SUB - SECTION

RL

TYPE 47 PAGE RL 2

TYPE 47

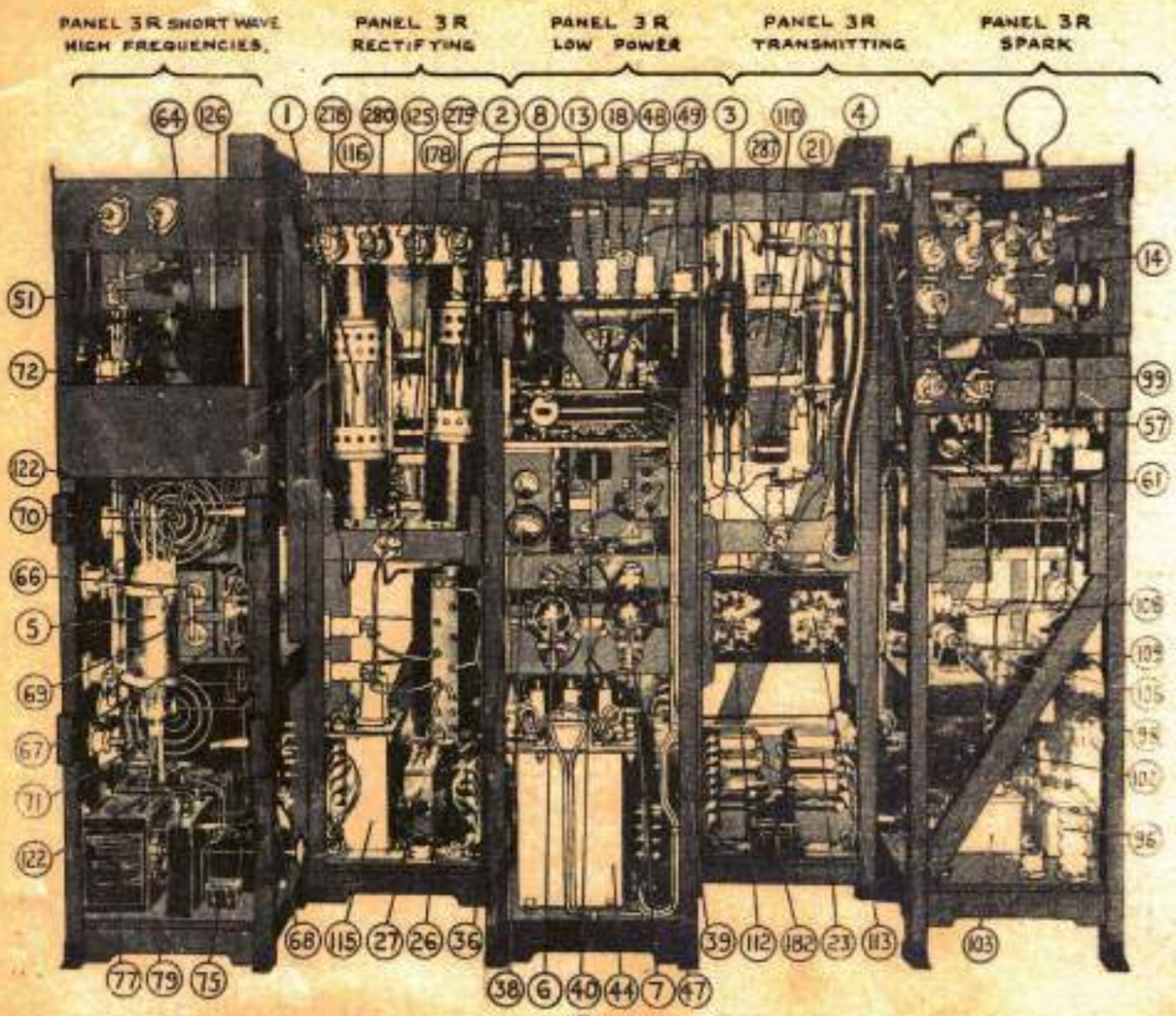


FIG. U

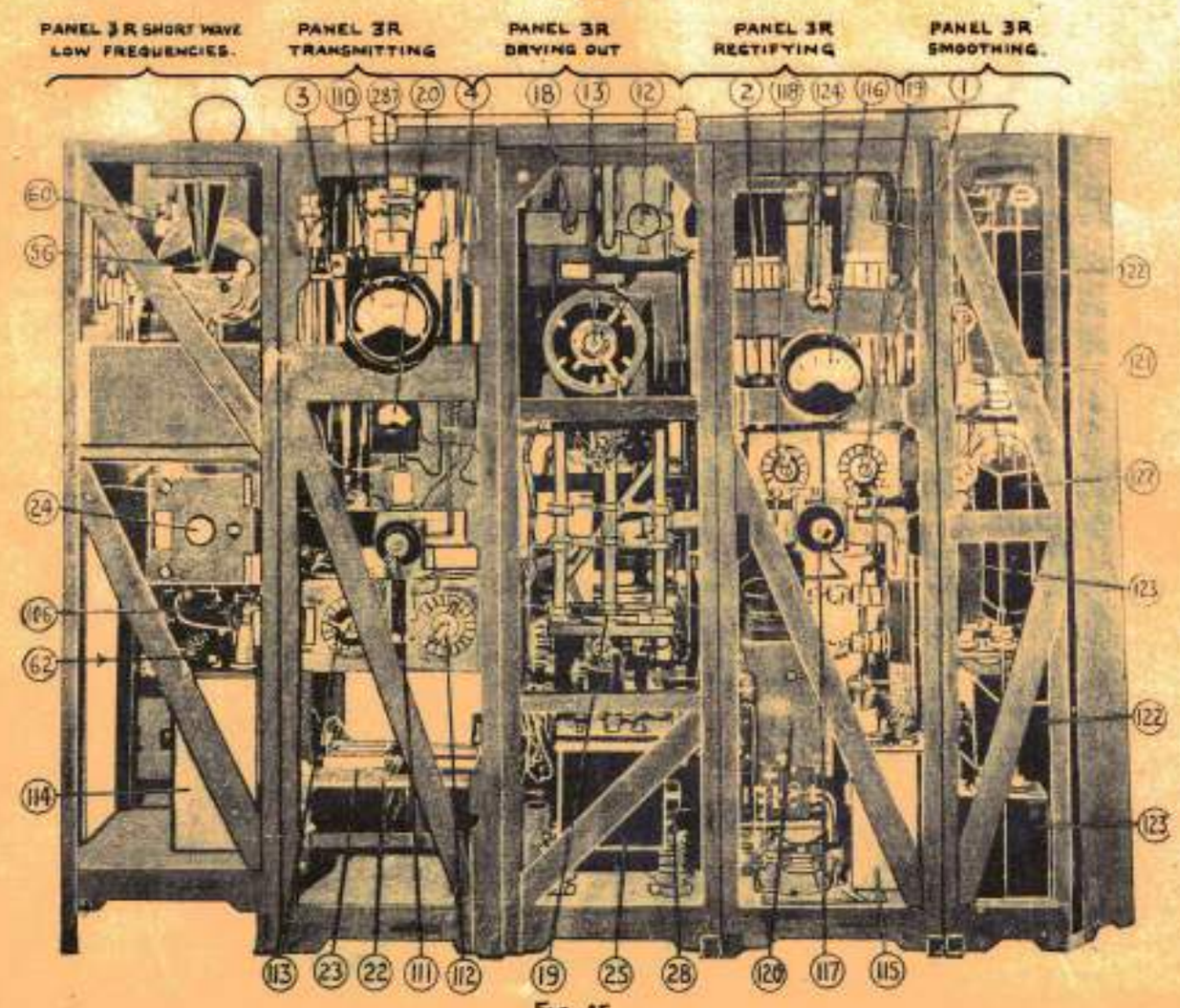


FIG. V.

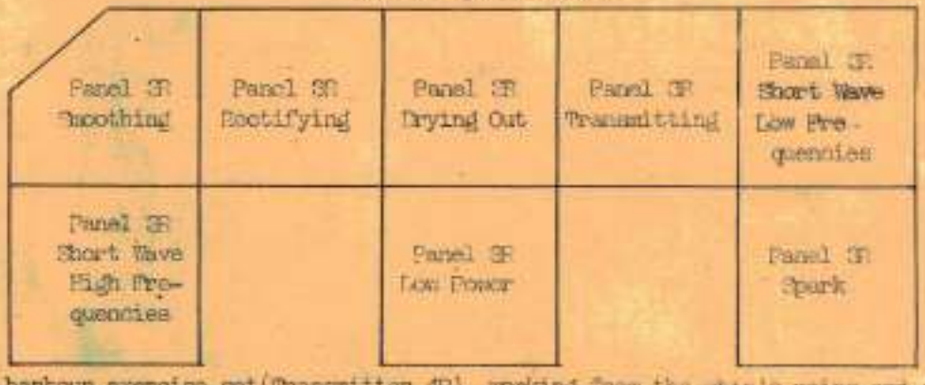
TYPE 47
DETAILS OF COMPONENTS

Transmitter.	3R L/P	3S Low Power	3R H/P	3R H.H/P	Spark	4R
Frequency range kc/s	100 - 500	100 - 500	4000 - 13,600	11,500 - 27,300	100 - 600	100 - 190
Power Supply.	20 kW Alternator	3 kW Alternator	20 kW Alternator	20 kW Alternator	3½ kW Alternator	230 volt mains
Filament Supply.	3 kW Alternator	3 kW Alternator	3 kW Alternator or 1.5 kW Generator	3 kW Alternator or 1.5 kW Generator	-	4 volt battery
Valves Used (See section J).	Two NT35 Two NT22C	One NT4A Two NU1	Two NT35 Two NT22C	One NT33		Two NT15A
Associated Wavemeters.	Patt. 1492R or 3D	Patt. 1492R or 3D	3T and 3U	3S and 3T	Patt 1492R or 3D	Patt. 1492R or 3D
Approximate range in miles.	1300	400	World wide at times	World wide at times	150	30
Date of design.	1927	1927	1927	1927	1927	1928
Reference Page.	~~RL10~~	~~RL17~~	RL13	RL15	~~RL20~~	~~RL18~~

Type 47 is a high power valve set. It has two power boards (Boards 2R, Supply D.C. and Output A.C.) each of which consists of three horizontal sections, Upper, Middle and Lower. The two boards are bolted and connected together and so form one complete unit (see figure ak.). They contain the 3 kW machine automatic starters, main magnetic keys, relay switch, and the necessary switches and fuses for the distribution of power to the set and the W/T office.

Type 47 has five separate transmitters and one drying out circuit and is contained in eight wooden panels (see figures u. and v.). The front of five of the panels form the back of the silent compartment, and all panel controls and indicating instruments are accessible to the operator, so that, once the transmitting circuits are tuned and adjusted to a desired frequency, the switching arrangements and control of H.T. and filament voltages of the transmitters can be operated by him, without his moving from the silent compartment.

CABINET (PLAN VIEW).



A harbour exercise set (Transmitter 4R), working from the ship's mains and 4 volt batteries, is fitted inside the safety screen.

The switches necessary for the control of Type 47 are mounted on Board 3F Controlling (see figures i. and ia.) which is fitted inside the silent compartment and within easy reach of the operator. The "ON" and "OFF" pushes (261)(262)(263)(269)(270) for the automatic starters are also fitted on this board.

The field regulators of all machines are fitted on the Boards 2R Regulating, installed in the lobby above the W/T office. There are six field regulators (209)(212)(224)(256)(266)(267), three fitted to each board. These boards each have a set of three concentric controlling spindles and handles, which are extended through the roof of the silent compartment to a position within easy reach of the operator. The three regulators controlled in each set of concentric spindles are (212)(224)(256) and (255)(257)(209) respectively, the last number in each case being the inner spindle.

The 20 kW and 3 kW machines output indicating instruments, voltmeter (247), ammeter (248) and voltmeter(140), ammeter (139) respectively, are also fitted inside the silent compartment. Thus it will be seen that the whole set can be switched on, all required voltages adjusted, panel switching arrangements operated and the set controlled from the silent compartment.

D.C. SUPPLY

The ring main emergency change over switch (285)(see figure i.) connects the bus bars(201) on the D.C. supply board either to the ring main or to the emergency supply terminals. The latter are intended for use when it is necessary to obtain the D.C. supply from some source other than the ship's ring main(e.g., from another ship alongside). A pilot lamp(286)can be connected across the centre contacts of the ring main emergency C.O.S.(285) by the switch(288) to indicate when power is supplied. The busbars(201) connect the D.C. supply to all the D.C. circuits which are controlled from the W/T Office.

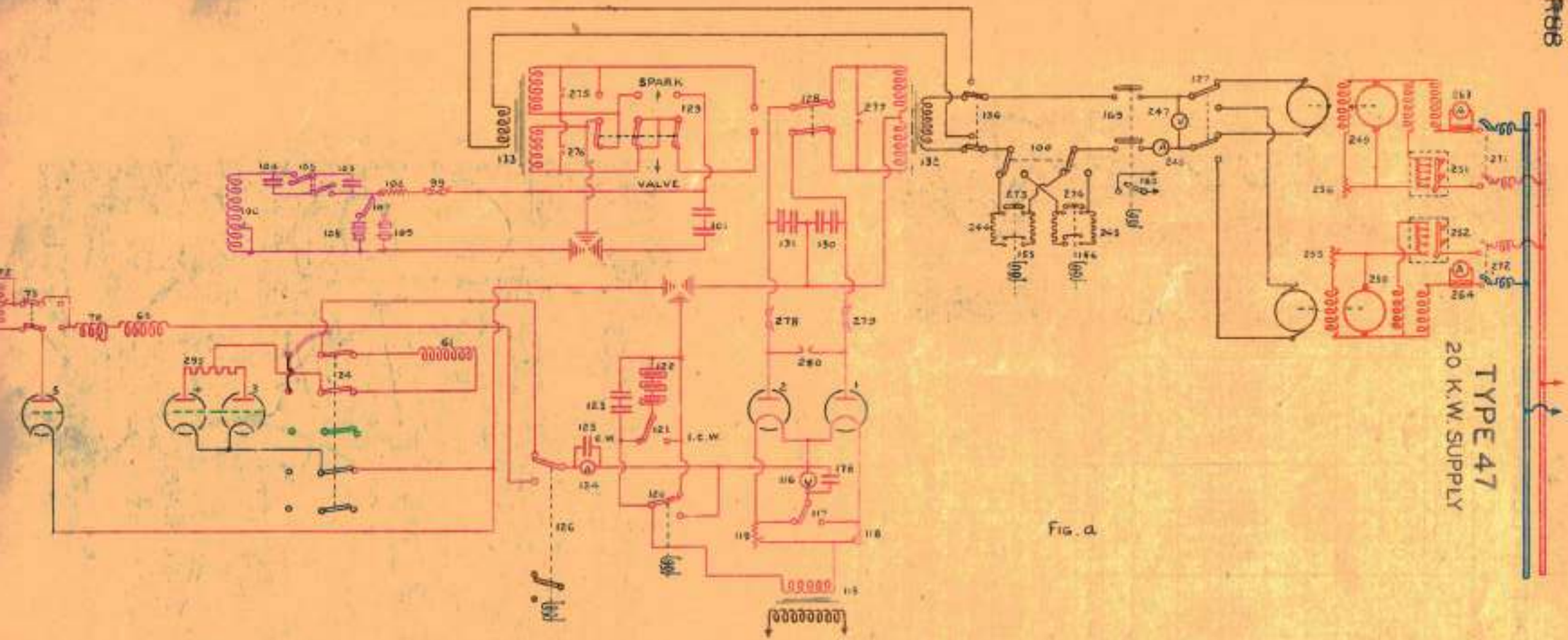


Fig. a

n Alternators 20 kW. Duplicate machines (349)(350) are fitted, and are supplied from separate circuit breakers (271)(272). The only change over arrangement is the A.C. C.O.S. (127) which connects the output of either machine to the set. Consequently both machines can be run simultaneously with the output of one only connected. Circuit eakers (271)(272) connect the main bus bars(201) to "X" size automatic starters (251)(252) (see page MA5) and the machines (349)(350). The circuit breakers are mechanically set to "ON" by hand and, if any excessive current is taken by the machine, they break to the "OFF" position by the action of the bobbin shown diagrammatically in ion with the contact. They can also be broken by pressing an "OFF" push. The automatic starters (251)(252) are fitted near the alternators, and as described on page the "ON" and "OFF" pushes (261)(262) for controlling the starters are fitted on Board 2E Controlling (see figure 1.). The ammeter(263)(264) is connected in the gative supply to each machine and indicates the current input of the motor. The machines are not fitted with motor field regulators but each machine has an alternator eld regulator (265)(266) which is controlled from the silent compartment (see page ☞) fig 5.

n A.C Supply. The main A.C. output from either machine(349)(350) is connected to the set by the A.C. C.O.S.(127). A voltmeter (247) connected across this switch indicates the voltage output, and the ammeter(248) the current output of the machine in use. The A.C. C.O.S.(127) is connected to the relay switch(169) which is a double pole eak in the main A.C. supply. The relay switch bobbin is operated by a safety circuit(see fig 2.) so that if all safety devices are not complete the relay switch is broken d the main A.C. supply isolated from the set. When the relay switch is made the A.C. supply is connected to the magnetic key C.O.S.(100) and the transformer primary C.O.S.(134).

TYPE 47

20 K.W. SUPPLY (CONT.)

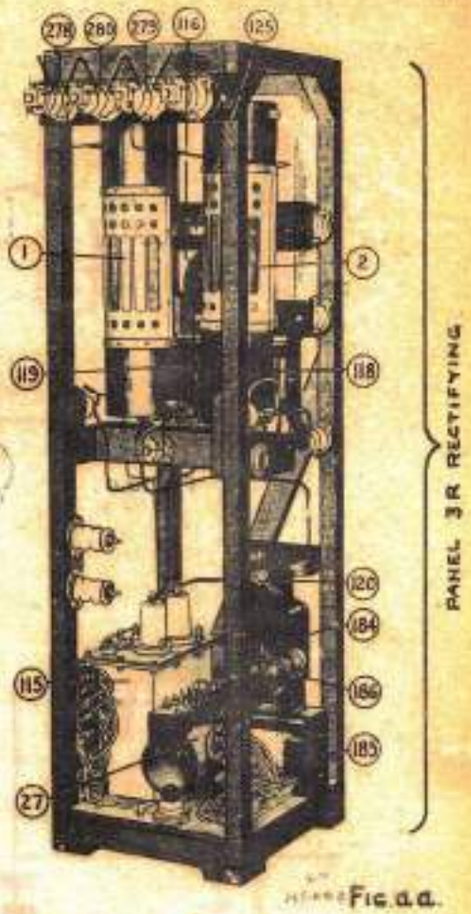


Fig. a.a.

