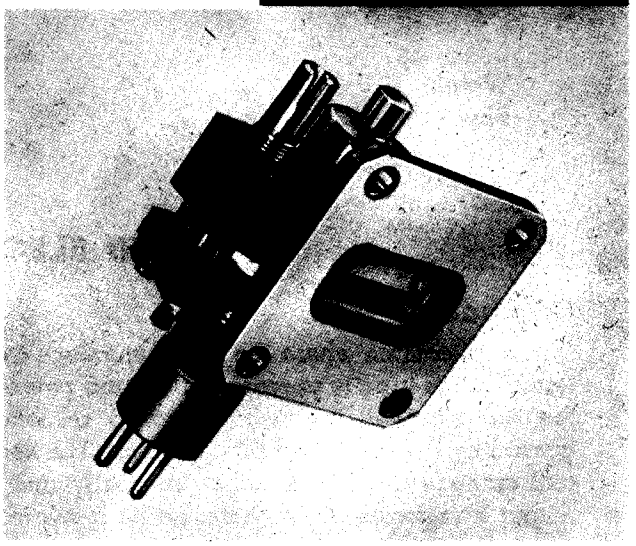
TYPE RK6310/ QK417

The RK6310/QK417 is a mechanically tuned velocity variation oscillator of the single cavity (integral) reflex type designed for CW operation in the 8500 to 10000 Mc range with an average power output of 40 milliwatts. No special provisions are ordinarily required for cooling the tube. It is a waveguide output type which can quite simply be fitted with a gasket and inserts 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 RK6310/QK417 is a rugged tube intended for radar applications where conditions of shock, vibration and sustained acceleration are encountered.



VELOCITY VARIATION OSCILLATOR

GENERAL CHARACTERISTICS

ELECTRICAL

Heater Characteristics

Heater Voltage	6.3 ±10% V
Heater Current	1.2 A

Maximum Ratings

Resonator Voltage	350 Vdc
Resonator Current	42 mAdc
Reflector Voltage	0 to −1000 Vdc
Ambient Temperature	150°C

Typical Operation

Frequency	9300 Mc
Mode	5¾
Resonator Voltage	300 Vdc
Resonator Current	28 mAdc
Reflector Voltage	−160 Vdc
Power Output	50 mW
Electronic Tuning Range	48 Mc
Modulation Sensitivity	1.5 Mc/v
Temperature Coefficient	60 Kc/°C

MECHANICAL

Mounting Position	Any
Overall Dimensions	See Outline Dwg.
Envelope	Metal
Base	Pee Wee, 3 Pin (A3-1)
Top Cap	Miniature (C1-4)
Tuner	Single Screw

Printed in U.S.A.

MICROWAVE AND POWER TUBE DIVISION

RAYTHEON COMPANY

FOUNDRY AVE., WALTHAM 54, MASS.

3400 — 6-55

Output	Bolts to UG 39/U flange or UG 40/U Choke for 1" x ½" x .050" Waveguide
Weight	7 oz.
Shock	250 G (Max.)
Vibration	10 G

DETAILED ELECTRICAL INFORMATION

Cathode

In applications where the metal envelope (resonator) of the tube is operated at ground potential, the cathode will be negative with respect to ground by the amount of this potential. The heater and cathode are tied together internally and the heater transformer must therefore be insulated to withstand maximum resonator voltage for all applications where the resonator is operated at ground potential.

In applications where the metal envelope is operated above ground potential, the tube should be surrounded by a grounded enclosure or insulator for the protection of the operator. In such an installation, tuning and mechanical adjustments made while the tube is in operation require an insulated tool, and coupling must be made with an insulating gasket interposed between the flanges of the tube and waveguide, and with insulating bushings in the clearance holes of the tube flange.

Whenever an insulator or grounded enclosure is used, adequate ventilation must be provided to maintain the ambient below the maximum specified limit.

Reflector

The power supply furnishing the reflector potential must be insulated to withstand the total resonator and reflector voltage in applications where the resonator is grounded. The reflector must never be allowed to become positive with respect to the cathode. Failure to observe this precaution may result in damage to the tube. In cases where modulating potentials bring the reflector potential close to zero volts, or where an extremely high reflector circuit impedance is required, a diode should be connected between cathode and reflector to prevent the reflector from going positive.

