WAVEMETER G56

Date of design:- 1932.
Frequency range:- 15 - 24,000 kc/s.
Valves used:- 1 N327 (coupling).
1 N931 (detector).
Reference:- Admiralty Handbook of W/T (1938), Vol.II, Section W (6 and 13).

Wavemeter G56 has been designed for use as a portable absorption wavemeter for tuning transmitting sets or, in conjunction with Oscillator G33, as a heterodyne wavemeter for measuring the frequency of incoming signals and calibrating receiver outfits. (See page GC5).

When G56 is used as a portable wavemeter, the H.T. and filament supplies for the valves can be taken from the ship's D.C. mains by using a filter unit as described below. When G56 is mounted in a rack with G33 the H.T. and filament supplies are obtained from the common receiver batteries or from the A.C. supply outfit. A diagram of the G56 circuit is shown in figure a.

The circuit consists of a coupling valve (7) loosely coupled to a tuned circuit (60)(61) which is in turn loosely coupled to a detector valve (8). The grid of the coupling valve (7) is connected to a transmitting set by connecting a lead between the transmitter and the input terminal (48) on the wavemeter. When G56 and G33 are fitted in a receiving rack the input terminal (48) is connected to Oscillator G33 by means of a link fitted on the front of G33.

The frequency band of 15 to 24,000 kc/s is covered in 11 ranges, identical with those of Oscillator G33, controlled by a range switch (57).

When the range switch (57) is set to any position from 1 to 10 the anode of the coupling valve (7) is connected to the wavemeter tuning circuit (60)(61) by a condenser (58)(see figure b.)

When the range switch (57) is set to position 11 the coupling valve is not used and the input terminal (48) is connected, through the coupling condensers (49)(50)(58), direct to the wavemeter tuning circuit (60)(61) (see figure c). The coupling valve (7) is by-passed in this manner as it is very inefficient on the highest frequency range and is liable to set up spurious oscillations.

The wavemeter tuning circuit consists of an inductance (61) with 10 tappings (i.e., eleven inductance coils) and a 0.5 jar variable condenser (60). This tuned circuit is loosely coupled to the first valve (7) by condensers (58) and (52) to (56) (depending on the range in use) and to the second valve (8) by condensers (59) and (62). This coupling system functions as if the tuning coil (61) were loosely coupled to a coil in the anode circuit of valve (7) and to another coil in the grid circuit of valve (8). The condenser coupling, however, prevents the complications which would arise if mutual coupling with coils were used. The selection of condensers (52) to (56) for each range position is equivalent to changing coupling coils in a system utilising mutual inductive coupling.

The wavemeter resonance tuning is indicated by the deflection of a D.C. milliammeter (64) in the anode circuit of the detector valve (8). The variable tuning condenser (60) is adjusted until a maximum deflection in the milliammeter is obtained. The detector valve (8) is used as a lower bend anode rectifier, with a potentiometer (63) connected across the H.T. supply for grid bias adjustment. By increasing the grid bias the milliammeter (64) can be prevented from running off the scale when the R/F potential from the wavemeter tuning circuit becomes excessive due to a very strong input signal. Clockwise rotation of the knob of the potentiometer (63), by which this adjustment is made, reduces the negative grid bias. The knob is marked "Increase Coupling".

If the wavemeter is severely overloaded by an excessive incoming signal the large grid swing on the detector valve (8) will cause grid current to flow. This grid current, passing through the grid leak (4) increases the negative grid bias and so limits the rectified anode current to a value (approximately) at which grid current commences. By this arrangement the milliammeter (64) is protected from a severe overload.

The milliammeter full scale deflection is 0.5 mA, but a special damped movement is fitted which prevents damage to the instrument with a sudden application of up to 4 milliamps.

A four position H.T. and filament supply switch (68) is mounted on the panel of the instrument, the positions are marked "OFF", "BATT", "Mains" and "A.C.".

The "OFF" position disconnects the supplies when the instrument is not in use.

The "BATT" position connects the valve heater filaments in parallel for use with 4-volt common battery supply to the receiving room.

The "Mains" position connects the filaments in series for use with a filter unit on the ship's D.C. mains as described later.

The "A.C." position connects the filaments in parallel when A.C. is used for filament heating of the receiver outfits.

If the supply switch (68) is set to the wrong position the heater filaments will not be harmed.

A flexible lead, with a 4-pin plug at one end and a 4 hole socket at the other, is used for connecting the G56 to the H.T. and filament supplies. The socket is pushed over a 4-pin plug which is fitted on the front panel of the instrument.

When G56 and G33 are fitted together in a rack the plug on the flexible lead is inserted in a socket on the G33 framework. This socket is connected to four terminals, mounted on the G33 framework, which are connected to the H.T. and filament supplies to the receiver outfits. When an A.C. supply outfit is fitted the filament heater supply for G56 must be taken from a heater circuit