SECTION
K
H/F RECEIVERS

RECEIVER Q2X

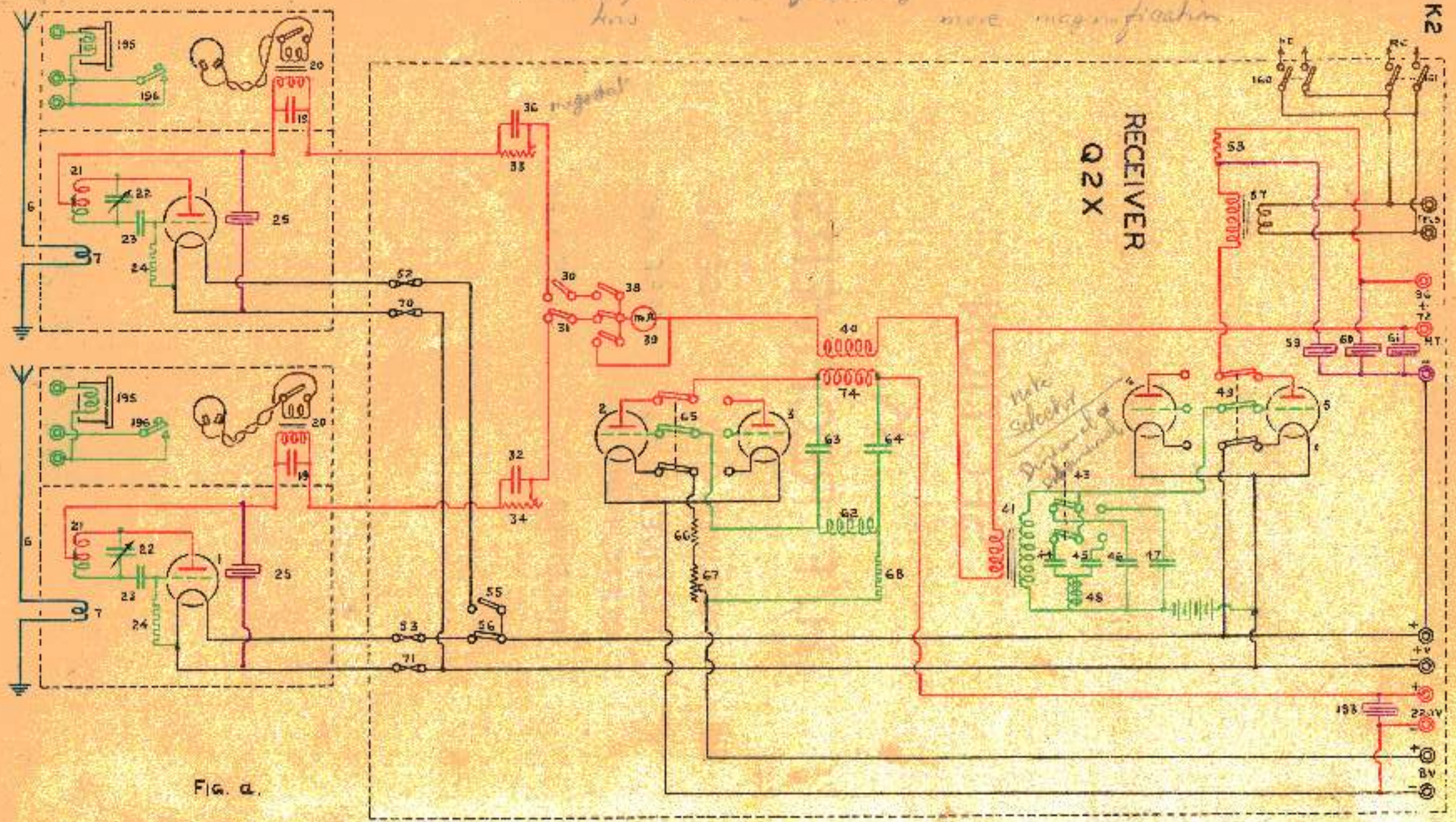

FIG. a.

RECEIVER Q2X

K3

Date of design:- 1928. Modified:- 1930.
Frequency range:- 50,000 to 75,000 kc/s.
Where fitted:- Type 7SX.
Valves used:- One detector valve MH(F).
Two quench valves MH4 (1 in use, 1 alternative).
Two note selector valves MH4A (1 in use, 1 alternative).
References:- Admiralty Handbook of W/T (1930) paragraph 703.

Receiver Q2X is a V.H/F quench receiver and is a component of type 7.X. It is fitted in Heavy ships and possibly later it may be fitted in cruisers also. In order to avoid shifting wave frequency a note selector is adopted. This enables two separate lines of communication to be established by using either of two note frequencies (1000 and 1400 cycles); the required note only being selected. The outfit consists of:-

(a) A V.H/F receiver mounted in one half of each of transmitter/receiver boxes fitted above decks. In some ships three such boxes are employed, one fitted on "P" Turret, one in the foretop and one in the maintop. In other ships only two boxes are fitted, foretop and maintop, and these notes describe this arrangement.

(b) A 50 kc quench unit, and a note selector, fitted in the control box in the Auxiliary W/T Office.

The Receiver is mounted in an aluminium box with the transmitter and is separated from the latter by a metal screen. Separate rod aerials are used for transmission and reception. In some cases the rod aerials are replaced by a lightning conductor with improved results.

The receiver is of the divided circuit type and the coil (21) is coupled to the aerial coupling coil (7). The amount of coupling is not adjustable. The circuit is tuned by the variable condenser (22). The grid leak (24) and condenser (25) provide cumulative grid detection and also maintain the grid at a potential suitable for satisfactory quenching.

