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**Volume I**

## SECTION 1, CHAPTER 5

# TRANSMITTER T.1083

## Contents



## List of Illustrations

# TRANSMITTER T.1083

(Stores Ref. 10A/8456)

## INTRODUCTION

1. This transmitter is a General Purpose Aircraft Transmitter covering the following frequency bands 136 to 500 kc/s and 3 to 15 Mc/s. It is capable of C.W., I.C.W. and R/T transmission. The send-receive switch of the transmitter may be remote controlled.

2. The transmitter comprises a master-oscillator valve and an amplifier valve, the frequency bands being covered in four ranges by means of four pairs of plug-in coils. The ranges are as follows: 136 to 500 kc/s, 3 to 6 Mc/s, 6 to 10 Mc/s and 10 to 15 Mc/s. C.W., I.C.W. or R/T

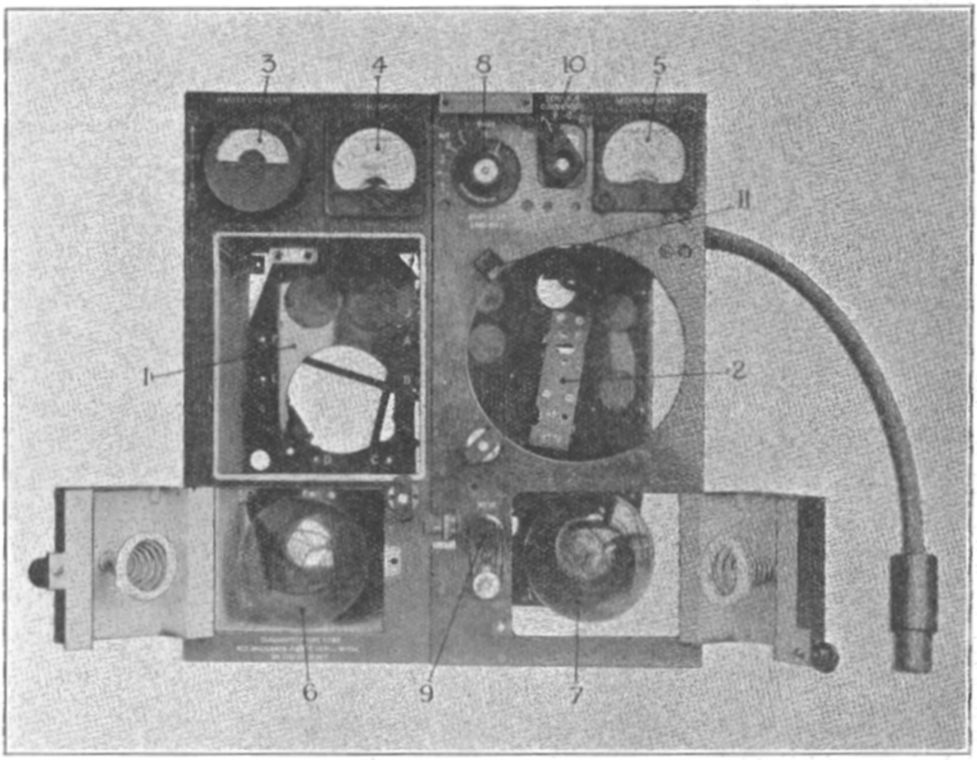



FIG. 1. Front view of transmitter, T.1083.

transmission may be made on any of these ranges, except the first mentioned range, where R/T is not practicable. The transmitter is intended to be used in conjunction with the receiver R.1082 and arrangements are provided to enable the transmitter and receiver to be used for intercommunication in the aeroplane. Provision is also made for "listening-through".

## GENERAL DESCRIPTION

### Transmitter

3. In fig. 2 is given a theoretical circuit diagram of the transmitter. $V_1$ is an amplifier valve and $V_2$ an oscillator valve. The plug-in units for both amplifier and oscillator may be changed to cover the frequency bands required. There are four of these units for the oscillator and four for the amplifier, marked as follows :—

| | | |
|---|---|---|
| Range A | .. .. | 10–15 Mc/s |
| ,, B | .. .. | 6–10 Mc/s |
| ,, C | .. .. | 3–6 Mc/s |
| ,, D | .. .. | 136–500 kc/s |

4. In the diagram of fig. 2 the circuit is shown for the 3–10 Mc/s band (ranges B and C). The circuit changes effected when coil units A or D are plugged into position are shown in the dotted rectangles near the oscillator and amplifier valves, and the resistance and capacitance values are given in the table in the upper right-hand corner of the illustration.

5. A switch is provided on the transmitter by means of which one, two or three small condensers may be included in the aerial circuit to raise its natural frequency. Position A gives the highest, and position D the lowest, natural frequency.

6. External to the transmitter a further condenser may be connected in the earth lead when, in a large aircraft, difficulty is experienced in reaching the highest frequencies. This condenser is shunted by an inductive resistance so that no steady charge can accumulate. Such a charge would raise the chassis of the transmitter to a potential other than earth potential. An aerial blocking condenser is provided.

