SUB - SECTION

RK

TYPE 46 PAGE RK2

TYPE 46

DETAILS OF COMPONENTS

Transmitter.	3N L/F	3N H/F	3N Spark	4R
Frequency range.	100 - 500 kc/s.	4300-25000 kc/s.	100 - 666 kc/s.	100 - 188 kc/s.
Power supply.	8 kW Motor alternator	8 kW Motor alternator	8 kW Motor alternator	100 volt mains.
Filament supply.	8 kW Motor alternator	8 kW Motor alternator	-	50 cycle receiving outfit alternator or 8 kW motor alternator.
Valves used. (See section J).	One NT33 Two NU26	One NT33 Two NU26	-	Two NR15A.
Associated wavemeters.	1492B(New Patt.)	G7 and G8	1492B(New Patt.)	1492B(New Patt.)
Wave indicators.	G52	G53	G52	G52
Approximate range in miles.	450	World wide at times	40	30
Date of design.	1931	1931	1931	1928
Reference page.	RK8	RK10	RK12	RL18

Type 46 is a medium power L/F-H/F valve set. It has one power board (Board 2N Supply D.C. and A.C.)(see figures c. and d.) which contains the ring main - emergency C.O.S.(285), circuit breakers (271)(272) and subsidiary switches and fuses controlling the supply to the Board 2N controlling, lights, fans etc. It also contains the main A.C. C.O.S.(123), fuses (78)(150)(163)(226)(227)(256)(257)(258)(301)(302)(303), ammeters (243)(239) and magnetic keys (269)(270).

The power board consists of two panels (upper and lower) which are secured to the transmitting panels as shown in figures y. and z. Its controls, with the exception of the auto transformer switch (220), field regulator control (255) and compensating resistance short circuiting switch (276) are operated from outside the cabinet. A different pattern number of board is supplied in cases where the Transmitter 4R is supplied from the 500 cycle A.C. mains (see page RK13).

Type 46 has four separate transmitters and one drying out circuit, which, with the exception of the Transmitter 4R, are contained in six aluminium panels (see figure y.) Four of these panels are in two sections facing the silent compartment. Their controls and indicating instruments are therefore accessible to the operator. A window giving access to the front of the panels is fitted with a safety switch (see figure r.).

Two smaller panels (see figure f.) are fitted behind the larger ones, inside the safety screen. They contain the rectifying unit and the filament distribution and controls, and therefore the adjustment of filament voltages cannot be operated from the silent compartment.

PANELS AND POWERBOARD.

(PLAN VIEW).

Panel 3N Rectifying.	Panel 3N Filament Distribution and Control.

Panel 3N Transmitting H/F Left and Panel 3N Spark.	Panel 3N Transmitting H/F Right (Upper and Lower)	Panel 3N Transmitting L/F (Upper and Lower)	Panel 3N Dryout (Upper and Lower)	Board 2N Supply D.C. and A.C. (Upper and Lower)

A low-power valve harbour-exercise set (Transmitter 4R)(see page RL18 working from the ship's mains and the 50 cycle receiving valve supply outfit, is fitted inside the safety screen. In some cases this transmitter is supplied from the 500 cycle A.C. mains.

The switches necessary for the control of Type 46 are mounted on Board 2N Controlling (see figure q.) This board is fitted inside the silent cabinet and within easy reach of the operator. The "STOP" and "START" pushes(264)(265) for the automatic starters are also fitted on this board.

D.C. SUPPLY

The ring main - emergency C.O.S.(285)connects the bus bars(201) on Board 2N Supply, D.C. and A.C.; either to the ship's mains 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 mains. The C.O.S. is looked in either of the "ON" positions by an electro-mechanical device. It consists of a bobbin (287), lamp (286) and control push (288) connected across the main contacts of the C.O.S. and is therefore operative when power is applied to the switch. The bobbin (287), when energised, pulls an arm which engages in a slot on the switch drum and thus mechanically locks it.

TYPE 46

D.C. SUPPLY (CONT).

The lamp (286) is an economy resistance. In later ships this locking device is not fitted. The control push (288) when pressed breaks the locking circuit and allows the C.O.S. (285) to be moved to either position. As this push is fitted with a spring, it must be kept pressed until the change over is completed.

The bus bars (201) distribute the D.C. supply via the various switches and fuses to all D.C. circuits which are controlled from the W/T office. An ammeter (289), connected between the C.O.S. (285) and the bus bars (201), indicates the total input current to the W/T office.

8 K.W. SUPPLY.

Main Alternators 8 kW. Duplicate machines (249)(250) (see page MB2) are fitted and are supplied from separate circuit breakers (271)(272). The machine in use supplies both the H.T. and filament circuits of the main transmitters. Both machines can be run simultaneously, but the output of one only can be connected to the set.

The circuit breakers (271)(272) connect the D.C. supply from the bus bars to "X" size automatic starters (251)(252) (see page MA5) and the machines (249)(250). These 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 series with the contact. They can also be broken by pressing an "OFF" push.

The automatic starters are fitted over the cage doors, and, as described on page RK2, the "START" and "STOP" pushes (264)(265) for controlling starters are fitted on Board 2N Controlling (see figure a.)

The machines are not fitted with motor field regulators, but one 230 ohm alternator field regulator (255) is fitted for use with either machine. This field regulator is connected to either machine by a two pole switch (261) fitted with spring contacts. This switch (261) is mechanically linked to the A.C. C.O.S. (126) and is therefore automatically changed over when either machine output is connected to the set.

Reversing Booster. Each 8 kW alternator is fitted with a reversing booster (259)(260) which can be brought into use by the respective switches (221)(222). The switches are fitted on Board 2N controlling (see figure a.). The reversing booster and contactors are used for controlling the A.C. voltage output of the alternators, and are similar to those used in Type 47, (see page RL7 and Admiralty Handbook of W/T (1931) paragraph 251)

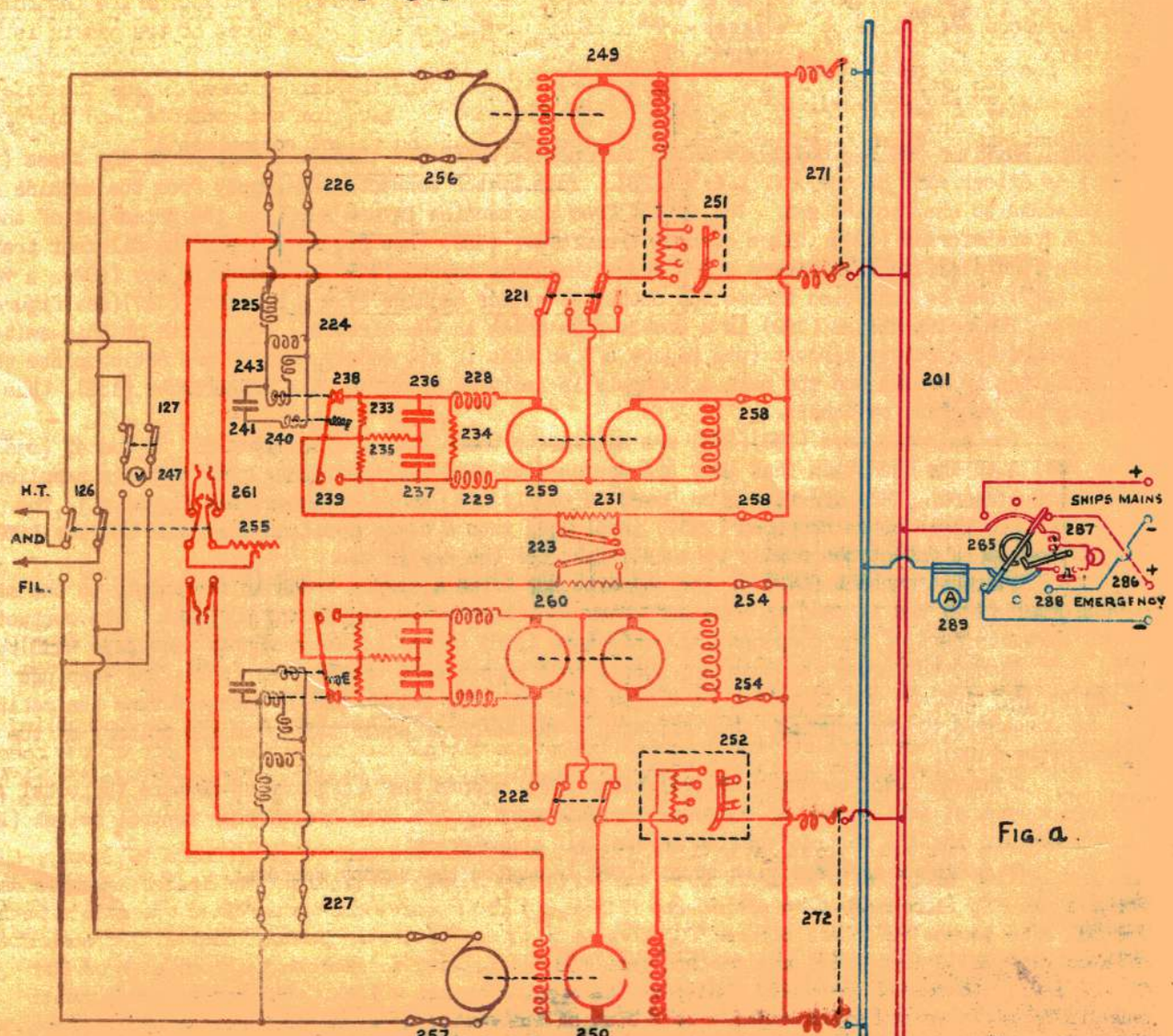


FIG. a.

RK4
R116

TYPE 46

8 K W SUPPLY (CONT).

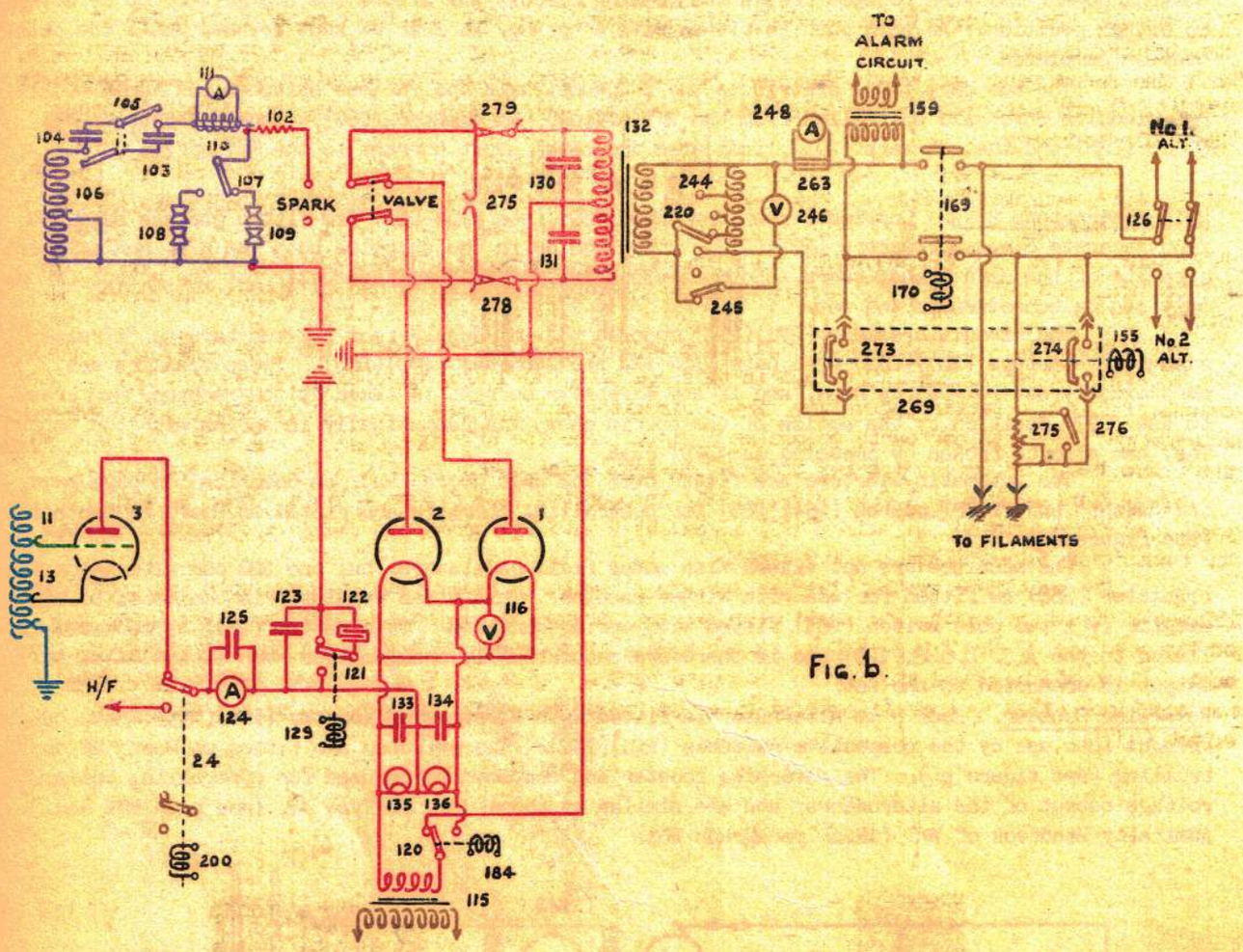


Fig. b.

