RH
R71

TYPE 43

STABILISER UNIT.

Method of producing oscillation	Nature of circuit	Grid excitation	Feed	High oscillating potential electrode
Self or Quartz Resonator.	Tuned circuit between anode and filament.	Mutual inductive.	Series	Anode

Reference - Admiralty Handbook of W/T (1931) paragraph 716.

The unit is housed in an aluminium box and comprises a NT17 master oscillator valve (3) and a NT17 amplifying valve (4).

It has been fitted to stabilise the frequency of the radiation from transmitter 4G. Either of the following two methods can be used (See Admiralty Handbook of W/T (1931) paragraph 838 et seq.)

(1) The circuit of the valve (3) is adjusted to oscillate as a "Master Oscillator" on any frequency between 1800 and 2500 kc/s by putting the switch (18) to the "O" position. The oscillatory voltage variations thus produced are amplified, and finally applied between grid and filament of the R/F valve of transmitter 4G. This valve is now acting as a power amplifier, whose tuned circuit is coupled to the aerial. The grid excitation which caused it to be a self-oscillator, when the stabiliser was not fitted, is now removed by disconnecting the link (96).

(2) A more accurate stabilisation is obtained on any one of four selected frequencies, by introducing a quartz crystal (14) (15) (16) (17) into the grid circuit of valve (3) by the switch (18). When the tuned anode circuit of this valve is adjusted to the value corresponding (very nearly but not quite) to the frequency of the crystal, oscillations are produced at the EXACT natural frequency of the crystal plate. The four crystals fitted are ground so as to be "tuned" to:-

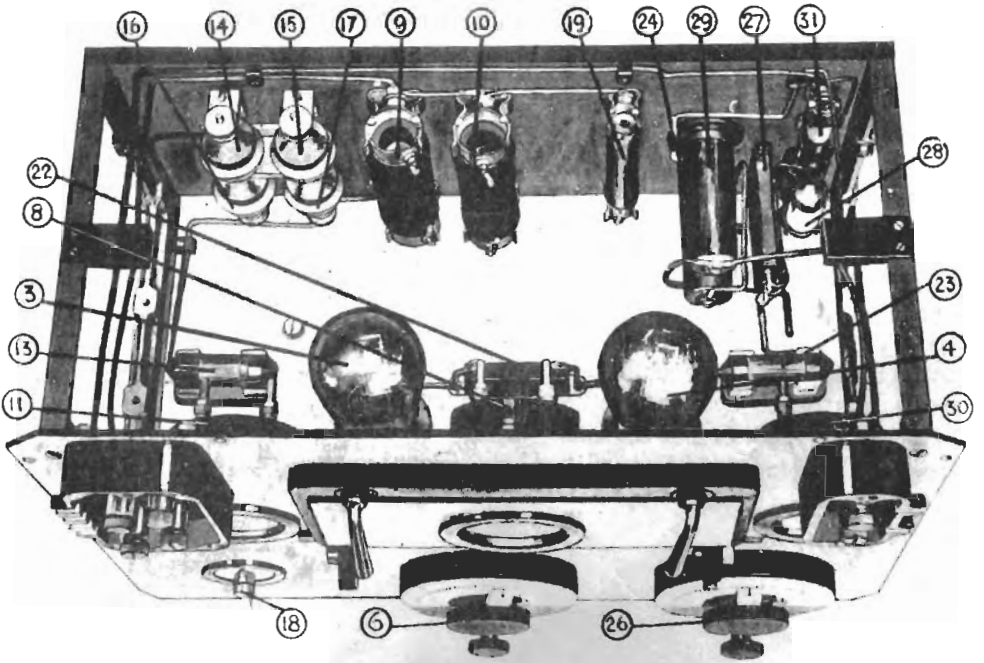
1875, 2000, 2150, 2333 kc/s.

H.T. Supply. The H.T. supply is from the 400 volt windings of the Type 43 motor generator and is connected to extra terminals fitted on transmitter 4G.

The H.T. supply for the valve (3) is connected through the 20,000 ohm resistance (9) when operating with crystal control. In master oscillator conditions another 20,000 ohm resistance (10) is connected in parallel with the resistance (9) by the switch (18), to give a higher anode potential. A D.C. ammeter (11) indicates the anode current. The by-pass condenser (20) is connected between the resistance (9) and the negative H.T. through a 3 amp fuse (31) to the casing of the stabiliser which is at earth potential.

The H.T. supply of the valve (4) is connected through a 5000 ohm resistance (19) and the primary of a tuned R/F transformer (25). Feed back between the transformer (25) and the master circuit is prevented by the neutralising condenser (24) (see Admiralty Handbook of W/T (1931) paragraph 844). A by-pass condenser (21) is connected between the resistance (19) and the negative H.T. and earth.