The magnetic keys (155)(156) are similar to those fitted with Types 35 and 36 (see page ~~155~~). The magnetic key forms a single break in the A.C. supply and is used to make and break the supply for signalling purposes. Either of the magnetic keys can be used by moving the magnetic key A.C. C.O.S. (100) and the D.C. C.O.S. (157) (see figure a.) to the position for the magnetic key required. The transformer primary C.O.S. (134) connects the main A.C. supply to the primary of the transformer (132) or (133) depending on which transformer it is desired to use (see below).

H.T. Supply. Either transformer secondary can be connected to the rectifying valves (1)(2) for valve transmission by the switch (128) and one transformer (133) can be used for the spark attachment (see figures ac. and ae.). The secondary windings of the valve-spark transformer (133) can be connected in series or parallel for valve or spark transmission respectively by means of the series parallel switch (129). When the switch (129) is in the valve or "series" position, the centre point of the secondaries is earthed (see figure ad.), and when in the spark or "parallel" position, the secondaries are in parallel (see figure af.), with one end of the windings earthed. Each half of the secondary is protected by the safety horns (275)(276). The secondary windings of the transformer (132) are permanently connected in series and the centre point earthed. Safety horns (277) are connected across them for protection. The outer ends of the secondary are connected to one side of a change over switch (126). The change over switch (126) connects the secondary of the transformer (132) direct, or the secondary of the transformer (133) via the series-parallel switch (129), to the anodes of the rectifying valves (1)(2). When using spark, the C.O.S. (128) should be broken. The valves (1)(2) are protected by safety horns (280) connected between the anodes, and an additional safety horn and fuse (278)(279) is connected in each anode supply.

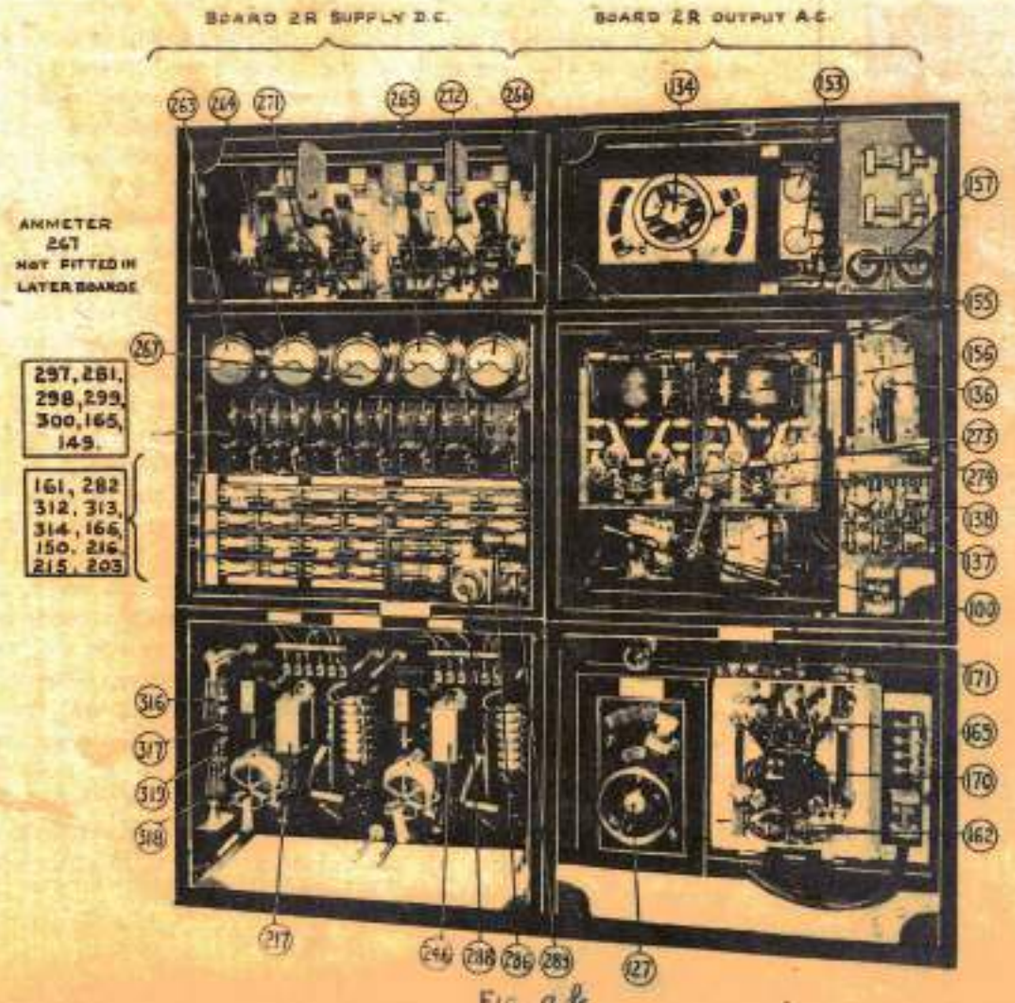


Fig. a.b.

RL6
R90

TYPE 47
20 K.W. SUPPLY

5

VALVE POSITION

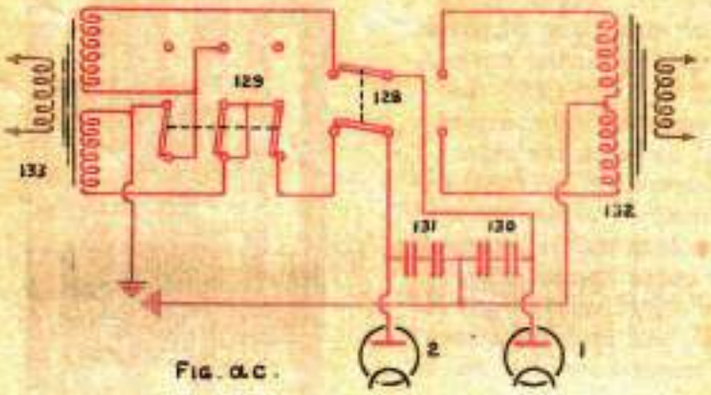


Fig. a.c.

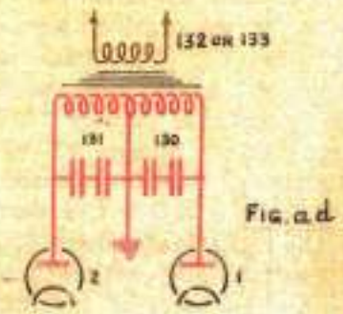


Fig. a.d

SPARK POSITION

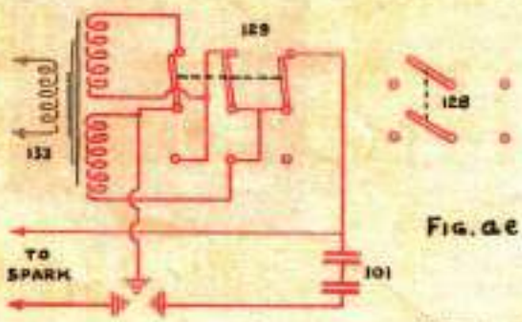


Fig. a.e

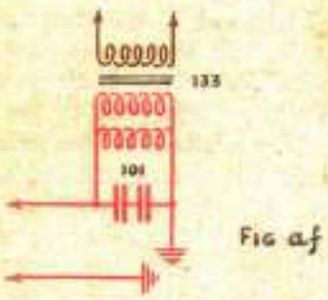


Fig a.f

Three pairs of R/F by-pass condensers(101,(130)(131) of 1 jar each are used to protect the transformers from stray oscillatory currents. The connections of the four condensers (130)(131) to the transformer switches(128)(129) are arranged so that in the "valve" position the condensers are connected in series across the secondary windings of either transformer with the centre point earthed. Thus two condensers are connected across each half of the secondary of the transformer in use. In the "spark" position the two condensers(101)are connected across the secondary windings of the valve-spark transformer (133). Simplified sketches of the transformers and condensers with switches omitted are shown in figures a.d. and a.f.

The filaments of the rectifying valves(1)(2) are connected via the anode ammeter(134)to one contact of the H.T. and filament C.O.S.(136), which in turn connects the H.T. supply to the valves (3)(4) or (5) for the transmitters 3R L/F, 3R H/F or 3R H-H/F respectively. A condenser(135) is connected across the ammeter (134) as a by-pass for R/F (see figure a.).

When the C.W - I.C.W. switch (121) is in the I.C.W. position, the smoothing condensers(122) are disconnected from the rectifying valve filaments and earthed, and two 1 jar condensers (123), connected in series, complete the circuit for the R/F component of the valve current, thus preventing the R/F component passing through the main transformer (132) or (133) via the earth connection. In the C.W position the smoothing condensers(122) are connected in parallel with the condensers (123) between the filament of the rectifying valves and earth.

The rectifier switch (120), when broken, shorts and earths the condensers(122)(123) after using C.W.; and the condensers (123) after using I.C.W.; thus discharging them, and making it safe to handle the rectifier circuit. It also breaks and earths the valve filament circuit. When made, the smoothing condensers(122) or, the condensers(123), are connected in the rectifier circuit and the filament circuit of the rectifier valves (1)(2) is completed (see figure a.).

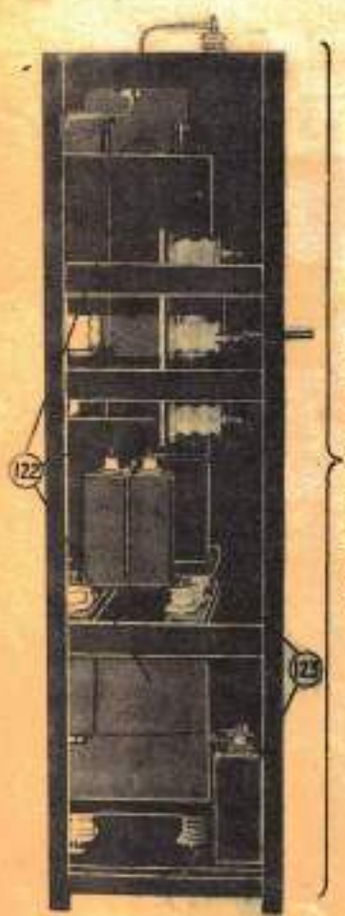


Fig a.g.

TYPE 47

3 K.W. SUPPLY

Filament Alternators 3 KW. Duplicate machines(213)(214) are fitted and are supplied from the busbars(201)through a pair of fuses(215)(216). As with the 20 KW machines, the only change over arrangement is the C.O.S.(138) which connects the output of either machine to the set. The D.C. supply is connected to W or Z size automatic starters(217)(246)(see pages MA3 and MA9) and thence to the machines. Ammeters(265)(266) connected in the circuit indicate the input current to the motors. Machine running indicating lamps(318)(319), protected by fuses(317)(319), are connected in the motor field. They are fitted in Board 2R Supply D.C Lower (see figure at.). The automatic starters(217)(246)are fitted in the Board 2R Supply D.C.Lower, and the "ON" and "OFF" pushes(268)(269) for controlling the starters are fitted on Board 2R Controlling (see figure i.). Motor field regulators are not fitted, but each machine has an alternator field regulator(224)(257) which is controlled from the silent compartment.

Reversing Booster (See Admiralty Handbook of W/T (1931) paragraph 251). The output voltage of the machine (213) can be controlled between the limits of 130 and 140 volts(i.e.,a mean of 130 volts) by the contactor(230)and reversing booster(259). When correctly adjusted, the contactor arms are balanced between the control spring and the bottins(240)(242) at a voltage of 130 volts. An increase of 3% in voltage will cause the moving contact to close, against the action of the spring, on to the fixed contact (239). The machine(214) can be controlled similarly.

Setting the Contactor. The contactor should only be set when the ship's voltage is steady, and should not be altered unless absolutely necessary. The operation should be carried out in the following order:-

(1) When the ship's voltage is steady, start the alternator and see that the voltage control switch (221) or (222) applicable to that alternator, is "OFF".

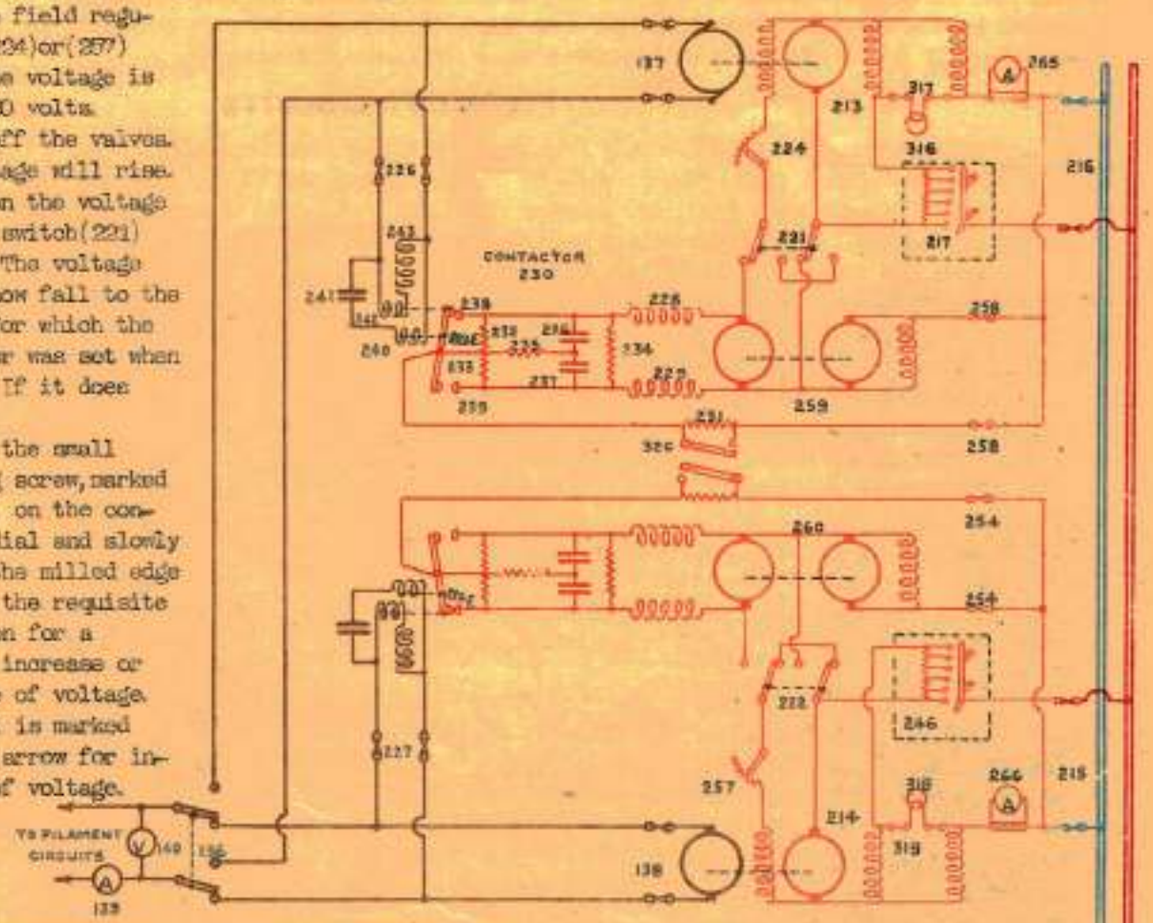
(2) Adjust the alternator output voltage by means of the field regulator(224)or(257) to 130 volts.

(3) Switch on the transmitting and rectifying valves and adjust each of the valve rheostats(112)(113)and (118)(119)respectively(see figure ba.)for the correct filament voltage, and then readjust the field regulators(224)or(257) until the voltage is again 130 volts.

(4) Switch off the valves. The voltage will rise.

(5) Switch on the voltage control switch(221) or(222).The voltage should now fall to the figure for which the contactor was set when issued. If it does not:-

(6) Unclamp the small clamping screw,marked "clamp", on the contactor dial and slowly rotate the milled edge dial in the requisite direction for a desired increase or decrease of voltage. The dial is marked with an arrow for increase of voltage.



When the output voltage is again 130 volts clamp the dial. When the valves are now switched on, the filament voltage of each should be correct, ~~but slight readjustment may be made by unclamping and readjusting the contactor dial, or by adjusting each rheostat as necessary.~~

The field regulators (224)(257) should never be altered when once set (vide (3) above) whilst using the constant voltage system, otherwise the mean position of working will be disturbed.

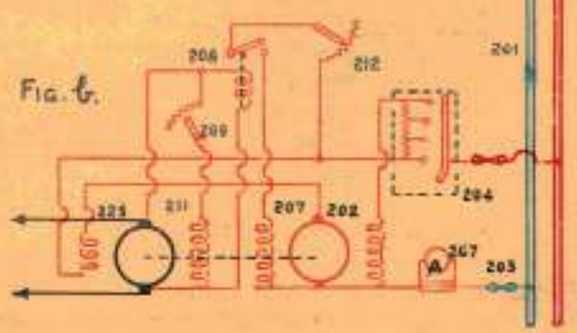


Fig. 6.

RL8
R92

TYPE 47

1½ K.W. SUPPLY

1½ KW Constant Voltage Generator. This motor generator is specially designed to give an approximately constant output voltage in spite of fluctuations of the motor supply. It is used as an alternative filament supply to the valves(3)(4) or (5) when using H/F or H.H/F, but in present sets will not be replaced when defective, and will not be fitted in future sets. (When not fitted, its starter (304) and ammeter (307) are also omitted, and neither Board 3F D.C. Output, nor link fittings (62) (79) are then fitted.)

One machine (302) is fitted (see figure t.) and is supplied direct from the bus bars(301) through a pair of fuses (308) to the automatic starter (304) and the motor. An ammeter (307) connected in the circuit indicates the input current to the motor. The generator has two shunt windings (207)(211), one of which is excited from the motor supply and the other from the generator output. The former is called the "Opposing generator field" and the latter the "Main generator field". It is also provided with a series field winding (226) in series with the motor armature input.

It is possible with the motor supply voltage at any figure between 180 and 240 volts to vary the output voltage from 19 to 35 volts. The output voltage is controlled by the field regulators (209)(212) which, as described on page [illegible], are controlled from the silent compartment. The regulator in the "Opposing field" is of 3000 ohms resistance and the regulator (209) in the "Main field" 7.5 ohms. In view of the fact that an "Opposing field" is provided in the generator, it is possible under certain settings of the field regulators (209)(212) for the "Opposing field" to take charge of the "Main field" and thus reverse the output polarity. An automatic relay switch (206) is therefore provided which is operated by the generator output, and prevents the "Opposing field" being excited until the output voltage has reached approximately 19 volts. The relay switch (206) is contained in a metal case and mounted on top of the generator (202).

D.C. Output (See figure ta.) The D.C. output is connected to a D.P. switch (145) on Board 2F D.C. Output in the silent compartment. A condenser (148) and voltmeter (146) are connected across the output, the former as a cushioning unit, the latter to indicate the output voltage. An ammeter(147) connected in the circuit indicates output current. The D.P. switch (145) connects the output to the transmitters 2F H/F or 2F H.H/F as described under "Filament Circuits".