Main A. C. Supply. The A. C. supply from the machines is connected through a pair of 40 amp fuses (256) (257) to either side of the A. C. C. O. S. (126). This switch connects the supply from the machine it is intended to use, to the set. The output from the machine in use supplies the primaries of the main H. T. transformer (132), alarm circuit transformer (159) (see figure a.) and the filament transformers (66)(114)(115)(see figure e.) through the relay switch (169) and magnetic key (269). A voltmeter (247) can be connected across the output of either machine by a D. P. switch (127)(see figure a.)

The relay switch (169) is a double pole break in the circuit. The bobbin of this switch is operated by a safety circuit (see figure a.) so that if all safety devices are not complete the relay switch is broken and the main A. C. supply is isolated from the main transformer (132), thus leaving the set safe to handle.

The magnetic keys (269)(270) are similar to those fitted with Types 35, 36 and 47 (see page RE5 ~~R220~~) with the exception that they are designed to plug into position. Two keys are supplied, one being a spare. They are fitted on Board 2N Supply D. C. and A. C. (Lower)(see figure c.). The spare key (in these notes numbered (270)) is plugged into a dummy position alongside the key (269) and in case of a defect can easily be substituted for the key in use.

The main contact (273) of the magnetic key forms a single break in the supply to the main transformer (132) and is used to make and break that supply for signalling purposes. The contact (274) short circuits part of the compensating resistance (275) in the filament supply (see page ~~R113~~)RK6

Connected across the main A. C. supply is a tapped auto-transformer (244); the tappings being at 180, 135, 90 and 45 volts. A single pole four way switch (220), operated from the cabinet, can be connected to any tapping, thus allowing a variation of power supply to the primary of the main transformer (132).

A switch (245) connects the voltmeter (246) across the A. C. mains to measure the total A. C. voltage output at that point, or connects the voltmeter to the auto transformer control switch (220), thus measuring the A. C. voltage applied to the main transformer.

An A. C. ammeter (248) with shunt (263) indicates the supply current.

TYPE 46

8 K.W. SUPPLY (CONT).

H. T. Supply. The H. T. supply for the L/F, H/F and spark transmitters is obtained from a 100 -1 step up transformer (132). The secondaries of the transformer are permanently connected in series with the centre point earthed. Each half of the secondary is protected by an R/F by-pass condenser (130)(131) and horn break fuses (278)(279). An additional safety horn (275) is connected across the whole secondary.

The H. T. output from the transformer is connected to the centre of a two-way D.P. switch (128) which connects the H. T. to the spark set, or to the anodes of the rectifying valves (1)(2).

The filaments of the rectifying valves are connected via an anode ammeter (124) to the H. T. and filament C.O.S. (24) which connects the supplies to the valves (3) or (4) for the L/F or H/F transmitters respectively. An R/F by-pass condenser (125) is connected across the anode ammeter (124).

The C.W. - I.C.W. switch (121) is a magnetically controlled switch (see figures f. and t.) Its normal position is for I.C.W. and in this position the 1 mfd. smoothing condenser (122) is disconnected from the rectifying valves, short circuited and earthed. A 1 jar condenser (123) connected between the filaments and earth completes a circuit for the R/F component of the valve current, thus preventing the R/F current passing through the main transformer (132) via its earth connection.

When the C.W. - I.C.W. switch (121) is operated (see figure t.)(i.e., made to the C.W. position) the smoothing condenser (122) in parallel with the condenser (123) is connected between the rectifying valves filaments and earth.

The rectifier switch (120) in its normal position (see figure t.) connects the rectifier filaments direct to earth, and short circuits and earths the condensers (122) or (123) depending on the position of the C.W. - I.C.W. switch (121), thus making it safe to handle the rectifier circuit. It should be noted that after transmitting C.W., when the C.W. - I.C.W. switch is broken, the condenser (122) is short circuited to earth irrespective of the position of the rectifier switch (120).

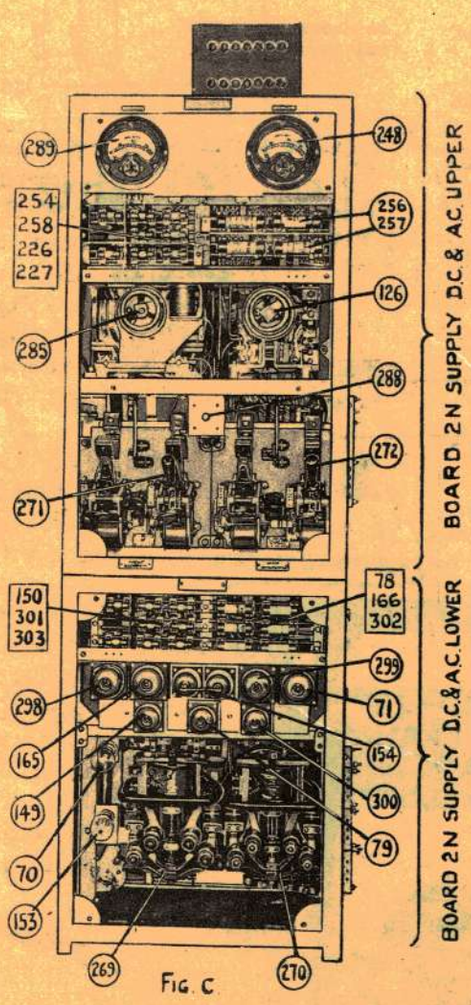


Fig. c

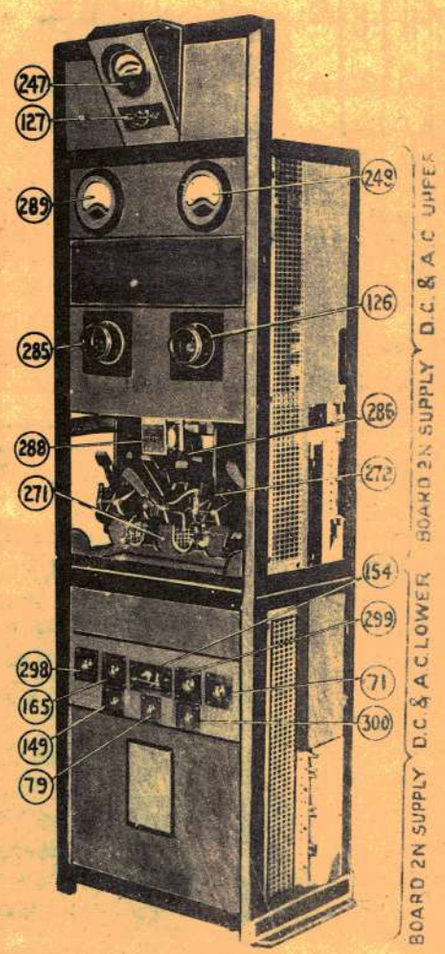


Fig d

Rk 6
~~R118~~

TYPE 46

8 K W SUPPLY (CONT).

Filament Supply. The filament supply for the L/F and H/F transmitters 3N is obtained from the main alternator in use. In some cases the filament supply for the transmitter 4R may also be taken from this source. The filament supply is connected from the A.C. C.O.S. (126) through the compensating resistance (275), to the primary of the rectifying valves filament transformer (115), and to the L/F or H/F filament transformers (114) or (66) depending on the position of the H.T. and filament C.O.S. (24). A 2 ohm rheostat (118) and 4 ohm rheostat (112)(67) are connected in the primaries of the rectifier, L/F and H/F filament transformers respectively to control the filament voltages of the respective valves. These voltages are indicated by the voltmeters (116)(18) and (68). The filament switch (49), when operated, (see figure e.) completes the filament supply to the primaries of the transformers in use.

The compensating resistance (275) is an adjustable resistance of 3.5 ohms. As the H.T. and filaments of the valves (1)(2)(3)(4) are supplied from the same alternator, this resistance is used to compensate for the drop in voltage when H.T. is applied to the valves. Its use is similar to the compensating resistance used in Transmitter 3G, Low Power (Page ~~R66~~ R[illegible]). The compensating resistance is adjusted by varying the amount of resistance in the filament supply, until the filament voltage remains constant with the magnetic key (269) made or broken (i.e., H.T. applied or not applied to the valves). The portion of the compensating resistance in the filament supply is short circuited by one contact (274) of the magnetic key (269) when that key is operated. When using automatic voltage control (i.e., reversing booster (see page R115)) the compensating resistance(275) is not required, and it is therefore short circuited by the switch (276).

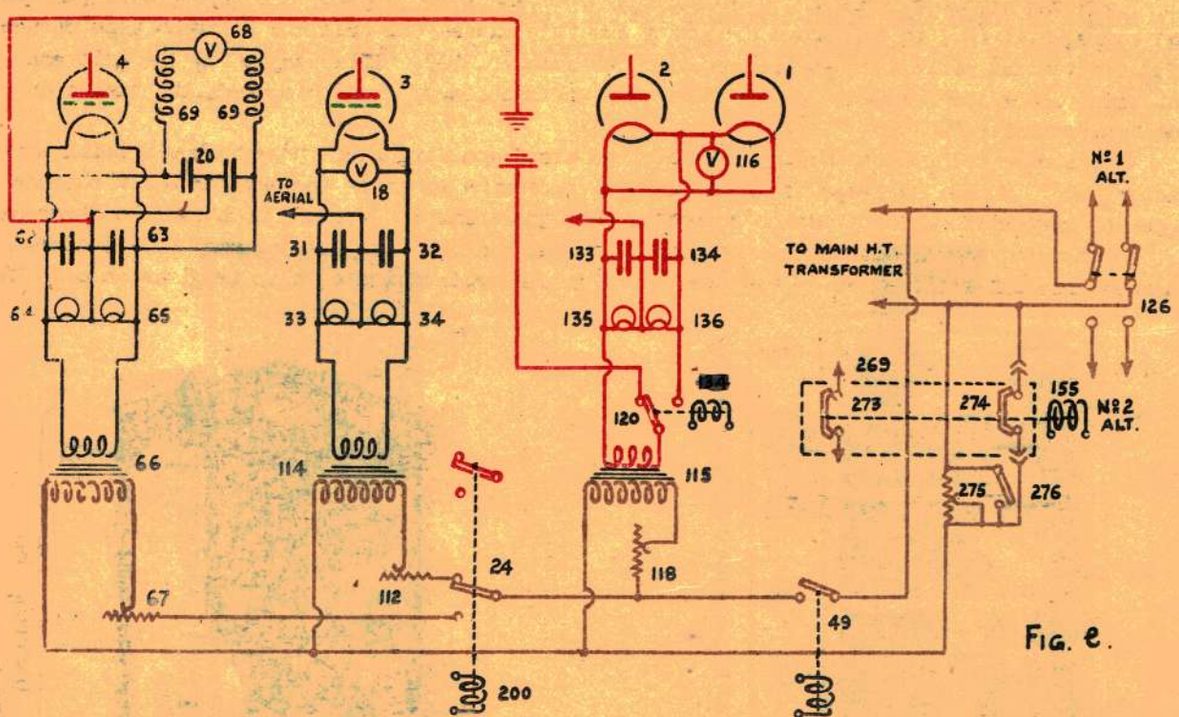


Fig. e.