Filament Supply. The filament supply is from the 22 volt windings of the Type 43 motor generator. A resistance board is connected in the supply between the stabiliser and the two 22 volt contacts of the C.O.S. (36) (see figure k.). This board contains two variable resistances (108) (109) of 9 ohms and an ammeter (110). The resistances (108) (109) control the filament current of both valves (3) and (4) and the ammeter (110) indicates the filament current. It should be noted this resistance board differs from that in the filament supply to the transmitter 4G. The filaments of the valves (3) (4) are connected in series, with the centre point connected through a 3 amp fuse (31) to the H.T. negative and the casing of the unit. It is therefore at earth potential. The fuse (31) prevents damage to the valves (3) (4) should one of the valves (1) (2) in transmitter 4G burn out.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TYPE 43

STABILISER UNIT (CONT.)

Oscillator Valve (2) circuit. The tuned anode circuit consists of a centre tapped 12 mic inductance, (7) two condensers in parallel (5) (6) and an R/F ammeter (8).

The tuning condensers (5) (6) are of 0.15 jar and 0.5 jar respectively, the latter being variable. The ammeter (8) indicates the oscillatory current of the tuned anode circuit.

The grid coil (12) is provided with a tap, and is connected to the switch (18). This switch is marked 0 to 4 and is so arranged that when in the 0 position for master oscillator conditions, the contact for connecting the resistance (10) in the anode circuit is operated. The positions 1 to 4 connect a crystal of the requisite frequency. It will be noted that the tap is used for the higher frequency crystals (15) (16) (17) and the whole coil for the crystal (14) and master oscillator.

A grid leak (13) of ~~100~~5000 ohms is connected between the grid and filament in parallel with the grid coil (12). ~~The coupling between the grid coil (12) and anode coil (7) is adjusted in Signal School and should not be altered.~~

Amplifying Valve (4) Circuit. The anode circuit consists of a 100,000 ohm resistance (19) and the primary of the R/F transformer (25) with a neutralising condenser (24) to prevent feed back between the transformer (25) and the master circuit.

The grid is connected to the anode of the valve (3) with a coupling condenser (22) which insulates the grid of the valve (4) from the anode potential of the valve (3) but passes the R/F potential from the master circuit to the valve (4). A grid leak (23) of 100,000 ohms is connected between grid and filament.

The secondary of the R/F transformer (25) is tuned by a 0.3 jar variable condenser (26). An ammeter (20) is connected in the circuit to enable this stage to be neutralised.

