RAYTHEON

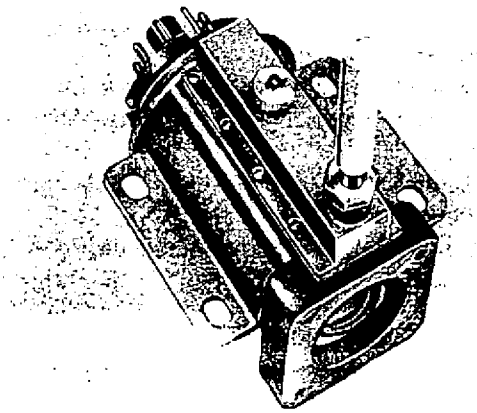
TECHNICAL INFORMATION

VARIATION OSCILLATOR

Excellence in Electronics

TYPE RK6573/ QK483

The RK6573/QK483 is a mechanically tuned velocity variation oscillator of the single cavity (integral) reflex type designed for CW operation in the 15,500 to 17,000 Mc range with an average power output of 40 milliwatts. Adequate cooling for this type tube is usually provided by freely circulating air. It is a waveguide output type fitted with a fiber flange which is capable of insulating the shell of the tube from the coupling guide. It is therefore convenient to operate the shell of this tube above ground, and to power the resonator circuit from the same supply which furnishes plate potential to other tubes in an equipment. The compound lever system of the mechanical tuner is free of backlash and yields an extremely smooth fine tuning adjustment which is linear with tuner shaft rotation.



GENERAL CHARACTERISTICS

ELECTRICAL:

Heater Characteristics:

Heater Voltage (AC or DC)	6.3 V
Heater Current @ 6.3 volts	450-600 mAdc

Maximum Ratings:

Heater Voltage	6.3 ±8% V
DC Resonator Voltage	330 Vdc
DC Resonator Current	45 mA
DC Reflector Voltage	—25 to —300 Vdc
Heater Cathode Potential Difference	±45 V
Envelope Temperature	175° C

Typical Operation:

Frequency Range	15500-17000 Mc
DC Resonator Voltage	300 Vdc
DC Resonator Current	30-45 mA
DC Reflector Voltage (15500 to 17000 Mc 4¾ cycle reflector mode)	—60 to —210 Vdc
Power Output (average)	40 mW
Electronic Tuning Range (to half power points)	75 Mc minimum

MECHANICAL:

Mounting Position	Any
Overall Dimension	See Outline Dwg.
Envelope	Metal
Base	Std Intermediate Octal

Printed in U.S.A.

MICROWAVE AND POWER TUBE DIVISION

RAYTHEON COMPANY

FOUNDRY AVE., WALTHAM 54, MASS.

DETAILED ELECTRICAL INFORMATION

CATHODE

In applications where the metal envelope is operated at ground potential, the cathode is negative with respect to ground by the amount of the resonator potential and must not be grounded. The cathode may be connected to one side of the heater or to the center tap of the heater transformer secondary. When the cathode and heater are connected together, connections to the cathode should be made directly to the cathode contacts on the tube socket and never to a heater lead. When cathode and heater are not connected together, the heater cathode voltage should not exceed ±45 volts. In all cases where the resonator is operated at ground potential, the heater transformer must be insulated to withstand the maximum resonator voltage.

In applications where the metal envelope is operated above ground potential, it is recommended that the tube be surrounded with a protective shield to eliminate the attendant shock hazard. This shield must be designed so as to allow sufficient convection circulation to maintain the shell temperature below the maximum specified value.

REFLECTOR

The reflector electrode is connected to pin #5 on the base of the tube. The power supply furnishing the reflector potential must be insulated to withstand the total resonator and reflector voltage. The reflector must never be allowed to become positive with respect to the cathode. If this precaution is not observed, damage to the reflector may result. In cases where modulating potentials bring the reflector voltage close to zero volts, or where extremely high reflector circuit impendance is required, a diode should be connected between cathode and reflector to prevent the reflector from going positive.

MECHANICAL TUNING

Extremely smooth, backlash free, mechanical tuning is obtained with a unique tuner design. A compound lever system actuated by a tuning shaft is linked mechanically to a diaphragm which is integral with the resonant cavity and coupled to the resonator grids. Tuning shaft rotation effects the flexing of the diaphragm, changing the geometry of the resonant cavity and altering the grid spacing in such a manner as to cause the frequency of the oscillator to track linearly with tuner shaft rotation. See Fig. 1.