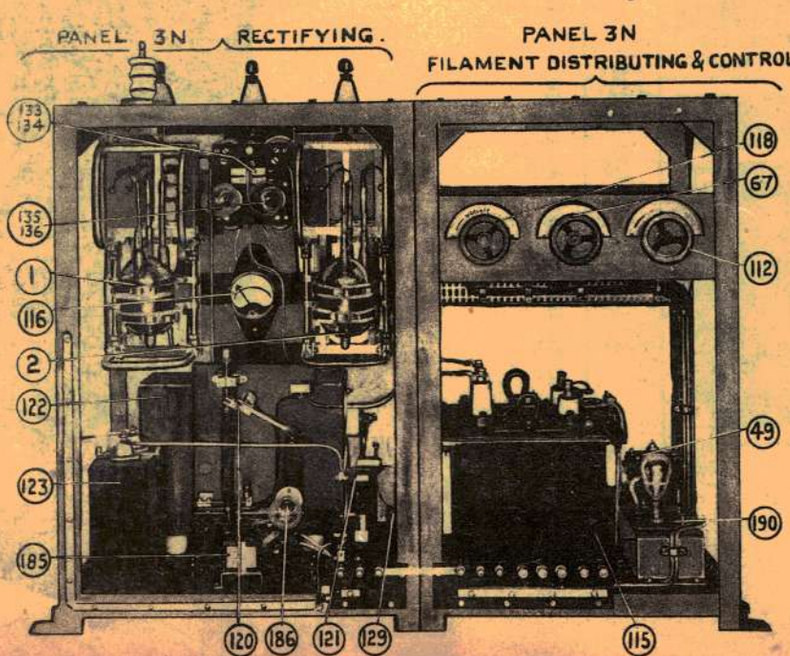


Fig f

RK7
~~R119~~

TYPE 46
DRYOUT CIRCUIT

The dryout circuit is a closed oscillatory circuit. It is used to dry off the deck and aerial insulators when the damping is so high, due to spray etc., that the L/F valve transmitter cannot maintain aerial oscillations (see Admiralty Handbook of W/T (1931) paragraph 633). The circuit is similar to that used for Type 47 (see page ~~R98~~ RL12)

The transmitter 3N L/F is used for the dryout circuit (see figure i.) with the exception that the grid and filament taps are connected to the dryout coil (26) instead of the aerial coil (11). The H.T. and filament supplies are therefore the same as for transmitter 3N L/F (see figures c. and e.)

The dryout circuit consists of a 0.25 jar condenser (25), adjustable 6000 mic coil (26), 250 mic fine tuning coil (27) and the primary of the aerial ammeter transformer (29), connected in series to earth.

The transmit-dryout switch (19) is a 3-pole two-way magnetically operated switch (see figures i. and v.). The grid and filament of the transmitter 3N L/F are connected to 2 poles and the dryout aerial tap to the third. When the switch is operated (made to the dryout position) the grid and filament of the transmitter and the dryout aerial tap are connected by adjustable taps to the dryout coil (26), the latter via the dryout condenser (25). 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 g.).

Tuning. Adjust the transmitter 3N L/F for the desired frequency and measure this frequency accurately by wavemeter. Disconnect the aerial by putting the aerial switch (9) to any position other than L/F and make the transmit-dryout switch (19) to "dryout" (see figure i.). Connect the aerial dryout tap to the aerial coil (11); the best position is generally found to be on or near the grid tapping of that coil.

Tune the dryout circuit by adjusting the upper and lower taps on the dryout coil (26) and the fine tuning coil (27) to the above frequency and then adjust the grid and filament taps on the coil (26) for maximum efficiency as indicated in the ammeter (30). After adjusting the grid and filament taps, check the frequency by wavemeter and, if necessary, finally correct the tuning on the fine tuning coil (27).

Put the aerial switch (9) to L/F and press the signalling key; current should still show in the ammeter (30). 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 the transmit-dryout switch (19) to "transmit".

When using the dryout circuit the aerial dryout tap may, for some reason, be disconnected, and a current reading still shown in the ammeter (30). An explanation of this is given on page ~~R98~~ RL12

EQUIVALENT CIRCUIT

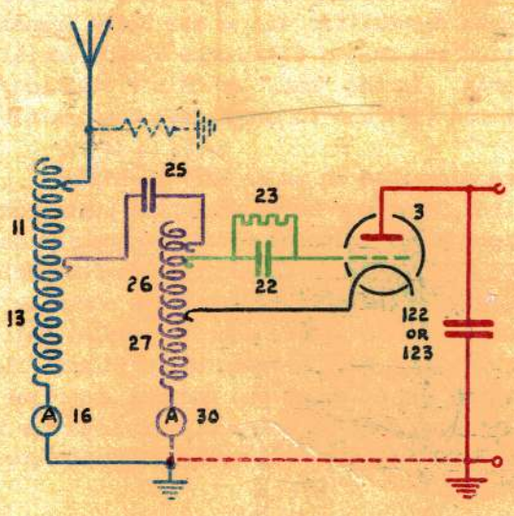


FIG. g.

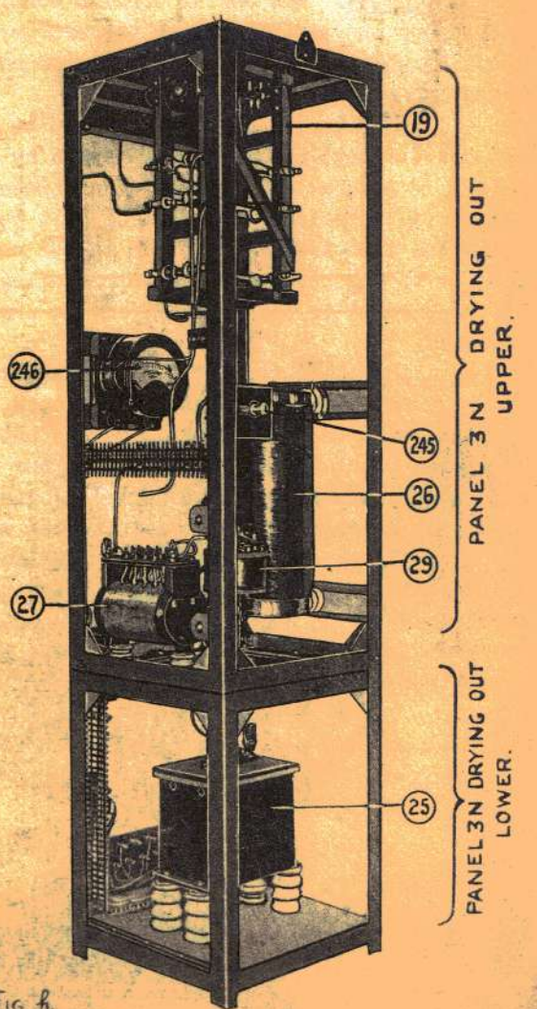


FIG h

RK8
~~R120~~

TYPE 46

TRANSMITTER 3N L/F

Wave form	Method of producing oscillations.	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) paragraphs 629 and 631.

Transmitter 3N L/F is the main L/F valve transmitter in Type 46. The circuit is similar to that for Transmitter 3K L/F (page ~~R40~~ R45) and Transmitter 3R L/F (page ~~R94~~). RL10

H.T. Supply. The H.T. supply is obtained from the main rectifier unit (see figure t.). The H.T. contact of the H.T. and filament C.O.S. (24), in its normal position, connects the H.T. supply from the rectifier unit direct to the anode of the valve (3). The anode current is indicated in the ammeter (124) (see figure t.).

Filament Supply. The filament supply is taken from the main alternator in use (see figure e.) which supplies the primary of the filament transformer (114).

The filament contact of the H.T. and filament C.O.S. (24) in its normal position completes the filament supply to the filament transformer (114) which has a step down of 10 to 1.

An equalising unit, consisting of two condensers (31)(32) in series and two 100 volt 32 c.p. lamps (33)(34) in series, is connected in parallel across the filament. The centre point of this unit is the filament tap, which is connected via one contact of the Transmit-Dryout switch (19) to the aerial coil (11). The equalising unit is used to ensure that the filament tap is connected to the centre point of the filament. This is to eliminate any ripple which may be imposed on the anode current due to the filament supply being A.C. The condensers (31)(32) are connected across the lamp resistances (33)(34) to by-pass R/F currents.

The filament voltage is controlled by a rheostat (112) connected in the transformer (114) primary circuit and is indicated by the voltmeter (18).

Oscillatory Circuit. The grid and filament of the valve (3) are connected to two contacts of the transmit-dryout switch (19). In the "Transmit" (or normal) position this switch connects the grid and filament via adjustable taps to the main aerial coil (11).

A grid leak unit consisting of sixteen resistance units (23) and a 4 jar condenser (22) in parallel, and also an ammeter (20), protected by a by-pass condenser (21), are connected between the grid of the valve (3) and the transmit-dryout switch (19). These components therefore also form part of the dryout circuit (see page ~~R110~~) RK7

Aerial Circuit. The aerial circuit consists of a 4000 mic coil (11), 100 mic fine tuning coil (13), primary of the aerial ammeter transformer (15) and primary of the G52 wave indicator link circuit coupling unit (138). The whole are connected in series, and the circuit completed to earth by the operating switch (17).

The aerial can be connected to the L/F aerial circuit, to the H/F aerial circuit, to the D/F set (if any) or directly to earth by means of a switch (9).

A three way switch (14) between the wave indicator coupling coil (138) and the operating switch (17) enables the aerial circuit to be connected to Transmitter 4R, to the Spark Transmitter or to the main transmitter. In the 4R and spark position the switch (14) connects the aerial circuit to the respective aerial coupling coils and earth. In the "main" or 3N L/F position the aerial circuit is connected direct to the operating switch (17) and to earth when that switch is operated.

D.C. Auxiliary Circuits. The D.C. auxiliary circuits are described on pages ~~R127 to R129.~~ RK15 to RK17

Tuning. Set the approximate adjustments for the required frequency as given on the tuning chart supplied with the set. Switch on the set, make the appropriate switches for L/F transmissions and check the transmitted frequency with the wave indicator G52 (137)(see figure z.) Coarse tuning adjustments are made on the coil (11) and fine adjustments on the coil (13). Final accurate tuning should be carried out by wavemeter, the mutual of which should be placed near the aerial coil (11).

It should be noted that the amount of the aerial coil (11) between the grid and filament taps determines the grid excitation and the amount between the filament tap and the lower tap corresponds to an anode tapping. Consequently, these amounts must be correctly adjusted for maximum efficiency (i.e., a maximum current reading in the aerial ammeter (16)), although the upper and lower taps have already been set for the required frequency.

The wave indicator G52 (see page GD4) should now be retuned to the transmitter frequency and the readings carefully noted, as this will provide a general method for checking that frequency in future transmissions.

TYPE 46

TRANSMITTER 3N L/F (CONT).