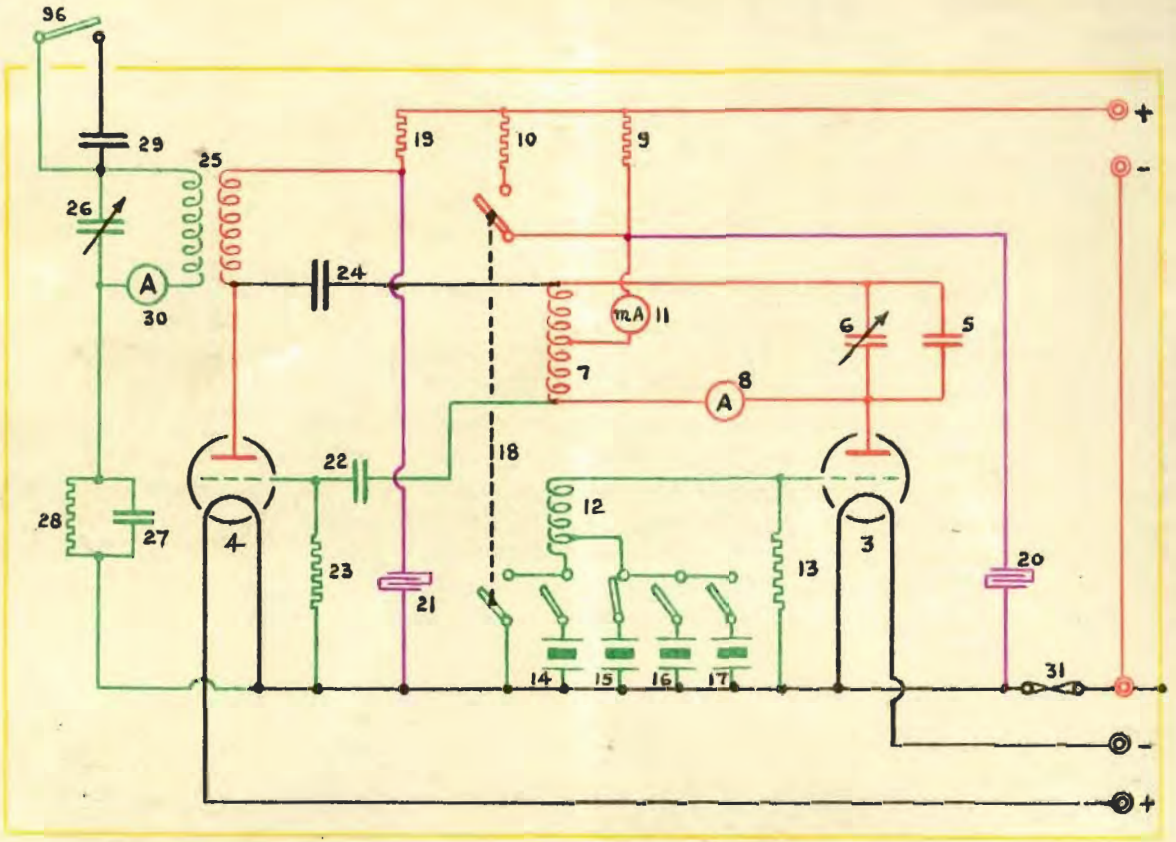

Fig. 9

Between the low potential side of the condenser (28) and the filament is connected a 30,000 ohms grid leak (28) and a 1 jar condenser (27) for the valve (1) in transmitter 4G, the grid leak(98) in 4G being replaced by a link(97) which short circuits condenser(20) when the stabiliser is in use.

The high potential side of the condenser(28) is connected to the terminal of the link(98) marked G, which is connected to the grid of the valve (1). As the filament supplies of the transmitter 4G and the stabiliser are common, voltages developed across the condenser (28) are applied between grid and filament of the valve (1).

A neutralising condenser (29) is connected between the tuned anode circuit of the valve (1) and the tuned transformer system (25) (26) to neutralise energy feed back. The link (24) is connected when the stabiliser is not in use.

The neutralising condensers (24) (29) are adjusted in Signal School and should not be altered.

RH4

~~R73~~

TYPE 43

STABILISER UNIT (CONT.)

Operation and Tuning. On first fitting the stabiliser, the necessary adjustments are obtained as follows The valves (1) (2) should be removed from Transmitter 4G, to avoid risk of damage during adjustment Power is then switched on, and the crystal switch (18) set to position "0". If the key is now pressed, current should show in ammeters (11) and (8), indicating that valve (3) is oscillating and power supply is correct.

Crystal Control Adjustments. Switch (18) is placed in position for the crystal which gives the required frequency, and condenser (6) slowly rotated until current shows in ammeter (8). It will be observed that at this point a fall of current occurs in the D.C. ammeter (11). The master valve is now oscillating (at the crystal frequency) but will only do so over about two degrees of the scale of condenser (6) and the latter should be very carefully adjusted until the current in ammeter (8) is slightly less than the maximum obtainable. The amplifier circuit is next tuned by adjusting condenser (23) to give maximum reading in ammeter (30). The settings so far obtained are recorded and a similar procedure carried out for all crystals. Valves (1) and (2) are now replaced, and the settings already obtained for a particular crystal put on condensers (6) and (23). Having loosened the aerial coupling, the key is pressed and the R/F circuit of Transmitter 4G brought into tune by adjusting condensers (90) (91) to give maximum current in ammeter (95) It will now be necessary slightly to readjust condenser (23) (owing to the introduction of the grid-filament capacity of valve (1)). Finally the aerial coupling is tightened and the aerial tuned for maximum current in ammeter (89). Final adjustment of the condensers (23) (90) and (91) may be made to give better current readings
in the ammeter (89).

Master Oscillator Adjustments.

Put switch (18) to position "O". Valve (2) will now oscillate whatever the adjustment of condenser (3). If a G31 is available, it can be used to receive the signals from the master circuit and so determine their frequency. Full instructions for tuning by this method with G31 are given on page 004. Once condenser (3) has been adjusted to the required frequency, the remaining stages are tuned in exactly the same way as for one of the crystal frequencies. (If no G31 is available, see next page.)

General

If, owing to a defect in the stabiliser or lack of adjustments, it should be necessary to use transmitter 4G as a self-oscillatory transmitter, the link (98) is replaced so as to provide the necessary grid excitation and the short-circuiting piece (97) is replaced by resistance (98). The R/T circuit is then tuned by wavemeter G8.

