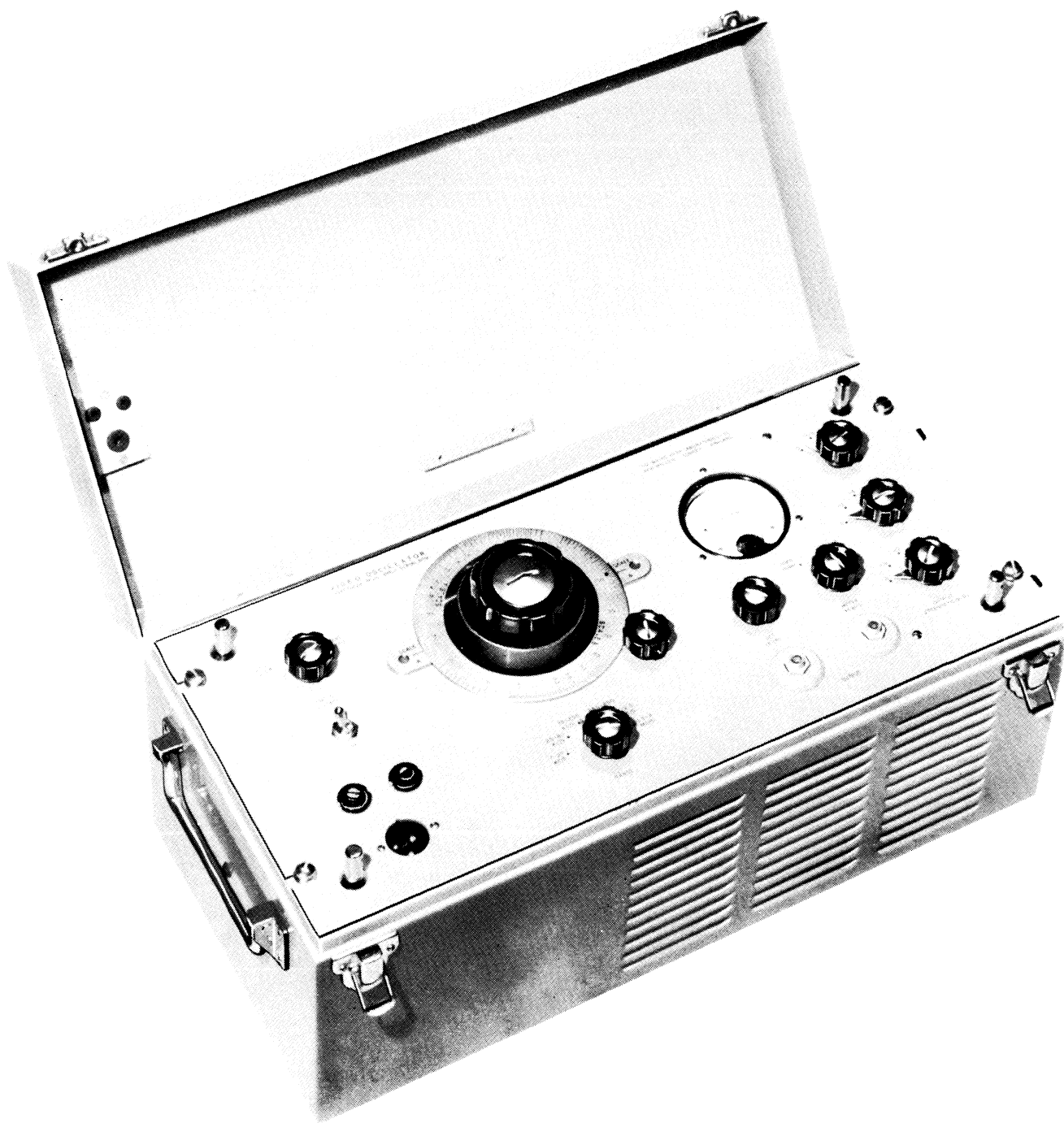


INSTRUCTION MANUAL FOR

Video Oscillator

Type 0222A

WAYNE KERR LABORATORIES LIMITED, NEW MALDEN, SURREY, MALDEN 2202



Video Oscillator

TYPE 0222A

General

The Wayne-Kerr Video Oscillator Type O-222A is a thermistor bridge stabilised LC oscillator covering a frequency band from 10 kc/s to 10 Mc/s in six ranges. For ease of reading, the ranges are displayed on two scales with multiplying factors of 1, 10 and 100.

The accuracy of calibration is 1% and the frequency is independent of the load impedance.

The reference zero level of the oscillator is 1 volt peak-peak, a figure commonly used in television and pulse testing. A constant-resistance attenuator provides a control between -50 db and +10 db in $\frac{1}{2}$ db steps.

The output impedance is 75 ohms.

Note: On models having serial numbers 125, 141, 154, 172, 173 the reference level is 1.127 V_{rms}. A constant-resistance attenuator provides a control between -60 db and 0 db in $\frac{1}{2}$ db steps. The normal level of 1 V_{p-p} can be obtained by setting the attenuator to -10 db.

Constant Output

An important feature of the oscillator is that the amplitude remains constant to within $\pm\frac{1}{2}$ db over the entire frequency range, and is independent of range setting and mains voltage variations.

The constant amplitude not only avoids the necessity of resetting the zero, but also provides a means of monitoring the load impedance.