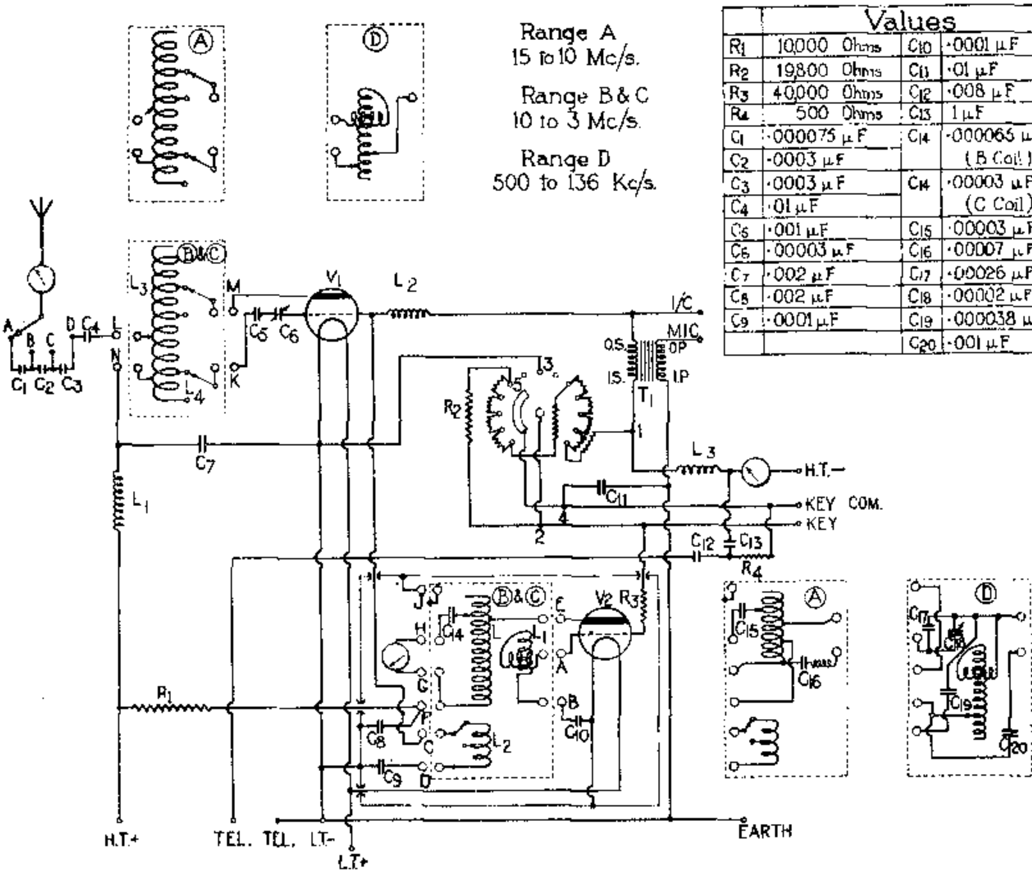
7. The neutralizing winding $L_4$ in the amplifier circuit is provided to prevent feed-back in the amplifier circuit. If this provision were not made the value of the master-oscillator drive would be lost. The winding is connected back to the grid of the amplifier through the fixed condenser $C_5$ and the variable condenser $C_6$, and neutralization is effected by adjustment of the condenser $C_6$. The fixed condenser $C_5$ is connected in series to prevent damage in the event of an accidental short-circuit in the variable condenser.

8. Keying is effected by joining H.T. negative to L.T. negative through the bias as shown in fig. 7. It will be seen that the oscillator is keyed as well as the amplifier.

9. For R/T, modulation is effected by connecting the secondary of a microphone transformer in series with the amplifier grid-bias arrangement. There is thus imposed on the steady grid bias a component which alternates at speech frequency.

10. In fig. 3, simplified diagrams are given showing the changes in the circuit of the transmitter for the frequency bands 15–10 Mc/s (range A), 10–3 Mc/s (ranges B and C) and 500–136 kc/s (range D). Referring first to range D it will be seen that on the lower frequencies the master-oscillator circuit is a Colpitts oscillator in which reaction is obtained by applying the R/F. p.d's of the mains condenser between grid and filament. The inductance is tapped and a fine tuning variometer is included. The amplifier circuit incorporates a tapped coil and fine tuning variometer. The coupling between amplifier and master-oscillator is through a coupling condenser. A neutralizing arrangement is not provided on this frequency band.

11. For ranges B and C it will be seen that the oscillator becomes a tuned-anode-tuned-grid circuit in which reaction is obtained through the anode-grid capacitance of the valve. The anode inductance is shunted by a condenser through a variable tapping point. The grid circuit is tuned by a variometer. The amplifier circuit incorporates an inductance with a variable aerial tap and a neutralizing winding. The coupling between amplifier and master oscillator is provided by the coupling coil.

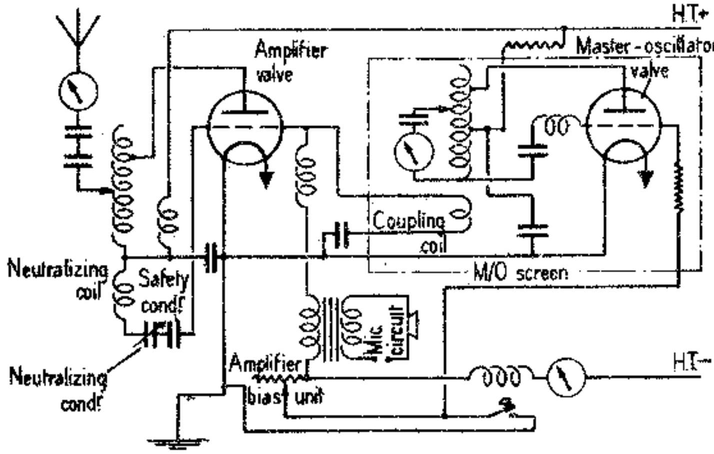



| Values | | | |
|---|---|---|---|
| $R_1$ | 10,000 Ohms | $C_{10}$ | ·0001 µF |
| $R_2$ | 19,800 Ohms | $C_{11}$ | ·01 µF |
| $R_3$ | 40,000 Ohms | $C_{12}$ | ·008 µF |
| $R_4$ | 500 Ohms | $C_{13}$ | 1 µF |
| $C_1$ | ·000075 µF | $C_{14}$ | ·000065 µF (B Coil) |
| $C_2$ | ·0003 µF | | |
| $C_3$ | ·0003 µF | $C_{14}$ | ·00003 µF (C Coil) |
| $C_4$ | ·01 µF | | |
| $C_5$ | ·001 µF | $C_{15}$ | ·00003 µF |
| $C_6$ | ·00003 µF | $C_{16}$ | ·00007 µF |
| $C_7$ | ·002 µF | $C_{17}$ | ·00026 µF |
| $C_8$ | ·002 µF | $C_{18}$ | ·00002 µF |
| $C_9$ | ·0001 µF | $C_{19}$ | ·000038 µF |
| | | $C_{20}$ | ·001 µF |