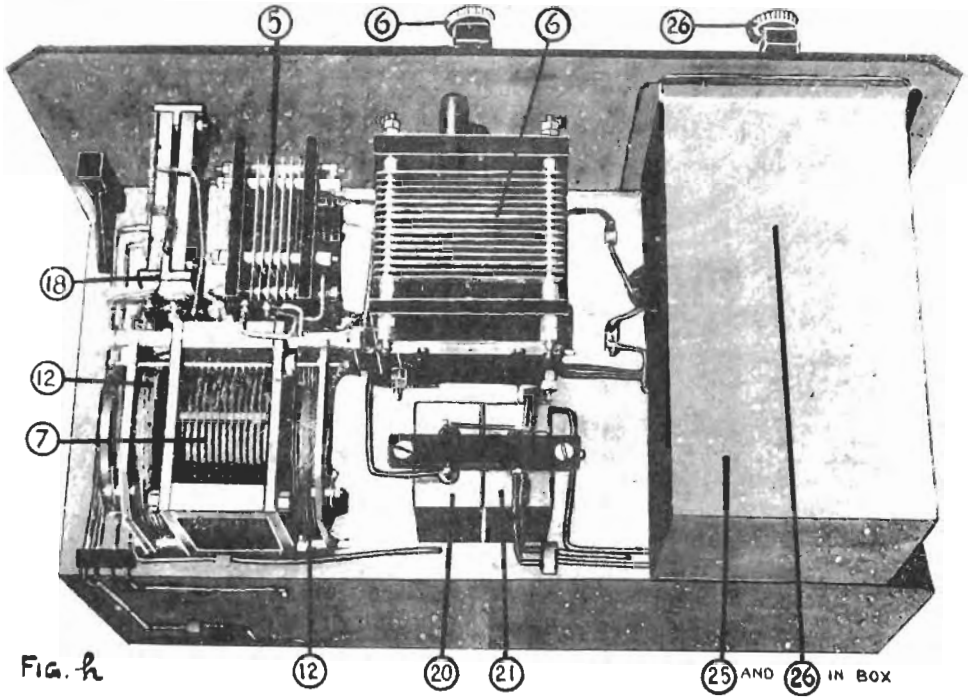

FIG. h

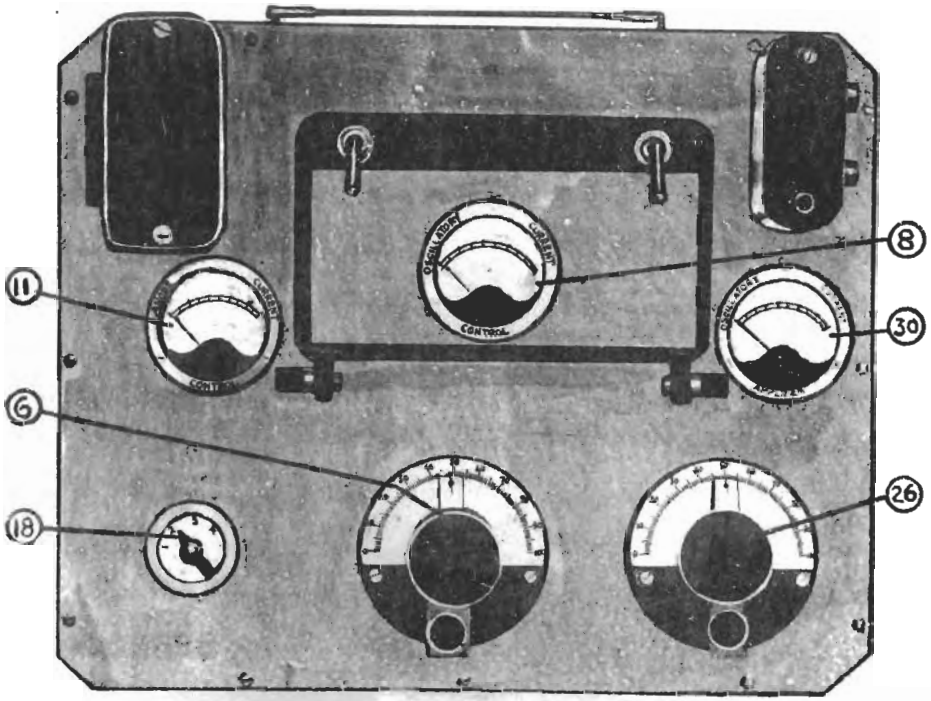

FIG. i.

RH10

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TYPE 43

STABILISER UNIT (CONT.)

If master-oscillator adjustments are required and no G31 is available, it is possible to obtain the adjustments by first tuning 4G (without stabiliser), and subsequently introducing the stabiliser and adjusting the circuits of valves (4) and (3) by condensers (26) and (6) respectively until maximum current is obtained in ammeters (20) and (8) The stabiliser is then oscillating at the frequency to which transmitter 4G is tuned