Below the transmitter-receiver box another box is fitted containing a telephone mains former (30) and .1 jar condenser (12) together with terminals for connecting telephones, and also a buzzer repeater (195) with key (109) for communication between the operator at the control box and the operator tuning the receiver. In older models these components were situated in the bottom of the transmitter-receiver boxes.

A 50,000 ohm variable resistance called a negostat (23) or (34), with a 2 mfd W/T by-pass condenser (26) or (35) across it, is fitted in the control box as a means of adjusting the sensitivity of the receiver.

A milliammeter (39) is fitted in the control box as an indication to the operator of the satisfactory operation of the receiver. It can be inserted in the anode lead of either receiver or short circuited altogether by means of a switch (32). H.T. supply is 72 volts obtained from a tapping on a 96 volt battery. Filament supply is taken from a 4 volt battery.

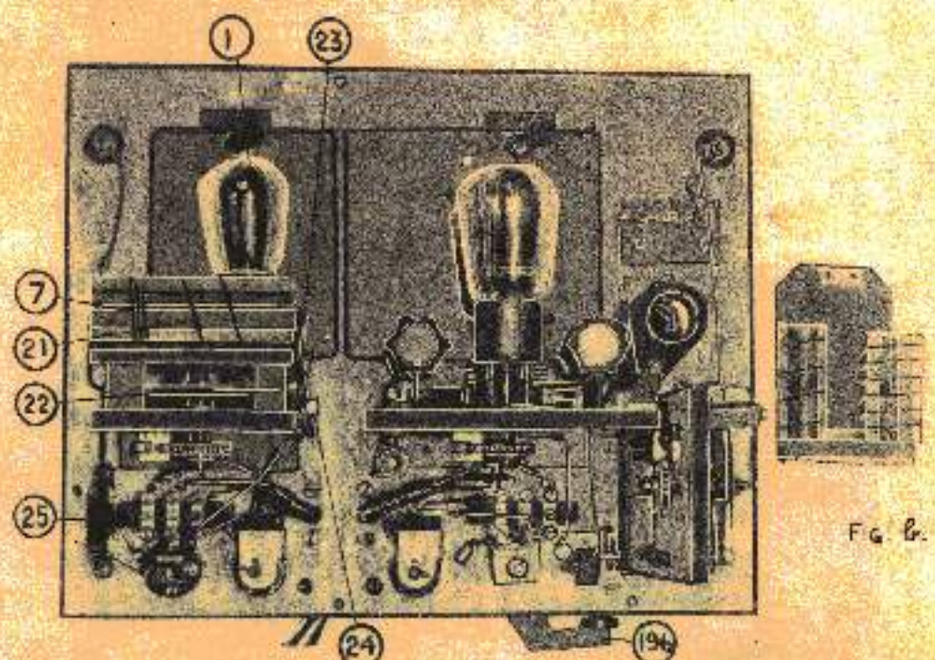

Fig 6.

The Quench Unit employs a divided circuit, three components (82) (83) (84) (74) tune to a fixed frequency of 50 kc/s. The coils (83) (84) are coupled to a coil (40) in the anode lead to the receiver. Consequently this 50 kc varying voltage is superimposed upon the normal H.T. anode supply to the receiver.

A 5000 ohm grid leak (81) is fitted.

H.T. supply to the quench unit is taken from the ship's 96 volt mains and 6 volt filament supply from an 8 volt battery with a fixed 3.3 ohm resistance (86) and an adjustable rheostat (87) in series.

RECEIVER Q2X

In the absence of signals there should always be a "mush" heard in the telephones. Complete absence of this "mush" generally indicates that the receiver is not functioning correctly, but the amount of mush can be reduced by suitable adjustment of the rheostat (37) and megostat (39) without impairing the sensitivity of the receiver. The presence of a continuous high pitched note indicates that the quenching valve (2) is not working.

Alternative valves (8) (9) are provided in the quench unit, either of which can be connected to the circuit by the C.O.S. (35).