FILAMENT CIRCUITS

2 KW A.C. Filament Supply. The A.C. supply from the C.O.S. (136) is connected to two arms of the 6-pole "Main – Low Power" C.O.S. (18). The circuit is completed when the filament switch (49) is operated (see figure l.). A voltmeter (140) and ammeter (139), fitted in the silent compartment, are connected in the circuit to indicate the output voltage and current from the 2 KW machine in use.

When the C.O.S. (18) is in the "Main" position, the supply is connected direct to the primary of the rectifier valves filament transformer (115) and the A.C. – D.C. C.O.S. (135). The secondary of the rectifier filament transformer (115) supplies the filaments of the rectifying valves (1)(2), the filament circuit of which, is completed when the rectifier switch (120) is operated.

A rheostat (118)(119) connected in the filament supply to each valve (1)(2) allows the current of either to be separately controlled. A voltmeter(116), protected from H/F currents by the condenser (178) can be connected in the filament circuit of either valve by the switch (117).

The centre contacts of the C.O.S. (135) are connected to the filament contacts of the H.T. and Filament C.O.S. (126). In its normal position one contact of the H.T. and Filament C.O.S. (126) completes the supply through the primary of the filament transformer (114) for the L/F or H/F valves (3)(4) or (5). By making the switch (198) on Board 2F Controlling (see figure m.) the tobtin circuit of switch (123) is completed and the switch operated. This breaks the supply to the filament transformer (114) of the L/F – H/F Transmitter and makes it to the filament transformer (78) of the H.H/F transmitter.

When the C.O.S. (18) is in the "Low Power" position, the supply is connected through the rheostat (48) to the primaries of the filament transformers (35) and (39) for the transmitting valve (8) and the rectifying valves(6)(7) respectively. The rheostat (48) has three variable contacts, two of which control separately the current of the transformers (35) and (39) and the other controls the amount of resistance short-circuited by the magnetic key (47). The resistance which is cut out acts as a compensating device similar to the Type 36 and 38 L.P.A. (see pages [illegible] and [illegible]). The primary of the transformer (44) for the Low Power H.T. supply is also connected in parallel with the filament transformers (35)(39) when the magnetic key (47) is made (see page [illegible]).

1½ KW D.C. Filament Supply. The filaments of the valves (3)(4), when used for H/F, and the valve(5) for H.H/F can be directly connected to the D.C. output from a constant voltage generator(302)(see pages [illegible] and [illegible]). The D.C. supply is from a D.P. switch(145) on Board 3F D.C. Output, through a pair of fuses(144). The supply is connected to one contact of the A.C. – D.C. change over links (62) and (79), for H/F and H.H/F respectively, and the magnetic switch (141). In the normal position this switch (141) connects the supply to another contact of the A.C. – D.C. links (62). When the links are in the D.C. position the supply is connected via two contacts of the L/F – H/F switch (24) to the filaments of the valves(3)(4). When the switch (141) is operated the supply is connected to the A.C. – D.C. links (79) and thus to the filament of the valve (5). The C.O.S. (135) in the D.C. position completes the tobtin circuit of the switch (141), when the switch (198) on Board 3F Controlling is made for H.H/F. This circuit is then in parallel with the tobtin circuit of the H.T. and Filament switch (126) (see figure m.).

RL9
~~R93~~

TYPE 47
FILAMENT CIRCUITS

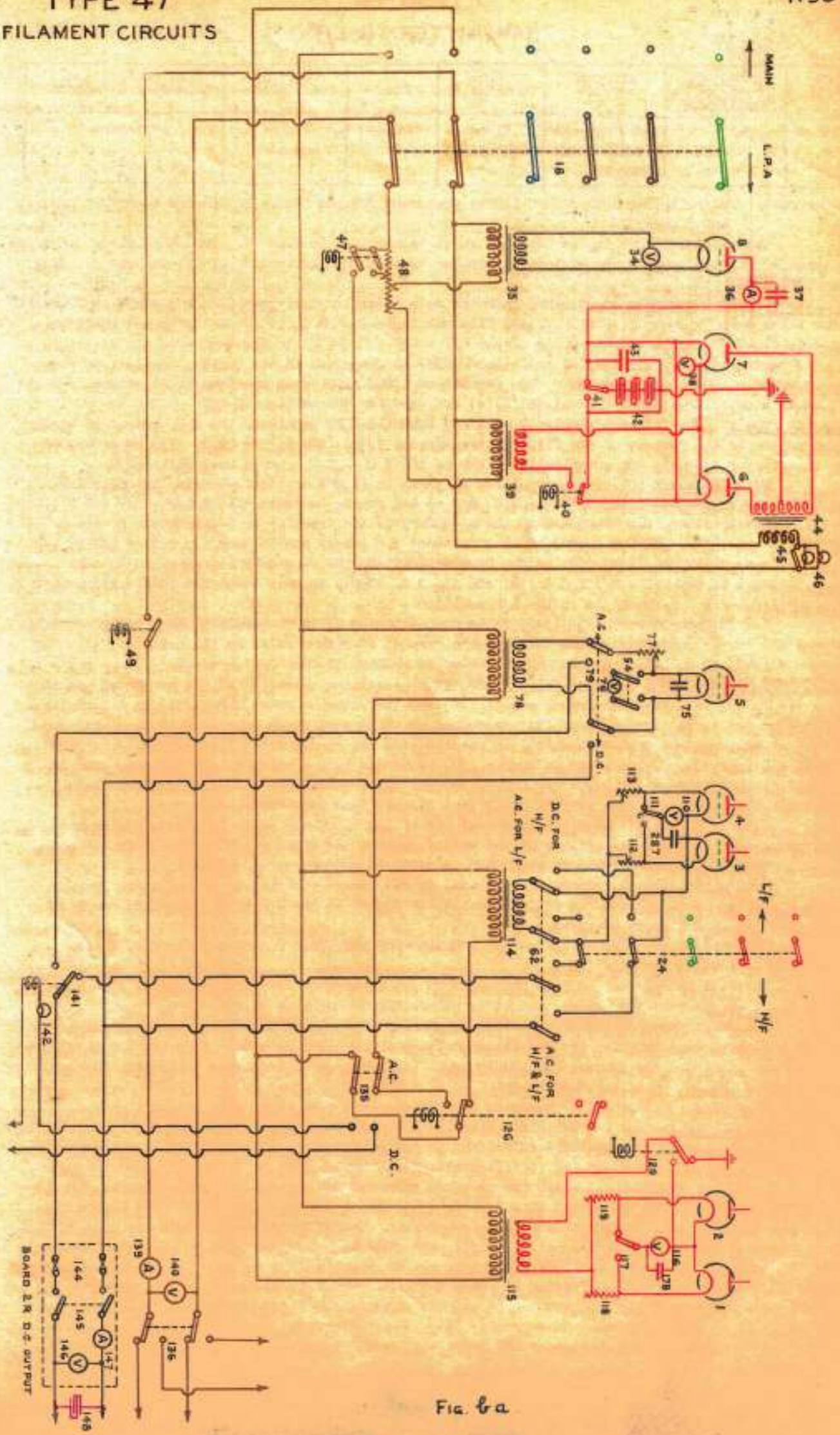


Fig. 6a

RL 10
R94

TYPE 47

TRANSMITTER 3R L/F

Wave form	Method of producing oscillation	Nature of circuit	Grid excitation	Feed	Aerial excitation	High oscillating potential electrode
C.W. or I.C.W.	Self	Tuned circuit between anode and grid.	Direct inductive	Series	Direct inductive	Filament

Reference:- Admiralty Handbook of W/T (1931) paragraph 639 and figure 361(t) and paragraph 631 and figure 364.

Transmitter 3R L/F is the main L/F valve transmitter in Type 47. Two MT25 valves connected in parallel are employed. The circuit is similar to that for Transmitter 3K L/F in Type 37, (see page ~~RF5~~ RF5

H.T. Supply. The H.T. supply is obtained from the main rectifier unit (see figure a.), and is described under notes on 20 kW supply. The H.T. and filament magnetic C.O.S. (126), in its normal position, connects the H.T. supply via two poles of the L/F - H/F C.O.S. (24) to the anodes of the valves (3) (4). A centre tapped non inductive resistance (295) is connected in the supply, one half of which is in series with each valve anode. This resistance (295) suppresses spurious oscillations from the H/F oscillatory circuit when the valves (3)(4) are used for Transmitter 3R H/F.

Filament Supply. The filament supply is obtained from the 3 KW machines, the A.C. output of which is connected to the primary of the filament transformer (114) (see figure ta.). The secondary of the transformer (114) is connected to two links of the A.C. - D.C. change over links (62).

With the links (62) in the position as shown in figure a., the secondary is connected direct to the filaments of the valves (3)(4) and to two centre contacts of the L/F - H/F C.O.S. (24). The filaments are therefore connected to the secondary of the transformer irrespective of the position of the L/F - H/F C.O.S. (24) and the filament A.C. supply can be used for either L/F or H/F transmissions. With the links (62) in the reverse position the secondary is connected to two outer contacts of the L/F - H/F C.O.S. (24) and the A.C. supply is only connected to the filaments when the L/F - H/F C.O.S. (24) is in the L/F position.

A 0.25 ohm rheostat (112)(113) is connected in the filament supply to each valve. A voltmeter (110) can be connected across the filament circuit of either valve by the switch (111). The condenser (307) is connected across the voltmeter to protect it from H/F currents.

Oscillatory Circuit. The grid and filament of the transmitting valves (3)(4) are connected via the L/F - H/F C.O.S. (24), Transmit-Dryout switch (19) and the Main-Low Power C.O.S. (18) to two variable tappings on the aerial coil (10) or (11) depending on which coil is in use. A grid leak unit consisting of two banks of resistances (23) in parallel and two condensers (22) in series, making a unit of 2.5 jars, 10,000 ohms, and an ammeter (20) protected by a condenser (21) are connected in the grid circuit between the L/F - H/F C.O.S. (24) and the Transmit-Dryout switch (19). These components therefore also form part of the dryout circuit (see page ~~RL12~~ RL12)

Aerial Circuit. The aerial circuit consists of one of two 2,200 mic coils (10)(11), variometer (12), fine tuning coil (13) and the primary of the aerial ammeter transformer (15). The whole are connected in series, and the circuit is completed to earth by the operating switch (17).

A flexible link (9) connects the aerial to the aerial circuit for Transmitters 3R L/F, 3R Low Power, 3R Spark, 4R and the dryout circuit, or direct to the H/F or H.H/F aerial coupling coils (62)(63) (see figures d. and e.).

The variometer (12) can be used if required for very fine tuning adjustments. It is fitted with a short circuiting link.

The fine tuning coil (13) is connected to the variometer (12) and the aerial link board (14). The link connects the aerial circuit to either the Transmitter 3R L/F, 4R or Spark.

The aerial ammeter transformer (15) is connected to either the ammeter (16) or milliammeter (33) according to which way the Main-Low Power C.O.S. (18) is made. When the C.O.S. (18) is in the "Main" position the ammeter (16) is in use. This instrument indicates the aerial current and is fitted inside the silent compartment.

The operating switch (17) connects the aerial circuit to earth when transmitting.

D.C. Auxiliary Circuits. The D.C. auxiliary circuits are described on page ~~RL11~~ RL11 to ~~RL20~~ RL20.

Tuning. Set the transformer switches (134)(135) to the transformer (132) or (133) (see figure a.). Make the L/F - H/F C.O.S. (24) to L/F, the Transmit-Dryout switch (19) to "Transmit", and the Main-Low Power C.O.S. (18) to "Main". Start the machines and make the appropriate D.C. circuits. Place the wavemeter mutual near the aerial coil (10) or (11), press the morse key (151) (see figure e.) and adjust the aerial circuit to the desired frequency. Coarse tuning adjustments are made by the upper and lower taps on the aerial coil (10)(11), and fine tuning adjustments on the fine tuning coil (13). Adjust the grid and filament tappings on the coil (10)(11) to give a maximum current reading in the ammeter (16). It should be noted that the amount of coil (11) between the grid and filament taps determines the grid excitation and the amount between filament and lower tap corresponds to an anode tapping. Consequently these amounts must be correctly adjusted to obtain the best performance although the upper and lower taps have already been set for the required frequency.

TYPE 47

TRANSMITTER 3R L/F

RL 11

~~R95~~

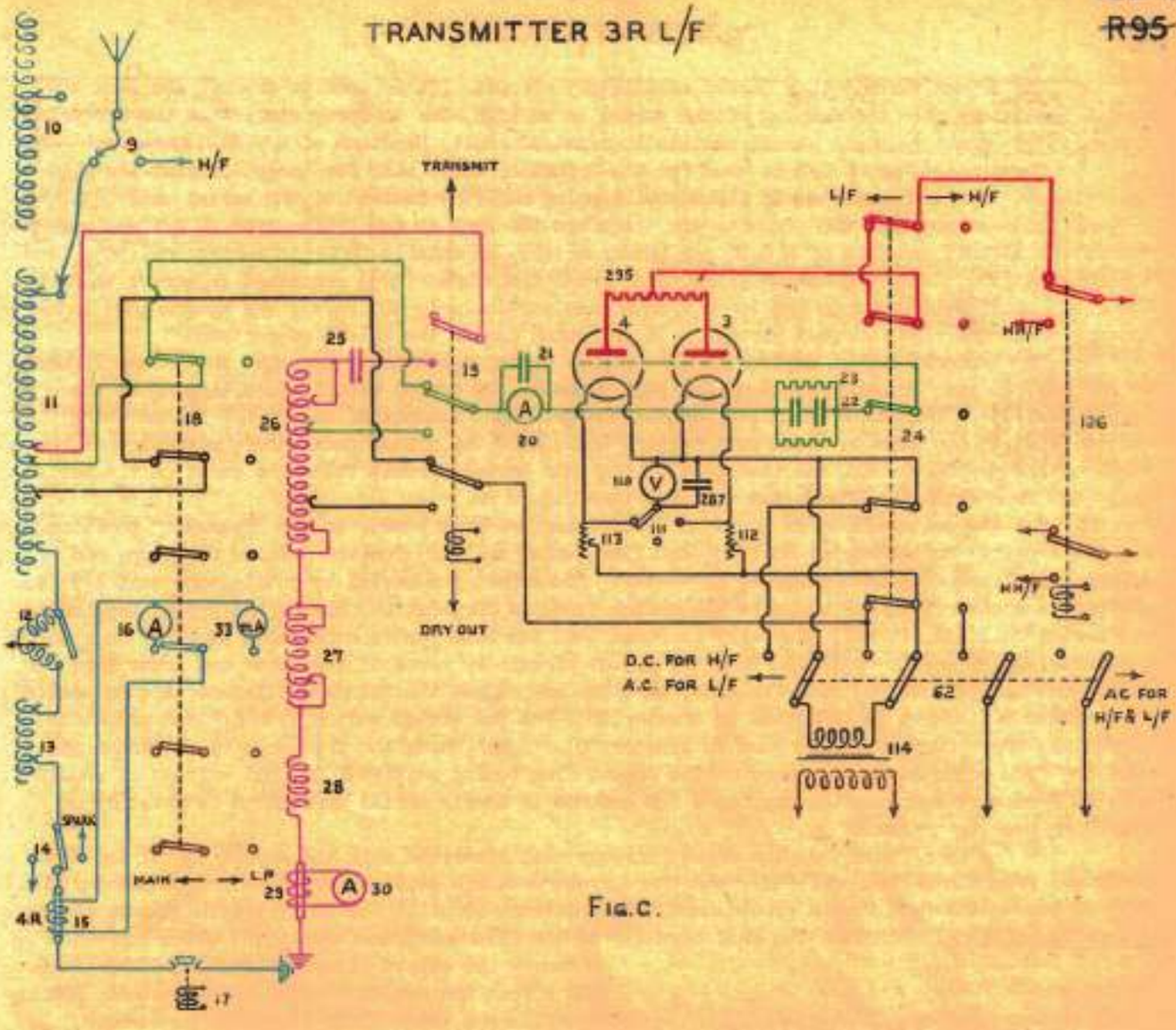


Fig. C.

EQUIVALENT CIRCUIT

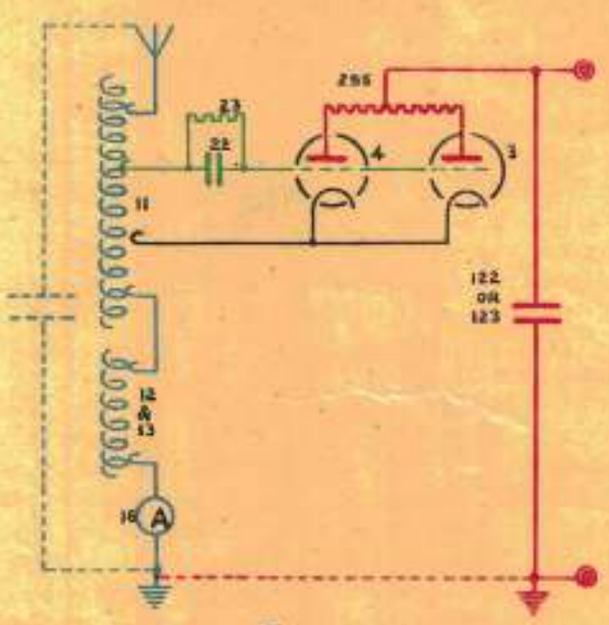


Fig. Ca.

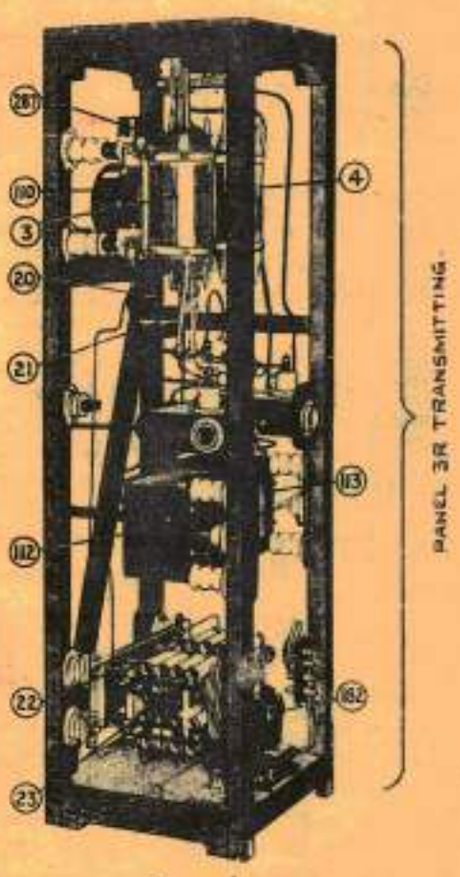


Fig. C b.