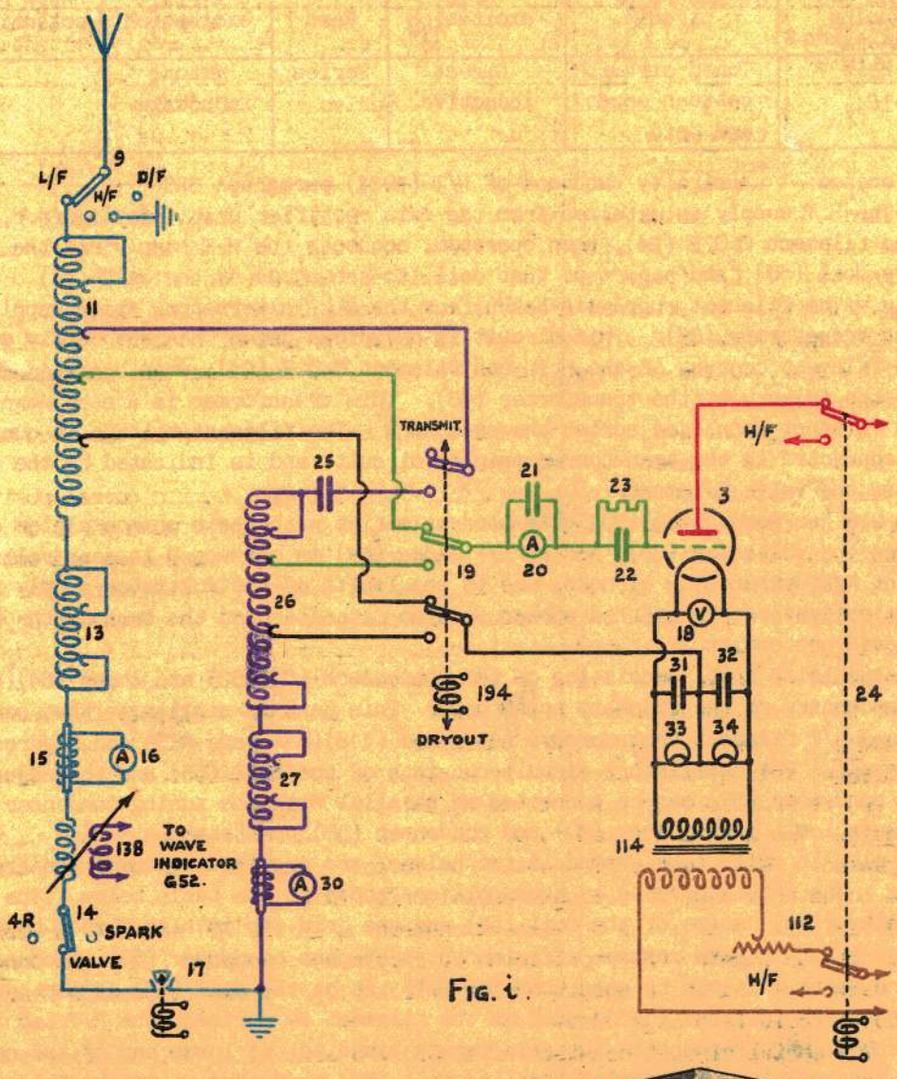


Fig. i.

EQUIVALENT CIRCUIT.

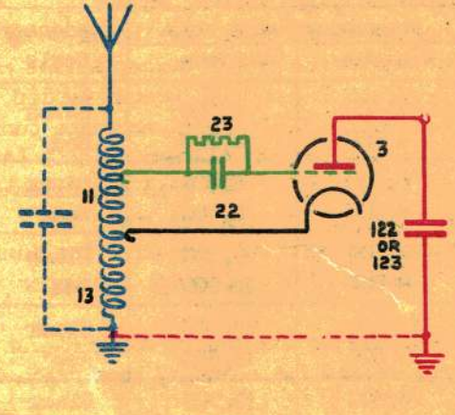


Fig. j

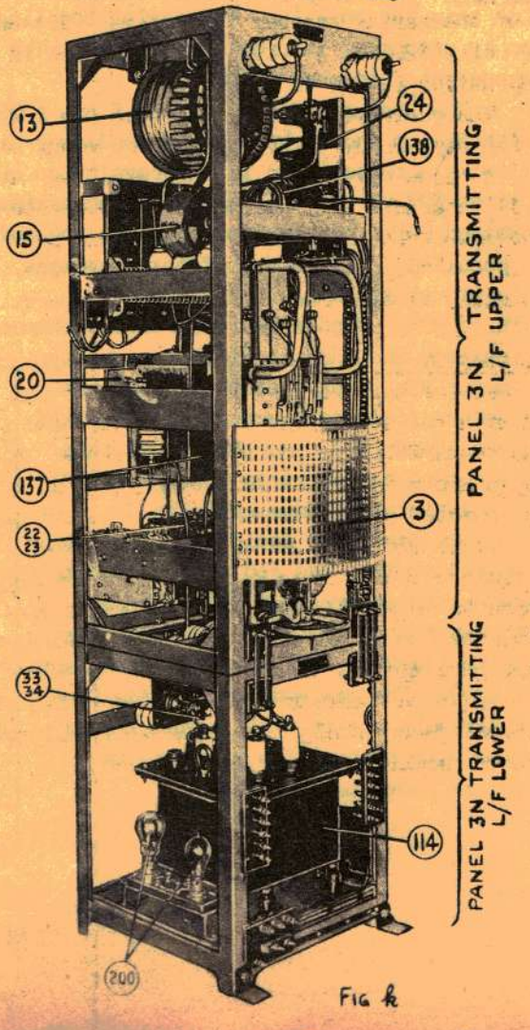


Fig k

RK 10

R122

TYPE 46

TRANSMITTER 3N H/F.

Wave form	Method of producing oscillations.	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 626.

H.T. Supply The H.T. supply is obtained from the main rectifier unit (see figure b.). One contact of the H.T. and filament C.O.S. (24), when operated, connects the H.T. supply via the H.T. tap of the plug-in primary coil (55), and a part of that coil, to the anode of the valve (4).

Filament Supply. The filament supply is taken from the 8 kW alternator, which supplies the primary of the filament transformer (66). This circuit is described under Filament Supply page ~~R118~~ RK6.

The filament contact of the H.T. and filament C.O.S. (24), when operated, completes the A.C. supply to the primary of the transformer (66). This transformer is a step down transformer with the valve filament connected across the secondary. The filament voltage is controlled by a rheostat (67) connected in the transformer primary circuit, and is indicated by the voltmeter (68) connected across the valve filament.

Two 0.5 jar condensers (70) connected in series with their common plates earthed are connected across the voltmeter (68), and an H/F choke (69) is connected in each voltmeter supply lead, to prevent R/F currents in circuit, due to the length of the voltmeter supply leads, from burning out the voltmeter. An earthed screen is also fitted around the back of the instrument itself as an added protection.

An equalising unit, consisting of the condensers (62)(63) and lamps (64)(65), is connected across the secondary of the filament transformer. This unit is similar to that connected across the rectifier and L/F filament transformers (114) and (115)(see page ~~R120~~ RK8 and figures b. and i.).

Oscillatory Circuit. The oscillatory circuit consists of the coil (55) and the adjustable condenser (56). A fixed condenser (57) can be connected in parallel with the tuning condenser (58) for the lower wave frequencies. A grid leak (60) and condenser (58) are fitted.

Six plug-in coils (55), wound in two halves, are provided to cover the frequency range of the transmitter. The ranges covered by each coil are shown in the table below. The H.T. tap is connected to the electrical centre of the coil (55) and the grid tap is also fixed; both positions being those which were found to give maximum efficiency. A by-pass condenser (59) is connected between the H.T. tap and earth. It can be seen that the H.T. tap on the coil (55) is earthed to R/F current through the condensers (59) and (123), and, as the filament is earthed, the H.T. tap is also the filament tap. On the higher frequencies the grid tap is taken to the lower end of the coil (55). To unship or ship the coil (55) the aerial coupling coil (52) is pushed up beyond its minimum coupling position by unlocking it from its carrier. The blower (figure u.) is used to cool the plug-in coils (55) to prevent frequency drift.

The condenser (56) is a 38.5 cms (.0385 jar) condenser fitted with a link motion switch (54), attached to and worked by the condenser dial spindle. The condenser is constructed so that the following effects occur in one revolution of the moving plates:-

(a) First 90° varies the capacity from maximum to minimum.

(b) Second 90°. Link motion actuates the switch (54) and connects the fixed condenser (57) in parallel. At the end of this movement, the capacity of the variable condenser (56) is again at maximum.

(c) Third 90°. Condenser (57) remains connected in parallel and condenser (56) starts at maximum and ends at minimum capacity.

(d) Fourth 90°. Link motion actuates the switch (54) and disconnects the fixed condenser (57). At the end of this movement the variable condenser (56) is again at maximum capacity.

The condenser dial is fitted with two 90 degree scales, one red and one black. These scales are so arranged that the red scale corresponds to the variable condenser (56) and the black to the combined condensers (56) and (57). The maximum and minimum frequency range with one or both condensers in combination with each of the six plug-in coils (55) is shown in the table.

Coil	Frequency Range kc/s.		Condenser Scale
	Minimum	Maximum	
A	4,100	4,800	Black
	4,600	5,900	Red
B	5,700	6,800	Black
	6,500	8,700	Red
C	8,300	10,100	Black
	9,700	12,000	Red
D	11,800	14,200	Black
	13,500	16,800	Red
E	16,600	19,700	Black
	19,000	22,700	Red
F	22,000	25,600	Red

TYPE 46

TRANSMITTER 3N H/F (CONT).

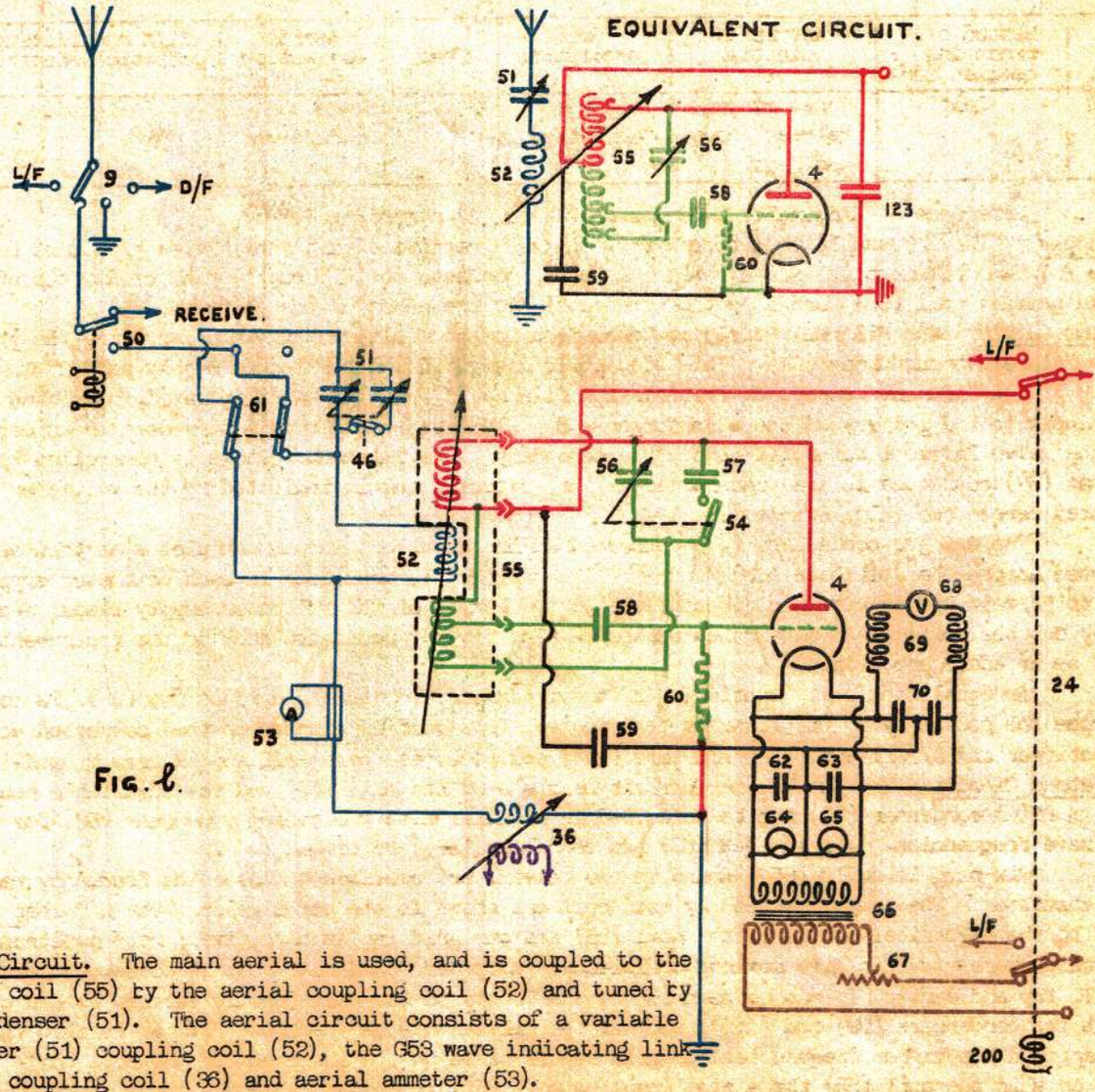


FIG. 6.