MECHANICAL TUNING

The mechanical tuner is designed to permit occasional frequency adjustments over the operating frequency range. Rotation of the tuning screw indicated in the outline drawing distorts the flexible cavity wall altering the spacing between the resonator grids to effect a frequency change. High and low frequency mechanical stops are provided to prevent tuning so far outside the specified tuning range that damage to the tube will result.

ELECTRONIC TUNING

With the mechanical tuner adjusted so that the tube is operating near the desired frequency, vernier frequency adjustments 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 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 nonlinear variation of frequency with reflector voltage. See Fig. 1.

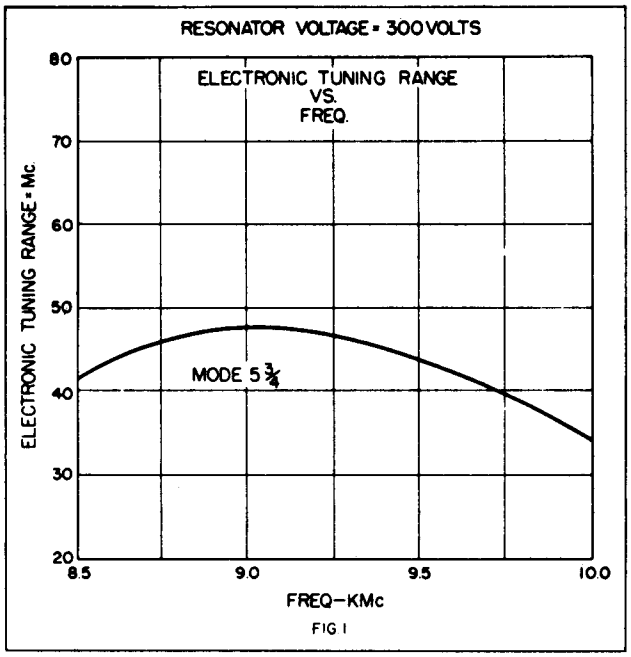


FIG 1

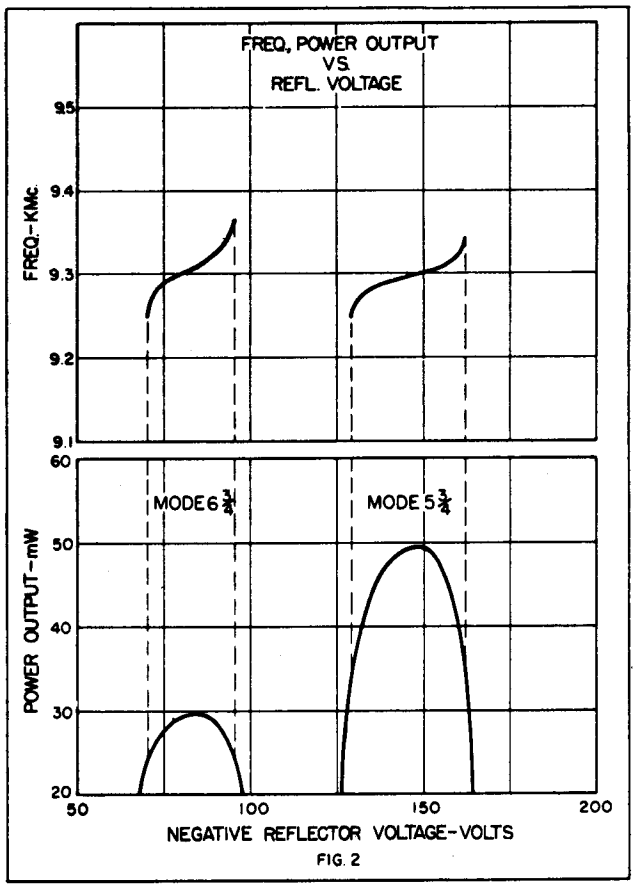


FIG. 2

MODE OF OPERATION

Oscillation may be obtained in a given tube with several combinations of resonator and reflector voltage at a particular frequency. See Fig. 2. The regions where oscillations occur within the reflector voltage range, are referred to as reflector transit modes. The curves of Fig. 3 show the RK6310/QK417 in the recommended 5¾ mode. This mode has been chosen because it represents the best compromise between optimum power and wide electronic tuning range. See Fig. 4.