RL 12
R96

TYPE 47

DRYOUT CIRCUIT

The dryout circuit is a closed oscillatory circuit. It is used to dry off the deck and aerial insulators when the damping of the aerial is so high, due to spray etc., that the L/F valve transmitters cannot maintain aerial oscillations(see Admiralty Handbook of W/T(1931)paragraph 633).

The transmitter 3F L/F is used for the dryout circuit, with the exception that the grid and filament taps are connected to the dryout tapping coil(26) instead of the aerial coil (11). The H.T. and filament supplies and circuits are therefore the same as for Transmitter 3F L/F(see page [illegible]). The dryout circuit consists of a 0.25 jar condenser(25), adjustable 5000 mic tuning coil(26), fine tuning coil (27), fixed 850 mic coil(28), and aerial transformer(29), connected in series to earth. The fixed coil(28) is used on the lower frequencies(particularly 107 kc/s). The ammeter(30) indicates the current of the dryout circuit. It is fitted inside the silent compartment.

The Transmit-Dryout switch(19) is a 3-pole 3-way magnetically operated switch(see figures c. and c.) In the "Dryout" position, one pole connects the dryout circuit to a tapping on the aerial coil(11). The other two poles connect the grid and filament of the 3F L/F Transmitting valves(3)(4) to two taps on the dryout tapping coil(26). The closed oscillatory circuit then consists of the dryout circuit and that part of the main aerial circuit below the point on the aerial coil (11) from which the dryout tap is taken (see figure cc.)

Tuning. Put the switch (193) on Board 2F Controlling(see page [illegible]), to the "Transmit" position. Set the tappings on the aerial coil(11) and fine tuning coil(12) for the desired frequency and measure this frequency accurately by wavemeter. Disconnect the aerial by putting the switch(9) to any position other than L/F and make the switch (193) to "Dry-Out". Connect the dryout tapping to the aerial coil(11). It will generally be found that the best position for this is on or near to the grid tapping on the coil(11). Tune the dryout circuit by means of the upper and lower taps on the dryout coil(26) to the same frequency as above and adjust the grid and filament taps on coil(26) for maximum efficiency as indicated in ammeter(30). Put the aerial switch(9)to L/F and press the signalling key. Current should show in ammeter(30). Again check the frequency by wavemeter and make any fine adjustments necessary on the dryout fine tuning coil(27). On full voltage it should only be necessary to press the key for a few seconds to enable aerial current to be obtained on switching over to transmit.

It has been found that the dryout circuit will oscillate with the dryout aerial tap disconnected from the aerial coil (11), and the current readings still be obtained in the ammeter(30). This is due to the fact that a closed oscillatory circuit is still formed by the inductance of the dryout circuit(26)(27)(28)and the self capacity of the filament transformer(114) to earth, which is shown by the dotted line in figure cd. This does not affect the dryout circuit to any extent, nor is the filament transformer liable to be damaged.

EQUIVALENT CIRCUITS

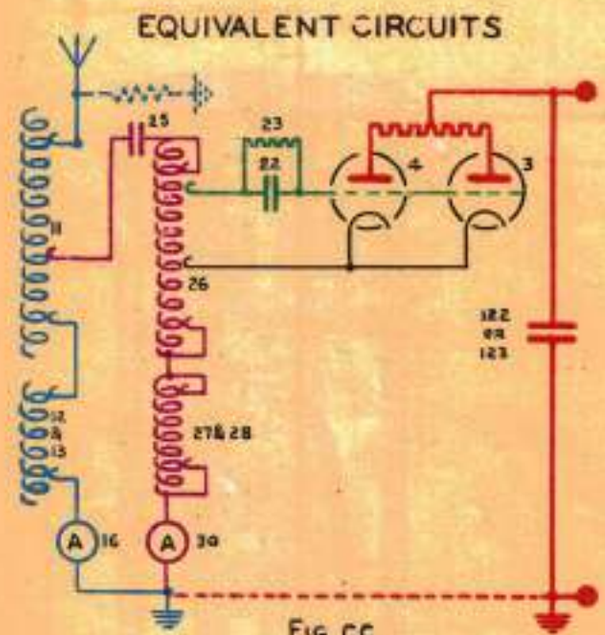


Fig. cc.

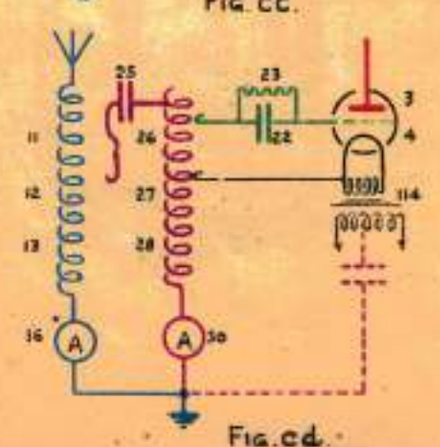


Fig. cd.

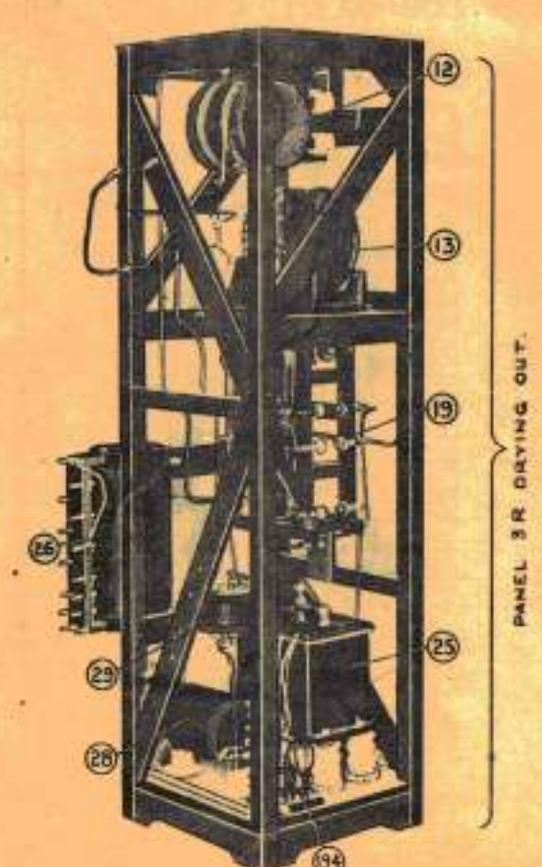


Fig. ce.

RL13
~~R97~~

TYPE 47

TRANSMITTER 3R H/F.

Wave form	Method of producing oscillation.	Nature of circuit	Grid excitation	Feed	Aerial excitation	High oscillating potential electrode
I. C. W.	Self	Tuned circuit between anode and grid.	Direct capacitive	Parallel	Mutual inductive	Anode.

Reference:- Admiralty Handbook of W/T (1931) paragraph 712.

Transmitter 3R H/F is the H/F transmitter in Type 47. It uses the same valves as Transmitter 3R L/F with a 5-pole change over switch for the power supplies and oscillatory circuit. The circuit is similar to that of Transmitter 3G H/F (see page ~~R94~~ RE 10)

H.T. Supply. The H.T. supply is obtained from the main rectifier unit (see figure a.) The H.T. and filament magnetic C.O.S. (123), in its normal position connects the H.T. supply to a centre contact of the L/F - H/F C.O.S. (24). When this switch (24) is in the H/F position, one pole connects the supply to the anode choke (61). This choke is connected between two contacts of the L/F - H/F C.O.S. (24), a second pole of the switch connects the anode choke(61) to the anodes of the valve(3)(4). A centre tapped non inductive resistance (235) is connected in the supply, one half of which is in series with each valve anode. This resistance (235) suppresses spurious oscillations from the oscillatory circuit.

Filament Supply. As stated on page ~~R96~~ RL8 the filament supply is from the 3 kW machine (A.C. supply) or the 1½ kW machine (D.C. supply). The A.C.-D.C. change over links (62) connect the filaments to the A.C. or D.C. supply.

A.C. Supply. The A.C. supply and circuit is the same as for Transmitter 3R L/F (see page ~~R94~~ RL10) except that the L/F - H/F C.O.S. (24) connects the filament to earth.

D.C. Supply. The D.C. supply is connected to two of the change over links (62). When these two links are in the position shown in figure d. they connect the D.C. supply to the filaments of the valves (3)(4) provided the L/F - H/F C.O.S. (24) is made to the H/F position. The filament circuit is the same as for the A.C. supply.

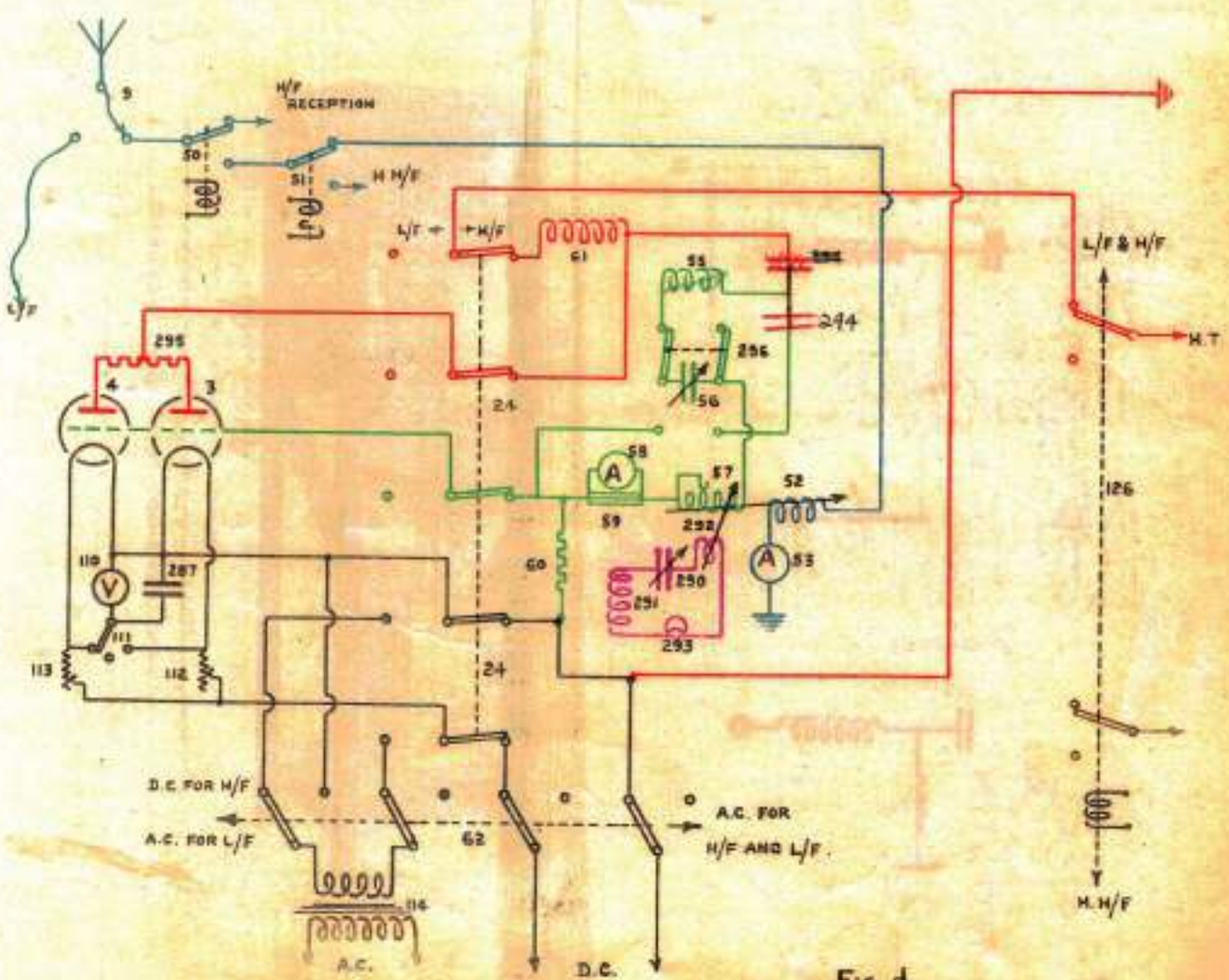


Fig. d.

TYPE 47

TRANSMITTER 3R H/F (CONT.)

Oscillatory Circuit. The oscillatory circuit in the series position (figure da) consists of a 5 mic coil(55) variable tubular condenser(56), 15 mic primary coupling coil(57) and anode-grid inter-electrode capacity of the valves(3)(4). In the parallel position (figure db) the coil(55) is isolated. The condenser(56) can be adjusted by a handle on the front of the panel inside the silent compartment. One pole of the L/F – H/F C.O.S.(24) connects the grid of the valves to the oscillatory circuit. The variable condenser (56) can be connected in series or parallel with the primary coupling coil (57) by the D.P. switch(296). The two types of circuits are used to obtain a greater frequency range. In parallel the frequency range is approximately 4120 kc/s to 10,000 kc/s and in series 10,000 kc/s to 13,600 kc/s. The ammeter (58), with shunt (59), connected in the grid circuit indicates the oscillatory current. A grid leak (60) of four 30,000 ohm resistances in parallel is connected between the grid and filament to earth.

Aerial Circuit. The main aerial is used untuned. An aerial coupling coil (52) is coupled to the grid primary coupling coil(57), the degree of coupling being variable. One end of the aerial coupling coil(52) is connected to an aerial ammeter(53) to earth, and the other end of the H/F – H.H/F aerial magnetic switch (51). In its normal position the aerial switch (51) connects the H/F aerial circuit to the H/F send-receive magnetic switch (50). The operating circuits of these switches are shown in figures m and n. When transmitting, the send receive switch (50) connects the aerial circuit to the flexible linkboard (9) and thus to the aerial. The ammeter (53) indicates the aerial current.

D.C. Auxiliary Circuits. The D.C. auxiliary circuits are described on pages RL21 to RL26

Tuning. A tuning chart applicable to the transmitter is supplied giving the approximate adjustments for various frequencies. The D.P. switch(296) is set to the "series" or "parallel" position, depending on the frequency required. The coil(57) is set to the approximate adjustments and the circuit finally adjusted to the required frequency by the variable condenser (56). A tuned link circuit or wavemeter coupling unit consisting of an inductance(291), variable condenser(290), pea lamp(293) and mutual coil (292) is permanently coupled to the primary grid coupling coil(57). This unit is fitted inside the silent compartment and enables the set to be tuned from that position. Maximum brilliancy is obtained in the lamp(293) by adjusting the variable condenser(290). The wavemeter in use is then coupled to this coupling unit and the frequency measured. The amount of coupling between the aerial coupling coil(52) and grid coil(57) is then adjusted to give a maximum current reading in the ammeter (53).

An alternative method of tuning is by Oscillator G31 as described under Transmitter SR H.H/F (see page RL16)

EQUIVALENT CIRCUITS

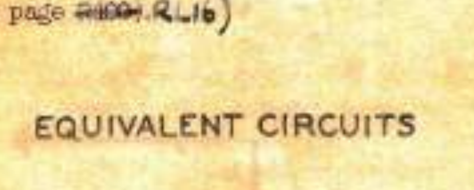


Fig da.

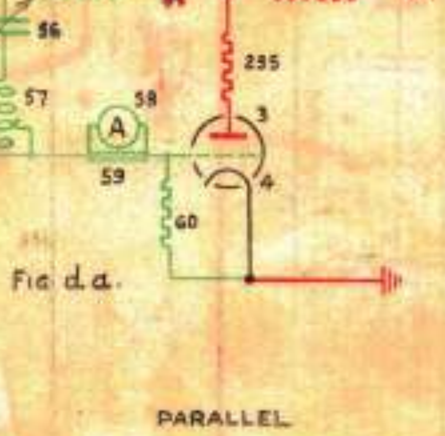


Fig db

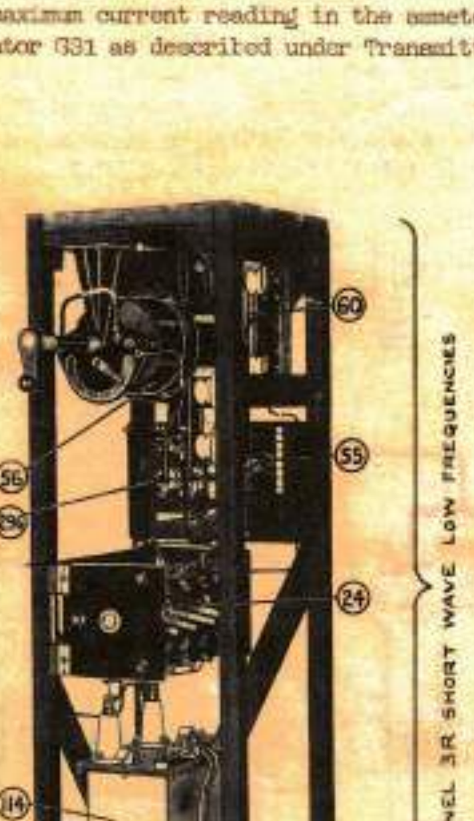


Fig dc

RL 15
~~R99~~

TYPE 47

TRANSMITTER 3R H.H/F

Wave form	Method of producing oscillation	Nature of circuit	Grid excitation	Feed	Aerial excitation	High oscillating potential electrode
I.C.W.	Self	Tuned circuit between anode and grid	Direct inductive	Series	Mutual inductive	Anode

Reference — Admiralty Handbook of W/T (1931) paragraph 632

Transmitter 3R H.H/F is the H.H/F transmitter in Type 47. A divided circuit similar to that in Transmitter 7H (see page 53), is employed.

H.T Supply. The H.T supply is obtained from the main rectifier unit (see figure a). The H.T and filament C.O.S (128), when operated (see figure a), connects the H.T supply to the anode choke (65) and variable anode coil (70). The anode coil (70) is connected direct to the anode of the valve (5) or through an additional coil (72) depending on the position of the D.P. switch (73). The use of this switch (73) and coil (72) is described below.

Filament Supply. The filament supply is taken from the 3 KW machine (A.C supply) or the ½ KW machine (D.C supply) (see page ~~60~~ 58). The A.C - D.C links (79) connects either of the supplies to the filament circuit. In the "A.C." position the change over links (79) are connected to the secondary of the filament transformer (78). In the "D.C." position, providing the magnetic switch (141) for H/F or H.H/F is operated (see figure a), the C.O.S. (79) is connected to the Board 3R D.C. Output.

The filament circuit is earthed. A rheostat (77) is connected in the circuit to control the filament current, and a voltmeter (76) can be connected across the supply by the switch (54) to indicate the filament voltage. The rheostat (77) cannot be controlled from the silent compartment. The condenser (75) protects the voltmeter (76) from R/F currents, but the switch (54) has been found necessary to isolate the voltmeter (76) completely from R/F currents.