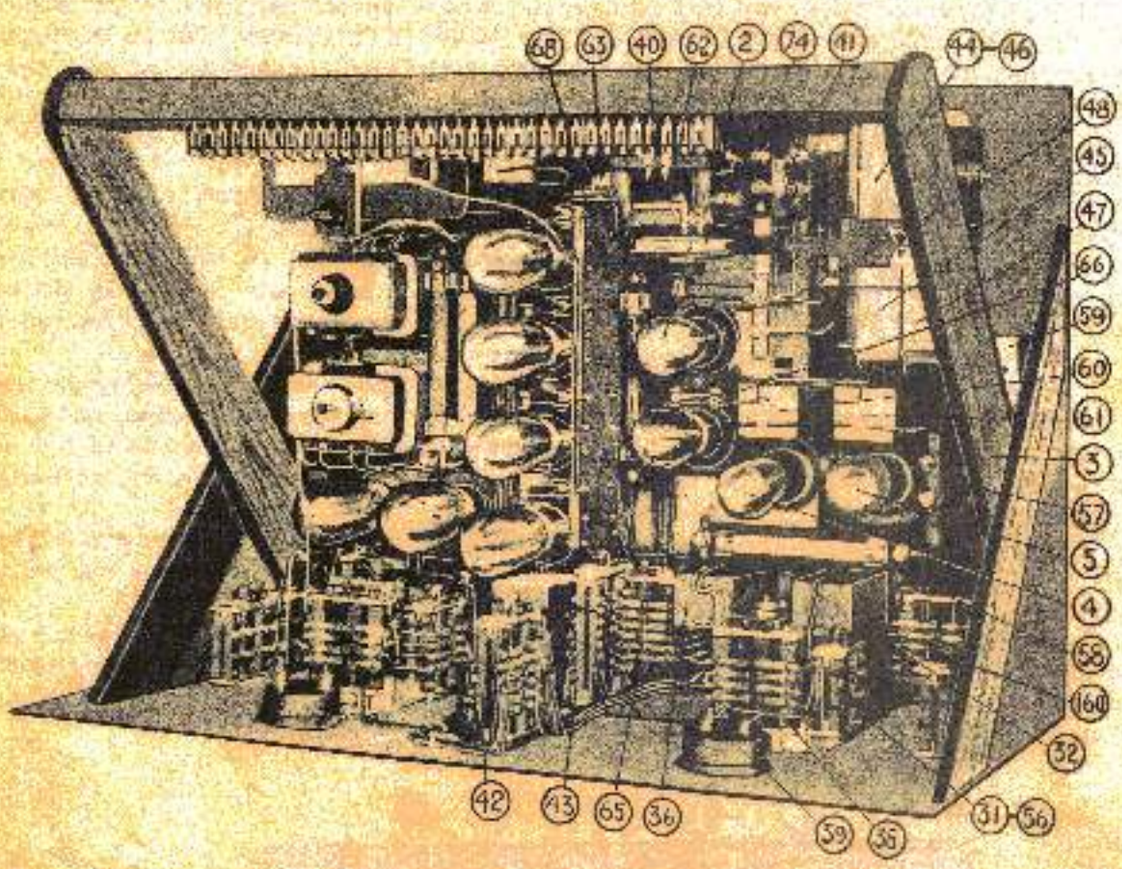

Fig. C.

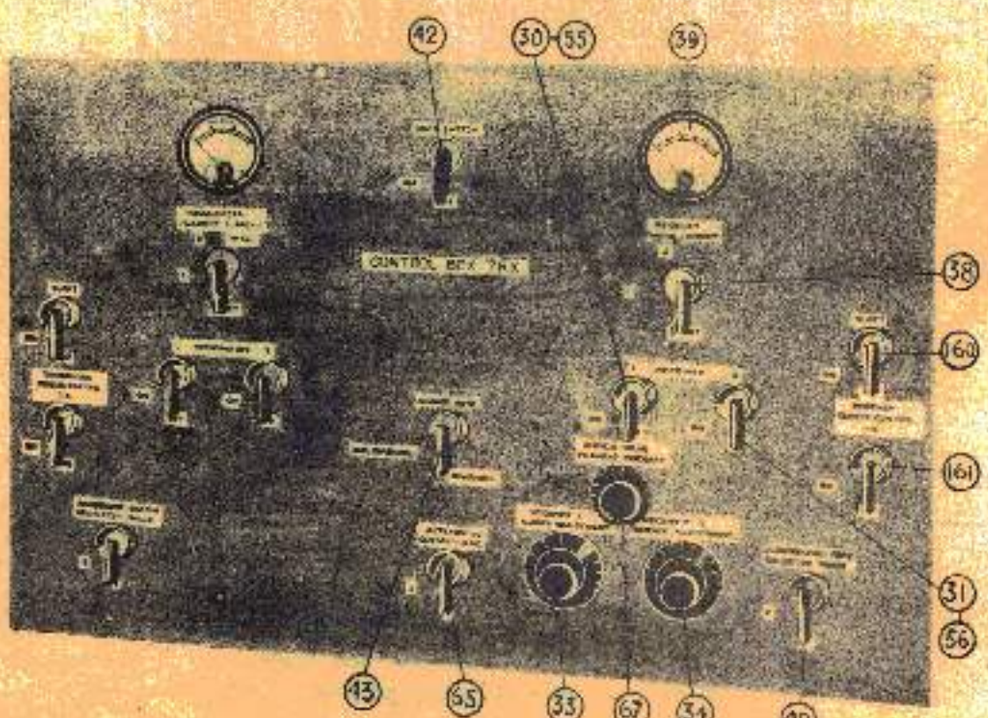

Fig. d.

Note Selector. The detected C.W. signals are not passed direct to the telephones but are taken to a step up transformer (41) and thence through a note selection stage. With the switch (43) as shown in figure 4, the secondary of the transformer (41) with the condenser (48) forms a tuned circuit with the combination of the iron cored choke coil (49) and condenser (44) across it. The circuit consisting of the secondary of the transformer (41), the condenser (48), the iron cored inductance (49) and the condenser (44) resonates, as a whole, to the wanted note frequency and develops a maximum voltage for amplification by the valve (4) or (5) to be then applied via the telephone transformer (57) to the telephones.

The coil (46) and condenser (44) are tuned so that they form an acceptor circuit to the unwanted note frequency which therefore develops only a minimum voltage across the input of the valve (4) or (5) and then does not actuate the telephones to any appreciable extent. (See Admiralty Hand book of W/T (1931) paragraph 205).

When the C.O.S. (43) (which also changes over the transmitted note) is put to its other position condensers (45) and (47) are brought into use and condensers (44) and (48) disconnected. These condensers (45) (47) are of such a value that the previously unwanted note frequency is now selected and the previously wanted note suppressed. These four condensers (44) (45) (48) (47) are semi-adjustable but are set in Signal School and should not be altered.