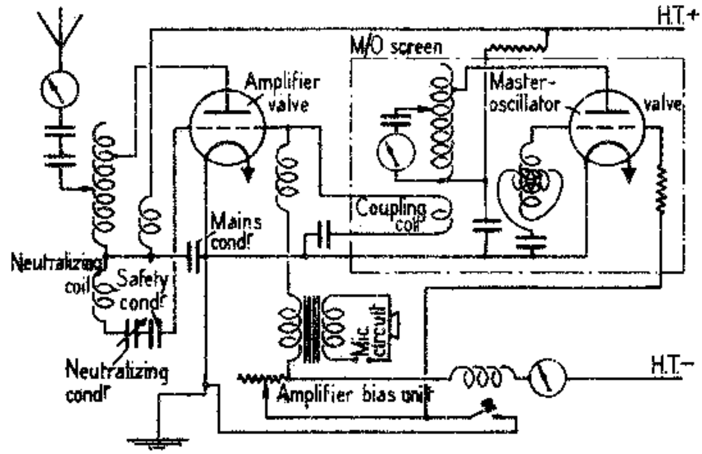
FIG. 2, THEORETICAL CIRCUIT DIAGRAM



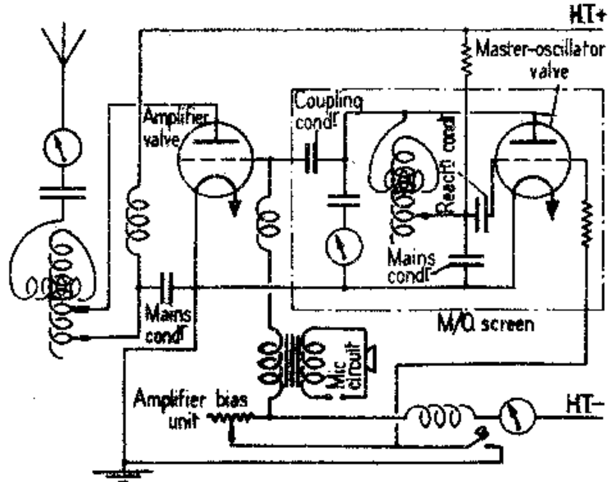
*Facing paras. 3-11.*




15–10 Mc/s. (Range A)




10–3 Mc/s. (Ranges B & C)




500–136 Kc/s. (Range D)

**FIG. 3, SIMPLIFIED CIRCUIT DIAGRAMS T.1083**

12. For range A the amplifying circuit remains the same as for B and C (an inductance with a variable aerial tap and a neutralizing winding) but the master oscillator circuit is now changed to a form of Hartley circuit, the anode inductance being shunted by a condenser through a variable tapping point, and the grid circuit being coupled to the end of the inductance through a choke and condenser.

13. The way in which grid bias is controlled is shown in fig. 7. A suitable fraction of the resistance $R+R_2+R_1$ is connected between H.T. negative and filament, and the IR drop across this resistance is used as grid bias. The resistance R is always in circuit ; it ensures that the bias will never fall below a safe minimum value. The arm selects a tapping on resistance $R_2$ and includes a suitable fraction of $R_2$ in series with R. When the arm is moved into the position " TUNE " the resistance $R_1$ is put in series with R and $R_2$. In this position the bias is so great that the amplifier valve is inoperative.

14. The arm has ten positions on $R_2$, marked C.W. 1, 2, 3, 4 and 5 and R/T 1, 2, 3, 4 and 5 respectively. As the arm is moved from stud 1 to stud 5 in either the C.W. or the R/T quadrant the bias is progressively decreased, and the input and output of the amplifier are correspondingly increased. When the arm is moved into any of the five R/T positions it not only selects a suitable steady bias but also short-circuits the key. The bias for the oscillator valve is fixed by means of a separate resistance.

15. In fig. 2 can be seen the arrangements for obtaining side tone. A portion of the audio-frequency component of the amplifier grid voltage is applied *via* a condenser $C_{13}$ to a resistance $R_4$ to which the telephones are connected in series with a small condenser $C_{12}$. The telephones are switched from this circuit to the receiver by means of the send-receive switch, when reception is taking place. Also in fig. 2 can be seen the R/F. chokes in the transmitter H.T.+ and H.T.— connections, and in the lead from the grid of the amplifier valve to the microphone transformer. The chokes in the H.T. leads are for the purpose of preventing R/F. energy from reaching the generator, and also to prevent any tendency for this circuit to resonate. The choke in the grid circuit ensures that the R/F. drive from the oscillator is not short-circuited *via* the microphone transformer and the bias circuit.

16. The chokes exterior to the transmitter can be seen in fig. 7. They are in the following circuits : H.T.+ and H.T.—, key and microphone, and are grouped in one unit.

17. Transmitter filament chokes (Stores Ref. 10A/8463) are provided for use in flying boats, where the filaments are heated from a 12-volt battery ; the D.C. drop in the chokes is 4 volts. If the battery is on charge (14 volts), the choke terminals marked L.BATT. should be used. The standard arrangement is shown in fig. 15, however, and no departure should be made from this without authority.