MECHANICAL TUNING CHARACTERISTICS

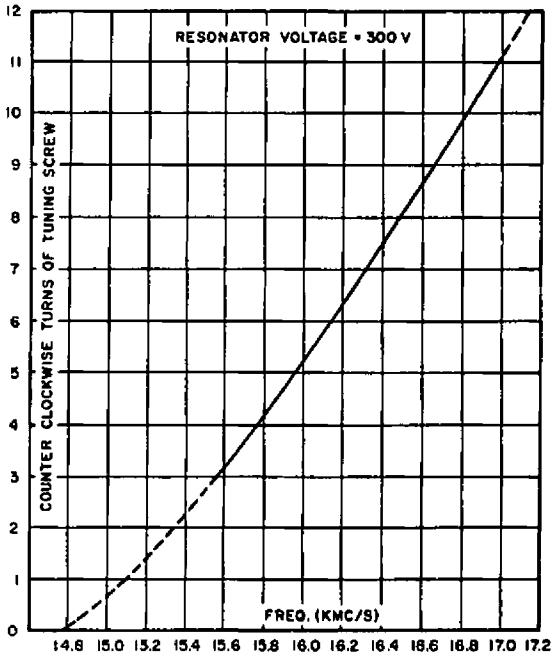
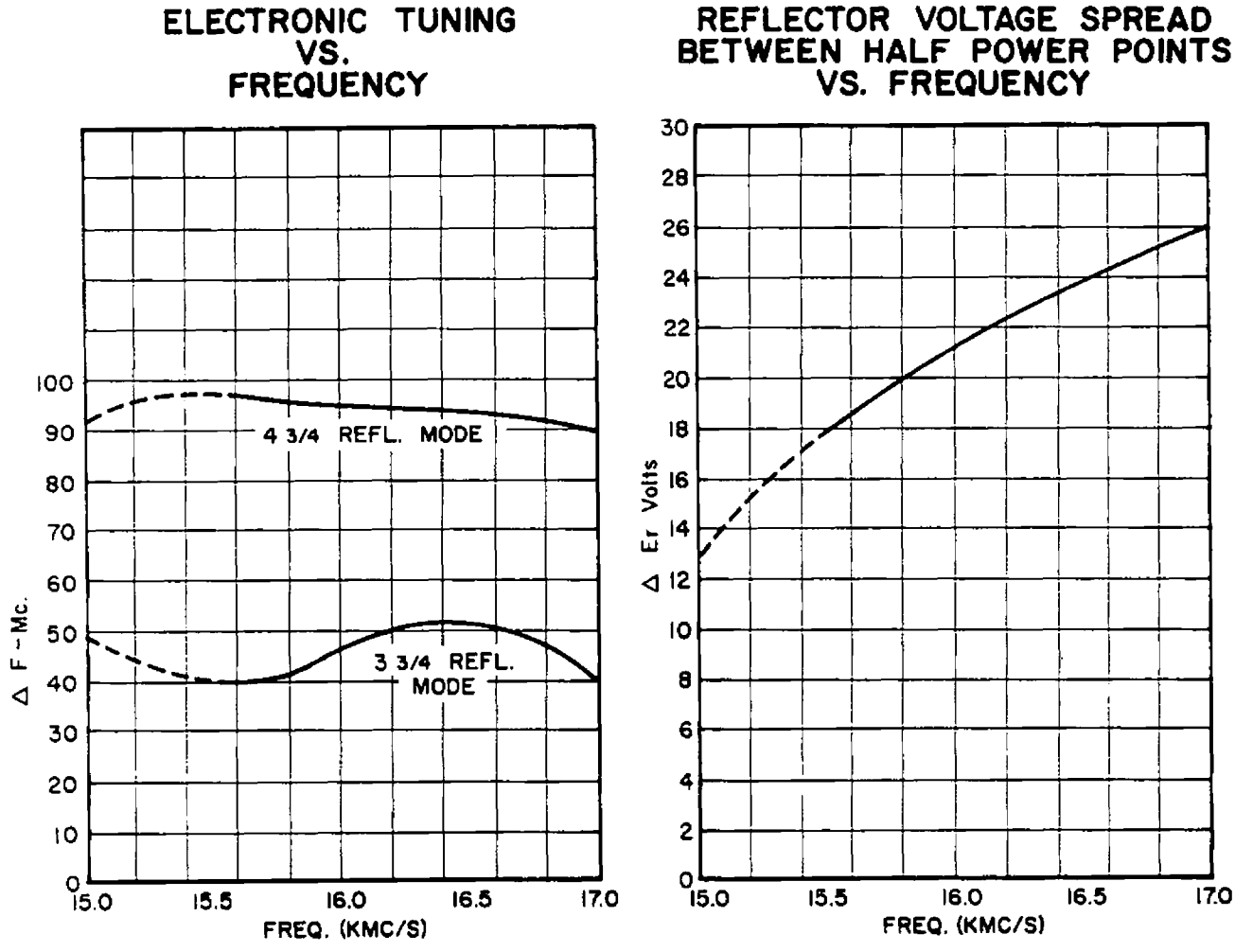


FIGURE 1

ELECTRONIC TUNING

With the mechanical tuner adjusted so that the tube is operating near the desired frequency, vernier frequency adjustment may be made by varying the reflector voltage. Maximum power output for a given mechanical tuner setting, however, will be obtained at only one value of reflector voltage. If the mechanical tuner and reflector voltage are mutually adjusted for maximum power output at a given frequency, and if then the reflector voltage is varied above and below the value for maximum power output such that the power output is reduced by one half, the frequency

change between the half power values is defined as the electronic tuning range. The electronic tuning range and linearity depend on the type of load and coupling used. A highly reactive load may shorten the electronic tuning range and cause non-linear variation of frequency with reflector voltage. See Fig. 2.