H.T. supply to the note selector is 98 volts from batteries cut down by a 5000 ohm resistance (58) and filament supply 4 volts from batteries. Dry cells supply 8 volts negative grid bias.

Alternative valves (4) (5) are provided in the note selector either of which can be connected to the circuit by the C.O.S. (43).

Either transmitter/receiver box may be brought into use by means of switches (30) (58) and (31) (58), while switches (181) (180) connect the receiver to the T.S. and aloft remote control positions.

All the anode, filament and grid bias battery supply leads are connected to the various components through a 12 pole, 4-way switch (42) which forms a means of completely disconnecting the whole outfit, both transmitting and receiving, from the power supplies.

Fuses (52) (53) (70) (71) are fitted in the filament leads to the receivers where the leads leave the control box. The receiver anode leads are not fitted with fuses as they each have a rheostat (33) or (34) in circuit. These rheostats provide safety arrangements in themselves since they prevent any rise in current.

Remarks on tuning will be found in the notes on Type 76X (See Section 6).

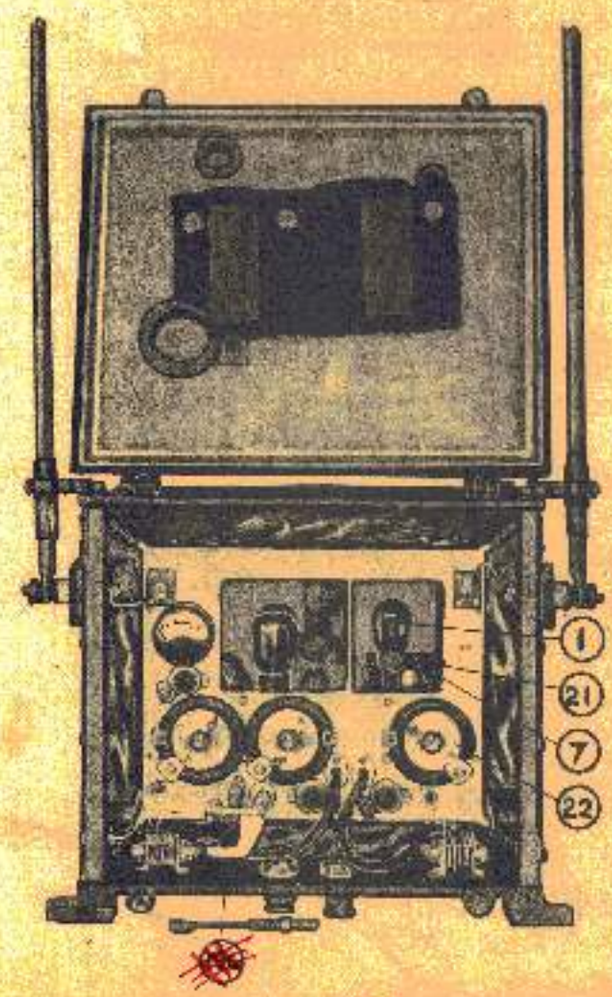

Fig. e.