## Coils

18. Six of the eight coil units with which the transmitter is provided are shown in fig. 4. The coil units in the front row are the M/O. units for ranges B, C and D covering the ranges 10,000 to 6,000 kc/s, 6,000 to 3,000 kc/s, and 500 to 136 kc/s respectively. The units in the rear row are the units for the corresponding ranges of the amplifier. Coil units range A (not shown) for both M/O. and amplifier are of similar appearance and cover the band 15,000 to 10,000 kc/s. All coil units are engraved with their frequency band. A diagram of the internal connections of the coils is given in fig. 13.

## Listening-through

19. The installation is provided with a listening-through arrangement. This consists of a small unit of moulded material provided with three connections. Two of these connections are taken to the transmitter, and one to the receiver. When they are connected in this way a fixed

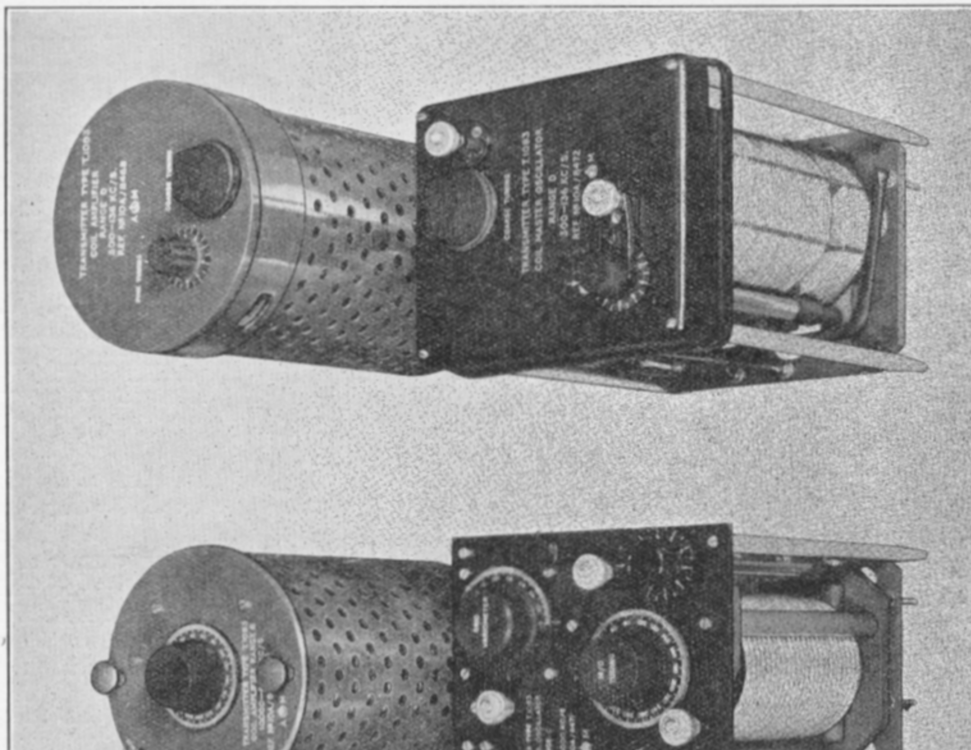


FIG. 4. Transmitter coils, B, C & D.

condenser incorporated in the unit is connected between the receiver and transmitter inductances, and the aerial is connected to one side of the condenser. As will be seen from the diagram of fig. 5, when transmission is in progress, the operator will be able to listen-in during pauses in his transmission owing to the permanent connection of the receiver through the listening-through condenser to the aerial. There is a further important effect arising from this listening-through arrangement. During reception, the transmitter aerial inductance (tuned to the same frequency) is coupled to the receiver aerial inductance, resulting in an increase of sensitivity and selectivity beyond those normal to the receiver. It will be apparent from the foregoing that background noises during reception would nullify any advantages derived from this and, therefore, it is essential that the generator should be as noise-free as possible. The smoothing unit shown in figs. 15 and 16 is, therefore, employed.

20. Listening-through is not possible when transmitting R/T. On telegraphic transmission it is only applicable when transmission and reception are being carried out on the same frequency. Searching is not practicable when listening-through. If it is desired to make use of the advantages accruing from the use of the transmitter aerial coil, and neither transmission nor searching is contemplated, it is important to ensure that the send-receive switch is in the " receive " position in order to avoid waste of L.T. current on the transmitter valve filaments.

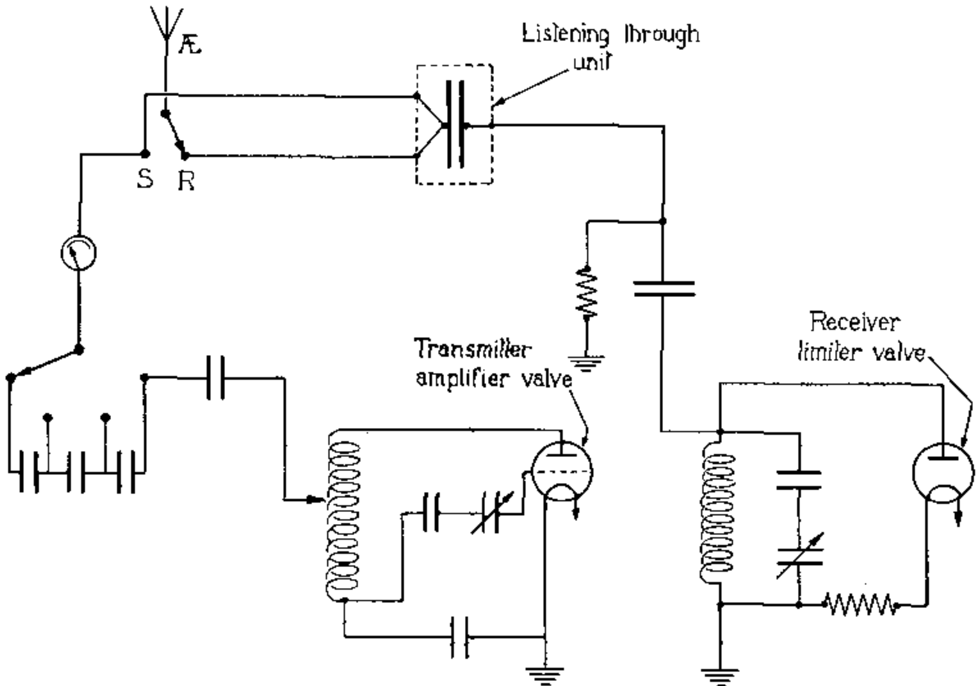



FIG. 5. Simplified listening-through circuit.

