TYPE 48

D.C. AUXILIARY CIRCUITS

The auxiliary circuits for Type 48 are all controlled by switches, numbered 1 to 18, fitted on No. 3 power board.

The duties of the switches are as follows:-

D.C. Switch (1). Radiator W/T Office.
D.C. Switch (2). Radiator Coding Office.
D.C. Switch (3). 12-1/2 inch fan.
D.C. Switch (4). 7-1/2 inch fan.
D.C. Switch (5). Pneumatic tube motor No. 1.
D.C. Switch (6). Charging board.
D.C. Switch (7). Warning Telephones.
D.C. Switch (8). Pneumatic tube motor No. 2.
D.C. Switch (9). Spare.
D.C. Switch (10). Lights, coding office.
D.C. Switch (11). Lights, C.R.R.
D.C. Switch (12). Blower and safety circuit (see figure t.).

D.C Switch (12) and fuses (30) supply the blower motors (381) or (382), the blower relay (380) and the bobbin of the main relay switch (252).

The delay action filament switch (375) has two long and two short contact arms and is arranged so that the former make contact before the latter. A detailed explanation of the action of the switch (375) is given in the notes on D.C. Switch (15). One of the long contact arms completes the supply to the bobbin of the blower relay (380) and a short contact arm completes the circuit to the bobbin of the main relay (252). By this arrangement the blower circuit is made before the main A.C. supply is completed by the main relay switch (252). The second short contact arm completes the supply to the filament switch (427) (see D.C. Switch (15)) and the blower will, therefore, be switched on before the filaments of the valves are burning. In the "Off" position the blower relay (380) short circuits the bobbin of the filament switch (427) (see D.C. Switch (15)).

When the filament C.O.S. (383) is set to any of the main power positions the bobbin of the blower relay (380) is connected in series with the blower motors C.O.S. (383). The blower relay (380) will only operate, therefore, when one of the blower motors is switched on. By this arrangement the filament switch (427) can only be operated when the short circuit of the blower relay (380) is removed by one of the blower motors being switched on. This prevents the valves lighting without the blower running.

The blowers are not used for the L/F master valve (43) and when the filament C.O.S. (383) is set to "L.P." the bobbin circuit of the blower relay (380) is completed by two 50 c.p. lamps (384) connected in parallel.

To prevent the set being used when men are working aloft in the vicinity of the aerials or feeders, etc., a locking device is fitted to the cover of D.C. Switch (12). By sliding a locking bar into position the switch (12) is secured in the "Off" position and a plate marked "Safe to transmit on M/F" can then be removed. The removal of the plate exposes a "Man Aloft" warning notice and releases a spring plunger which holds the locking bar in place to prevent the switch (12) being made to "ON".