A common source of error in gain and attenuation measurements arises from mismatch between the generator and load. If, however, the internal e.m.f. and the impedance of the generator are fixed, the voltage across the load is a measure of its impedance. The monitoring voltmeter of the instrument is therefore calibrated to read the load impedance directly, with sufficient accuracy for ordinary observations.

Operating Instructions

The oscillator is supplied with a 3-core mains plug and socket connector. Before switching on, see that the mains voltage tapping is selected by the switch S_4 (on the left-hand side of the panel) to correspond with the voltage of the supply.

When the oscillator is switched on, one or other of the scale indicating lamps will glow, depending on the position of the range selector switch.

The oscillator is ready for use almost immediately, but if accurate readings are required the circuit should be allowed about 15 minutes to become stabilised.

Turn the output selector switch to 'OSC EMF' and then turn the 'SET LEVEL' knob until the meter pointer is at 75 ohms on the scale (red mark).

Turn the selector switch to 'LOAD OHMS' and the oscillator is ready for use.

Load Impedance

Turn the attenuator knobs fully anti-clockwise. With the selector switch in the 'LOAD OHMS' position the meter will indicate the value of an unknown load impedance connected to the output socket. The accuracy of this reading is sufficient for most practical purposes.

High Level Output

To use the high level output, turn the selector switch to 'OFF'. The voltage available at the High Level Output socket is approximately 2.0 rms. The attenuator is not in circuit for this socket and the voltage is affected by the value of the load impedance.

Maintenance

The performance of the oscillator can be checked with the aid of a universal test meter of not less than 500 ohms per volt and an oscilloscope of the usual commercial pattern.

Each component in the circuit is numbered to correspond with the circuit diagram, with the exception of those marked*. These have been selected on final test to suit the individual requirements of each oscillator.

Before removing the oscillator from the case, see that the bench is free from dust and particles and that the chassis is not put down on a metal surface.

The four metal pegs at the corners of the front panel protect the dial and knobs when the oscillator is turned on its face.

CAUTION: Do not alter the setting of any trimming capacitor, as this will upset the calibration of the oscillator.

Operating Voltages

The correct operation of the valve circuits can be checked by taking voltage readings at the following points in the circuit:

Test Point	Voltage Reading
Unsmoothed voltage on C_1 ..	380
Tap on chokes (C_4)	340
End of filter circuit (C_3)	305
Cathode to chassis (ground), $V_{3, 4, 5}$	85
Screen to chassis (ground), $V_{3, 4, 5}$	200
Anode to cathode, $V_{3, 4, 5}$	210
Bias voltage across $R_{12, 13, 14}$..	2.2
Cathode to chassis (ground) of V_2	48

These readings are approximate.

Meter Calibration

1. *If the meter is reading low*, but the output is normal, the germanium crystal may be faulty.

This crystal (X_2 in the circuit diagram) will be found on the component board at the extreme left of the chassis, viewed from beneath.

Check the back-to-front ratio, which should be greater than 100 : 1, by testing with an 'Avo' type ohmmeter (approximately 200 ohms to $>20,000$ ohms).

Switch the oscillator to 'SET LEVEL' and check that the voltage across the meter circuit (tag of X_2 nearest the main chassis and earth) is 1.12 V_{rms} at 10 kc/s.

Alternatively, insert 1 db in the attenuator by setting the knobs to +9 db (or -1 db in certain models—see note on p. 1) and alter the pre-set control in the meter circuit (VR_2 , marked on chassis) until the pointer is at the red calibration mark when 1.0 V_{rms} is across the 75-ohm load R_{26} . Re-check this at 10 Mc/s and adjust the compensating capacitor C_7 if necessary.

2. *If the meter is reading low and the output is also low*. Check the connexions to choke L_9 . This is on the same board as X_2 .

If the circuit through L_9 is in order, check the valves. If these are satisfactory, it is possible that the thermistor may have altered its characteristics.

Changing Thermistor

Unsolder the two white leads from the thermistor, which is located in the black tube between the output sockets, and pull out the thermistor. After inserting a new thermistor and resoldering the leads, select a value for R_{17} between 0 and 50 ohms to give a satisfactory control range on the 'SET LEVEL'.

Check that the calibration remains within 1%.

Harmonic Content

If the cathode follower valves become seriously unbalanced the harmonic content of the output waveform will increase. If an oscilloscope test shows the presence of undue harmonic content, check the back-to-front ratio of the rejector crystal X_1 . This is on the component panel behind the output sockets. The ratio should be greater than 100 : 1 measured by the ohmmeter.

Loss of Calibration

Provided that the trimmers are not touched, the calibration of the instrument should not be affected by any of the foregoing faults.

It is not recommended that any adjustment be made to the oscillatory circuit, and it is only necessary to keep the main tuning capacitor clean and free from dust accumulation. Before returning the oscillator to its case after examination, the main tuning capacitor should be inspected for accidental damage and particles of dirt.

If the frequency calibration is out at the lowest point on the scale (10 kc/s) as shown by comparison with a crystal standard, it is possible that either the electrolytic capacitor C_{20} or C_{21} may be faulty. These are located immediately behind the thermistor.

Attenuator

An open-circuit in the attenuator should be suspected if there is no output although the oscillator is in order and there is a voltage between the centre tap of the auto-transformer and the chassis.



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