Oscillatory Circuit. The oscillatory circuit is a divided circuit consisting of the variable grid coil (71), condensers (66) (67), variable anode coil (70) and the grid anode capacity of the valve (5). The variable coil (72) can also be included. An ammeter (68), with shunt (69), are connected in the circuit to indicate the oscillatory current. The condensers (66) (67) are the anode blocking condensers, and prevent the H.T. voltage being impressed on the grid. They are 0.66 jar units connected in series, and mounted in one case forming a unit of 0.33 jars. The strap connecting the two condensers forms the shunt (69) for the ammeter (68). The coil (72) can be connected in the circuit by the D.P. switch (73) as an additional inductance for the lower frequency range of the transmitter (frequencies below 10,000 kc/s). A grid leak (74), consisting of three 30,000 ohm resistances in parallel, is connected between the grid and the filament earth. It will be noted there is no variable capacity in this circuit.

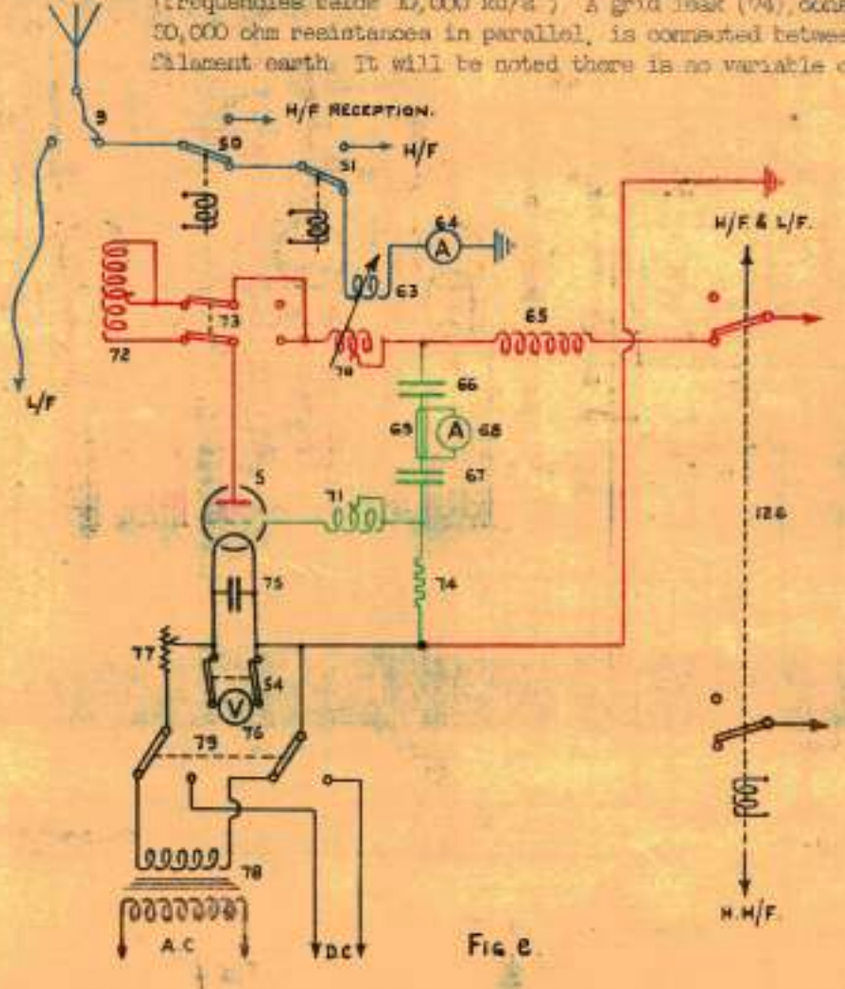


Fig e

RL16
~~R100~~

TYPE 47

TRANSMITTER 3R H.H/F (CONT)

Aerial Circuit. The main aerial is used untuned. An aerial coupling coil (63) is coupled to the anode coil (70). The coil (63) is mounted on the same axis as the anode coil (70) and is provided with means to alter its position relative to the anode coil, thus providing an adjustment for the amount of coupling.

One end of the aerial coupling coil (63) is connected to earth through an aerial ammeter (64). The other end is connected to one contact of the H.F-H.H/F aerial magnetic switch(51). When the aerial switch (51)is operated (see figure n) the H.H/F aerial circuit is connected to the H/F send-receive switch (5). In the "send" position this switch connects the aerial circuit to the flexible linkboard (9) and thus to the aerial. The ammeter(64) indicates aerial current.

D.C Auxiliary Circuits. The D.C. auxiliary circuits applicable to Transmitter 3R H.H/F are described on pages ~~R99 to R100~~ RL22 To RL26

Tuning. To enable the transmitter to be tuned without entering the cage, an oscillator G31 is supplied and fitted inside the silent compartment. The oscillator is used in conjunction with the appropriate wavemeter for measuring the frequency of the H.H/F transmitter.

The method of tuning a transmitter with the above instruments is explained on page G04. It must be noted, however, that when tuning the transmitter, several harmonics may be audible and care must be taken to select the fundamental frequency.

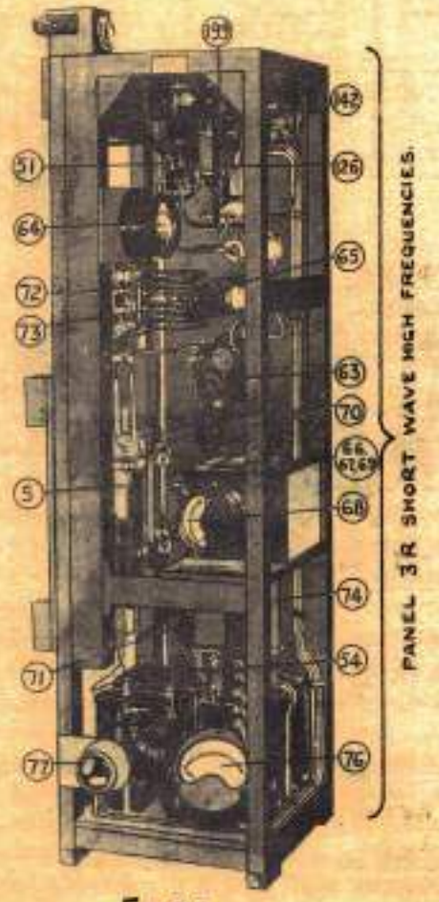


Fig. e a

TRANSMITTER 3R LOW POWER

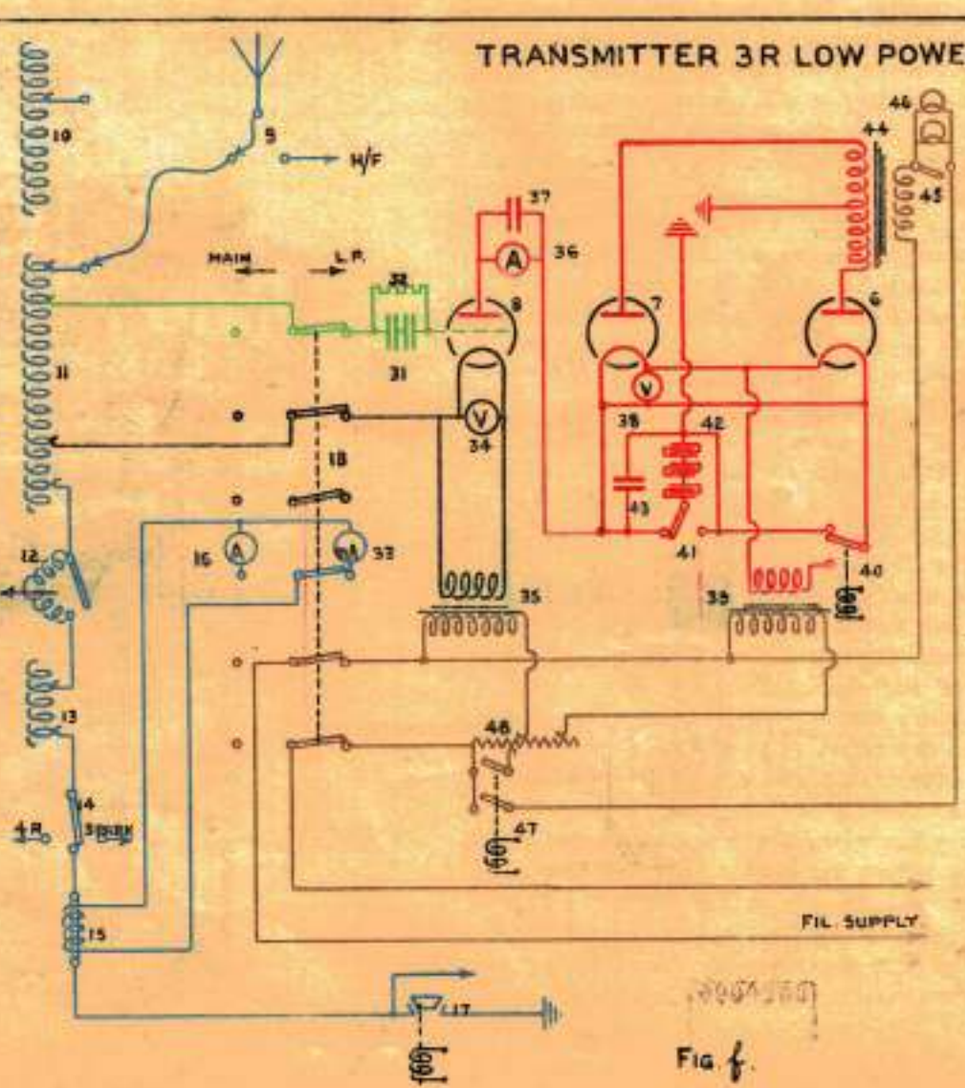


Fig. f.

RL 17
~~R10t~~

TYPE 47
TRANSMITTER 3R LOW POWER

Wave form	Method of producing oscillation	Nature of circuit	Grid excitation	Feed	Aerial excitation	High oscillating potential electrode
C.W. and I.C.W.	Self	Tuned circuit between anode and grid	Direct inductive	Series	Direct inductive	Filament

Reference:- Admiralty Handbook of W/T (1931) paragraph 531 :

Transmitter 3R Low Power is the low power attachment to Type 47. With the exception that a rectifier unit is provided the circuit is the same as for Transmitter 3Q Low Power (see page ~~R35~~ R36)

A.C. Supply. The A.C supply is from the 3 kW machine, and is connected to two centre contacts of the Main-Low Power C.O.S (18). When the C.O.S (18) is in the "Low Power" position the A.C. supply is connected direct to the primaries of the filament transformers (35)(39). A three contact rheostat is connected in the circuit as a compensating resistance (see page ~~R27~~ R-8)

The primary of the H.T. transformer (44) is connected in parallel with the transformers (35)(39) when the magnetic key (47) completes the circuit. The make and break of the A.C. supply in this circuit is the method employed for signalling. A second contact of the magnetic key (47) short circuits part of the compensating resistance. Two lamps (46) can be connected in the A.C. supply to the transformer (44) by breaking the switch (45). These lamps are a means of power control.

Rectifier Circuit. Two MU4 valves (6)(7) are used in the rectifier circuit. The anodes of the valves are connected across the secondary of the H.T. transformer (44). The centre point of the secondary is earthed. The filaments of the rectifier valves (6)(7) are connected across the secondary of the filament transformer (39). The rectifier switch (40), when operated, completes the circuit. In the "Normal" position the rectifier switch earths the filament and, after transmitting on C.W., the smoothing condensers (42). A two-way single pole C.W. - I.C.W. switch (41) connects the smoothing condensers (42) in the circuit for C.W., or a 4 jar condenser (43) for I.C.W. transmissions. The latter condenser is used to pass the R/F component of the valve current. The rectifier unit is connected to the anode of the transmitting valve (8).

H.T. Supply. The H.T. supply is from the low power rectifier unit as described above. An ammeter (36) protected from R/F currents by a condenser (37) is connected in the supply to indicate the anode current.

Filament Supply. The filament supply is from the 3 kW machine. The secondary of the filament transformer (35) is connected to the filament of the valve (8). A voltmeter (34) connected across the supply indicates the filament voltage. The rheostat (48) in the A.C. primary supply, controls the filament current. A connection is taken from the filament to the Main-Low Power C.O.S. (18).

Oscillatory Circuit. The grid and filament of the transmitting valve are connected to the Main-Low Power C.O.S. (18). A grid leak resistance of 30,000 ohms, across two ¼ jar condensers in series, is connected between the grid and the C.O.S. (18). When the C.O.S. (18) is in the "Low Power" position the grid and filament of the valve (8) are connected to two variable taps on the aerial coil (10) or (11).

Aerial Circuit. The Aerial circuit for the Transmitter 3R Low Power is the same as for Transmitter 3R L/P (see page ~~R30~~ R30) with the exception that one pole of the Main-Low Power C.O.S. (18) completes the aerial transformer (15) circuit through the milliammeter (33) instead of the ammeter (16).

D.C. Auxiliary Circuit. The D.C auxiliary circuits are described on page ~~R30~~ R30 Figure p

Tuning. The actual tuning of the transmitter is similar to that for the Main Transmitter 3R L/P. Place the wavemeter mutual near the aerial coil (11), adjust the aerial taps for coarse adjustments, and finally obtain the correct frequency by adjusting the fine tuning coil (13). Adjust the grid and filament taps for the maximum current reading in the milliammeter (33).

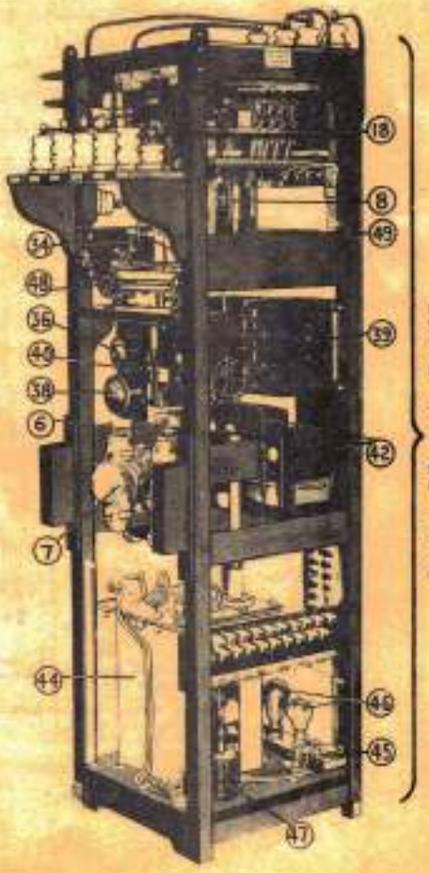


FIG. fa.

RL 18

R102

TYPE 47

TYPE 47 TRANSMITTER

Wave form	Method of producing oscillation	Nature of circuit	Grid excitation	Feed	Aerial excitation	High oscillating potential electrode -
C.W.	Self	Tuned circuit between anode and grid.	Direct inductive	Series	Mutual inductive	Anode

Reference:- Admiralty Handbook of W/T (1931) paragraph 629.

Transmitter 47 is a low power L/F transmitter, employing two NR15 valves in parallel, and is fitted as a component of Type 47. The transmitter, including the aerial coupling coil and aerial ammeter, is contained in a wooden box and is supplied as a complete instrument. It is designed for harbour use and for short distance transmission.

H.T. Supply. The H.T. supply is from the 220 volt busbars (201)(see figure 1.) and is controlled by the D.P. switch (149). This is also the key circuit supply (see figure 2.). It is connected to one pole of the key C.O.S. (154) and the morse key (151). The morse key completes the positive supply to the second pole of the key C.O.S. The key C.O.S. (154) connects the positive supply through a 5000 ohm resistance (83) and anode coil (84) to the anodes of the valves (81)(82) and the negative supply to the positive filament supply. The resistance (83) is used to reduce the 220 volts to 150 volts.

A 0.25 mfd. by-pass condenser (90) is connected between the H.T. and negative filament to complete the oscillatory circuit.

Filament Supply. The filament supply is taken from the 6 volt terminals on Board 3F (lower (see page 134). A D.P. switch (283) controls the supply and a pair of fuses (294) protect the filament circuit. The filaments of the valves are in parallel and a 6 ohm rheostat (92) controls the current. The voltmeter (91) indicates the filament voltage of both valves. A 50 jar condenser (93) is connected between the negative supply and earth, to isolate the 220 volt ship's mains from earth.

Oscillatory Circuit. The oscillatory circuit is of the divided type. It consists of the anode coil (84), grid coil (85), condenser (87), variable condenser (86) and the by pass condenser (90). A small grid leak unit consisting of a 20,000 ohm resistance (89) and a 5 jar condenser (88) is connected in the circuit to maintain the necessary negative grid potential. The coils (84) and (85) and the aerial coupling coil (94) are all wound on the same former.

The condenser (87) is 0.5 jars fixed and is connected in parallel with the 0.9 jar variable tuning condenser (86). This raises the maximum capacity value to 1.4 jars to obtain the frequency range for which the set was designed.

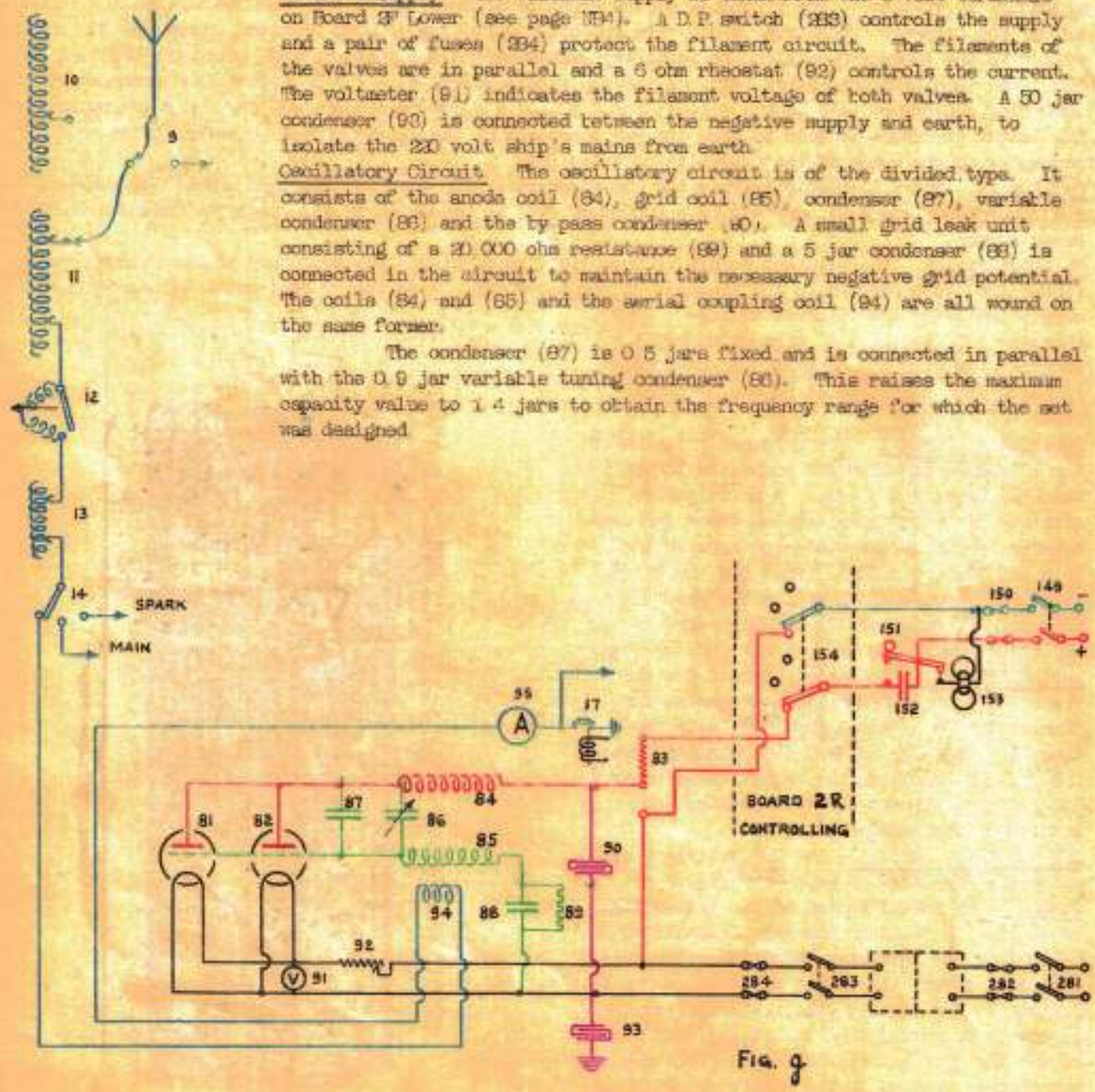


Fig. 9

RL 19
~~R103~~

TYPE 47

TRANSMITTER 4R (CONT.)