VELOCITY VARIATION OSCILLATOR

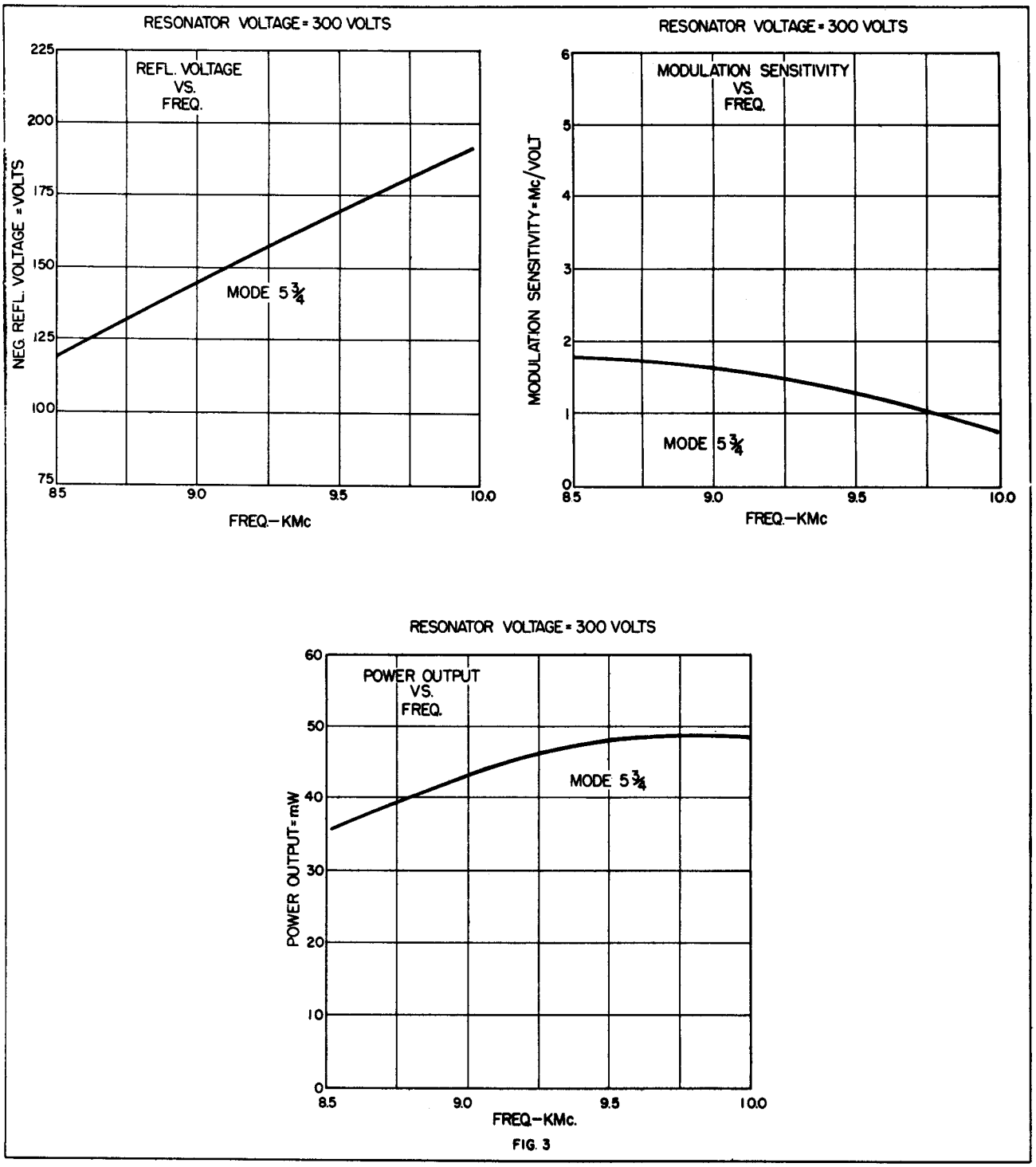


FIG. 3

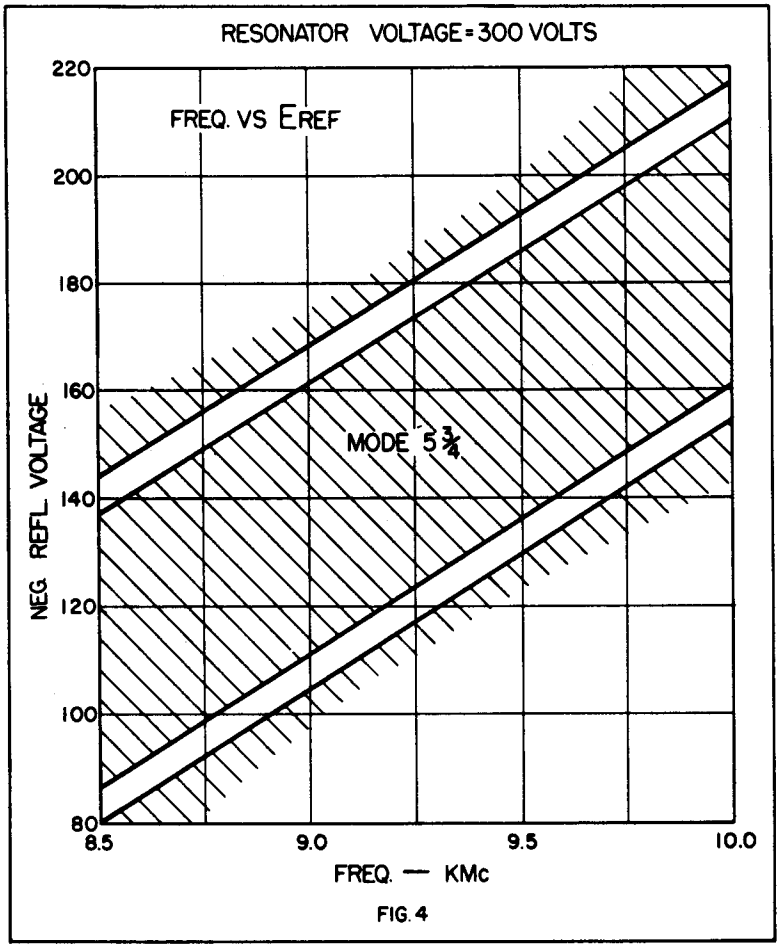


FIG. 4

DETAILED MECHANICAL INFORMATION

INSTALLATION

The RK6310/QK417 mounts in any position and is supported by the waveguide coupling flange.

SHIELDING

Operation of the RK6310/QK417 in the presence of strong magnetic fields usually requires shielding of the resonator and reflector leads to avoid undesirable modulation of the R.F. power output. In extremely troublesome envrionments, magnetic shielding of the whole tube may be necessary. Whenever shielding is used, adequate ventilation must be provided to keep the ambient below the maximum specified limit.