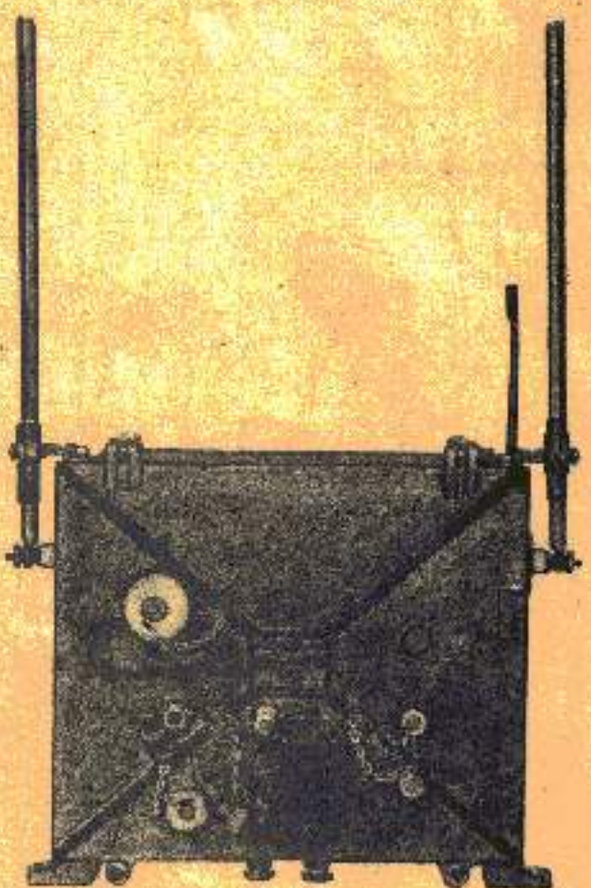

Fig f

RECEIVER Q4 & QUENCH UNIT P2

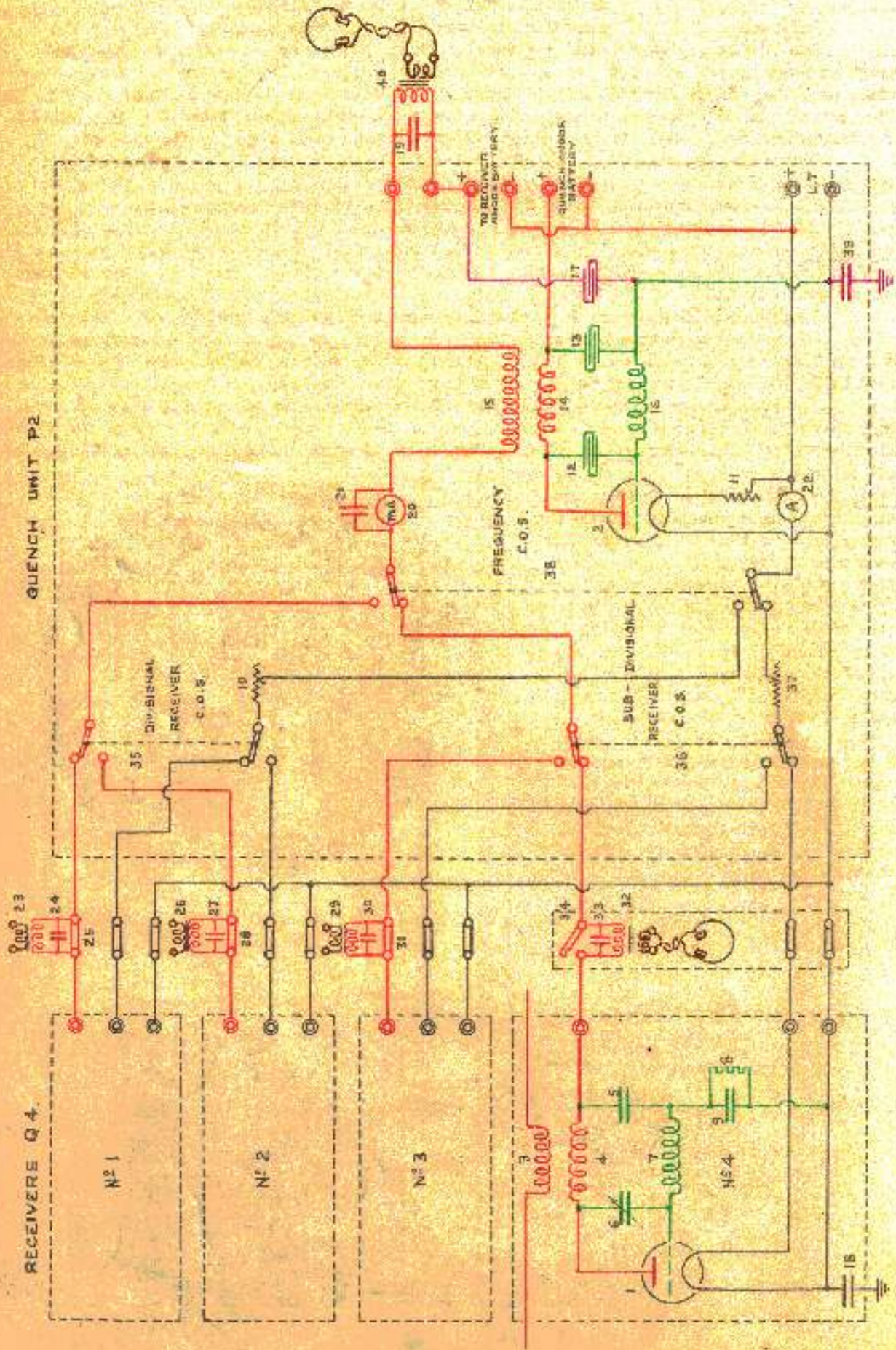

Fig a

RECEIVER Q 4 & QUENCH UNIT P2

Date of design:- 1928
Frequency range:- 18,500 - 29,000 kc/s
Where fitted:- With Quench Unit P2 in Receiver Outfit QP for Type 71
Valves used:- One MS18 (or MS18A) R/F oscillating cumulative grid detector
One MR18 (or MR18A) S/F Quench Oscillator
References:- Admiralty Handbook of W/T (1931) paragraph 708.

Receiver Q4 is employed with the quench unit P2 in W/T receiver outfit QP fitted with Type 71 in heavy ships. Either two or four receivers are provided fitted either on deck with rod aerials or in the office alongside P2. If fitted in the office, the receiver is coupled to the 2nd office aerial. If only two receivers are fitted, one is tuned to the divisional and the other to the subdivisional wave. With four receivers, a stand-by receiver is available for each wave.

Change over switches (34) and (35) (36) are fitted in the quench unit P2 to enable the operator in the office:-
(a) To shift from the divisional to the subdivisional receiver (Switch (28).)
(b) To shift from one divisional (or subdivisional) receiver to the other (Switch (35) or (36)).

The Receiver Q4 consists of a divided circuit. The tuned circuit is between anode and grid and therefore includes the anode grid capacity. Tuning of this circuit is effected by means of the 0.02 jar condenser (8)

Cumulative grid detection is carried out by means of the grid leak (7) and condenser (9).

In the case of receivers fitted on deck, the aerial coupling is fixed and must not be varied - the length of the rod aerial (2) should, however, be adjusted for best signals. For receivers fitted below, the aerial coupling must be varied to give best results.

The anode supply (90 volts) is modulated plus or minus about 10 volts by means of the quench unit P2, which is coupled to the anode circuit of the detector valve (1) by means of the fixed coils (14) (15) (16). This provides the necessary variations of anode voltage to effect quenching. The anode voltage is obtained from a 90 volt battery.

Tuning. The receiver Q4 is tuned by listening out to the transmission from one's own ship or a neighbouring ast. For this reason a metal box is fitted near the receiver containing a telephone transformer (32) the primary of which can be connected in the anode supply to the receiving valve (1) by removing a link (34). The only adjustment then necessary is to vary the tuning condenser (8) until the loudest signals are heard in the telephones.