Aerial Circuit. The main aerial and aerial circuit is used and is coupled to the transmitter by the aerial coupling coil (94). The aerial link (14) connects the main aerial circuit to the coupling coil. The amount of coupling between the aerial and oscillatory circuits is fixed.

An aerial ammeter (95) is connected between the aerial coupling coil and earth when the operating switch (27) is completed.

D.C Signalling Circuit. The morse key (151) is connected in the H.T. supply. The operating switch (27) earths the aerial for transmitting. For the circuit of this switch see figure a.

Tuning. Place the wavemeter mutual near the primary coils (84)(85) and adjust the condenser (86) until the required frequency is obtained. The aerial circuit is adjusted to the required frequency the adjustments being those obtained from that frequency when tuning the Main Transmitter SR L/F. Slight alteration of the fine tuning coil (13) may give a greater aerial current reading in the aerial ammeter (95).

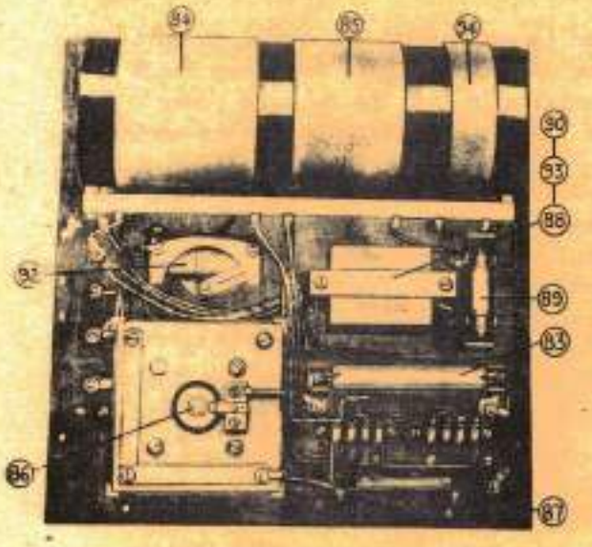


Fig. 9a.

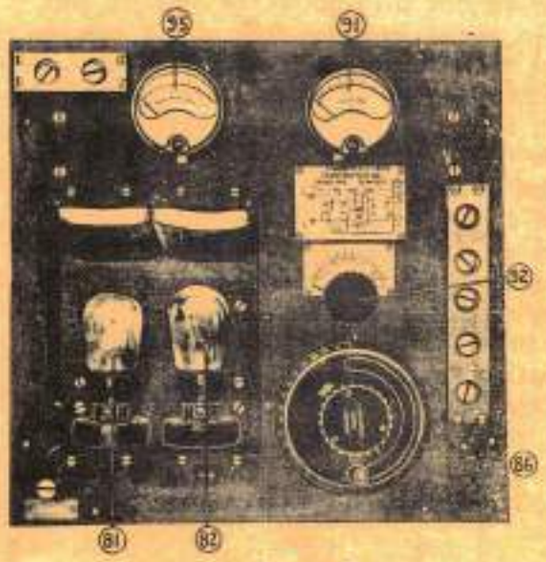


Fig. 9b.

TRANSMITTER 3R SPARK

Reference Admiralty Handbook of W/T (1931) paragraph 455.

The spark attachment to Type 47 is a medium power spark transmitter. The power supply is from the 10 kW machine, and one of the main transformers (see figure a.)

H.T. Supply. The H.T. supply is from the main transformer (133), the secondaries of which are connected in parallel by the "Series Parallel" Switch (139) (see figure as.). The parallel position is marked "Spark". In this position one end of the secondaries are earthed, and the condensers (101) are connected across them.

The high potential side of the secondaries are connected to one side of the spark gap (108) or (109) and the condensers (103) and/or (104). The other side of the spark gap and condensers is connected through an adjustable inductance (106) to earth, thereby completing the circuit to the earth side of the transformer secondaries.

A horn break fuse (99) and resistance (102) are connected in the circuit, the fuse as a protection, and the resistance to prevent oscillations occurring in the circuit formed by the secondaries of the transformer (133) and the two 1 jar condensers (101) connected across them.

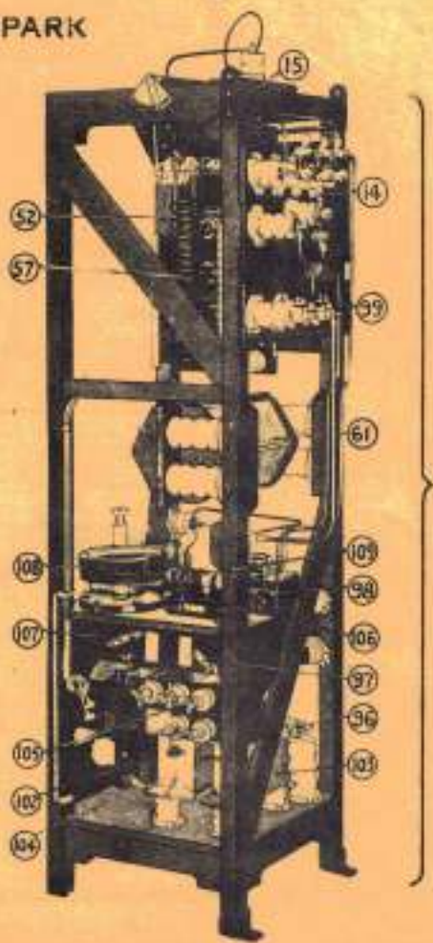


Fig. h.

RL20.

R104 -

TYPE 47

TRANSMITTER 3R SPARK (CONT.)

Oscillatory Circuit. The oscillatory circuit consists of the spark gap (108) or (109), condensers (103)(104), and primary coil (106). The spark gap (109) is a semi-quenched adjustable gap, and (108) a ½ kW adjustable quenched gap. The former is adjusted by moving one electrode, and altering the spark length (i.e., distance between the electrodes), the latter is adjusted by a flexible connection and clip which alter the number of electrode discs in use. Either of the spark gaps are connected in the circuit by a single pole 2 way switch (107).

The condensers (103, 104) are of 10 jars each and by means of the links (105) a combination of two condensers in series, or two in parallel, or one alone can be used (see figure bt.). The capacity values of these combinations are 5, 20 and 10 jars respectively. The value of the primary coil is 120 mics which is adjustable for tuning purposes.

Aerial Circuit. The main aerial and aerial circuit is used with the variometer (12) short circuited. The link (14) is moved to the "Spark" position, and thus connects the spark aerial coupling coil (98) in the aerial circuit. The coupling coil (98) is adjustable and is coupled to the primary coil (106). The coupling coil is wound on a former over the primary coil, and secured. The degree of coupling is obtained by varying the taps on the coupling coil.

An aerial condenser (96) of 0.5 jars can be connected in series with the aerial circuit by removing the short circuit link (97). This condenser is for use on the higher frequency range of the transmitter (above 667 kc/s) to reduce the value of the aerial circuit. The Main-Low Power switch (18) is set to the "Main" position. The aerial ammeter (16) is then connected to the aerial transformer (15).

Tuning. The condensers (103)(104) are set to the combination required for the frequency to which the transmitter is to be tuned. The wavemeter mutual is placed near the primary coil (106) and the oscillatory circuit is tuned by adjusting this coil. The aerial is then connected, the wavemeter mutual is placed near the aerial coil (11) and the aerial tuned to the same frequency as the oscillatory circuit, tuning adjustments being made on the aerial (11) and fine tuning coil (13). The aerial condenser (96) is connected in the circuit if the required frequency is above 667 kc/s. The aerial coupling is adjusted but it must be noted that any adjustment of coupling will affect the aerial tuning. The aerial circuit is earthed, when transmitting, by the operating switch (17).

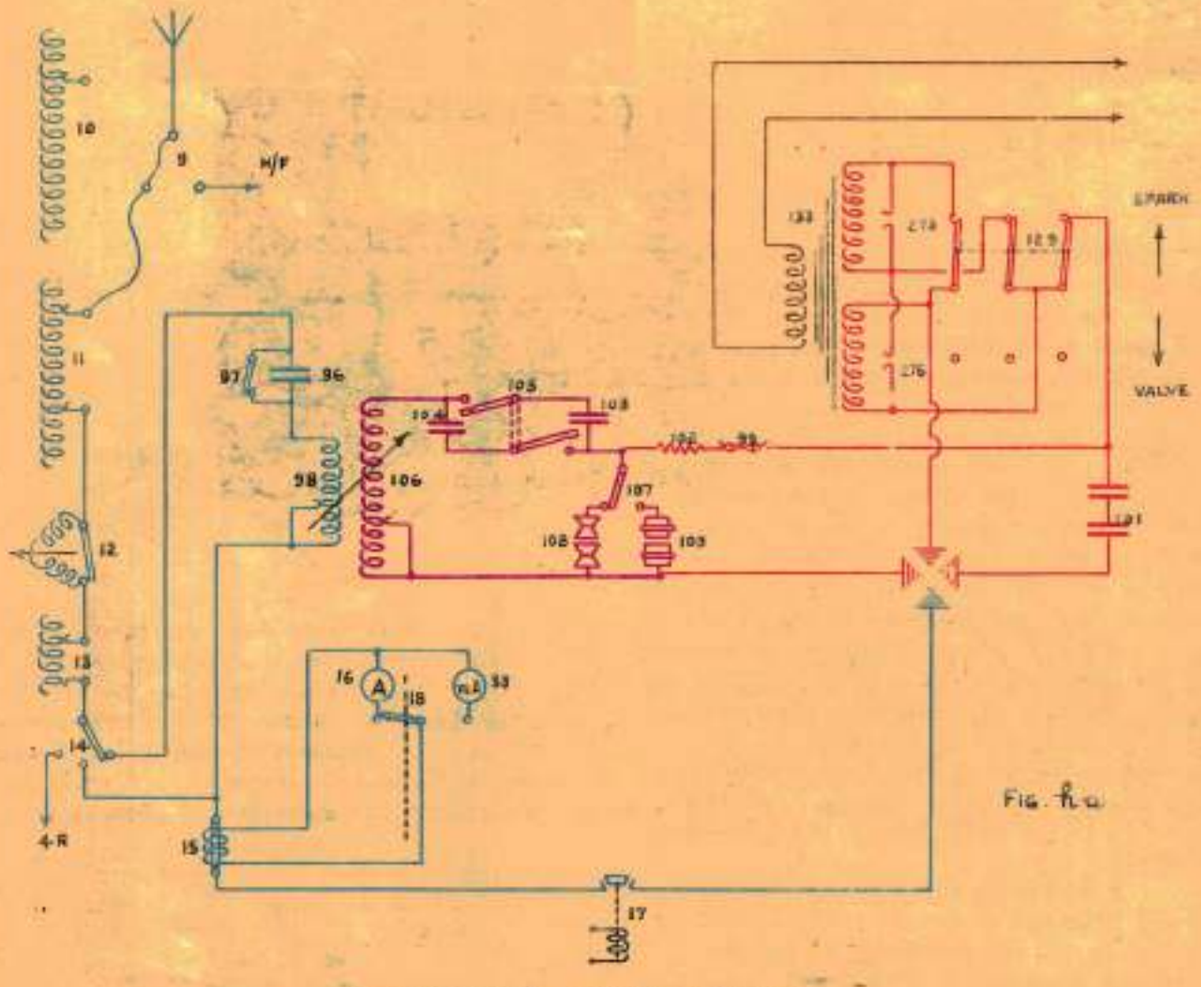


Fig. 4a

CONDENSER COMBINATIONS

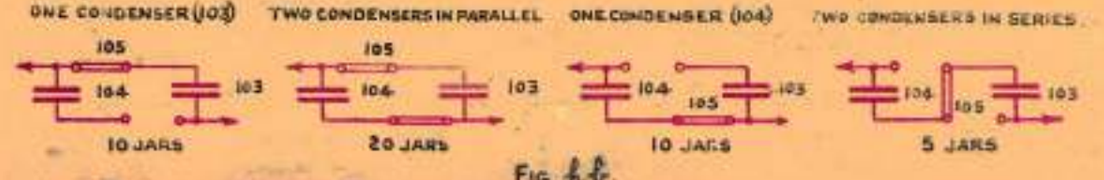


Fig. 4b

TYPE 47
BOARD 2R CONTROLLING

Board 2R Controlling is fitted inside the silent compartment. In addition to the "ON" and "OFF" pushes (261)(262)(268)(269)(270) for automatic starters and the switches (221)(222) for connecting in the reversing toosters, it contains the controlling switches for all D.C. auxiliary and signalling circuits, and two D.P. switches (324)(325) as spares.

The supply for this Board is from the 220 volt busbars (201). A D.P. switch (185) controls the supply and the fuses (186) protect the circuit. The D.P. switch (185) is connected to a D.P. switch (187) fitted on the Board. This switch controls the supply to the six subsidiary single pole switches (176)(198)(193)(174)(196)(183) and a D.P. switch (188). The single pole switches control supplies to the following:-

(176) { Loop Aerial Send-Receive Switch.
H.T. and Filament C.O.S.
(198) { H/F and H.H/F D.C. Filament Switch.
H/F and H.H/F Aerial Switch.
(193) Transmit-Dryout Switch.
(174) H/F Send-Receive Switch.
(196) Low Power Rectifier Switch.
(183) { Main Filament Switch.
Main Rectifier Switch.

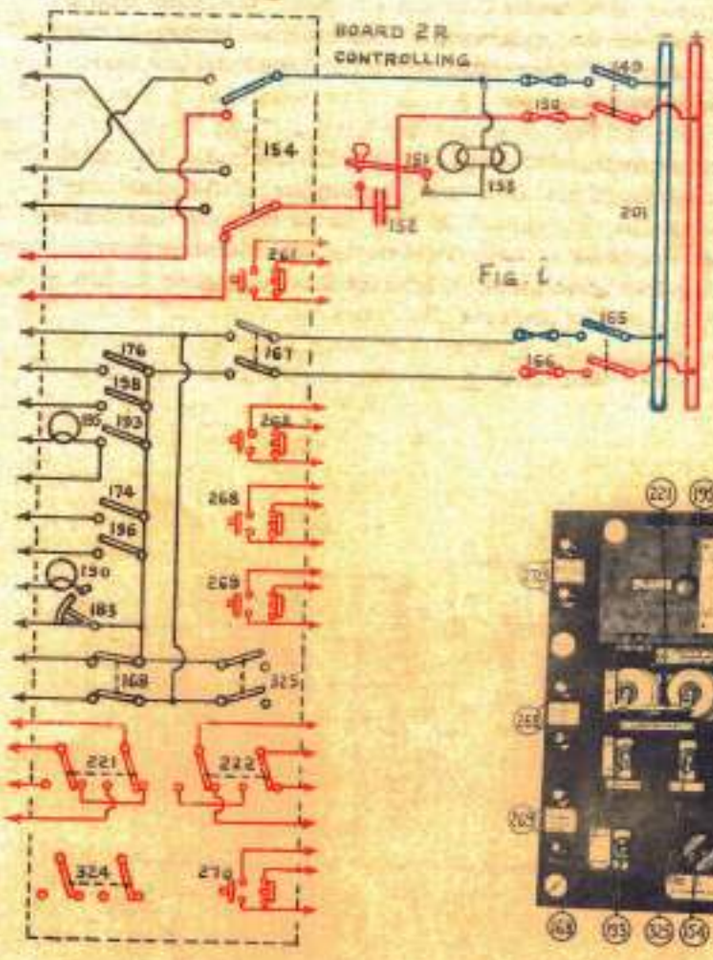


Fig. i.

The D.P. switch (188) controls the supply to either blower (190) or (191) and the relay switch (189) (see figure k.). The two-pole 3-way switch (154) is the control switch of the D.C. signalling circuit. It connects the morse key (151) in the Main Magnetic Key, Low Power Magnetic Key or Transmitter 4R H.T. supply circuits. (see figure a.).

One lamp (195) in the Transmit-Dryout switch circuit and one lamp (190) in the Filament and Main Rectifier switch circuits are inside the Board 2R Controlling.

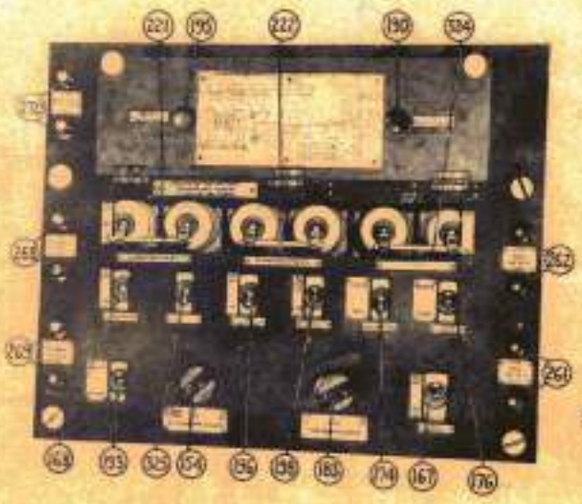


Fig. i a.