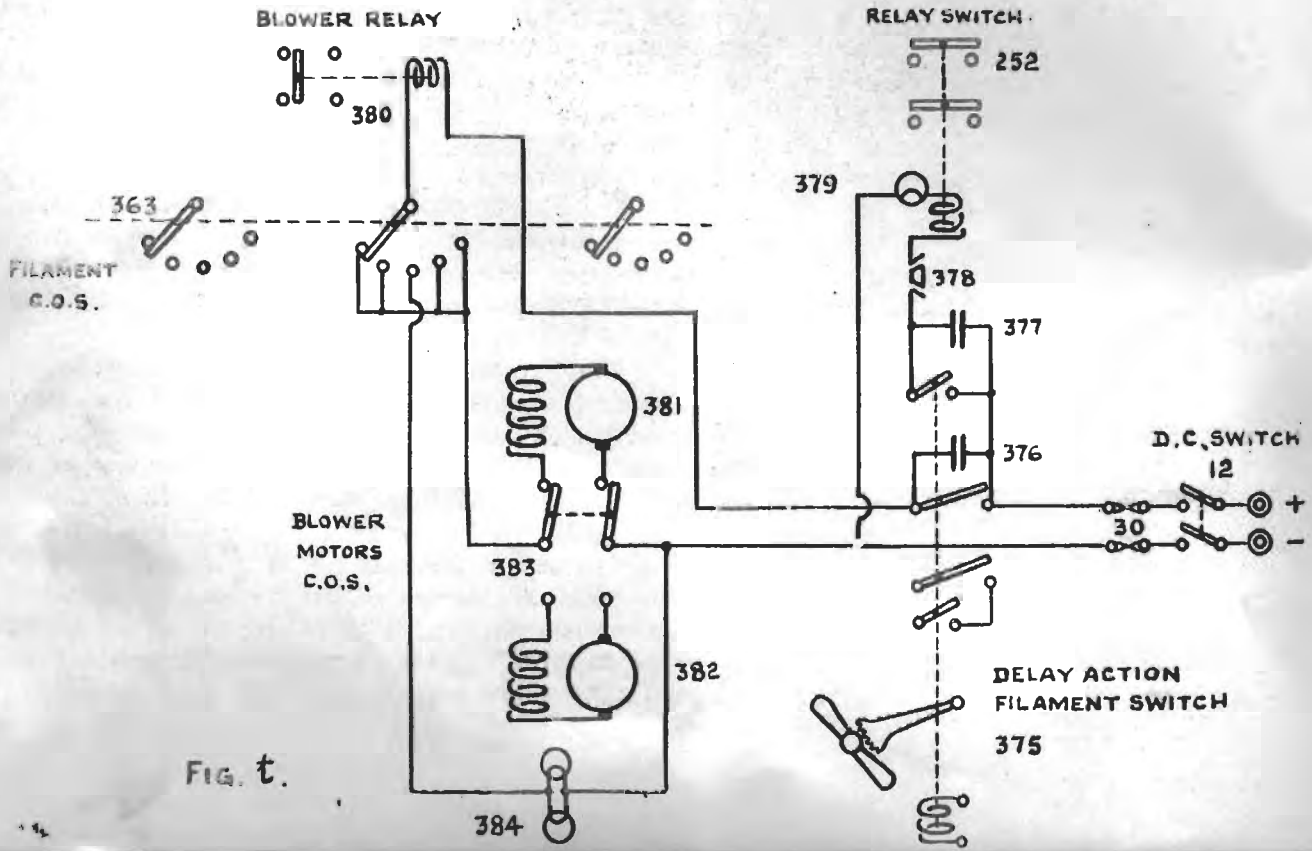

BLOWER RELAY
380
363
FILAMENT
C.O.S.
RELAY SWITCH
252
379
378
377
376
381
D.C. SWITCH
12
30
+
-
BLOWER
MOTORS
C.O.S.
383
382
DELAY ACTION
FILAMENT SWITCH
375
384

Fig. t.

D.C. AUXILIARY CIRCUITS (CONT.)

D.C. Switch (13), Morse Key R.C. (See figure u).

D.C. switch (13) and fuses (31) supply the tottins of the master keys (469) and (470) which are operated by the remote control morse keys fitted in the receiving bays of the C.R.R. Two contacts of the master key C.O.S. (435) fitted on Board 2S Controlling, connect the tottins of the master keys (469)(470) in circuit as required.

The morse key selector switch (429) connects the morse keys in the receiving bays to the master key in use as required.

The Remote Control Office morse key (431) is independent of the selector switch (429) and is connected in circuit by one contact arm of the remote control switch (432) on Board 2S Controlling. Each morse key in the C.R.R. and the R.C.O. morse key (431) has a neon lamp connected across the contacts to indicate when the key is connected in circuit.

The tottin circuit of the master keys (469)(470) is connected to contacts on the magnetic switches (442)(443)(444)(445) and aerial C.O.S. (50). The L.P. and main alternator magnetic switches (442)(443) are made when the filament and main alternators are supplying power to the set and the second and D/F office magnetic switches (444)(445) close when the second and D/F office aerial switches are earthed. (See figure s).

When the low power transmitter is in use the main alternator is not required and it is not necessary to earth the second and D/F office aerials. For this reason the key circuit contacts on the main alternator, second office and D/F office magnetic switches (443)(444)(445) are short circuited by an auxiliary contact on the aerial C.O.S. (50) when the latter is set to "L.P."

Similarly for H/F transmissions the second and D/F office magnetic switches (444)(445) are short circuited when the aerial C.O.S. (50) is set to "H/F".

When testing the tottin circuits the key circuit contacts on the magnetic switches (442) to (445) and aerial C.O.S. (50) can be short circuited by a tumbler switch (468) fitted in the lamp indicating box in the C.R.R. This switch (468) should always be broken after testing.