It will be found that a considerable signal strength will be heard over a wide arc on the receiving condenser (8) if the transmitter is very close to the receiver. Final tuning adjustment should therefore be made when the transmitting station is more than about 1½ miles from the receiver

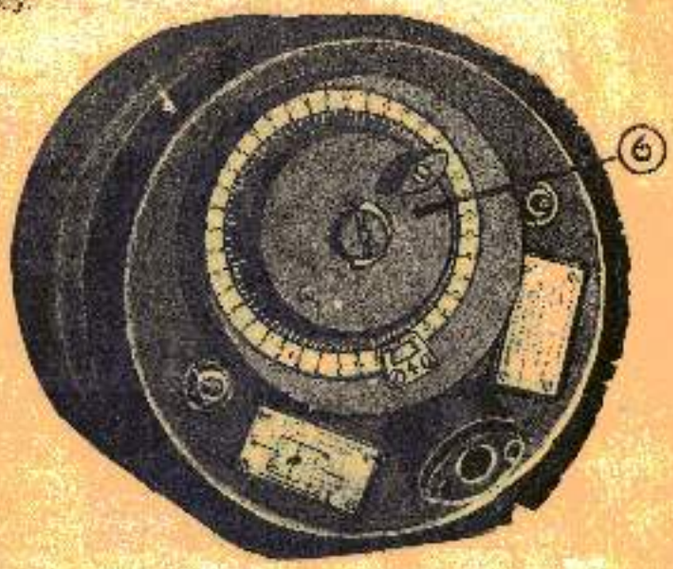

FIG B.

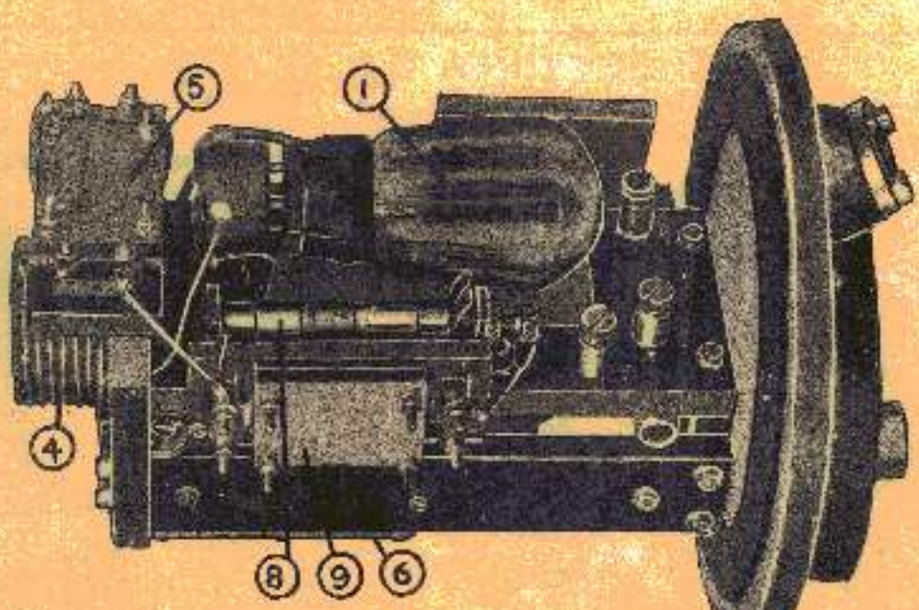

FIG C.

RECEIVER Q 4 & QUENCH UNIT P 2

The Quench Unit P2 consists of a divided circuit tuned to 2.. 7 kc/s. Both this tuning and the coupling to the anode circuit of the receiving valve (i.e., between coils (14) (18) and (15)) are fixed in Signal School and must not be altered. Filament rheostats, (10) and (37) for the receivers and (11) for the quench unit, are fitted in the P2. Great care must be taken to adjust these rheostats correctly in order to obtain the best results. Similarly in the P2, a milliammeter (30) shunted by a 40 mfd R/F by-pass condenser (21) and an ammeter (22) are fitted in the anode and filament supplies of the receiving valve (1) to enable the operator in the W/T office to ascertain if the receiving valve is working correctly without having to go on deck to look at the receiver itself.

If the quench filament is first switched on and the filament current of the receiving valve (1) slowly increased by means of the rheostat (37) the reading of the milliammeter (30) will be seen to rise to about 4 milliamps. A further slight increase of filament current to receiving valve (1) will cause the reading of the milliammeter (30) to drop back to about 1 milliamp and "mush" will be heard. This indicates that quenching action is working satisfactorily and incoming signal will then cause deflections of the milliammeter needle.

Even if insufficient current is applied to quench valve filament fair signals may be heard due to self-quenching action in the receiver. In this case, on switching on, the drop (referred to above) in the reading of milliammeter (30) will occur in two distinct steps and a high pitched whistle will be heard.

H.T. supply is 60 volts obtained from the same battery as is used for the receiver. In some cases it has been found necessary to vary the anode voltage slightly in order to ensure efficient quenching.

QUENCH UNIT P2

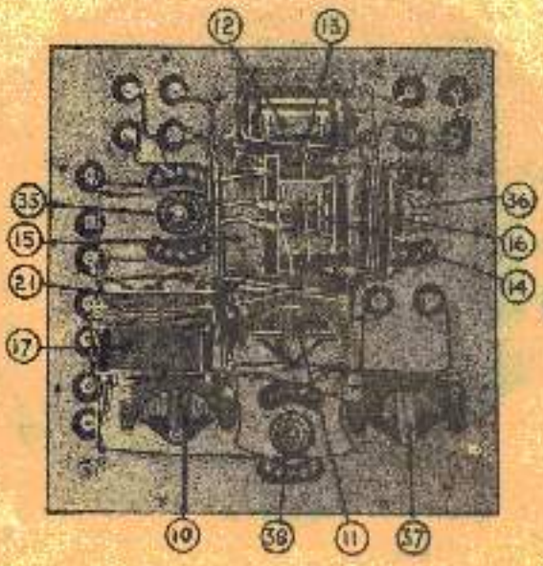

Fig 1.