21. Owing to the use of plug-in connections on the listening-through unit, it is possible to re-arrange the connections to give " free receiver ". By removing the receiver aerial connection (milled plug) from the unit and mating it with the milled socket (*see* fig. 7), the receiver is connected directly to the send-receive switch, and operation of the switch now merely changes the aerial from transmitter to receiver or *vice versa*.

22. When the receiver is connected up *via* the listening-through unit, and transmission is in progress, R/F. voltages will be developed across the transmitter aerial coil and applied *via* the listening-through condenser to the receiver input circuit. To avoid damage to the receiver

a limiting valve is employed. This is a diode connected across the receiver input circuit. During alternate half cycles it acts as a low resistance across the receiver input, and any energy which the latter has accepted from the transmitter is harmlessly dissipated at the limiter valve anode. This protection is afforded only when the receiver switch is on. In order to ensure that the valve does not damp the receiver during normal reception, a small negative bias is applied to the limiter valve.

## Remote controls

23. The arrangement of the remote controls for the T.1083–R.1082 installation is shown in fig. 6. The " control, switch and tuning " (1) has two handles, the upper one being engraved SEND-RECEIVE and the lower one being engraved TUNING. Movement of these handles is transmitted, through flexible shafts sliding in casings (2), to the send-receive switch (3) on the transmitter and the tuning control (4) on the receiver respectively. The internal flexible shafts (5) comprise a core of stranded steel wire on which is wound a spiral " tooth " wire, making approximately 10 turns to the inch.

24. In the controller is a " gear wheel " (6) which engages with the spiral tooth winding so that rotation of the gear wheel moves the shaft backwards or forwards in the casing. On the send-receive switch and tuning control of the instrument are coupling units similarly provided with gear wheels which are engaged with the spiral windings on the flexible shafts. The movement of the flexible shafts thus rotates these gear wheels operating the send-receive switch and tuning controls. The remote controls are permanently installed in the aeroplane and means are provided for easily releasing them from the instruments when the latter are removed from the aeroplane.

25. The outer casing is of solid drawn light aluminium alloy for the greater part of its length, but the portion (7) near the instrument is flexible, being constructed from a spiral brass strip, over which are two windings, one of steel wires and one of phosphor-bronze or spring steel, with an outer weatherproof covering of cotton braid treated with transparent varnish. The junctions between the rigid and flexible casing are made by unions (8).

26. The switch coupling consists of an aluminium body in which is a gear wheel, the spindle of which projects and carries an exterior handle (9). On the underside of the gear wheel is a dog coupling which engages with the fitting on the end of the send-receive switch spindle. The body of the switch coupling is provided with a split-ring and clamping bolt (10), and when fitting the switch coupling to the transmitter, the dog is engaged with the fitting on the send-receive switch spindle and the body is secured to an adaptor ring (11) on the transmitter by means of the split-ring and clamping bolt. Provision is made for different positions of the switch coupling to suit possible different angles at which the remote control shafts may enter. It is positioned by a projection on the underside of the switch coupling body which may be engaged in any one of 8 slots around the periphery of the adaptor ring. The handle may also be fitted in any one of 8 positions by undoing a slotted screw, removing the handle from the squared spindle and re-fitting.

27. Remote control of the tuning on the R.1082 is accomplished by varying the permeability of the anode inductance coil S.50. A square hole is provided in the movable element of the coil. In this is engaged a square spindle (12) carried in the coupling tuning which is, in turn, fitted on the pedestal coupling (13) fitted to the receiver. The coupling tuning is secured to the pedestal coupling by a split-ring and clamping bolt (22). A gear wheel (20) in this coupling is rotated by the to-and-fro motion of the flexible shaft causing the core to be inserted or withdrawn according to the direction of rotation. A spring plunger device (14) on the top of the coupling provides a means of disengagement. Disengagement is effected by pressing in the plunger after which the knob is rotated to obtain the correct tuning and then released. Operation of the remote tuning control, which has previously been set in a central position, now varies the tuning either side of a given point.