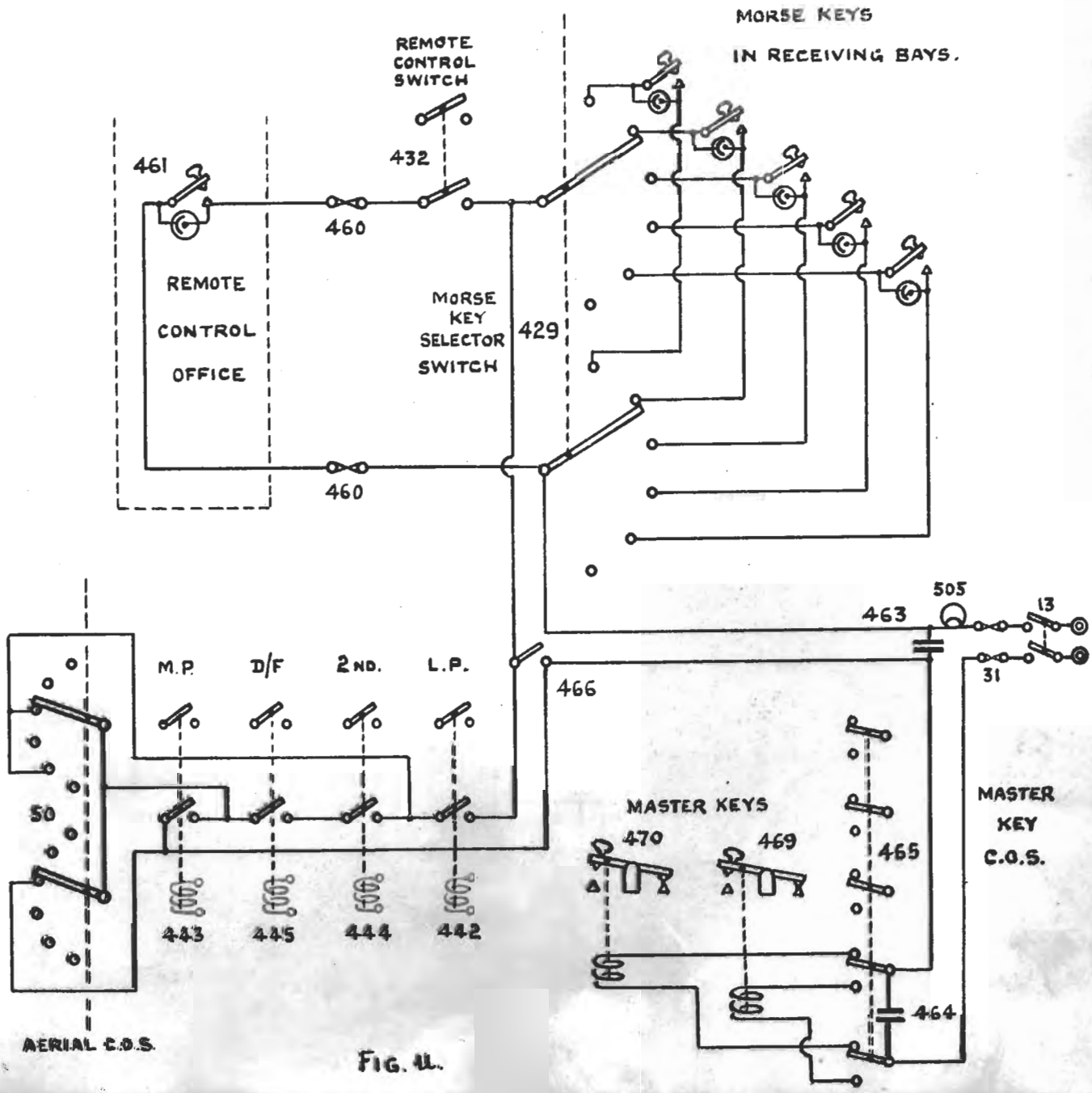

MORSE KEYS
IN RECEIVING BAYS.
REMOTE CONTROL SWITCH
461
432
460
REMOTE CONTROL OFFICE
MORSE KEY SELECTOR SWITCH
429
460
505
463
13
31
466
M.P.
D/F
2ND.
L.P.
50
443
445
444
442
MASTER KEYS
470
469
465
MASTER KEY C.O.S.
464
AERIAL C.O.S.

FIG. 11.

TYPE 48

D.C. AUXILIARY CIRCUITS (CONT.)