Aerial Circuit. The main aerial is used, and is coupled to the primary coil (55) by the aerial coupling coil (52) and tuned by the condenser (51). The aerial circuit consists of a variable condenser (51) coupling coil (52), the G53 wave indicating link circuit coupling coil (36) and aerial ammeter (53).

The coupling coil (52) is movable between the two halves of the primary coil (55) to obtain the correct degree of coupling.

The condenser (51) can be connected in series or parallel with the coupling coil (52) by means of the D.P. switch (61). In addition this condenser is so arranged that by means of a switch (46) fitted and controlled by a cam on the condenser spindle, half or all the fixed plates may be brought into use as necessary for tuning. The respective capacity values are 80 and 150 cms. (.08 and .15 jars).

The coil (36) is coupled to the link circuit of the G53 (see page GD5) for checking the transmitted frequencies.

The aerial link switch (9) connects the aerial to the H/F send-receive switch (50). This switch (50) when operated (see figure u.) completes the transmitting aerial circuit.

Tuning. Insert the appropriate primary coil (55) for the frequency required. Adjust the condenser (56) as indicated in the approximate adjustment table issued with the set. Make the appropriate auxiliary circuit switches and switch on the set. The primary A.C. voltage must not exceed 135 volts.

Press the morse key (151)(see figure w.) and adjust the aerial condenser (51) for a maximum reading in the aerial ammeter (53). Note the frequency reading on the wave indicator G53 (35) (see figure z.) and adjust the condenser (56) until the desired frequency is indicated by the G53. Readjust the aerial condenser (51) and aerial coupling (52) for a maximum aerial current, then reduce the coupling until the aerial current has fallen about 10%. The condenser (56) may require slight readjustment and the set is now roughly tuned.

Accurate adjustment is now carried out with the G7 or G8 wavemeter (see pages GA8 and GA9) and the G31 oscillator as described on pages GC3 - 4.

Finally tune the wave indicator G53 (see page GD5) to the transmitted frequency and carefully note the adjustments for checking any future transmissions on that frequency.

It should be noted that the aerial condenser (51) and primary condenser (56) should not be adjusted to work either of the switches (46) and (54) while power is applied to the transmitter or arcing will occur at the switch contacts.

RK12
R124

TYPE 46

TRANSMITTER 3N H/F (CONT)

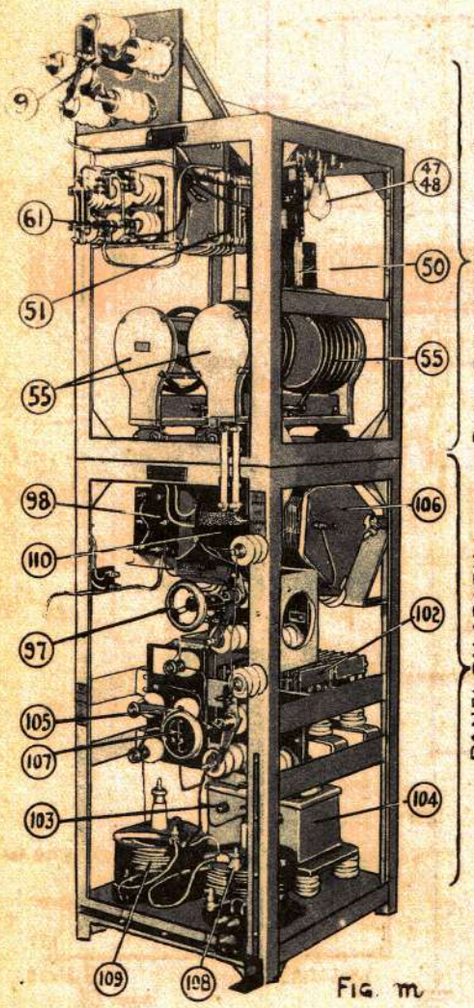


Fig. m

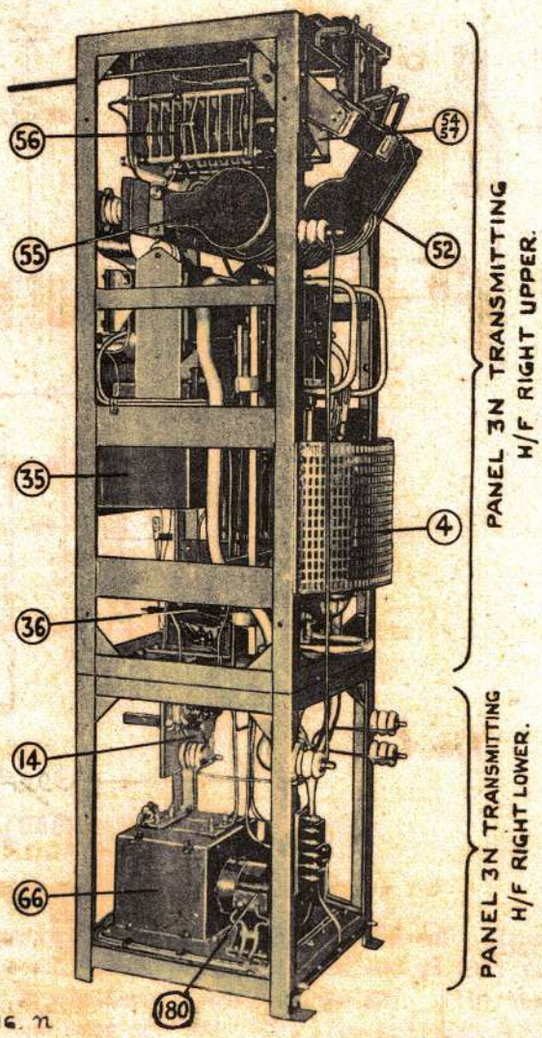


Fig. n

TRANSMITTER 3N SPARK

Transmitter 3N spark is the spark attachment for Type 46. It is similar to Transmitter 3R spark used with Type 47 (see page ~~3109~~ 2L 16). The power supply is obtained from the main 8 kW alternators (249)(250) and main transformer (132)(see figure c.).

H. T. Supply. The H. T. supply is obtained from one half of the main transformer (132) secondary. In the "spark" position one contact of the valve -spark switch (128) connects one end of the transformer secondary to the spark circuit. The H. T. return is via the earth connection of the spark circuit, and the centre earthed point of the transformer; thus only half of the transformer secondary is used.

A 600 ohm resistance (102) is connected in the H. T. supply to prevent oscillations occurring in the circuit formed by the half of the secondary in use and its 1 jar condenser (130).

Oscillatory Circuit. The oscillatory circuit consists of a 1½ kW quenched spark gap (108)(109) (see Admiralty Handbook of W/T (1931) paragraphs 454 (d) and 455 (a)), ammeter and shunt (111)(110), 10-jar condensers (103)(104) and an adjustable 120 mic coil (106).

Either spark gap can be used depending on the position of a single pole two way switch (107). A combination of two condensers (103)(104) in series, or two in parallel, or one alone can be obtained by adjusting the links (105) in different positions as shown in figure o. The primary coil is adjustable for tuning purposes. It is coupled to the aerial coupling coil (98).

Aerial Circuit. The main aerial and aerial circuit is used and therefore the aerial switch (9) should be in the L/F position. The link switch (14) connects the aerial circuit to the spark aerial coupling coil (98). This coupling coil is adjustable by 5 tappings. It is wound on the same former as the primary coil (106), and the degree of coupling is obtained by varying the taps of the coupling coil.

An aerial condenser (96) of 0.5 jars can be connected in series with the aerial circuit by the switch (97) for use on the higher frequency range of the transmitter (above 667 kc/s.)

TYPE 4.6

TRANSMITTER 3N SPARK (CONT).

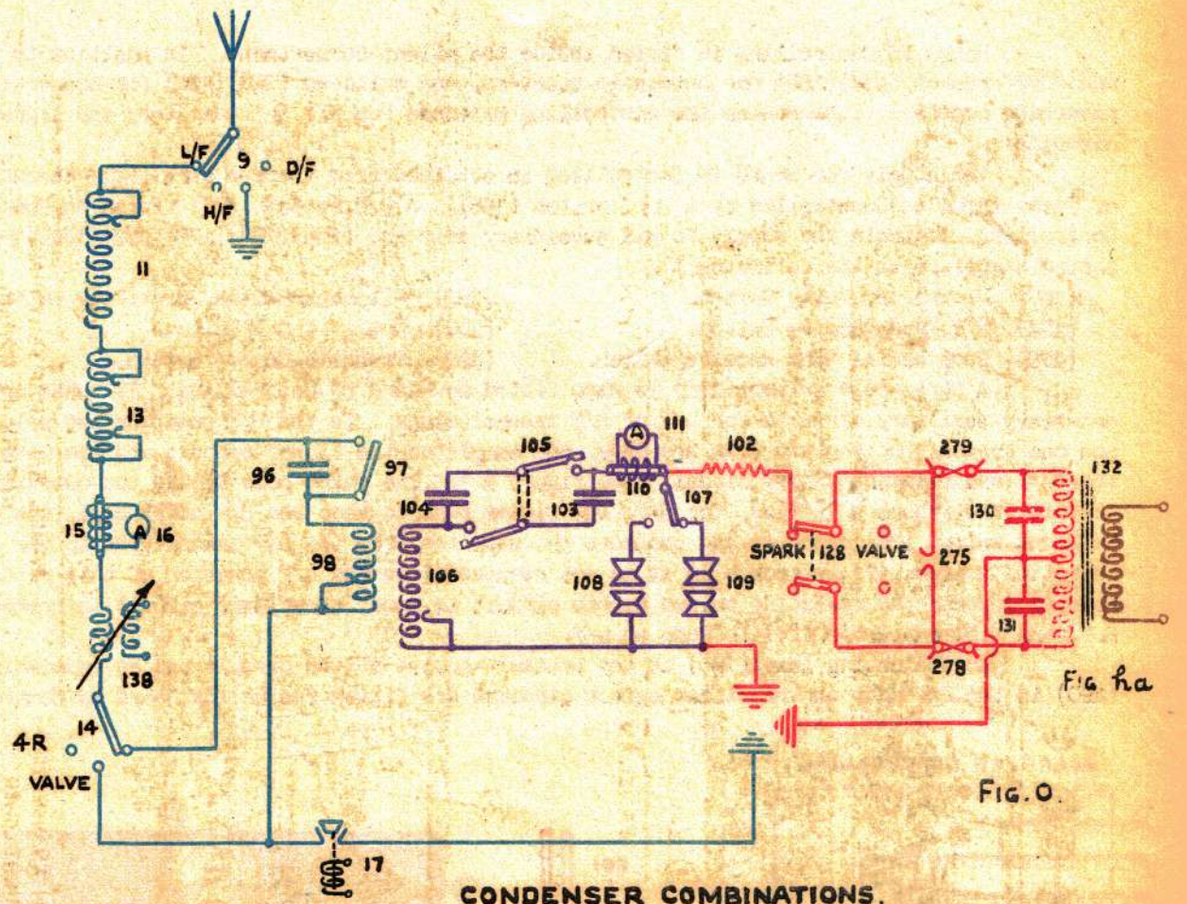
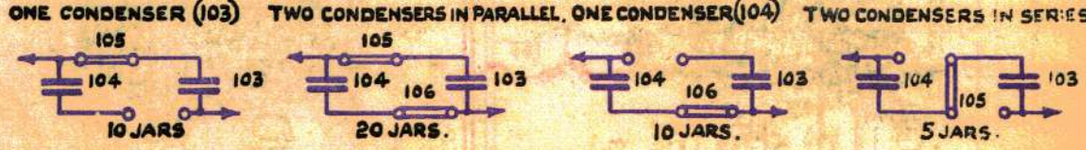


Fig 4a

FIG. 0.

CONDENSER COMBINATIONS.



Tuning. (Reference:- Admiralty Handbook of W/T (1931) paragraph 832 et seq.) The condensers (103)(104) are set to the combination required for the desired frequency, and the primary coil (106) set to the appropriate adjustments issued with the set. The aerial is disconnected, the wavemeter mutual placed near the coil (106), the set switched on and appropriate auxiliary switches made, and the oscillatory circuit is tuned by adjusting the primary coil (106).