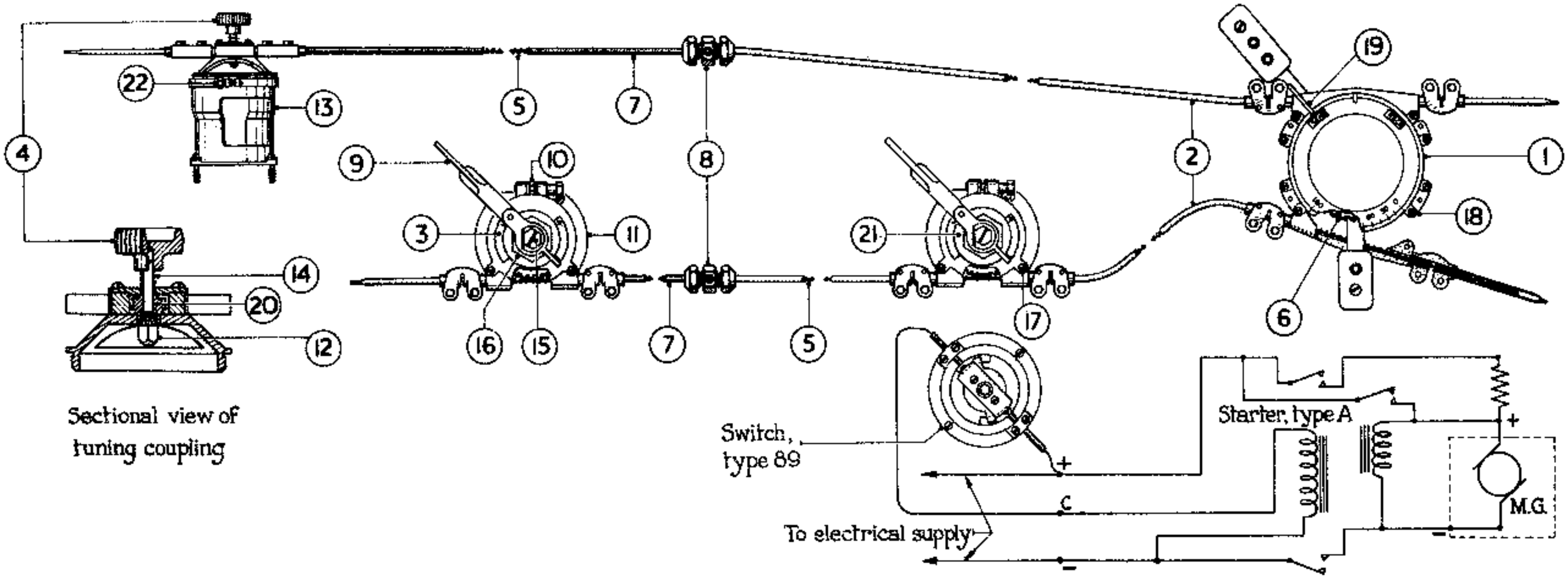



FIG. 6, REMOTE CONTROLS

28. At one or more intermediate points on the send-receive shafting provision may be made, by means of additional switch couplings, to operate the send-receive switch. One of these (21) is provided with a remote switch (switch type 89) which is a simple " on and off " switch connected up to the motor-generator starting switch to ensure that the motor-generator starts up whenever the send-receive switch is placed in the send position and is stopped when the switch is placed in the receive or off position.

29. It is essential that the remote control mechanism be so adjusted that the controls on the instrument always occupy their correct positions when moved by, and as indicated on, the remote controller. The method of adjusting the controls is described in the following paragraphs.

30. At the instrument end, the dog of the switch coupling is engaged with the send-receive switch fitting and the body of the switch is secured to the adaptor ring by tightening up the clamping bolt. The switch is placed in the send position and the handle correctly positioned with respect to the indicating plate. The handle may be removed from the spindle by undoing the screw (15) and may be refitted in any one of eight positions. By undoing the nut (16) the indicating plate may be removed and refitted in any one of sixteen positions.

31. The intermediate switch coupling should now be disengaged from the internal shafting by undoing one of the screws (17) and swinging away the body of the switch coupling. Leaving this disengaged the controller end should now be set by undoing one of the screws (18) and swinging away the body of the controller so that the internal shafting is disengaged from the gear wheel. The control send-receive handle is now moved into the send position, but before re-engaging the wheel with the internal shafting, the latter should be tensioned by grasping the projecting end in the hand and pulling. Whilst maintaining the shafting in tension the body of the controller should be swung back again into position so that the gear wheel is again engaged with the flexible shafting and the screw (18) re-inserted. The intermediate switch coupling may now be placed in the send position, the wheel engaged with the shafting and the screw (17) re-inserted. Rotation of the controller handle should now result in the rotation of the send-receive switch and the intermediate switch coupling. To obtain correct synchronism a further slight adjustment may be necessary on the intermediate switch coupling. This may be made by locking the controller handle in the intermediate or off position with the catch (19) in the slot provided. If it is found on examination that the intermediate coupling switch is not exactly central, it should be disengaged and the wheel rotated a tooth or so either way to bring it exactly to off, and then re-engaged. It is important to check that the position of the switch type 89, coupled to the underside of the intermediate switch coupling is correct. In the send position it should be closed and in the off and receive positions it should be open. Two leads are taken from this switch to the starter type A, which is a relay starting switch for the motor-generator.

32. The relay starting switch consists of two electro-magnetic switches, one being double-pole and the other single-pole, and a resistance element of 0·22 ohm. When the switch type 89 is closed the solenoid operating the double-pole switch is energized from the 12 volt aircraft supply. Both contacts close, and the supply is connected across the motor-generator (the resistance being in series with the L.T. armature), and the motor-generator starts up. The solenoid of the single-pole switch is connected across the L.T. armature of the motor-generator and as the motor-generator speeds up, the voltage across the armature increases. When it reaches about 8 volts the single-pole switch closes and short-circuits the series resistance element thus allowing the motor-generator to run up to full speed. To stop the motor-generator the switch type 89 is opened. This de-energizes the solenoid of the double-pole switch breaking both sides of the supply to the motor-generator.

33. The tuning handle on the controller is provided with disengaging devices similar to those on the send-receive handle. The adjustment is facilitated by the provision of the spring plunger device on the receiver coupling tuning. It is only necessary to fit the pedestal coupling on the

receiver and the coupling tuning on this with the square spindle on the latter engaged in the square hole in the movable element of the coil and ensure that the internal shafting is positioned so as to allow for rotation of the gear wheel on the coupling tuning over the full travel of the tuning handle.