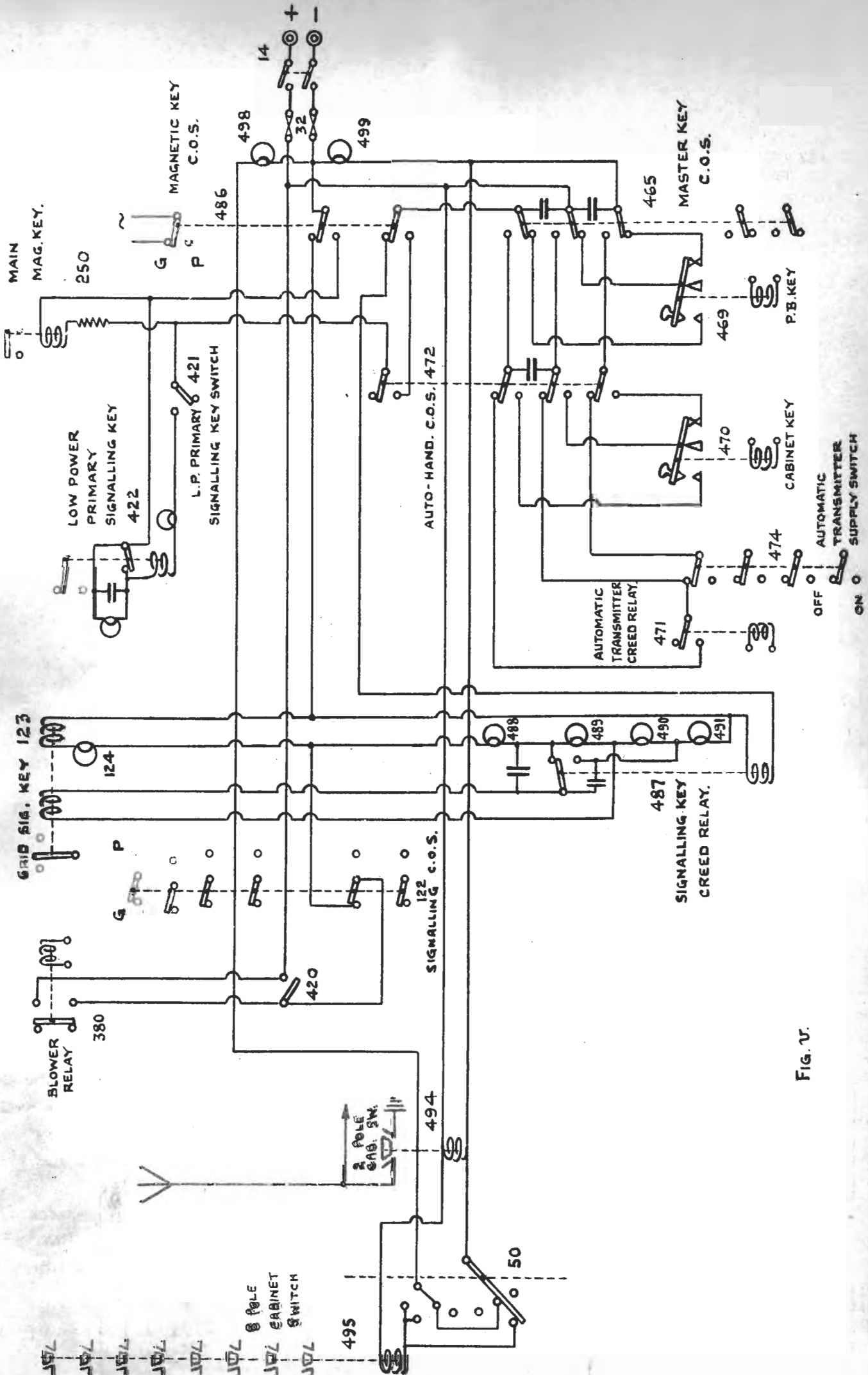


FIG. V.

D. C. Switch (14) Key Circuit (See figure v).

D. C. Switch (14) and fuses (32) supply the master key circuits for operating the main magnetic key (250), low power primary signalling key (422), the signalling key creed relay (437), the eight pole catinet switch (495) and the double pole catinet switch (494). The bottins of the grid signalling key (125) are also connected to the supply from D.C. switch (14). Three contacts of the master key C.O.S.(435) connect the operating circuits to the power board master key (469) or to the auto-hand C.O.S.(472) in the high speed transmitting bay.

The auto-hand C.O.S.(472) connects the operating circuits to the catinet master key(470) or to the automatic transmitter creed relay (471).

Two methods of signalling can be used, viz., "Grid" or "Primary".

Grid Signalling. For grid signalling the magnetic key C.O.S.(433) is set to "Grid" and the signalling key creed relay (437) can then be operated by either of the master keys (469) (470) or by the automatic transmitter creed relay (471). The signalling key creed relay (437) controls the grid signalling key (125) which has a field and a moving coil to operate the contact arm.

The moving coil is suspended in the field produced by the current in the field coil. The contact arm of the grid signalling key (125) is attached to the moving coil. The direction of the current in the moving coil determines the direction in which the coil, and consequently the contact arm, will move for spacing and marking.

One side of the moving coil is connected to the centre point of a resistance consisting of four 32 c.p. lamps (488)(489)(490)(491) which are connected in series between the positive and negative supply.

The other side of the moving coil is connected to the positive or negative side of the centre of the resistance lamps by the contact arm of the signalling key creed relay (437).

The direction of the current through the moving coil will therefore depend on the position of the contact arm of the signalling key creed relay (437).

The signalling key creed relay (437) is magnetically biased and can be adjusted, so that the contact arm will connect to either side when the operating bottin is not energised. The biasing adjustment is made by means of a milled handle on the side of the relay (437) marked "M - S". The bias should be set so that the grid signalling key (125) remains in the "spacing" position when the bottin of the signalling key creed relay (437) is not energised.

When the bottin circuit of the signalling key creed relay (437) is completed by the master key the current in the moving coil is reversed and moves the contact arm of the grid signalling key (125) to the "Marking" position.

For high speed working the signalling key creed relay (437) is controlled by the automatic transmitter creed relay (471) which is operated by the creed sender (see D.C.Switch (16)). Two of the 220-volt, 32 c.p. lamps (488) and (491) are replaced by 100-volt, 50 c.p. lamps when the high speed apparatus is in use.

The supply to the field coil and the resistance lamps (488) to (491) is completed when the blower relay (330) is made and the signalling C.O.S.(122) is set to "Grid". For testing purposes the contacts of the blower relay (330) can be short circuited by the grid key testing switch (420) fitted on the H/F main transmitting panel.

Primary Signalling.