The aerial adjustments are set from the adjustment table supplied and the aerial connected up. It should be noted that, owing to the addition of the spark coupling coil (98) in the aerial circuit, the adjustments on the aerial coil (11) will be slightly less than those given for Transmitter 3N L/F. The aerial condenser (96) is connected in the circuit if the required frequency is above 667 kc/s.

The wavemeter mutual is placed near the aerial coil (11) and the aerial circuit tuned by means of the coil (11) and fine tuning coil (13). The aerial coupling is adjusted, but it must be noted that any alteration of the coupling coil (98) will affect the aerial tuning which will then require resetting.

The wave indicator G52 (137) is now tuned and the adjustments noted so that future transmissions on that frequency may be checked easily.

TRANSMITTER 4 R

Transmitter 4R is a low-power valve transmitter fitted with Types 46 and 47. It is described on page R102 as part of Type 47. The only difference when fitted with Type 46 is in the filament supply which is taken either from special receiving valve supply alternators or from the main 8 kW alternators (249)(250). In both cases the supply is taken through a unit which comprises:- fuses (77), a transformer (76), a metal rectifier (75) (see Admiralty Handbook of W/T (1931) paragraph 651), and an output potentiometer (73) for regulating the filament voltage, shunted by a by-pass condenser (74) (see figure x.)

RK14
R126

TYPE 46

BOARD 2N CONTROLLING

Board 2N Controlling is fitted inside the silent compartment. In addition to the "ON" and "OFF" pushes (264)(265) for automatic starters, and switches (221)(222) for connecting in the reversing boosters, it contains the controlling switches for all D.C. auxiliary and signalling circuits.

The supply for Board 2N Controlling is obtained from the bus bars (201) through a pair of fuses (166) and controlled by a D.P. switch (165). A D.P. switch (167) fitted on Board 2N Controlling, controls the supply to six subsidiary switches (168)(174)(176)(183)(199)(193) which control supplies to the following:-

(168) Blower and Relay Switch.
(174) H/F Send-Receive Switch.
(176) Loop Aerial Send-Receive Switch.
(183) Filament Switch, Rectifier Switch.
(199) C.W. - I.C.W. Switch.
(193) Transmit-Dryout Switch.

A three-pole switch (198) is also fitted on Board 2N Controlling. It makes or breaks the necessary auxiliary circuits for L/F or H/F transmissions. In the H/F position two poles are made and one broken. Of the two that are made, one completes the blower circuit and the other completes the H.T. and filament C.O.S. circuit (see figure u.). The third pole breaks the operating switch circuit (see figure w.) Thus, for H/F, the blower runs to keep the H/F coils cool, the H.T. and filament switch (24) operates and connects the supplies from the L/F transmitter to the H/F, and the operating switch (17) is broken as it is not required. In the L/F position of this switch (198) the reverse occurs; the operating switch bobbin circuit is made, the blower circuit is broken and the H.T. and filament C.O.S. (24) is made to L/F.

An indicating lamp (195) in the transmit-dryout switch circuit and an indicating lamp (190) in the filament and rectifier switch circuits are fitted inside the Board 2N Controlling.

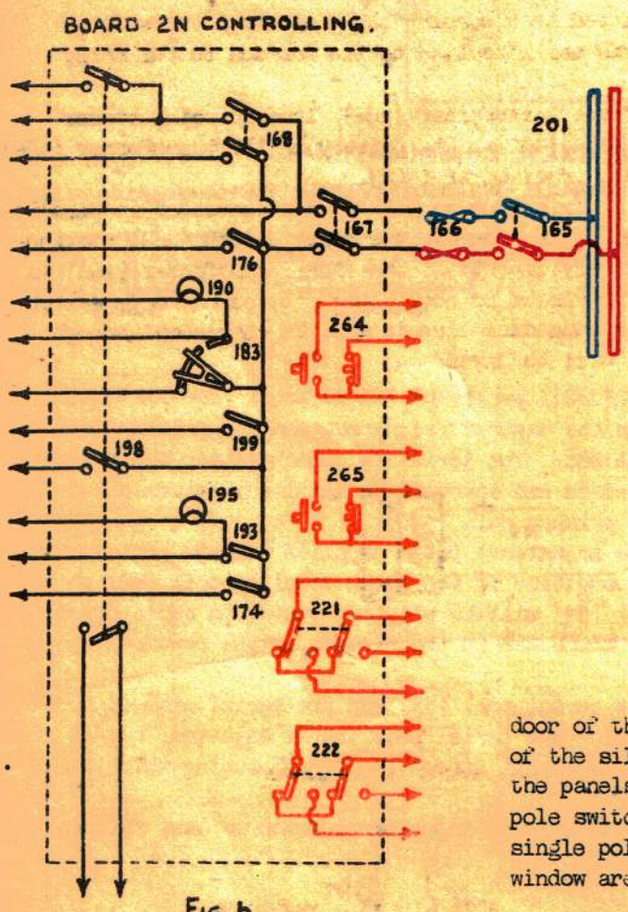


Fig. p

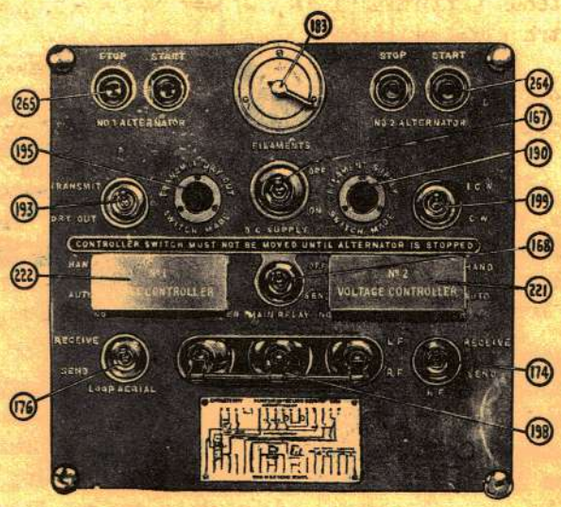


Fig. Q

GATE SWITCHES.

Two three point gate switches are fitted, one in the door of the safety enclosure, and one on the window at the back of the silent compartment which gives access to the front of the panels. Each three point switch consists of two single pole switches (171)(172) - (178)(179) which close, and one single pole switch (161) - (162) which opens, when the door and window are closed.

Two sets of corresponding single pole switches (171)(172) - (178)(179) are connected in series. They are connected in various D.C. auxiliary circuits to break these circuits when the door or window is opened. The other set of single pole switches (161) - (162) are wired in parallel. They are connected in the alarm circuit (see figure s.), and complete the A.C. supply to the alarm buzzer when the door or window is opened with power still applied to the set, due to the relay switch (169) sticking.

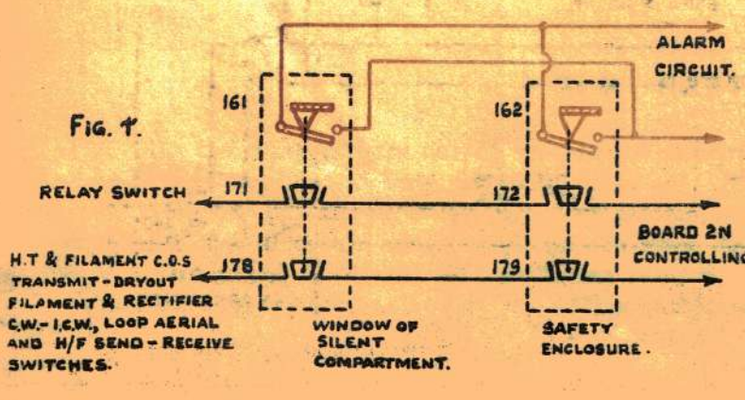


Fig. r.

TYPE 46

D.C. AUXILIARY CIRCUITS.

Relay Switch Circuit (figure s.). The relay switch circuit is controlled by a D.P. switch (183) on Board 2N Controlling. This switch also controls the blower supply when using H/F (see figure u.)

The positive supply is connected to one side of a single pole break of the loop aerial send-receive switch (173). The negative supply is connected to the gate switches (171)(172). The gate switches are in series (see figure r.) and, providing the safety arrangements are complete, the supply is connected via the relay switch bobbin and lamp (170) to the other side of the single pole break of the loop aerial send-receive switch (173). Therefore when the loop aerial send-receive switch is operated, the relay switch bobbin circuit is completed and the relay switch (169) is operated. The reason why one contact of the loop aerial send-receive switch completes the relay switch bobbin is described below.

The relay switch (169) when operated completes the 8 kW A.C. supply to the magnetic key (269) and to the primary of the main transformer (132) (see figure t.), and also to the primary of the alarm circuit transformer (159).

Loop Aerial Send-Receive Switch Circuit (figure s.) The loop aerial send-receive switch bobbin circuit is controlled by a single pole switch (176). This switch completes the circuit through two lamps (177) in parallel, the bobbin of the send-receive switch, and two gate switches (179)(178) to the common negative of the D.C. supply switch (167).

In the normal position two contacts of the send-receive switch (173) are made and one broken. The two which are made complete the loop aerial circuit to the receiving gear and the one which is broken, breaks the bobbin circuit of the relay switch (169).

When operated the send-receive switch breaks the loop aerial circuit from the receiving gear and completes the relay bobbin circuit. This ensures that the loop aerial is disconnected from the receiving gear before power is applied to the main transmitters.

Alarm Circuit (figure s.). The alarm circuit is fitted as a warning that, although the safety switches (171)(172)(178)(179) may be broken, power is still applied to the set due to the relay switch (169) sticking.

The circuit consists of the secondary of the transformer (159), loud sounding buzzer (164), and resistance lamp (163) and gate switches (161)(162). The primary of the transformer (159) is connected in parallel with the primary of the main transformer (132). RK14

The gate switch contacts (161)(162), (as described on page ~~R126~~) are connected in parallel and break when the safety door and window are closed. Therefore if the relay switch (169) remains made, although its bobbin circuit is broken, the primary circuit of the alarm transformer (159) is still complete. If for any reason the safety door or window is now opened, the safety cage switch contacts (161)(162) will make, the alarm transformer secondary circuit will be completed through the loud sounding buzzer (164), and an alarm signal will be given.

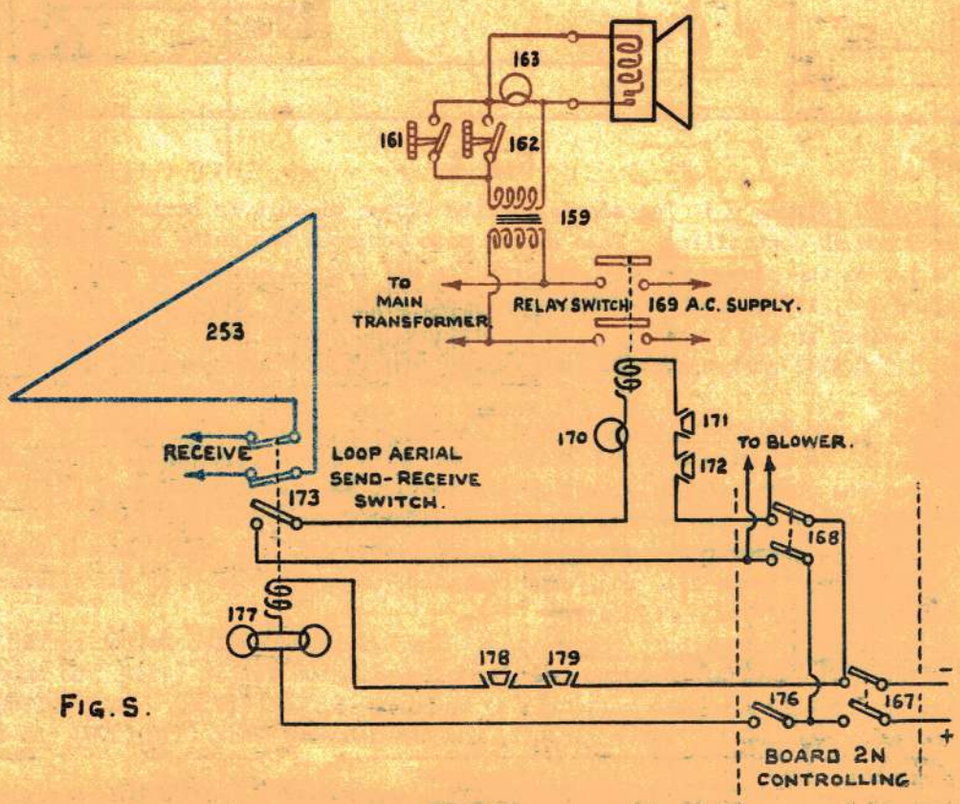


FIG. S.