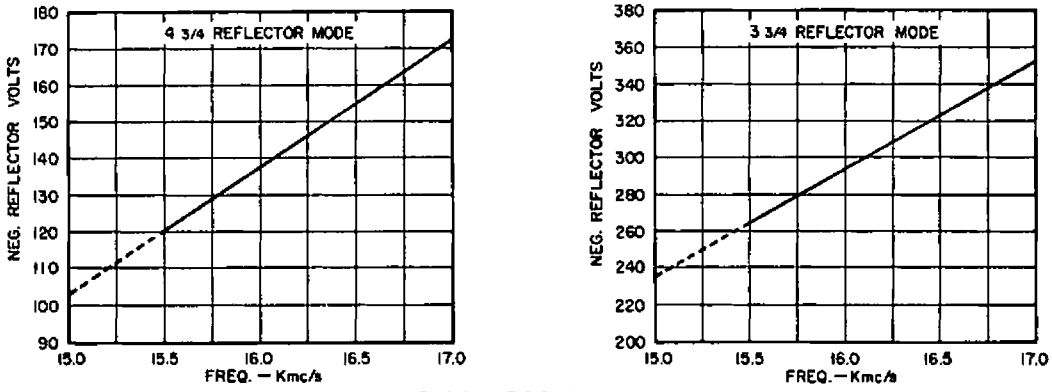
RESONATOR VOLTAGE = 300 VOLTS

FIGURE 2

MODE OF OPERATION

Oscillation may be obtained in a given tube with several combinations of resonator and reflector voltage at a given frequency. The region where oscillations occur within the reflector voltage range are referred to as voltage modes. The curves of Figure 3 show the characteristics of the RK6573/QK483 in the recommended mode. The 4¾ mode has been chosen because it represents the best compromise between optimum power and wide electronic tuning range.

REFLECTOR VOLTAGE (AT MAX. POWER OUTPUT) VS. FREQUENCY



RESONATOR VOLTAGE = 300 VOLTS FOR ALL GRAPHS

POWER OUTPUT VS. FREQUENCY

POWER & FREQUENCY VS. REFLECTOR VOLTAGE

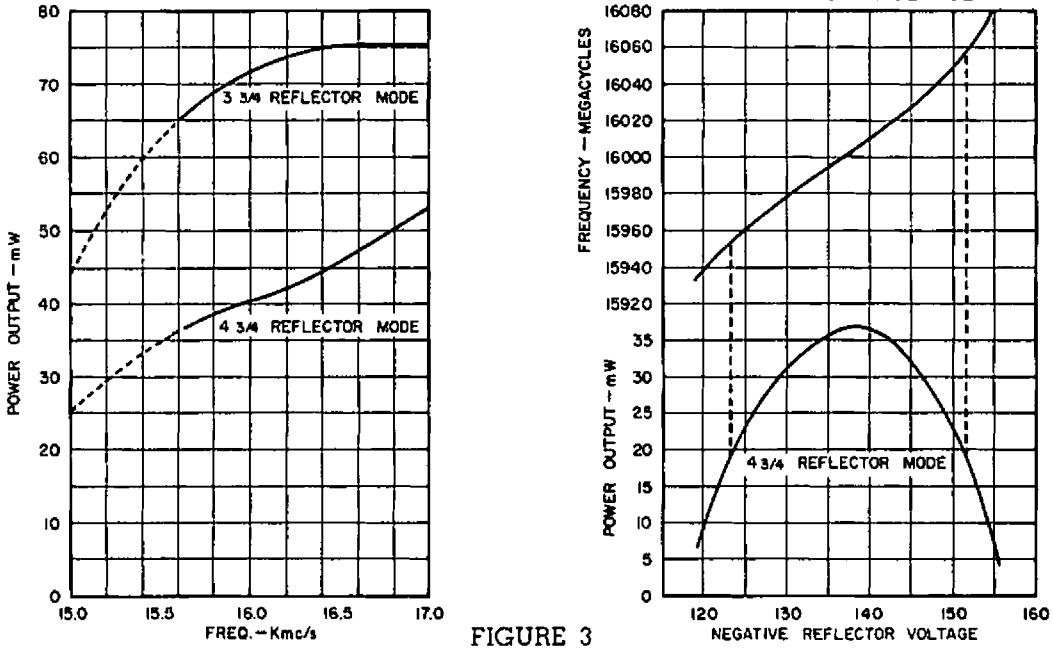


FIGURE 3

INSTALLATION

The RK6573/QK483 requires a standard intermediate octal socket, and may be mounted in any position supported by either the output coupling flange, the mounting flange, or both.

The tube couples directly to standard RG91/U waveguide with UG541/U choke flange required. See tube outline drawing for pin connections.

SHIELDING

Operation of the RK6573/QK483 in the presence of a strong magnetic field usually requires shielding of the resonator and reflector leads to avoid undesirable modulation of the tube output. In extremely troublesome magnetic environments it may be necessary to place the RK6573/QK483 in a metal chamber with polyiron chokes provided to bring the voltages into the chamber.