For primary signalling the magnetic key C.O.S.(433) is set to "Primary" and the auto-hand C.O.S.(472) to "Hand". The main magnetic key (250) can then be operated by either of the master keys (469) or (470).

The bottin of the low power primary key (422) is connected in circuit by setting the L.P. primary signalling key switch (421) to "Master or L.P." This connects the bottins of the main magnetic key (250) and the low power primary key (422) in parallel.

Both keys (250)(422) will then operate when the master key (469) or (470) is pressed but as the main A.C. supply is not used for low power transmissions the movement of the main magnetic key (250) can be disregarded.

When the L.P. Primary signalling key switch (421) is set to "Self or Spark" the bottin circuit of the low power primary key (422) is broken.

The supply to the bottins of the magnetic keys (250)(422) is broken by a contact on the auto-hand C.O.S. (472) when the latter is set to "auto". This prevents the automatic transmitter creed relay (471) being used for operating the magnetic keys (250)(422). The catinet switches (494) (495) are operated by the back contacts of the master keys (469)(470).

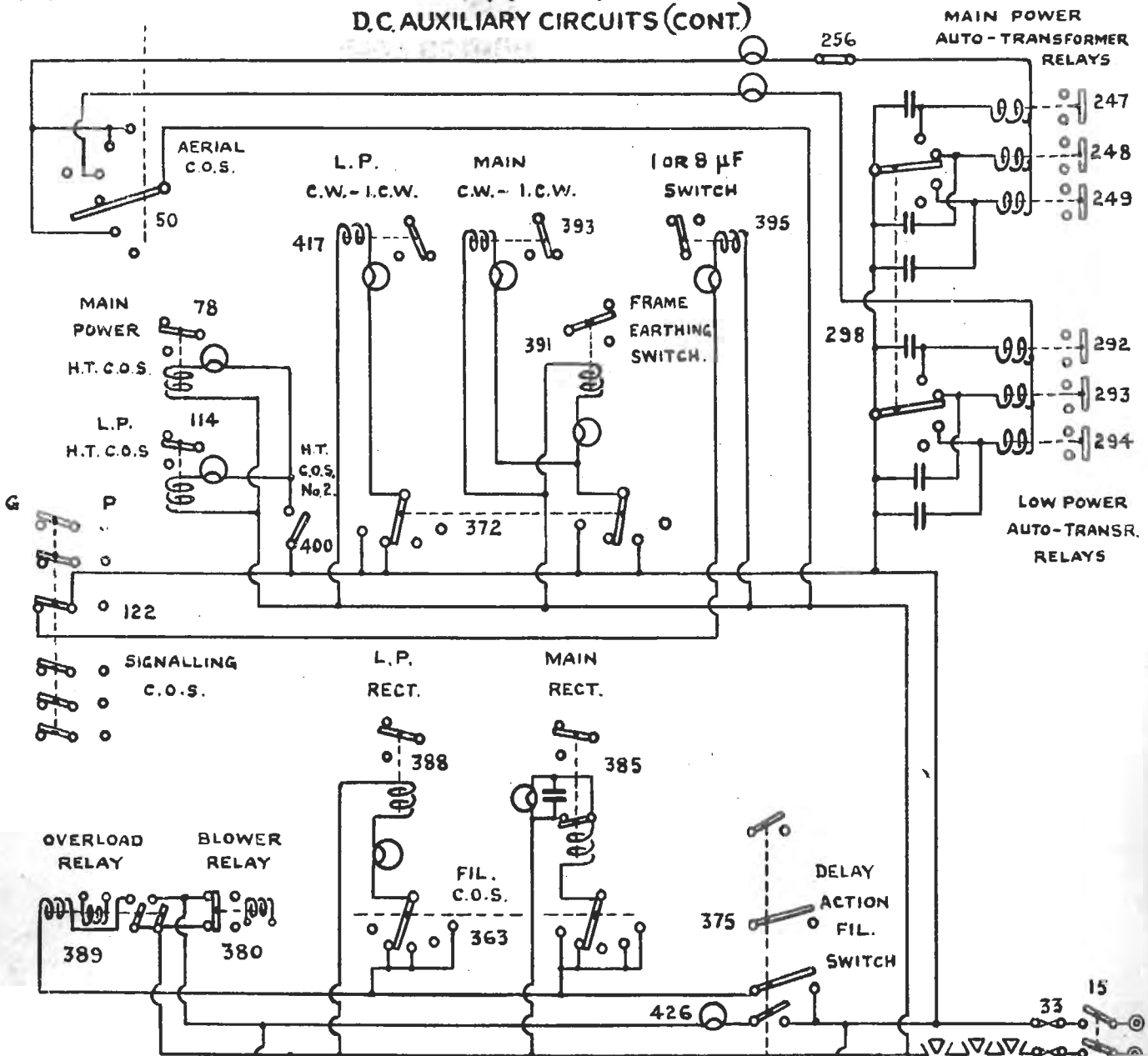
The two pole catinet switch (494) is connected to the receiving aerial used by the operator controlling the low power transmitter, and operates for all types of transmission.