GATE SWITCHES

Three 3-point gate switches are fitted, one at the aerial trunk door, one at the sliding door of the upper flat and one at the gate in the lower flat. Each 3-point switch consists of two single pole switches (172)(187) - (320)(188) - (321)(189) which close when the doors are closed and one single pole switch (163)(322)(323) which open when the doors are closed. Two sets of corresponding single pole switches (172)(320)(321, and (187)(188)(189) are connected in series, the remaining set (163)(322)(323) are connected in parallel. The former are connected in various D.C. auxiliary circuits as a safety arrangement, and the latter are connected in an alarm circuit (see figure q.).

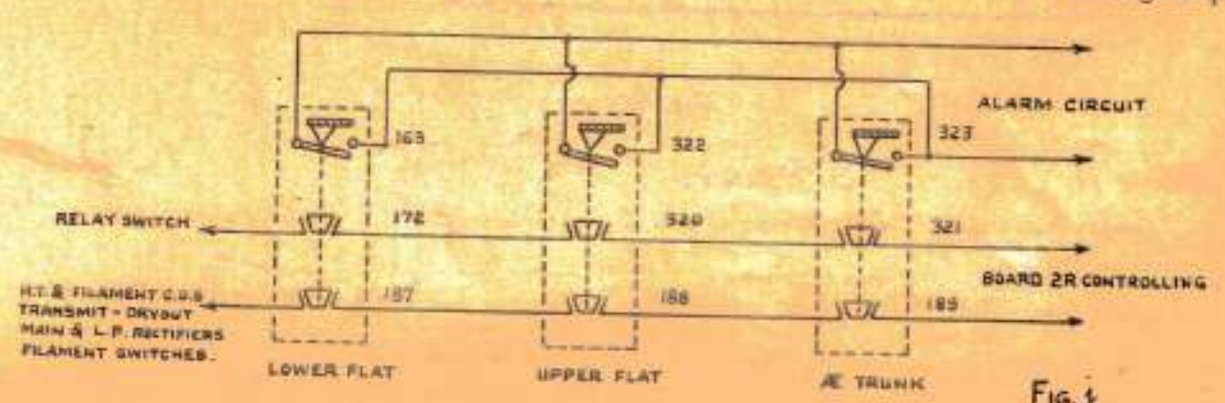


Fig. j.

RL 22
~~R106~~

TYPE 47

D.C. AUXILIARY CIRCUITS

Blower Circuit. (figure k.) The supply to this circuit, controlled by the Blower switch (188) on Board 2R Controlling, is connected to the centre contacts of a double pole 2-way switch (179) with a bobbin in the positive supply. The switch (179) connects the supply to the blower (180) or (181) it is intended to use. The bobbin of the magnetic switch (182) is therefore in series with the field of the blower in use. When the Blower switch (188) is made the blower starts, the bobbin is energised and breaks the switch (182).

When the Main-Low Power C.O.S. (3B) is in the "Main" position the switch (182) completes a short circuit of the filament switch bobbin (see figure l.) and therefore as the blower starts this short circuit is removed and the switch operates. This ensures the blower is running before power is supplied to the rectifier and transmitter valve filaments.

Relay Switch Circuit. (figure k.) The relay switch circuit is connected in parallel with the blower circuit. The positive supply is connected through a single pole contact (170) and bobbin of the relay switch (169) to one side of a single pole break of the loop aerial send-receive switch (173). The negative supply is connected to the cage door switches (172)(320)(321). These switches are connected in series (see figure j.) and, providing all safety doors are closed, the supply is connected to the other side of the single pole break of the loop aerial send-receive switch (173). Therefore when the loop aerial switch (173) is operated (see figure r.) the relay switch bobbin circuit is completed and the relay switch (169) is operated.

The two main contacts of the relay switch (169) complete the Main A.C. 20 KW supply to the main magnetic key C.O.S. (100) and the transformer primary C.O.S. (134)(see figure a.). The single pole contact (162) completes the "Alarm Circuit" (see figure q.), and the single pole contact (170) breaks, and removes the short circuit across the lamp (171). This lamp is an economy resistance. Once the relay switch is operated, the current required to keep it made is considerably smaller, and the lamp (171) now connected in series with the bobbin becomes an additional resistance in the circuit.

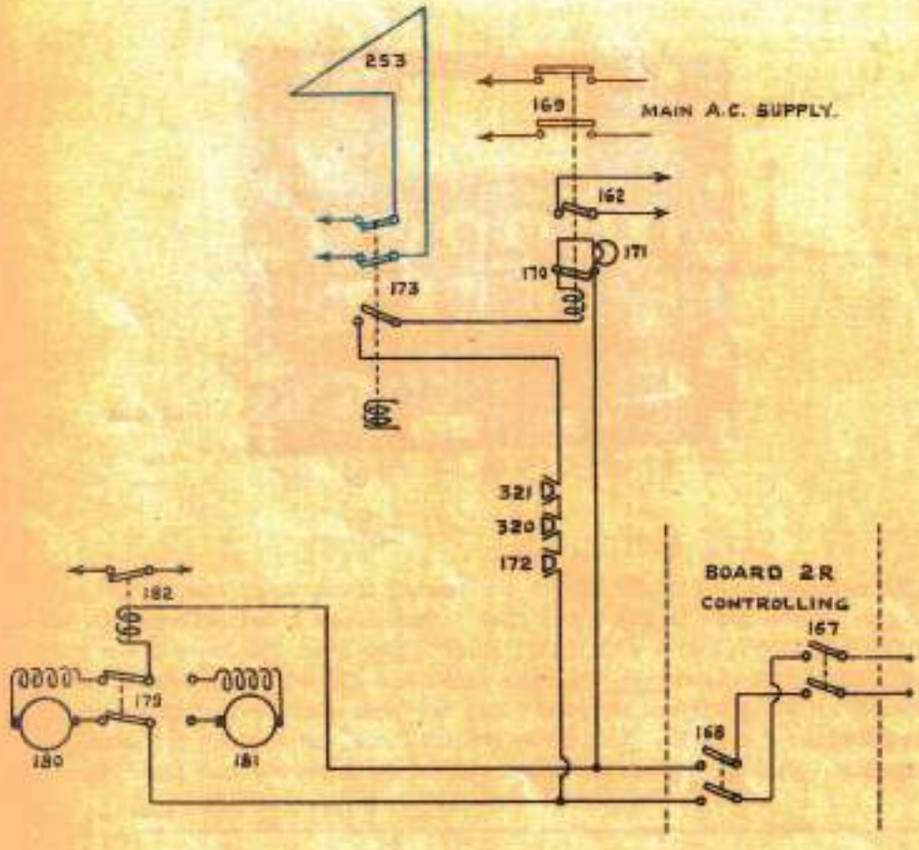


FIG. k.

TYPE 47

D.C. AUXILIARY CIRCUITS (CONT.)

Rectifier Switch Circuit. (figure 1.) This circuit is supplied from the switch (183), marked "Main Power Filaments", which is on Board 2R Controlling. The first movement of the switch (183) connects the positive supply across the single pole break (184) and the bottin of the rectifier switch to the cage door switches (187)(188)(189). These cage door switches are connected in series (see figure j.) and if all safety doors are closed they complete the circuit to the common negative supply of the D.C. supply switch (187).

The main contact (180) of the rectifier switch, when operated, completes the filament supply of the rectifier valves (see figure ta.). The second contact (184), when operated, removes the short circuit across the lamp (196) and condenser (195). The lamp is an economy resistance similar to that fitted in the relay switch circuit (figure k.). The condenser prevents arcing as the contact (184) breaks.

Filament Switch Circuit. (figure 1.) This circuit is connected in parallel with the rectifier switch circuit. The second movement of the switch (183) connects the supply through the lamp(191) and bottin of the filament switch to the cage door switches (187)(188)(189). These switches are connected in series, and, when closed, complete the circuit to the common negative of the D.C. supply switch (187). A 2½ c.p. lamp (190), fitted on the Board 2R Controlling, is connected in parallel with the bottin resistance lamp (191) as an indicating lamp. The condenser (192) is connected across the supply to the filament switch to prevent arcing when the switch (183), controlling the supply, is broken.

The contact of the filament switch forms a single pole break in the 3 kV A.C. supply. It therefore controls the filament supply to all valves and the H.T. supply to the transmitter 3R low power (see figure ta.).

The supply for the filament switch is also connected to a centre and outer contact of the main-low power C.O.S. (18), with a single pole magnetic switch (182) connected in the circuit. When the C.O.S. (18) is in the "Main" position it therefore short circuits the bottin of the filament switch (49). The bottin of the magnetic switch (182) is in series with the field of the blower (see figure k.) so that as the blower is switched on, the bottin is energised, the switch (182) is broken and the short circuit of the filament switch bottin is removed. This ensures that the filament supply to the main transmitting and rectifier valves is not completed until the blower is running. When the C.O.S. (18) is in the "Low Power" position, the short circuit is permanently removed, as, although the filament supply is required for the filament and H.T. supplies of that transmitter, the blower is not necessary for the valves in use.

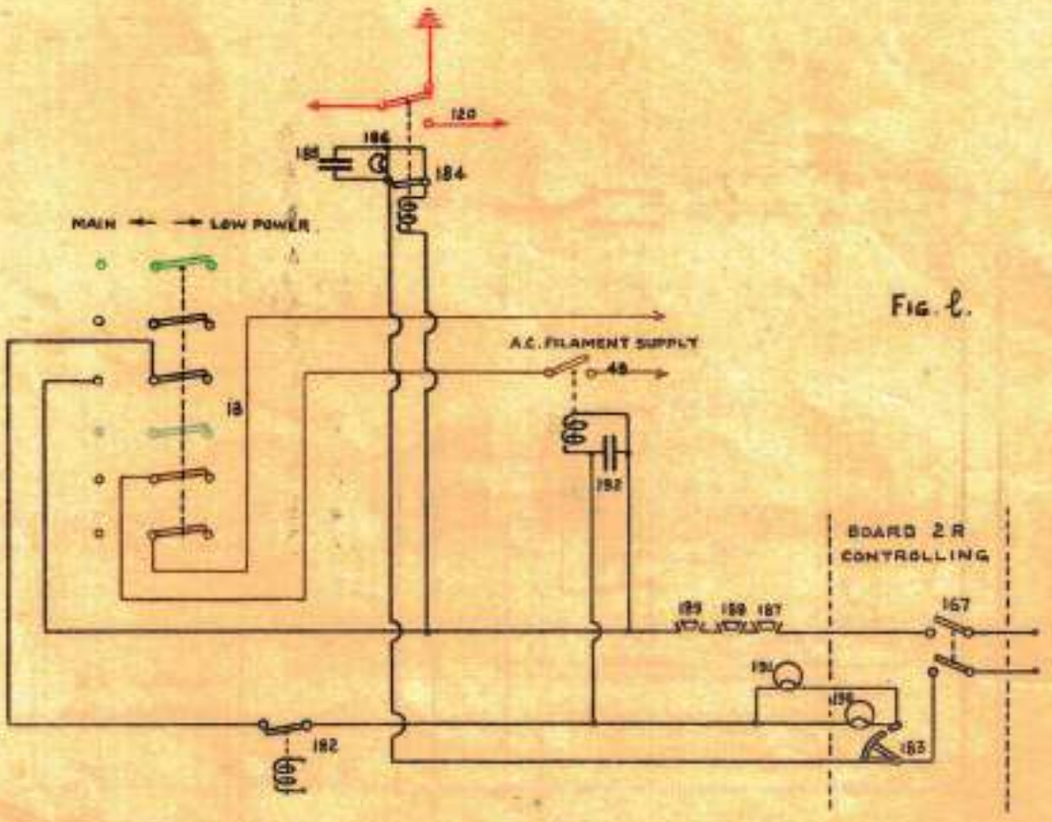


Fig. l.

RL 24
~~R 108~~

TYPE 47

D.C. AUXILIARY CIRCUITS (CONT.)

H.T. and Filament C.O.S Circuit. (figure a.) The supply is taken from the single pole switch (198), marked "Aerial, H.T. and Filament", which is on the Board 2R Controlling, and is connected to the bottin and lamp (200) of the H.T and filament C.O.S (126). The lamp (200) is connected to the cage door switches (187)(188)(189), which, when closed complete the circuit to the common negative supply of the D.C. supply switch (167).

In its normal position the H.T. and filament C.O.S (126) connects the H.T. and A.C. filament supplies to the transmitting valves for the main L/F and H/F transmitters (see figures a. and ba.) When operated it connects the H.T. supply to the H.H/F transmitting valve and the filament contact of the C.O.S (126) is connected to a centre contact of the A.C. - D.C. C.O.S (135). With this switch in the "A.C." position the filament contact of the C.O.S (126) completes the filament A.C. supply to the H.H/F transmitter and in the "D.C." position it completes the bottin circuit of the H/F - H.H/F D.C. filament C.O.S (141) (see below).

H/F - H.H/F D.C. Filament C.O.S Circuit (figure m.) This circuit is connected in parallel with the H.T. and filament C.O.S. circuit, and has a lamp (142) connected in series with the bottin. The circuit is broken by the A.C. - D.C. C.O.S (135) when in the "A.C." position.

In its normal position the D.C. filament C.O.S (141) connects the D.C. filament supply to the A.C. - D.C. change over links (82) of the H/F transmitter (see figures ba. and d.). If D.C. is required for the H.H/F transmitter, the A.C. - D.C. C.O.S (135) is set to the D.C. position. This completes the bottin circuit of the H/F - H.H/F D.C. Filament C.O.S (141) through the filament contact of the H.T. and filament C.O.S (126) and the D.C. filament supply is connected to the A.C. - D.C. change over links (79) of the H.H/F transmitter (see figures ba. and e.).

H/F - H.H/F Aerial C.O.S. circuit (figure m.). The H/F - H.H/F aerial C.O.S. (51) is connected in parallel with both the above circuits and has a lamp (199) connected in series with the bottin. In its normal position it connects the aerial to the H/F transmitter, and, when operated, connects the aerial to the H.H/F transmitter, (see figures d. and e.).

It will be noted that the door switches (187)(188)(189) complete all these circuits. The circuits are not required when using Main L/F or H/F with either A.C. or D.C. filament supplies as these transmitters use the same valves with links to enable A.C. or D.C. filament supply to be used when transmitting on H/F. The H.T. and filament C.O.S (126) and H/F - H.H/F aerial C.O.S. (51) can be used without the H/F - H.H/F D.C. filament C.O.S (141), which is only operated when D.C. is required for the filaments of the H.H/F transmitter valve.

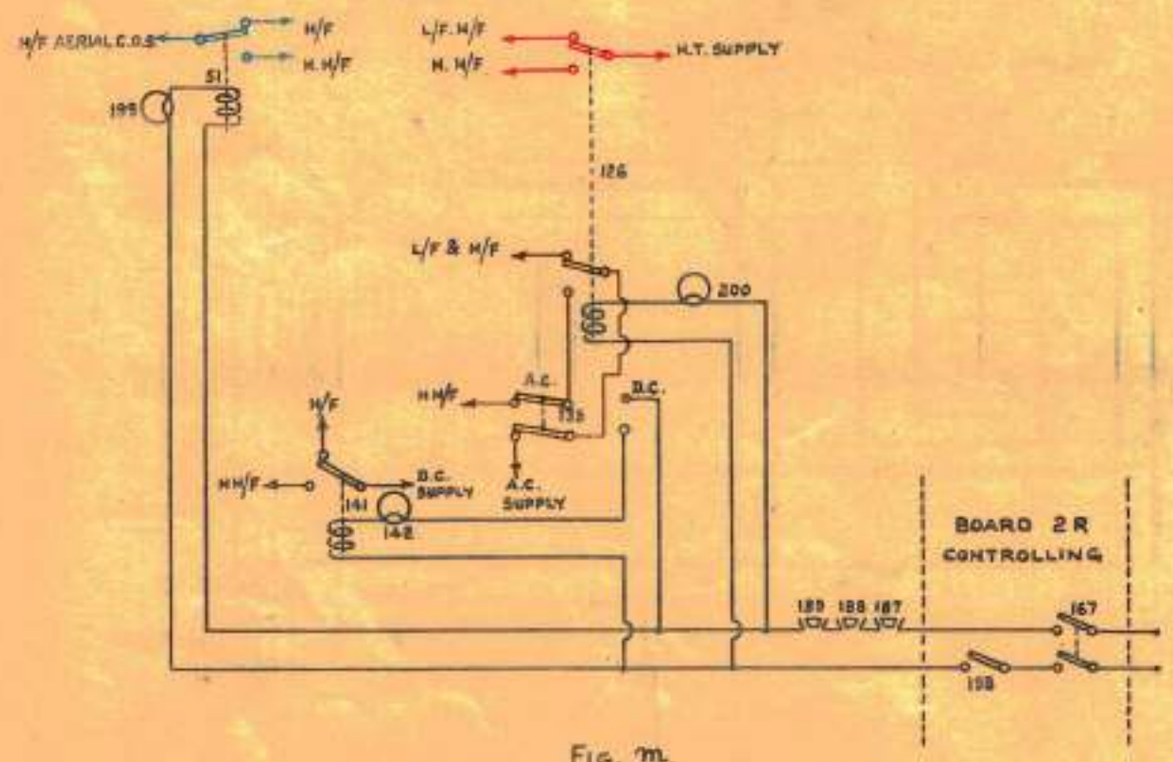


FIG. m.

TYPE 47

D.C. AUXILIARY CIRCUITS (CONT.)

H/F – H.H/F Send-Receive Switch Circuit (figure n.). The H/F – H.H/F send-receive switch circuit consists of two lamps (175) in parallel connected in series with the bobbin of the switch (50). The supply is taken from the Board 2R Controlling and is controlled by a single pole switch (174) marked "SR and SSF". This switch connects the supply to the above circuit, the return of which is to the common negative of the D.C Supply switch (177). It should be noted the cage door switches are not in this circuit.

Normally the send-receive switch (50) connects the main aerial to the H/F receiving gear, providing the flexible aerial link (9) is made to the H/F position. When operated it connects the main aerial to the H/F – H.H/F aerial C.O.S (51) which in turn connects the aerial to the H/F or H.H/F transmitter (see figures d. and e.).

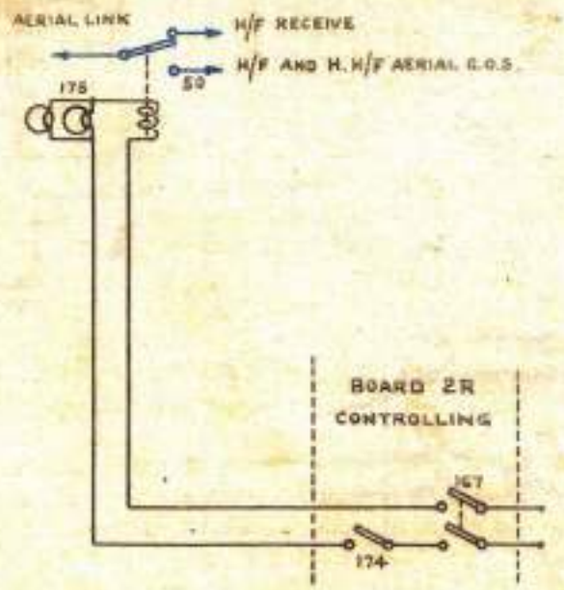


FIG. n.

