the cathode.

The applied voltages should not exceed the maximum published ratings under any circumstances.

Voltage surges due to switching must be limited within the maximum ratings.

Heater Voltage.

Life and reliability are directly related to the deviation of the heater voltage from its centre rated voltage. Under no circumstances should it deviate by more than $\pm 10\%$.

Reflector Voltage.

The Reflector must always be operated at a potential which is negative with respect to that of the cathode, and its power supply should not be disconnected during the time the resonator voltage is applied. When the reflector voltage is modulated, the magnitude of the modulating voltage must be limited to the extent necessary to prevent positive excursions of the reflector voltage. When there is any possibility of the reflector voltage becoming equal to or more positive than the cathode a protective diode should be connected between the reflector and cathode. The performance of this diode should be checked regularly.

Load.

For correct functioning of the tube the load should meet the following conditions:

- (a)] Over the specified operating frequency range the load should present a VSWR of less than 1.2 to the tube.
- (b) Over the frequency ranges: 7,800 to 8,500 Mc. and 9,655 to 10,500 Mc. the load should present a VSWR of less than 1.5 to the tube.

Failure to meet condition (b) may result in the occurrence of spurious modes.

Life.

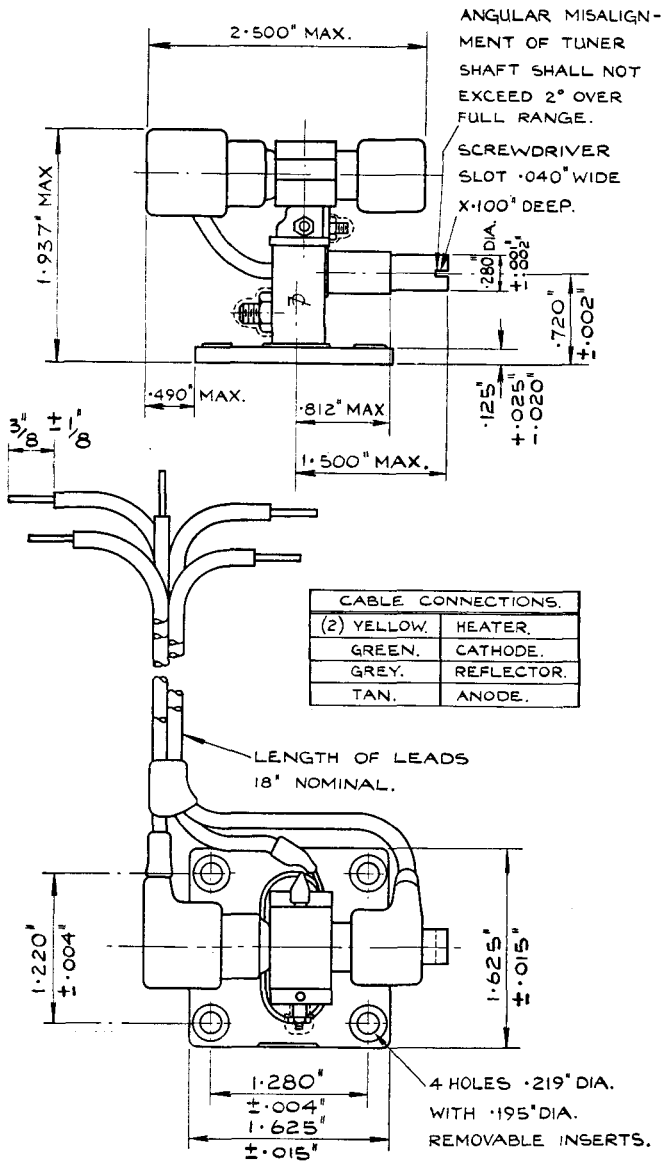
The guaranteed life under normal operating conditions is 500 hours. An average life of 1000 hours is a 95% expectancy. The life expectancy will be appreciably reduced if the valve is operated under conditions where specified maximum ratings are exceeded. See also the note on 'Heater Voltage' above.