The bottin of the eight pole catinet switch (495) is connected in parallel with the bottin of the two pole catinet switch (494) by an auxiliary contact on the aerial C.O.S.(50) when the latter is set to any of the L/F or H/F main power positions. An additional 32 c.p. lamp (498) is connected in parallel with the 32 c.p. operating circuits lamp (499) when both operating switches (494)(495) are working.

RM30

TYPE 48

D.C. AUXILIARY CIRCUITS (CONT.)



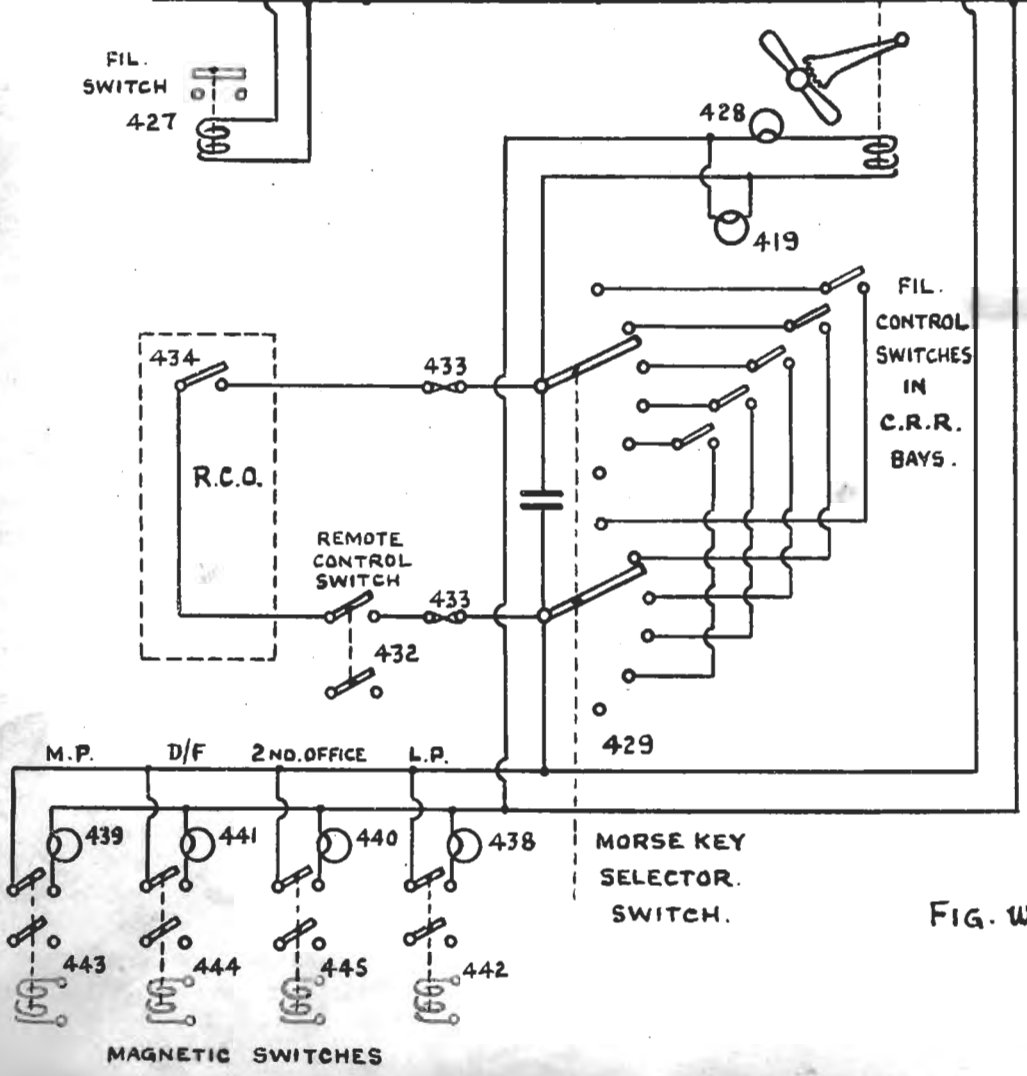

435 436 437
FIL. SWITCH
427
428
419
FIL. CONTROL SWITCHES IN C.R.R. BAYS.
434
433
R.C.O.
REMOTE CONTROL SWITCH
433
432
429
M.P.
D/F
2ND. OFFICE
L.P.
439
441
440
438
MORSE KEY SELECTOR. SWITCH.
443
444
445
442
MAGNETIC SWITCHES

FIG. W.

TYPE 48
D.C. AUXILIARY CIRCUITS (CONT.)

D.C. Switch (15). Control Board (see figure w.)

D.C. Switch (15) and fuses (33) supply three groups of control and indicating circuits as follows:-

(a) Power tapping switch (298), main and low power C.W. - I.C.W. switches (393)(417), frame earthing switch (391), main and low power H.T. change over switches (78)(114) and the 1 or 8 mfds. condenser switch (395).