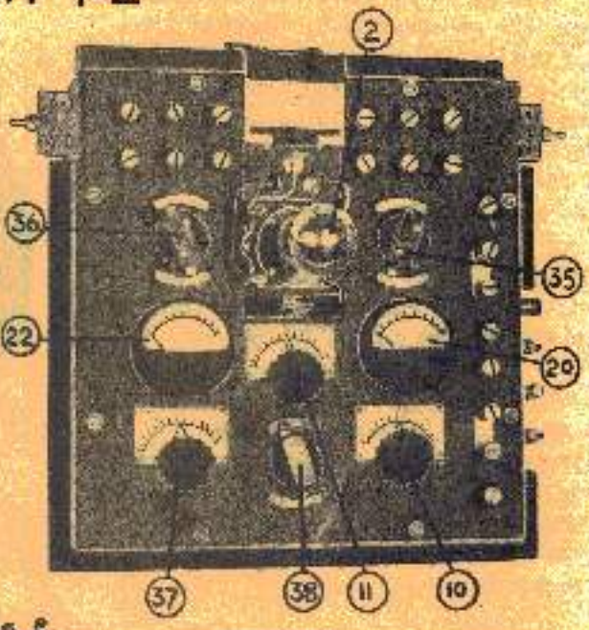

Fig. 2.

RECEIVER Q7

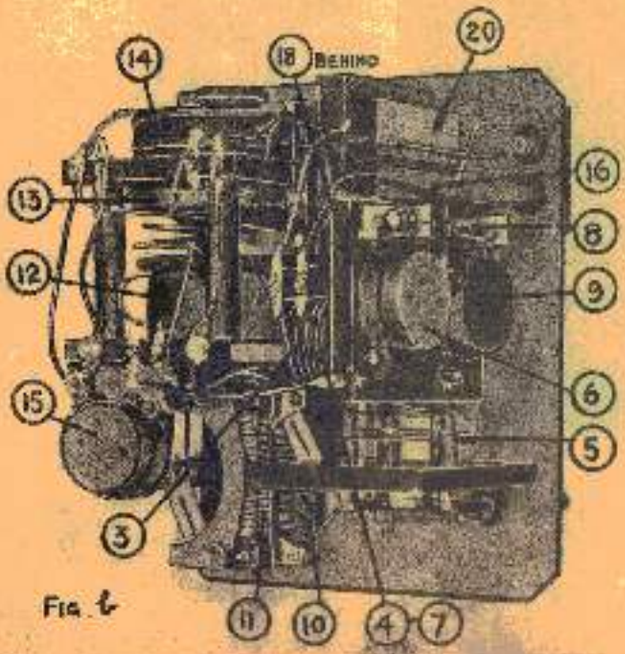

Fig. 4

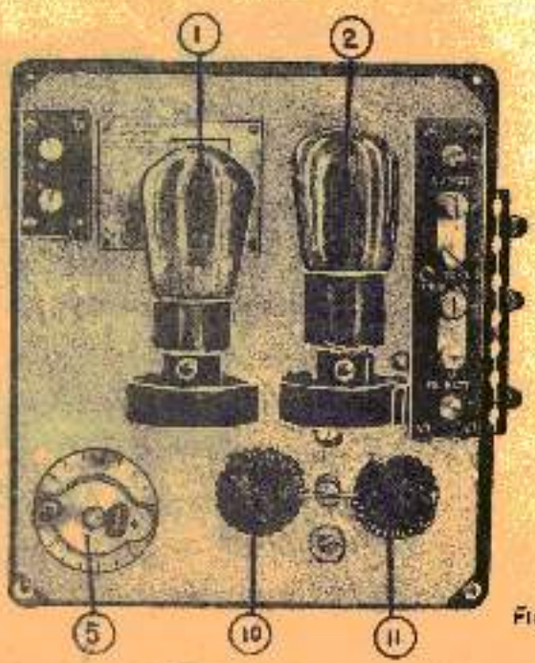

Fig. C.

RECEIVER Q 7

Date of design - 1926
Frequency range - 17,000 - 30,000 kc/s.
Where fitted - In receiver outfit QC for Types 46X, 46Y, 47, 71
Valves used - One NR13 R/F oscillating cumulative grid detector
One NR15 S/F Quench Oscillator
Reference - Admiralty Handbook of W/T (1931) paragraph 793

Receiver Q7 is employed in R/F receiver outfit QC fitted with types 46X, 46Y and 47. The receiving and quench circuits are placed together in a box in order to attain compactness. In other respects the receiver is very similar to the combination of receiver Q4 and quench unit P2, and since it is in more convenient form is replacing them for use with Type 71.

Q7 is designed to work on an untuned aerial circuit, which may consist of aerial and earth, aerial and counterpoise or an untuned loop. A tuned aerial should not be used, as, owing to the extra damping thus introduced into the R/F oscillatory circuit, to which the aerial is coupled by a fixed coupling, the set generally fails to operate under such conditions (see Admiralty Handbook of W/T (1931) paragraph 803).