34. Final adjustments of the tuning control are made with the receiver in operation. The tuning handle on the controller is set to the central position. The spring plunger is depressed, disengaging the spindle from the gear wheel, allowing the spindle to be turned freely. The movable element of the coil may thus be rotated until the correct tuning is obtained. The plunger is now released, allowing the spindle to be re-engaged with the gear wheel. Movement of the controller tuning handle now gives variation of the tuning on either side of a given frequency. It is important when installing the shafting to ensure that the flexible portion is cleated up as near the instrument as possible. If this is not done movement of the outer flexible casing takes place and unnecessary friction is produced when the controls are moved.

**Artificial aerial, type 1**

35. When a new transmitter is drawn from stores and installed in an aircraft one of the important things to be done is to set up the transmitter on all the operational frequencies which are likely to be used. When using a fixed aerial for transmission, *i.e.* for frequencies above 3,000 kc/s, the initial setting-up can be done conveniently in the aircraft on the ground, but when a long trailing aerial is used for transmission, *i.e.* for medium frequencies, the initial setting-up on operational frequencies cannot be done conveniently in this way, but it may be done by using the artificial aerial as a load.

36. The artificial aerial consists of a resistance and a variable capacitance and simulates the aircraft aerial. The capacitance of a trailing aerial varies with its length and with the type of aircraft and, possibly within small limits, with different aircraft of the same type. With a 250 ft. length of aerial, the capacitance may be expected to vary between 200 and 300$\mu\mu$F, depending on the size of the aircraft and the method of construction. The artificial aerial may be set to some intermediate value as a compromise, for the initial bench setting-up of the transmitter. Since the amplifier settings in the air may differ quite considerably from those obtained on the bench, a method is employed whereby the artificial aerial may be matched to the trailing aerial of a particular aircraft for a particular frequency.

37. This method may be described in the following way. The M/O settings and the final amplifier setting obtained in the air, for a particular frequency, are ascertained. On the ground these readings are set on the transmitter, which is then operated into the load of the artificial aerial, the latter having first been adjusted to an approximate setting. The artificial aerial is then tuned until minimum input (corresponding to maximum aerial current) is shown on the transmitter milliammeter. The tuning point is well defined.

38. The setting of the artificial aerial for this particular frequency is noted and the procedure repeated for any other frequency required. The settings of the artificial aerial thus recorded may then be used for initial setting-up of a transmitter intended to be used on a similar aerial system, and at similar frequencies. Bench testing of the transmitter will be greatly facilitated by the use of the artificial aerial since the value of capacitance (matched to the aircraft for a particular frequency) is now known and may be used for this purpose.

## CONSTRUCTIONAL DETAILS

**Transmitter**

39. Four views of the transmitter are given in figs. 1, 8, 9 and 11, and a bench wiring diagram in fig. 10. All the components of the transmitter with the exception of the send-receive switch are carried on a removable panel. The panel is carried in a case, the sides of which are perforated