(b) Main and low power rectifier switches (385)(388), hold on coil of overload relay (389) and the filament switch (427).

(c) Delay action filament switch (375) and the indicating lamps (438)(439)(440)(441).

The power tapping switch (298) is fitted on Board 2S Controlling and operates the bobbins of the relays (247)(248)(249)(292)(293)(294) for controlling the power taken from the main and low power auto transformers. A link (256) in the bobbin circuit to the main relays can be used to complete the A.C. supply from the 2/3 power tapping on the main auto transformer in the event of failure of the bobbin circuits (See figure e.)

An auxiliary contact on the aerial C.O.S. (50) completes the bobbin circuit to the main auto transformer relays (247)(248)(249) for L/F and H.F. main power transmissions and to the L.P. auto transformer relays (292)(293)(294) when using low power.

The main and low power C.W. - I.C.W. switches (393)(417) and the frame earthing switch (391) are controlled by the C.W. - I.C.W. C.O.S. (372) which is fitted on the front of the filament distributing panel. This switch (372) has four positions and connects the bobbins of the main and low power C.W. - I.C.W. switches (393)(417) in circuit for the various types of transmission as follows:-

Position	1.	C.W. Master.
"	2.	I.C.W. Master or C.W. L.P.
"	3.	C.W. Self.
"	4.	I.C.W. Self or I.C.W. L.P.

The bobbin circuit of the 1 or 8 mfd condensers switch (395) is completed by one contact arm of the signalling C.O.S. (122) when the latter is set to "Grid". This ensures that the eight 1 mfd condensers are used as the smoothing unit for all grid signalling master controlled trans missions.

missions.

The bobbins of the main C.W. - I.C.W. switch (393) and frame earthing switch (391) are connected in parallel. When the main C.W. - I.C.W. switch (393) is broken the frame earthing switch (391) falls to the "OFF" position and connects the insulated metal framework, in which the smoothing condensers are fitted, to earth. This prevents danger from shock to anyone touching the framework, due to an induced floating potential, after using C.W.

The bobbins of the main and low power H.T. change over switches (78)(114) are connected in parallel and are controlled by H.T. C.O.S. No.2(400) which is fitted on the front of the filament distributing panel.

The main and low power rectifier switches (385)(388) are connected in circuit by two contact arms on the filaments C.O.S.(363). The main rectifier switch (385) operates when the filament C.O.S.(363) is set to either of the self-excited or master positions. The low power rectifier switch (388) operates when the filament C.O.S.(363) is set to low power or either of the master positions. The supply to the bobbins of the rectifier switch, or switches, in use is completed by one of the long contact arms of the delay action filament switch (375). The delay action filament switch (375) is fitted with a braking device which ~~contacts~~ consists of a fan, enclosed in a box, and revolved by a rachet attached to the spindle of the switch. When the bobbin of the switch (375) is energised the switch moves to the "ON" position in, approximately 3 seconds. The long contact arms are flexible and, after making contact, will bend until the switch moves to the full "ON" position and the short arms make contact. A short contact arm on this switch (375) completes the supply to the bobbin of the filament switch (427). As the long contact arm makes contact a short time before the short contact arm the rectifier switches (385)(388) operate before the filament switch (427) is closed and break in the reverse order. By this arrangement the A.C. supply to the primaries of the voltage step down filament transformers is broken by the filament switch (427), before the secondary circuit of the rectifying valves filament transformers (370)(371) is broken by the rectifying switches (385)(388). Arcing at the contacts of the rectifying switches, due to the large filament current, is therefore prevented.

A 32 c.p. lamp (426) fitted in the filament distributing panel, is connected in series with the supply to the bobbin of the filament switch (427). The lamp (426) burns at half brilliancy when the filament switch (427) is "ON" and at full brilliancy when the resistance of the bobbin of the filament switch is short circuited by the overload relay (389) or the blower relay (390).

The delay action filament switch (375) is controlled by tumbler switches fitted in the bays of the C.R.R. Two additional contacts on the morse key selector switch (429) connect the bobbin circuit to the tumbler switch in the required bay. The morse key selector switch(429), therefore, connects the morse key (see D.C.Switch (131) and the filament control tumbler switch to any desired bay.

Each of the removable covers on the H/F main and master panels and the safety cage gate is fitted with a safety gate switch (435)(436) or (437). These switches are connected in series and break the supply from D.C.Switch (15) when either of the covers is removed or the safety gate is open.

TYPE 48

D.C. AUXILIARY CIRCUITS (CONT.)

A separate filament control tumbler switch (434) is fitted in the remote control office and is independent of the morse key selector switch (429). The R.C.O. tumbler switch (434) is connected in circuit by one contact arm of the remote control switch (432).

A 2-1/2 c.p. indicating lamp (419), fitted on the rack in the main receiving bay, is connected in parallel with the resistance lamp (428) and bobbin of the delay action filament switch (375).