RK 16
R128

TYPE 46

D.C. AUXILIARY CIRCUITS (CONT).

Rectifier Switch Circuit (figure t.). The rectifier switch bobbin circuit is controlled by the switch (133) on Board 2N Controlling, the first movement of which connects the positive supply through the bobbin and contact (134) to the gate switch contacts (178)(179). These contacts are connected in series, (see figure r.) and if the cage door and window are closed the circuit is completed to the common negative of the D.C. supply switch (167).

The main contact (120) of the rectifier switch, when operated, completes the filament supply to the rectifier valves (1)(2)(see figure e.). The second contact (184), when operated, removes the short circuit from the condenser (185) and lamp (186). The condenser (185) prevents arcing as the contact (184) breaks, and the lamp (186) is an economy resistance.

Filament Switch Circuit (figure t.) The filament switch bobbin circuit is also controlled by the switch (133). The second movement of this switch completes the filament switch bobbin circuit and connects it in parallel with the rectifier switch bobbin circuit; thus the rectifier switch is operated before the filament supply is made.

The lamp (191) is a resistance lamp in series with the bobbin of the filament switch. The lamp (190) is a 2½ c.p. lamp, fitted in Board 2N Controlling, and connected in parallel with the resistance lamp (191), as an indicating lamp

The contact of the filament switch forms a single break in the 8 kW A.C. supply to the filament transformers (see figure e.).

C.W. - I.C.W. Switch Circuit (figure t.) The C.W. - I.C.W. switch of Type 46 is magnetically operated. The bobbin circuit is controlled by a single pole switch (199) which completes a circuit through the bobbin and resistance lamp (139) and gate switches (178)(179) to the common negative of the D.C. supply switch (167).

In its normal position the C.W. - I.C.W. switch (121) is in the I.C.W. position when it short circuits the smoothing condenser (122) (see figure t.). It is therefore only operated for transmissions on C.W.

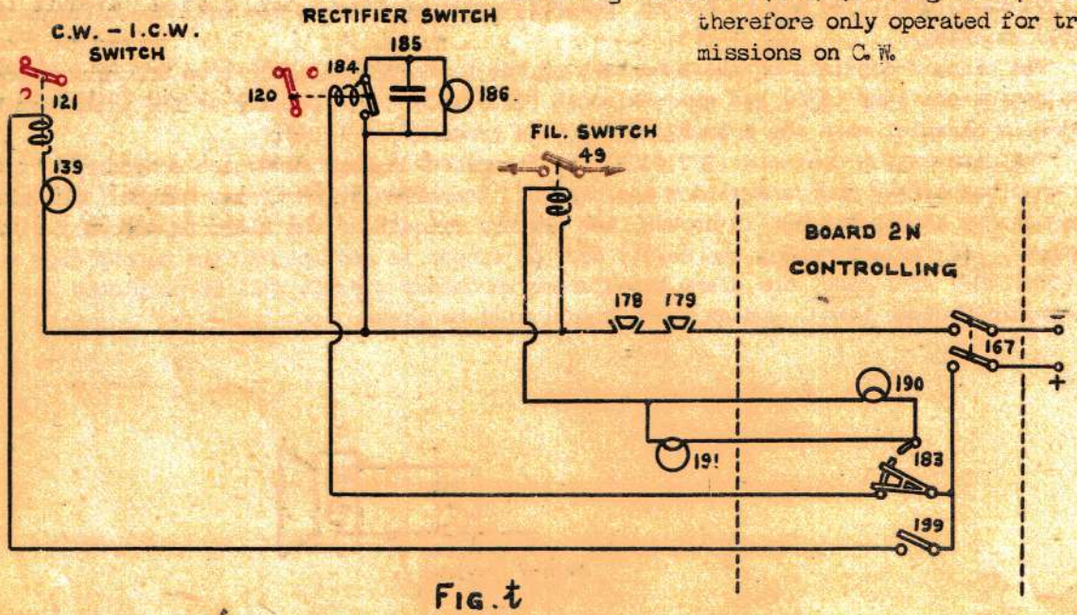


FIG. t

Blower Circuit (figure u.) The supply for the blower circuit is controlled by the D.P. switch (138) on Board 2N Controlling. This switch also controls the relay switch bobbin circuit (see figure s.). As the blower is only required for H/F transmissions, to cool the plug-in coils (55) (see figure l.), its circuit is completed by one pole of the three pole H/F - L/F switch (198) when that switch is set to H/F. In this position the switch (198) also completes the H.T. and filament C.O.S. (24) bobbin circuit (see below), and breaks the operating switch circuit (see figure w.).

H/F - L/F H.T. and Filament C.O.S. Circuit (figure u.). The bobbin circuit of the H.T. and Filament C.O.S. (24) is completed by one pole of the H/F - L/F switch (198). This pole completes a circuit from the positive supply through the bobbin, two resistance lamps (200) and the gate switches (178)(179), to the common negative of the D.C. supply switch (167).

In its normal position the switch completes the H.T. and filament supplies to the transmitter 3N L/F (see figure i.), and, when operated, completes the H.T. and filament supplies to the transmitter 3N H/F (see figure l.)

H/F Send-Receive Switch Circuit (figure u.). The H/F send-receive switch bobbin circuit consists of two lamps (48) in parallel connected in series with the bobbin (47). The supply for the circuit is controlled by a single pole switch (174) on Board 2N Controlling. This switch connects the positive supply through the above circuit, and the gate switches (178)(179), to the common negative of the D.C. supply switch (167).

In its normal, or "Receive", position the switch connects the receiving gear via the aerial link switch (9) to the aerial. When operated the aerial coupling coil (52) of the transmitter 3N H/F (see figure l.) is connected via the link switch (9) to the aerial.

TYPE 46

D.C. AUXILIARY CIRCUITS (CONT).

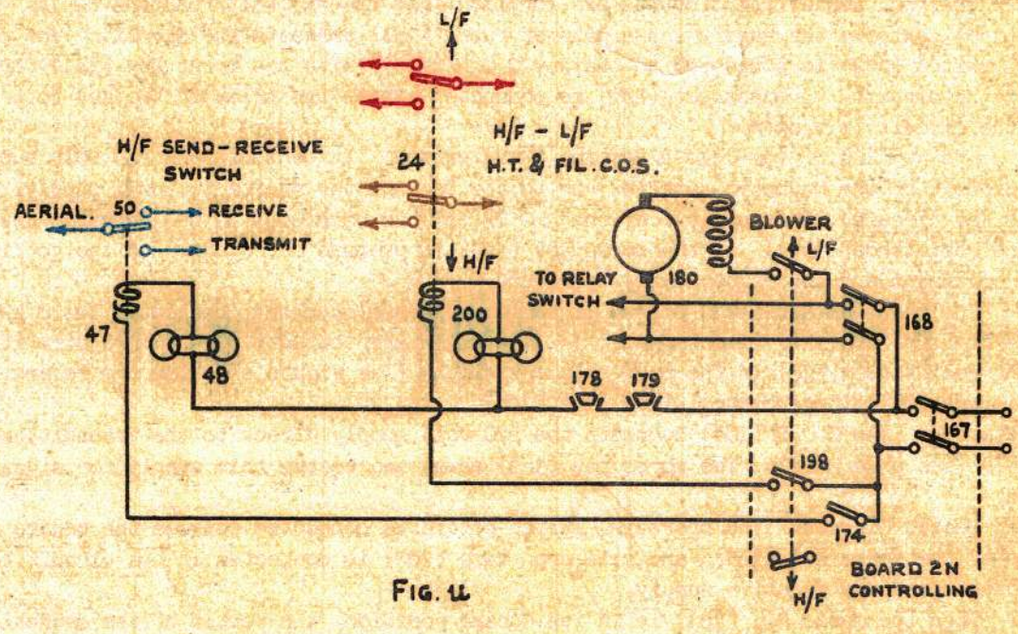


FIG. U

Transmit-Dryout Switch Circuit (figure v.) The transmit-dryout switch bobbin circuit is controlled by a single pole switch (193) on Board 2N Controlling. This switch completes the circuit through the bobbin and the gate switches (178)(179) to the common negative of the D.C. supply switch (167).

The lamp (194) is an economy resistance which is short circuited by one contact of the transmit-dryout switch (19), until the switch is operated. A 2½ c.p. lamp (195) fitted in the Board 2N Controlling is connected in the circuit as an indicating lamp.

The transmit-dryout switch (19) in its normal position, connects the grid and filament taps of the Transmitter 3N L/F to the aerial coil (11). When operated, it connects the grid and filament taps of the Transmitter 3N L/F to the dryout coil (26) and the aerial tap of the dryout coil to the aerial (see figure i.).

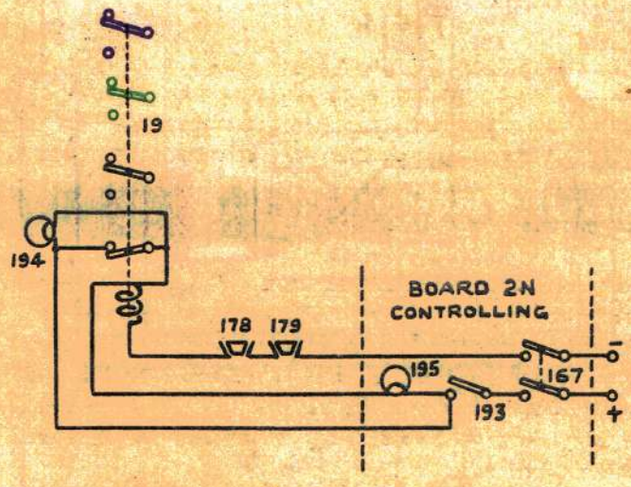


FIG. V.

RK 18
~~R130~~

TYPE 46

D.C. SIGNALLING CIRCUIT

The D.C. signalling circuits are supplied from the 220 volt bus bars (201). A D.P. switch (149) controls the supply and a pair of fuses (150) protects 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 3-pole, 3-way switch. It connects the 220 volt supply to the bobbin circuit of the magnetic key (269) or to the Transmitter 4R for the H.T. supply.

Magnetic Key Circuit. The supply from the C.O.S. (154) is connected to the magnetic key bobbin (155) and resistance (156). As the morse key (151) is pressed or released so the bobbin circuit is made or broken and the magnetic key operated.

The main contact (273) of the magnetic key, when operated, completes the 8 kW supply to the main transformer (132) (see figure b.). The auxiliary contacts (274) short circuit the compensating resistance (275) in the 8 kW filament supply (see figure e.) when the reversing booster is not in use for voltage control (see page R115).

Transmitter 4R. The C.O.S. (154) connects the 220 volt supply direct to the Transmitter 4R for the H.T. supply (see page R102). The morse key (151) makes and breaks this 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 a 32 c.p. lamp (153) is connected in the circuit between the back contacts 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 lamp (153) and the back and centre contacts of the morse key. The lamp therefore burns at full brilliancy.

When the morse key is pressed, the short circuit of the operating switch bobbin is removed, and a complete circuit is made through the lamp (153) and bobbin in series. The lamp therefore burns at reduced brilliancy.

One pole of the H/F – L/F switch (198), when in the H/F position, breaks the operating switch circuit supply as the operating switch (17) is not required for H/F transmissions. Figure w. shows the switch (198) in the L/F position.

