M.215.

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WAVEMETER-SELF-QUENCHING G31X.

This wavemeter covers a range of 20-90 metres and is intended for use with W/T receiving apparatus. It consists of a valve oscillating circuit capable of emitting continuous oscillations or a tonic train and can thus be used either as a heterodyne or as a sharply tuned buzzer tester.

The oscillator is provided with a scale graduated in degrees and approximate wavelengths. It is liable to the usual wavelength variations associated with changes of valves and battery potentials and cannot therefore be relied upon alone where great accuracy is required. The provision of a separate calibrating unit, however, allows for much greater accuracy in setting or reading the oscillator frequency and, in fact, enables the oscillator to be recalibrated at any time.

A diagram of connections of the oscillator is given in Fig. 1. It consists of a MR7A valve with a tuned grid circuit and a tightly coupled reaction coil in the anode circuit. The tuned circuit has a variable condenser of 0-0.2 jar capacity provided with an automatic switch which connects one part of the inductance between 0 and 180 degrees of the condenser scale and the whole of the inductance between 180 and 360 degrees. The corresponding ranges of wavelength are 20-40 metres and 35-90 metres.

The anode circuit is provided with terminals for 120 ohm telephones (no transformer is necessary) and the telephones and batteries are shunted by two 10 jar condensers connected to either side of the filament. The connection between the grid circuit and filament is made through a 10 jar condenser shunted by a 1 megohm resistance rod which may be short circuited by the switch marked "C.W." - "QUENCH".

A 4 or 6 volt battery supply is required for the filament and 50 volts for the anode. The valve used must be Patt. 5427A.

An arrow on the face of the instrument indicates the axis of the inductance coils below.

The action of the oscillator is as follows:-

When the grid leak and condenser are short-circuited by the switch, the valve emits continuous oscillations in the usual manner. When, however, the switch is open, (QUENCH), the grid condenser rapidly charges up, due to the flow of

current in one direction only between grid and filament, until the grid of the valve becomes so negative that the oscillations are quenched out. The grid condenser then discharges through its leak resistance until a potential is reached where oscillations are able to recommence, after which the process is repeated indefinitely. The interval of time between successive charges on the grid condenser depends chiefly upon the value of the condenser and leak resistance and upon the filament current. With the values adopted in this instrument the charge and discharge of the condenser is repeated at a rate which may be varied by means of the filament rheostat from about 100 to 1000 times per second.

The current in the anode circuit of the valve follows the variations in grid potential. The high frequency component due to the oscillating potential in the tuned grid circuit during the charging of the grid condenser is shunted through the two 10 jar condensers, while corresponding to the charge and discharge of the grid condenser a low frequency component passes through the telephones giving an audible note.

As long as the oscillator is at a distance from other tuned circuits and interfering oscillations, the audible frequency or quench note remains steady. If however, an electromotive force of the same frequency as that to which the oscillator is tuned, is induced in the grid circuit from an external source (such as an incoming W/T signal) a rise in pitch of the quench note is observed. A similar rise in pitch is also observable when any other circuit coupled to the oscillator is brought into tune with it. This rise in pitch of the quench note is utilised to bring the oscillator into tune with any other circuit or oscillation or conversely to tune any other circuit to the oscillator frequency. The coupling required for this purpose may be very loose.

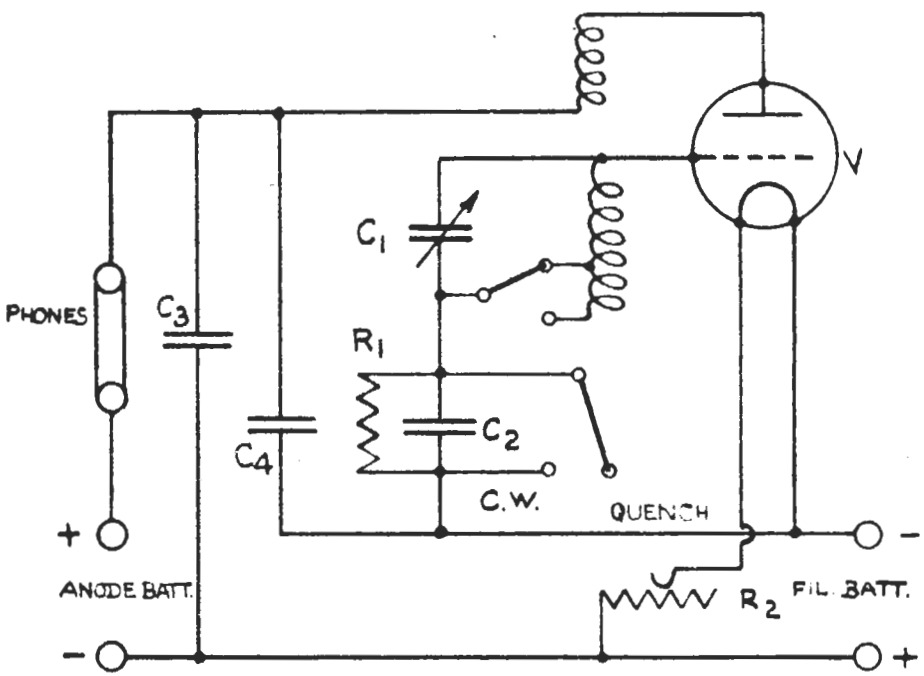
The calibrating circuit consists simply of a 0-0.25 jar variable condenser which may be connected by a switch across either one of two inductances giving ranges of 18-42 metres and 38-92 metres respectively. A calibration curve is provided with the circuit.

To tune a W/T receiver to a given wavelength the following method should be employed:-

Set the oscillator to the wavelength marked on its scale and with the switch at "QUENCH" adjust the filament rheostat to give a moderately high note in the telephones. If great accuracy is required, place the calibrating circuit with the appropriate inductance in line with the oscillator inductance and set the calibrating circuit to the correct wavelength by means of its calibration curve. Then turn the condenser scale of the oscillator slowly and observe the rise in pitch of the quench note. Tune to the point which gives the highest note. This tuning is best done with a high note and loose coupling.

WAVEMETER SELF-QUENCHING G31X.

20 - 90 METRES.



C_1	0 - 0.2 JAR.
C_2	10 JARS.
C_3	10 JARS.
C_4	10 JARS.
R_1	1 MEGOHM.
R_2	0-6 OHMS
V	NR7A VALVE.

The oscillator can then be used as a buzzer tester to tune the W/T receiver. When great accuracy is not required, the calibrating circuit need not be used, nor are telephones necessary in the oscillator circuit for this purpose.

For measuring the wavelength of an incoming signal the oscillator may again be used as a buzzer tester after first carefully tuning the W/T receiver to the signal. The frequency of the oscillator may again be measured with great accuracy by bringing the calibrating circuit into tune with it by the aid of the rise in pitch of the quench note in the receiver telephones.

When strong signals are available the wavelength may be measured directly by using the oscillator as a receiver with or without a loosely coupled untuned aerial, a rise of pitch in the quench note indicating when the oscillator is exactly in tune with the signals.

In all the above operations it must be remembered that the oscillator itself is actually a sensitive W/T receiver and care must be taken that a false reading is not obtained from a rise in pitch in the quench note due to local interference, such as a harmonic of a neighbouring long wave W/T transmitter.