The indicating lamps (438)(439)(440)(441) are fitted in the lamp indicating box which is mounted in a convenient position in the C.R.P. Each lamp will light when the appropriate magnetic switch operates as described on page RM31.

D.C.Switch (16) High Speed Sender. (see figure x.).

D.C. switch (16) and fuses (34) supply the creed keyboard perforator motor (475), the creed sender (482) and the automatic transmitter creed relay (471).

The keyboard perforator is used to prepare the perforated paper tape necessary for operating the signalling mechanism of the creed sender (482). In appearance the perforator resembles a typewriter with a bank of keys representing the alphabet, numerals etc. The depression of any single key causes the required punches to be selected and driven through the paper tape in accordance with the corresponding code combination.

After punching, the paper tape is inserted in the creed sender (482) and is pulled through the operating mechanism when the transmitter motor is switched on.

The creed sender (482) operates the automatic transmitter creed relay (471) by an arrangement of levers and bell cranks protruding through the holes in the paper tape. One side of the bobbin of the automatic transmitter creed relay (471) is connected to the positive or negative side of the D.C. supply through resistance lamps (477) or (479). The other side of the bobbin is connected in series with a condenser (481) and lamp (483) to the centre point of two lamps (479)(480) which are connected in series across the D.C. supply.

The current through the bobbin of the relay (471) charges the condenser (481) and the direction of the charging current will change as the "marking" or "spacing" levers in the sender protrude through the paper tape.

The relay (471) is polarised and will stop at the position in which it was left by the last charging current to the condenser (481).

As explained in the notes on D.C.Switch (14) the automatic transmitter creed relay (471) operates the signalling key creed relay (487) which, in turn, operates the grid signalling key (123).

D.C.Switch (17) lights W/T office.

D.C.Switch (18) Spare.

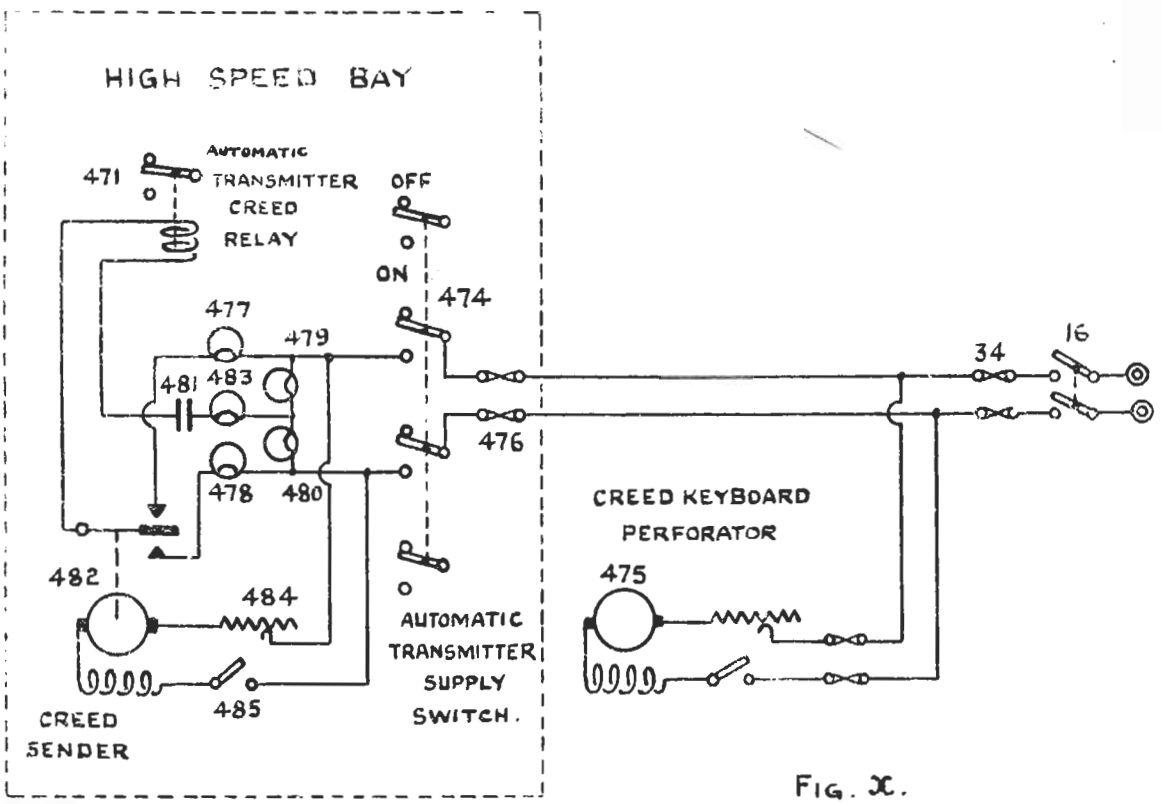


FIG. X.