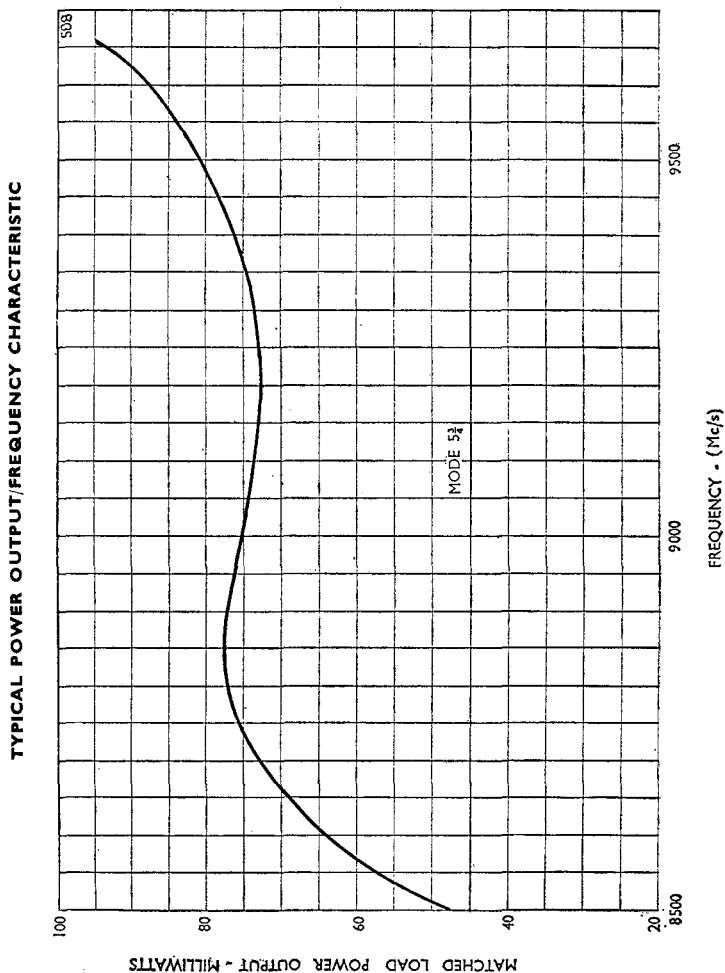
*The R.F. noise is the sum of the R.F. noise power in two channels 40 Mc/s. above and below the frequency of oscillation, compared to normal noise at 290°K. in the same channels.

The noise standard used in these measurements is a CV1881 discharge tube. The noise power is expressed as Watts per Mc/s. of I.F. band width per milliwatt of R.F. output power.

†Resetting accuracy defines the frequency deviation which can result from turning the tuner screw through approximately half a turn in either direction, then returning it to its original position.

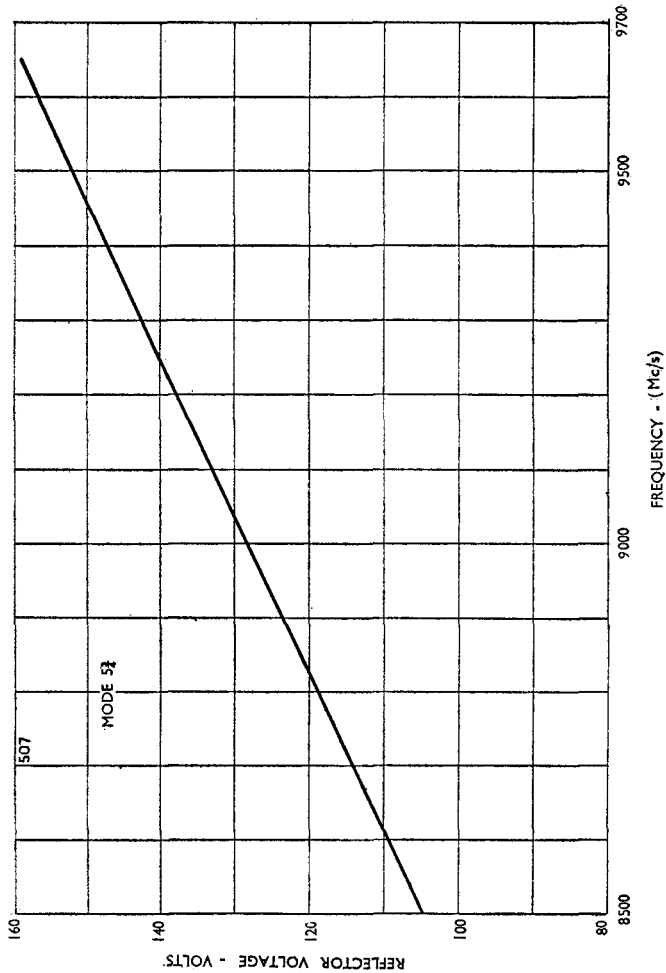
‡The frequency deviation, caused by side thrust due to the application of a $\frac{1}{2}$ lb. weight to the top of the tuner spindle in each of two mutually perpendicular axes both of which are perpendicular to the spindle axis.



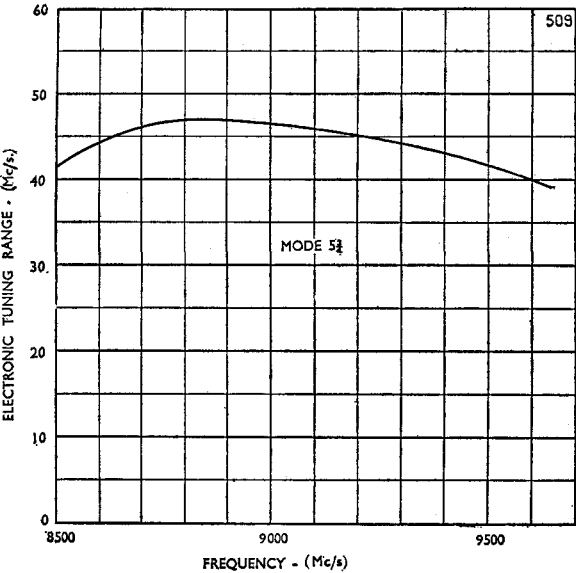


TYPICAL REFLECTOR VOLTS/FREQUENCY CHARACTERISTICS

Reflector Voltage at Maximum Power Point.



TYPICAL ELECTRONIC TUNING RANGE



TUNER SCREW SETTING