<u>The Receiver</u> consists of a divided circuit which is tuned by the 0.005 jar condenser (5) in parallel with the anode grid capacity of the valve (1). Cumulative grid detection is carried out by means of the grid leak (8) and condenser (9). They also maintain the grid at a suitable potential for the satisfactory operation of the quench.

The anode supply (50 volts) is modulated plus or minus about 10 volts by means of the quench unit which is coupled to the anode circuit of the detector valve (1) by means of the fixed coils (12) (13) (14). This provides the necessary variations of anode voltage to effect quenching.

<u>The Quench Unit</u> consists of a divided circuit accurately tuned to 20 kc/s. Both this tuning and the coupling to the anode circuit of the detector valve (i.e., between coils (13) (14) and (12)) are fixed in Signal School and must not be altered.

The correct amplitude of S/F voltage variation is obtained when a 4 jar condenser (19) is connected across the output terminals as in conjunction with coil (12) it tunes to 20 kc/s.

H.T. and L.T. voltages for both valves are 50 and 4 volts respectively. When the receiver is tuned, the filament rheostats (10) and (11) must be adjusted to give greatest signal strength. In the absence of signals there should always be a "mush" heard in the telephones. Complete absence of this "mush" usually indicates that the receiver is not functioning correctly, but the amount of mush can be reduced by suitable adjustment of the rheostats (10) (11) without impairing the sensitivity of the receiver. The presence of a continuous high pitched note indicates that the quench valve (2) is not working.

The output terminals can be connected to high resistance telephones, telephone transformer or note magnifier, but in all cases the 4 jar condenser (19) must be used in parallel across these terminals.

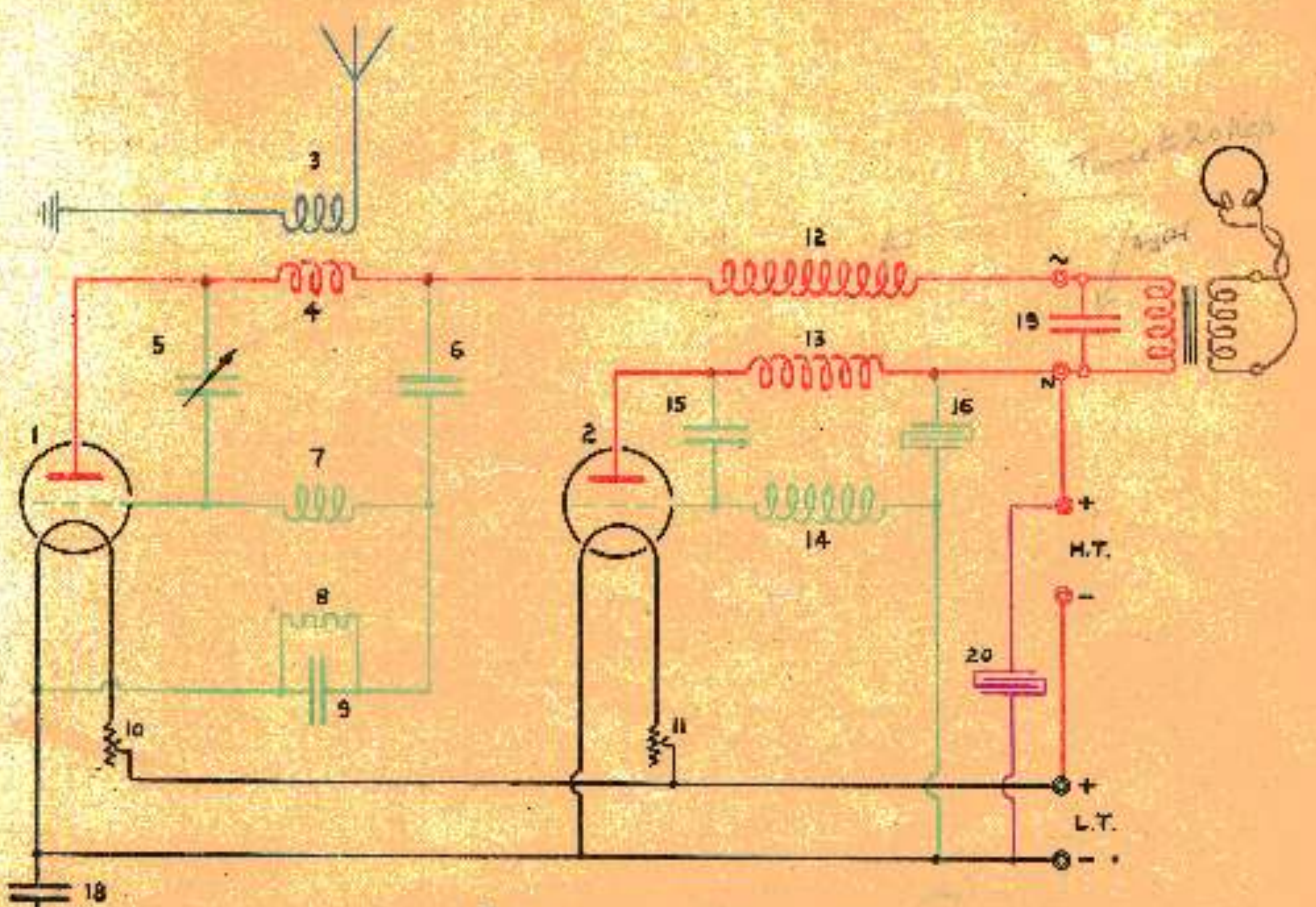

FIG. a