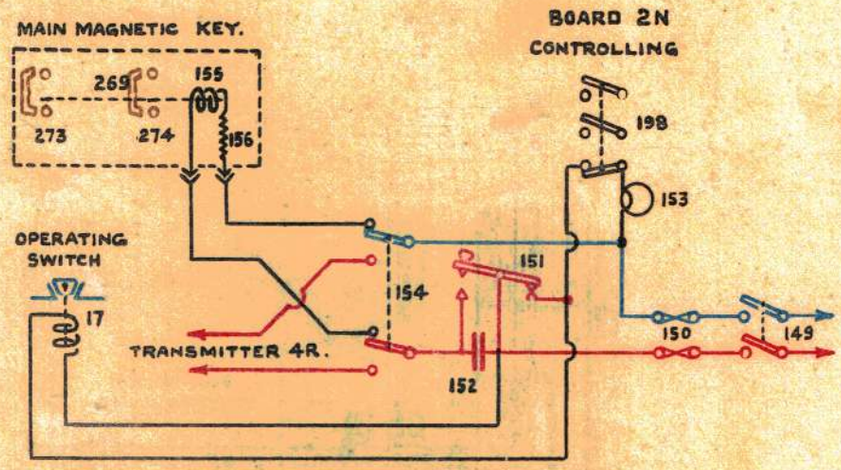
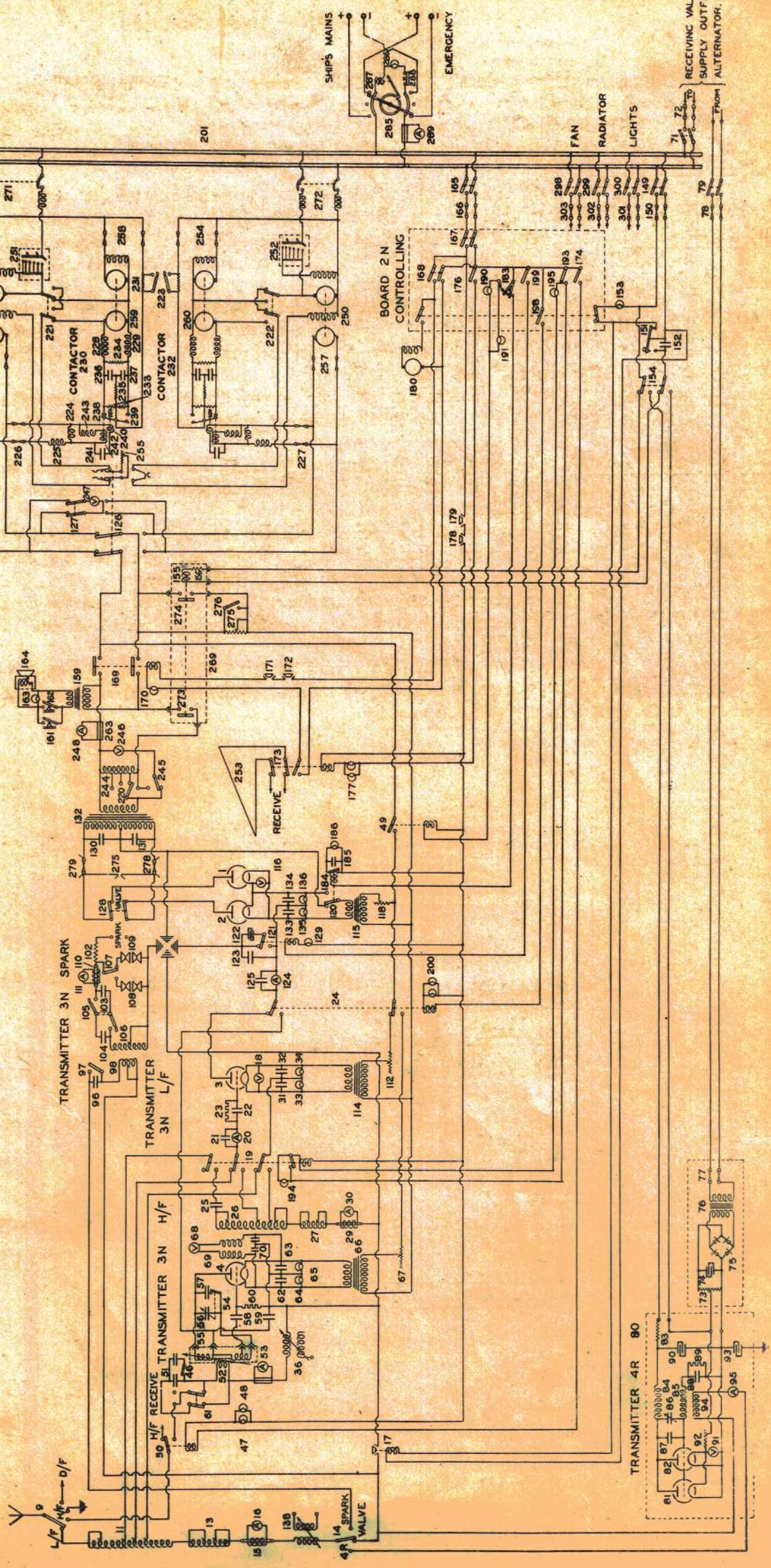


Fig. w.

RK 19

R131

TYPE 46



RK20
~~R132~~

TYPE 46

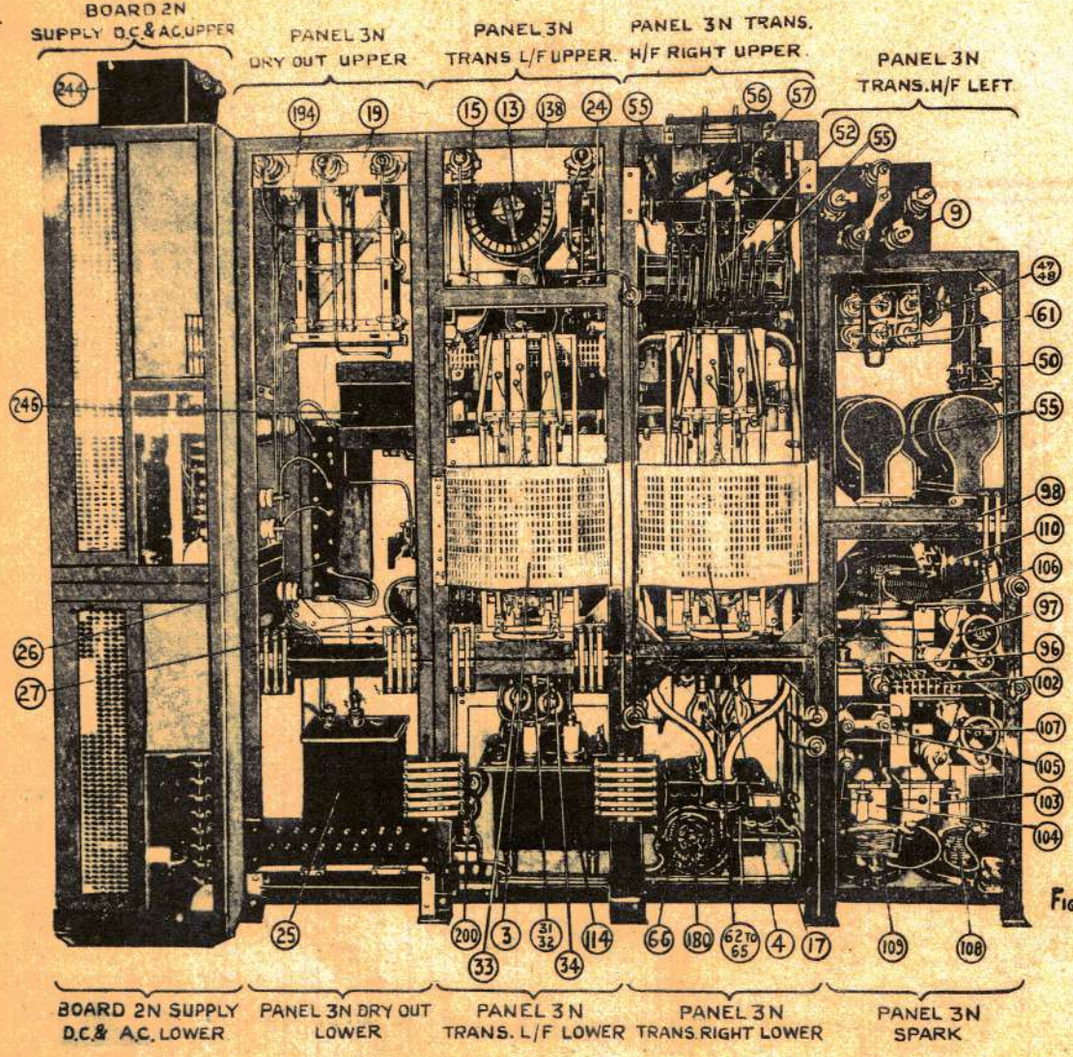


Fig. y.

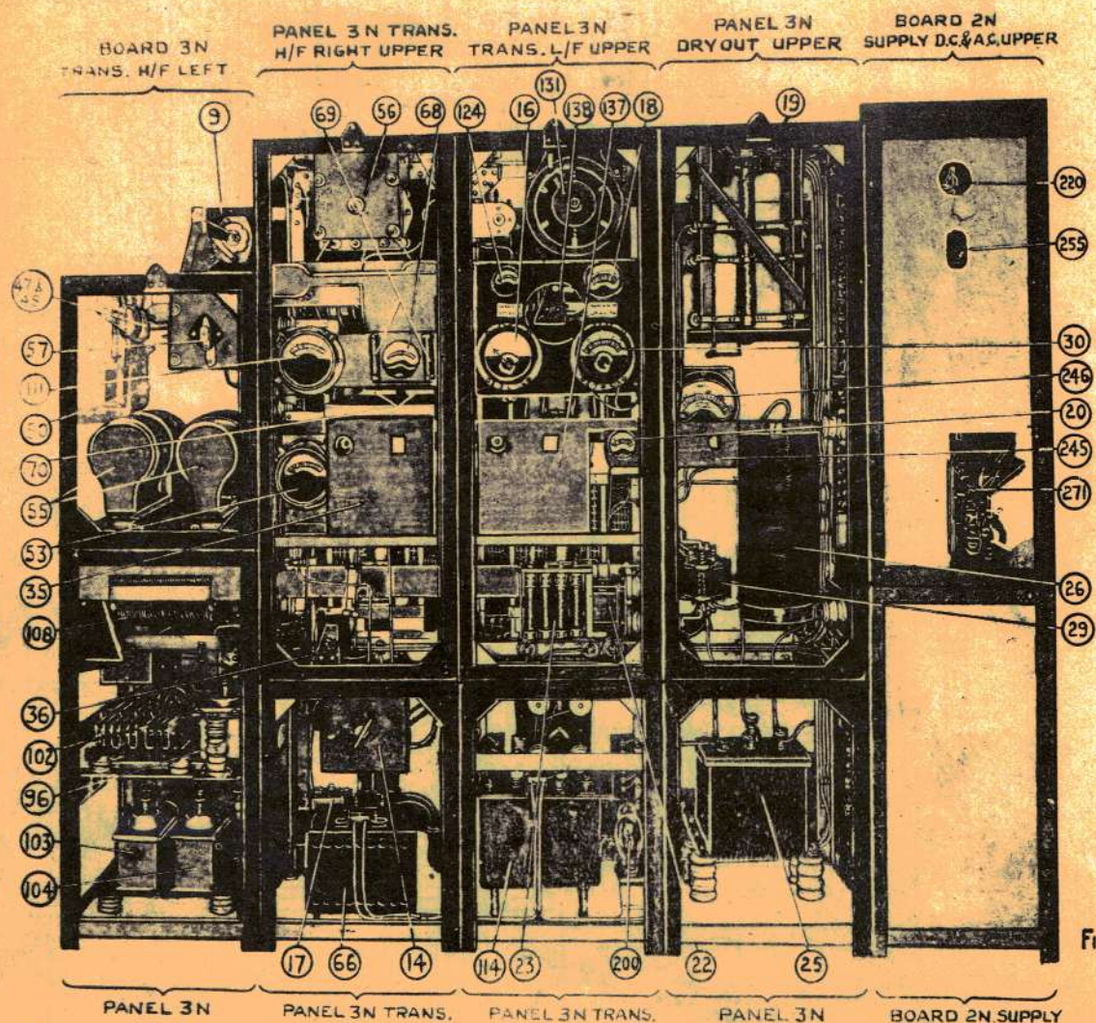


Fig y