Transmit-Dryout Switch Circuit (figure o.) The transmit-dryout switch circuit is supplied from the Board 2R Controlling, and is controlled by a single pole switch (193) marked "Transmit-Dryout". This switch connects the supply through two resistance lamps (194) in parallel, and the bobbin of the switch, to the cage door switches (187)(188)(189). When closed, the cage door switches complete the circuit to the common negative supply of the D.C supply switch (177). A 2½ c.p. lamp (195), fitted on Board 2R Controlling, is connected in parallel with the resistance lamps (194) as an indicating lamp.

The switch (19) in its normal position connects the grid and filament taps of the Transmitter 2R L/F to the aerial coil (see figure o.). When operated it connects the grid and filament taps of the Transmitter 2R L/F to the dryout tapping coil, and the aerial tap of the dryout tapping coil to the aerial.

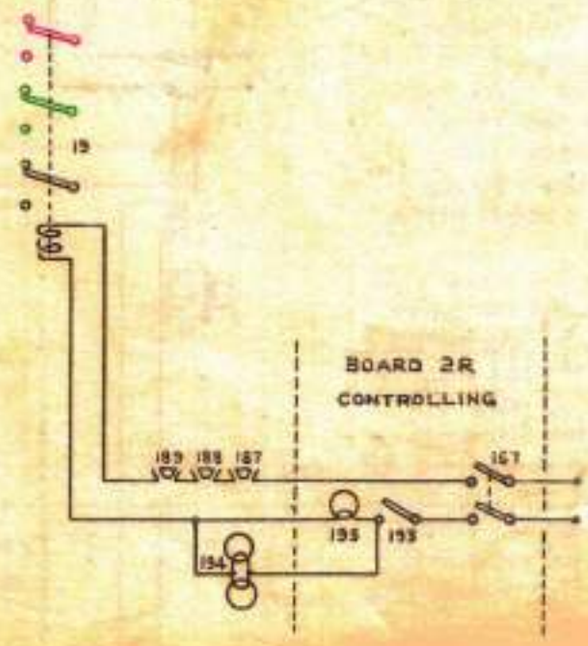


FIG. o.

RL26
R110

TYPE 47

D.C. AUXILIARY CIRCUITS (CONT)

L.P.A Rectifier Switch Circuit (figure p.). The low power rectifier switch circuit is supplied from the Board 2R Controlling and is controlled by a single pole switch (196) marked "L.P. Rectifier". This switch connects the supply, through the bobbin and resistance lamp (197) in series, to the cage door switches (187)(188)(189). When closed the cage door switches complete the circuit to the common negative supply of the D.C. supply switch (167).

Normally the rectifier switch (40) earths the filaments of the low power rectifier valves, and also the smoothing condensers after transmitting on C.W. When made it completes the filament circuit of the rectifier valves (see figure f.)

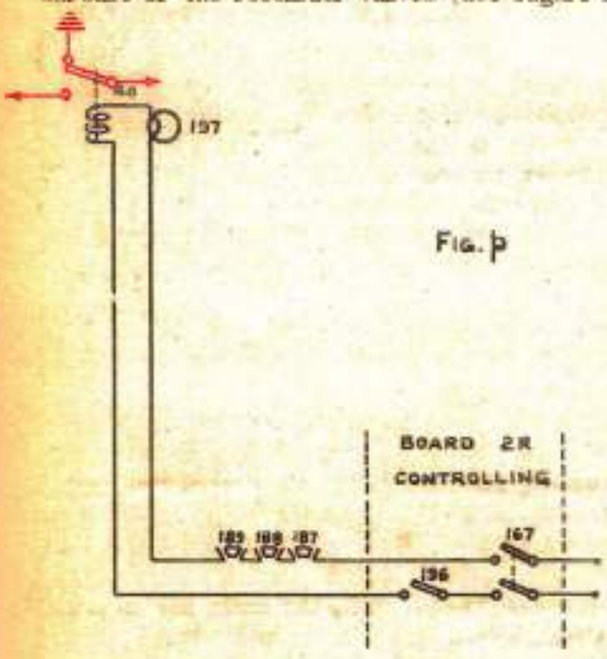


Fig. p

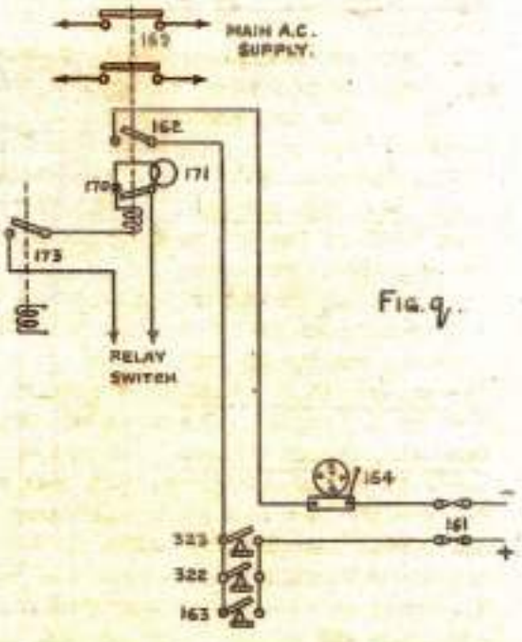


Fig. q.

Alarm Circuit (figure q.) This circuit is supplied direct from the 220 volt busbars through a pair of fuses (161). It is not controlled by any local switch in the W/T office. This ensures that power is supplied to the circuit as soon as the ring main C.O.S. is made.

The alarm circuit is a 230 volt bell circuit, with two breaks formed by a single pole contact (162) of the relay switch (169) and the three gate switches (163)(322)(323).

This circuit is fitted to give warning that, if either safety door is opened, the set may yet be dangerous to handle should the relay switch remain made, in spite of its bobbin supply being broken. If the relay switch (169) is made, the single pole contact(162) completes a circuit through the bell (164) to the cage door switches (163)(322)(323). These switches are connected in parallel (see figure j.) and close when the door is opened, therefore if a safety door is opened while the relay switch is made the bell or alarm circuit is completed.

Loop Aerial Switch Circuit. (Figure r.). The send-receive loop aerial switch(173) circuit is supplied from Board 3R Controlling, and is controlled by a single pole switch (176) marked "Loop Aerial". The circuit consists of two resistance lamps (177) in parallel, connected in series with the bobbin of the send-receive switch (173). The loop aerial switch (176) completes a circuit through the above to the common negative supply of the D.C. supply switch (167).

In the normal position two contacts of the send-receive switch are made and one broken. The two which are made complete the loop aerial circuit to the receiving gear. The one which is broken breaks the bobbin circuit of the relay switch (169) (see figure k.). When the send-receive switch is operated two contacts break and one makes. The former disconnect the loop aerial circuit from the receiving gear and the latter completes the bobbin circuit of the relay switch. This ensures the loop aerial is disconnected from the receiving gear before the main transmitters can be used.

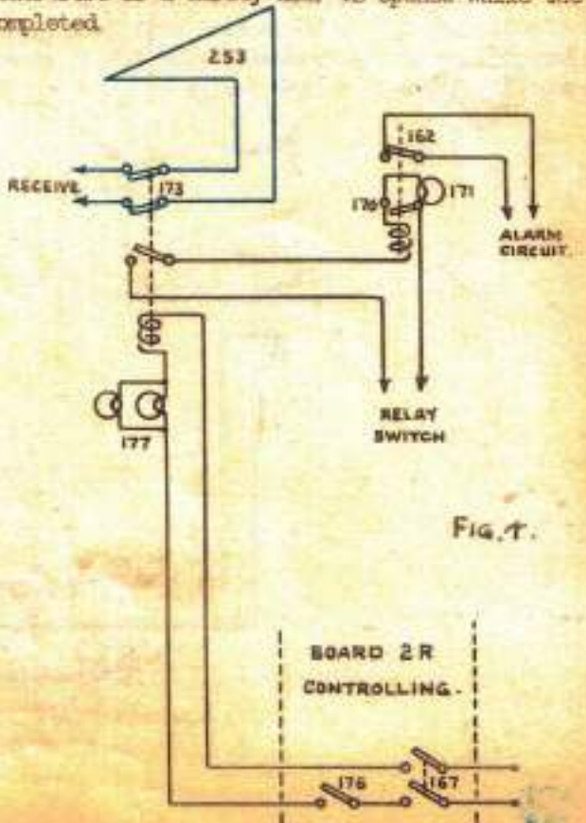


Fig. r.

RL27
RIII

TYPE 47

D.C. SIGNALLING CIRCUITS

The D.C. signalling circuits are supplied from the 220 volt busbars. A D.P. switch (149) controls the supply and a pair of fuses(150) protect the circuit. The supply from the D.P. switch (149) is connected to the key C.O.S.(154), with the morse key (151)forming a break in the circuit. A condenser (152)is connected across the break of the key to prevent arcing as the circuit is broken.

The key C.O.S.(154) is a 2-pole 3-way switch. It is fitted on Board 2R Controlling and is labelled "D.C.Signalling Circuits". This switch connects the 220 volt supply to the bobbin circuits of the Main or Low Power magnetic keys, or to the Transmitter 4R for the H.T. supply.

Main Magnetic Key Circuit. The supply from the switch (154) is connected to the magnetic key D.C. C.O.S.(157). This switch connects the supply to the bobbin (155) and resistance (158), or the bobbin (156) and resistance (159), depending on the magnetic key it is desired to use. As the morse key (151) is pressed or released so the circuit is completed or broken and the magnetic key operated.

The main contact (273) or (274) of the magnetic key in use makes and breaks the 30 kW supply to the main transformers(see figure a) corresponding to the make and break of the morse key (151). The main magnetic key circuit is required for transmissions on Main, L/F, H/F and H.H/F.

Low Power Magnetic Key Circuit. The supply from the switch (154) is connected to the bobbin and lamp (160) of the low power magnetic key (47). The morse key (151) makes and breaks the circuit for signalling purposes.

One contact of the magnetic key completes the A.C. supply to the primary of the low power H.T. transformer (44) (see figures b. and f.) and the other short circuits part of the compensating filament resistance (48).

Transmitter 4R H.T. Supply. The switch (154) connects the 220 volts direct to the Transmitter 4R for the H.T. supply. The morse key(151) makes and breaks the supply for signalling purposes.

Operating Switch Circuit. The operating switch bobbin is connected between the centre and back contacts of the morse key (151), and two 32 c.p. lamps(153) in parallel are connected in the circuit between the back contact of the morse key and the negative supply. When the morse key (151) is in its normal position the bobbin of the operating switch (17) is short circuited, and a circuit is completed through the two lamps (153) which burn at full brilliancy. When the morse key is pressed, the short circuit on the operating switch bobbin is removed and a complete circuit is made through the lamps and bobbin in series, and the lamps are therefore not at full brilliancy. It will be noted that irrespective of the position of the key C.O.S.(154), each time the morse key is pressed the operating switch (17) is worked and the aerial earthed.

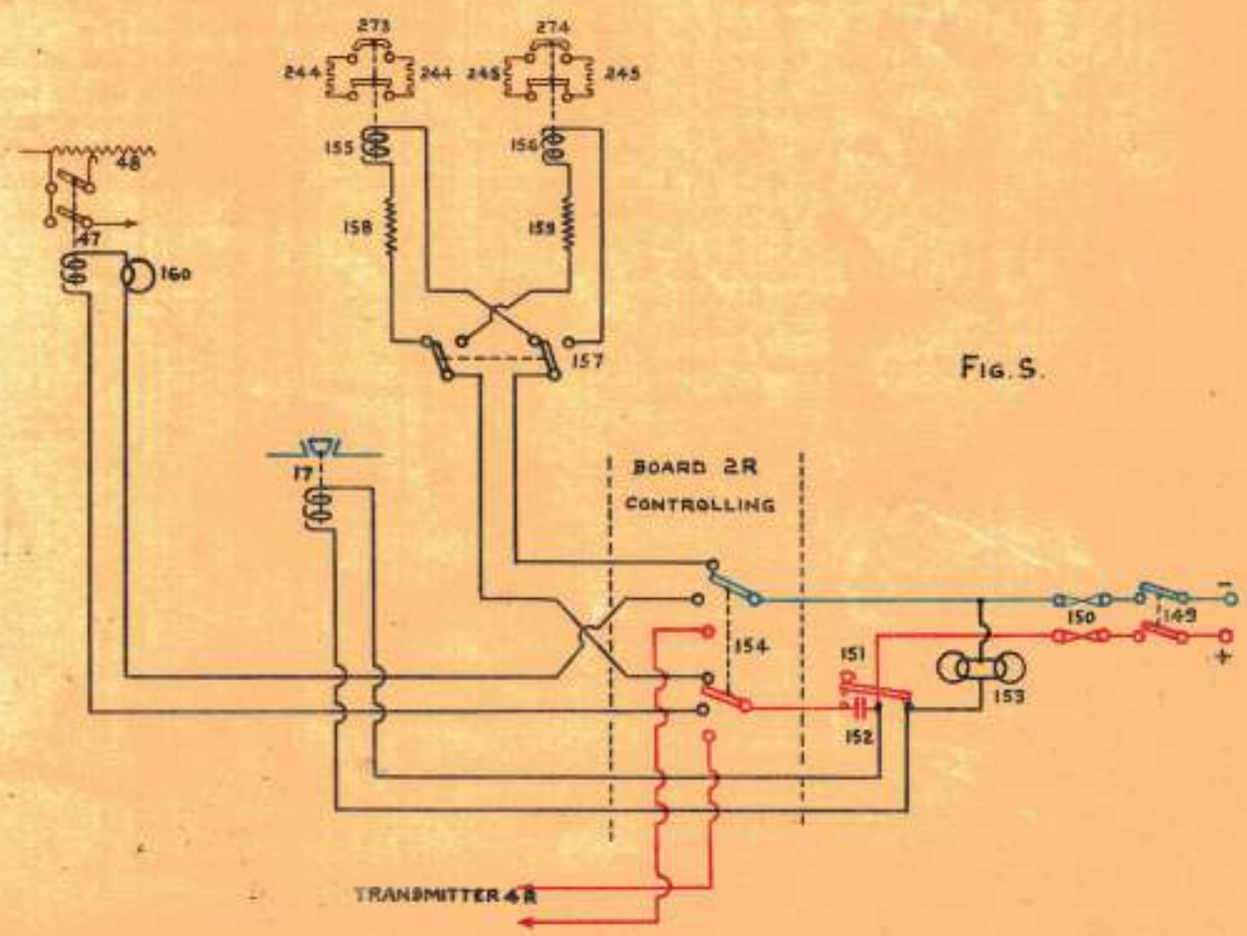


FIG. 5.

R-28
~~R112~~

TYPE 47

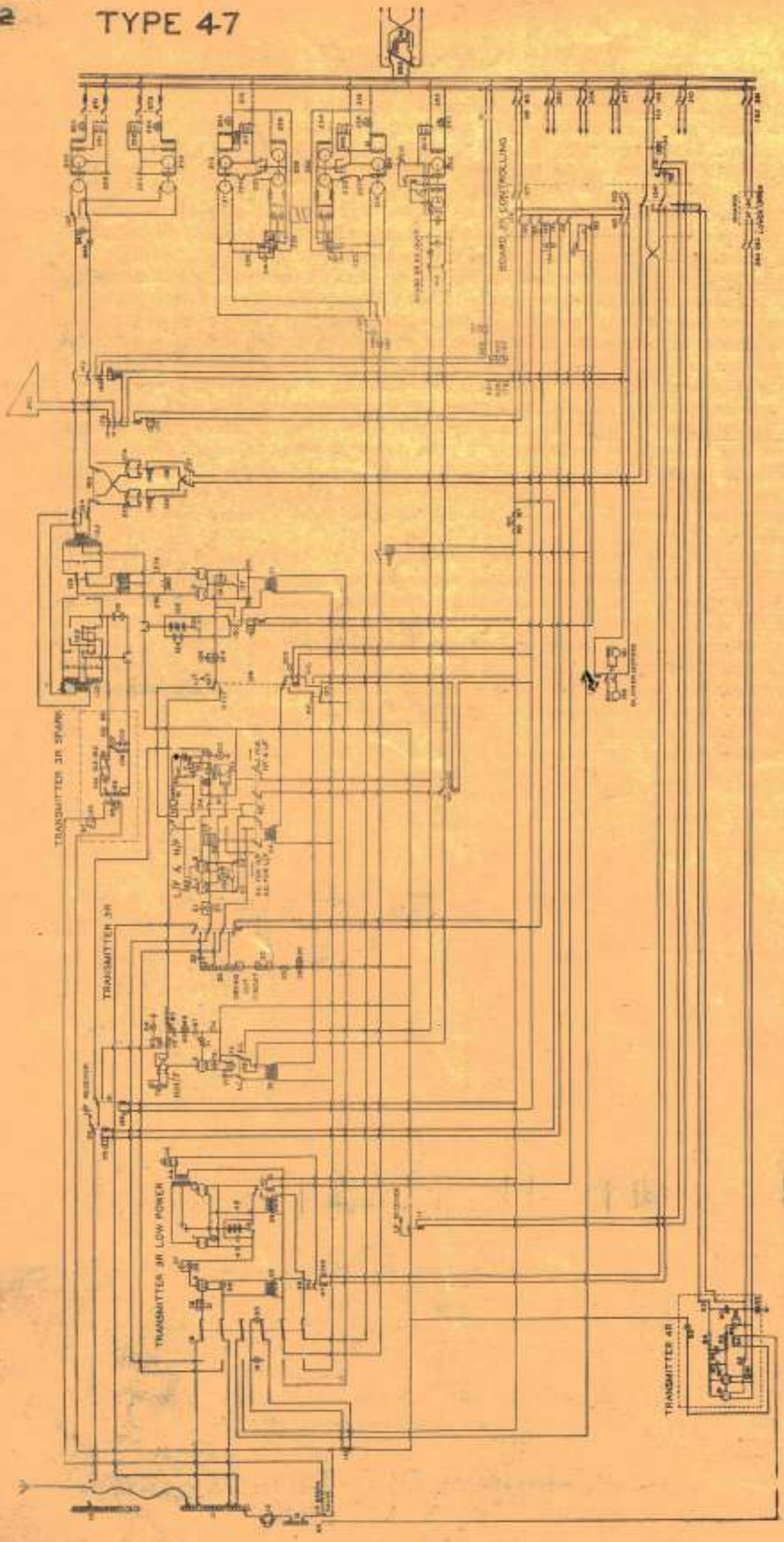


Fig 1.