WAVEGUIDE WINDOW

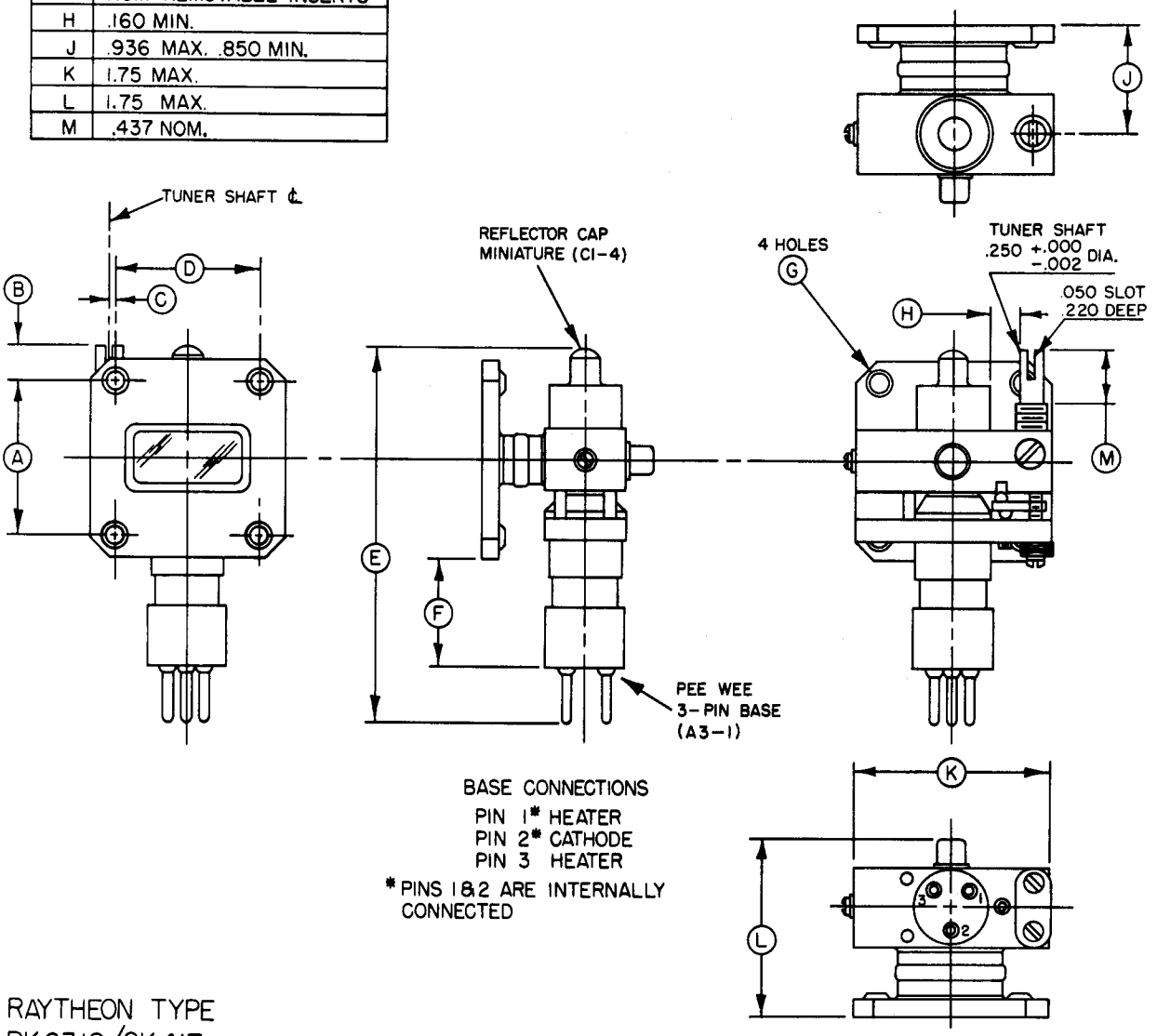
The waveguide output section contains a thin, low reflection mica window which is part of the vacuum envelope. This window can be cleaned when necessary with a soft material. Care should be exercised not to scratch or puncture the mica.

VELOCITY VARIATION OSCILLATOR

REF.	DIMENSIONS
A	1.284 MAX. 1.276 MIN.
B	.187 NOM.
C	.070 MAX. .010 MIN.
D	1.224 MAX. 1.216 MIN.
E	3.125 MAX.
F	1.00 MAX.
G	.219 DIA. NOM. WITH .185 DIA.
	NOM REMOVABLE INSERTS
H	.160 MIN.
J	.936 MAX. .850 MIN.
K	1.75 MAX.
L	1.75 MAX.
M	.437 NOM.

NOTE:

EYELET-TYPE INSERTS IN THE FLANGE MOUNTING HOLES ARE 0.219 O.D., 0.185 I.D., NOMINAL, AND ARE EASILY REMOVABLE FROM REAR OF FLANGE. WITH INSERTS IN PLACE, THE MOUNTING HOLES PROVIDE CLEARANCE FOR #8 SCREWS. WITH INSERTS REMOVED, THE MOUNTING HOLES PERMIT USE OF INSULATING BUSHINGS WHERE d-c ISOLATION BETWEEN TUBE FLANGE AND WAVEGUIDE SYSTEM IS DESIRED.



BASE CONNECTIONS

PIN 1* HEATER
PIN 2* CATHODE
PIN 3 HEATER

* PINS 1 & 2 ARE INTERNALLY CONNECTED

RAYTHEON TYPE
RK6310/QK417
OUTLINE DRAWING