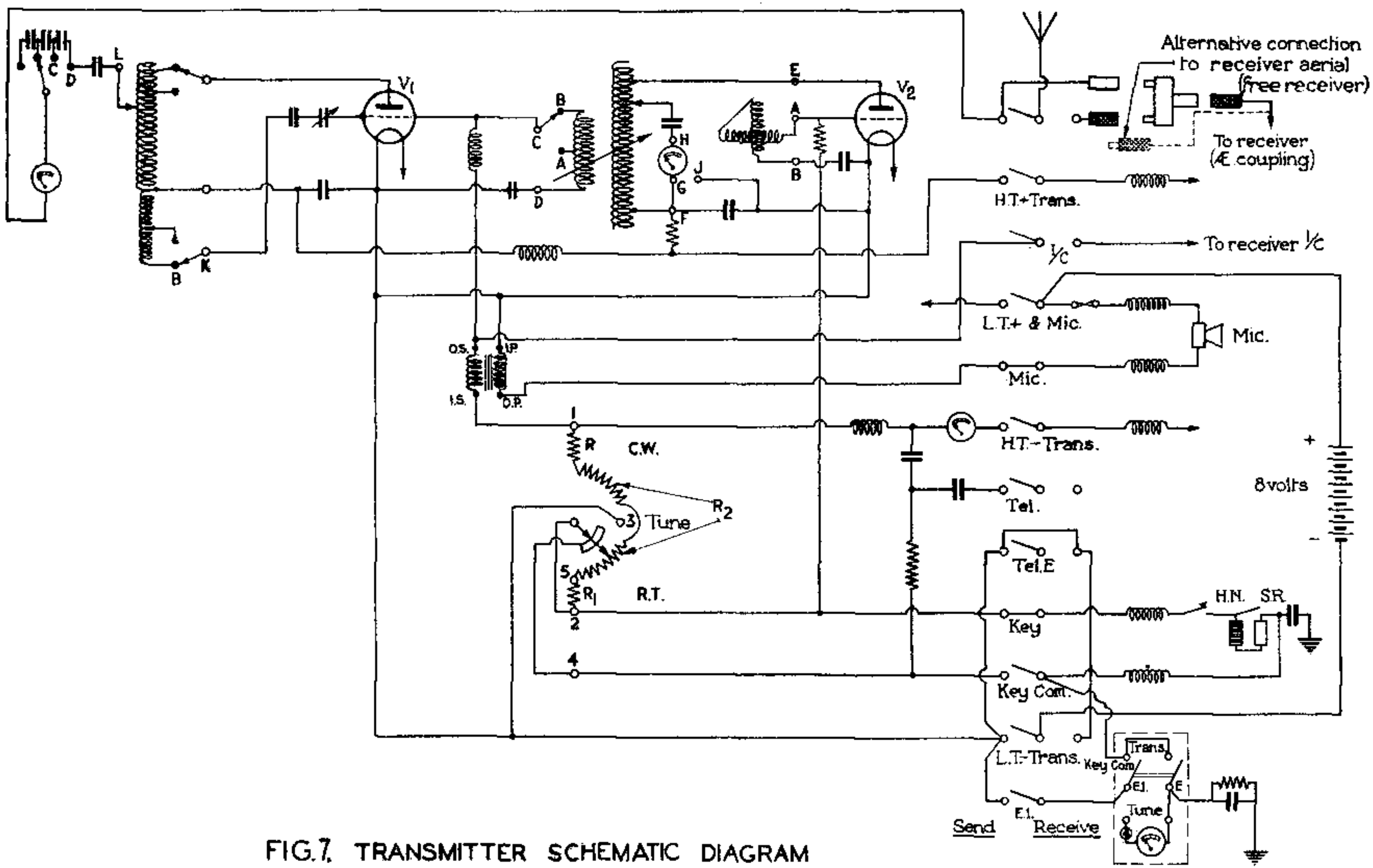



FIG.7. TRANSMITTER SCHEMATIC DIAGRAM

for ventilation, and the transmitter may be lifted out of the case after loosening three screws in hinged clamps. The master-oscillator unit is screened by a metal case having a removable bottom. On the panel above the valves (6 and 7, fig. 1) are hinged perforated caps for protection. The weight of the transmitter alone, without coils, is 16 lb. 4 oz., and the approximate dimensions are 12½ in. × 11½ in. × 10 in.

40. Referring to fig. 1, the series aerial condenser switch (10) can be seen between the aerial ammeter (5) and the amplifier grid-bias switch (8). Next to this switch is a milliammeter (4) reading from 0 to 150 which is connected in the H.T. circuit through a choke and indicates the total input. The thermo-ammeter (3) on the top left-hand corner is in the anode circuit of the M/O valve. It reads from 0 to 3 amps and indicates the oscillatory current in the M/O circuit.

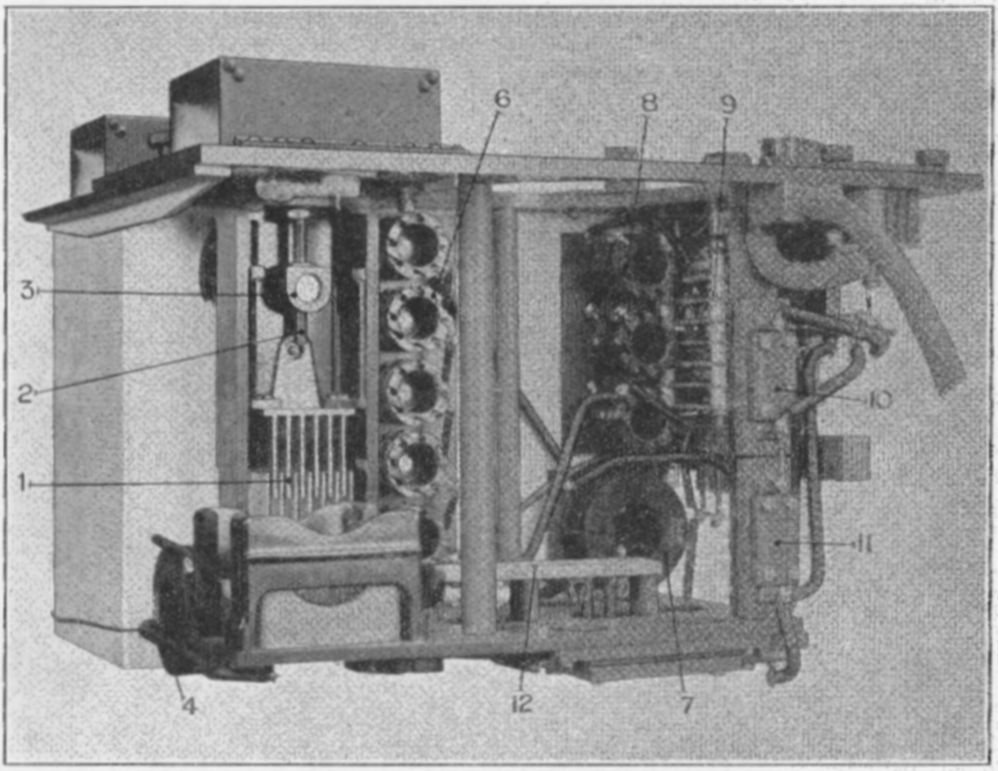



FIG. 8. Interior view of transmitter, amplifier components.

Below these two instruments can be seen the coil-holder (1) for the master-oscillator coil and to the right of it the coil-holder (2) for the amplifier coil. To the left of the amplifier valve (7) can be seen the handle (9) of the neutralizing condenser. The small knurled metal nut below this forms a locking device for the condenser. The amount of movement of the condenser is indicated on a scale which can be seen to the left of this unit.

41. Fig. 8 is an interior view of the transmitter, showing the components in the amplifier section, the valve having been removed. In the left foreground can be seen the amplifier valve-holder and behind this the neutralizing condenser (1). As can be seen, this is a variable air-dielectric condenser, the bottom set of plates being fixed and the upper set of plates being movable. Movement is obtained by the screw (2), secured to the handle (9, fig. 1), engaging the nut (3).

To the left of this condenser can be seen a choke (4), one end of which is connected in the grid circuit of the amplifier valve, the other end of which is connected to the fixed plates of the neutralizing condenser. To the right of the neutralizing condenser can be seen a bank of five resistances (6), each of 2,000 ohms, connected in series. One end of the bank is connected to the choke (7) and the other end is connected to the terminal engraved F on the M/O coil socket (*see* fig. 2). The three resistances (8) seen above the choke (7) have a value of 6,600 ohms each

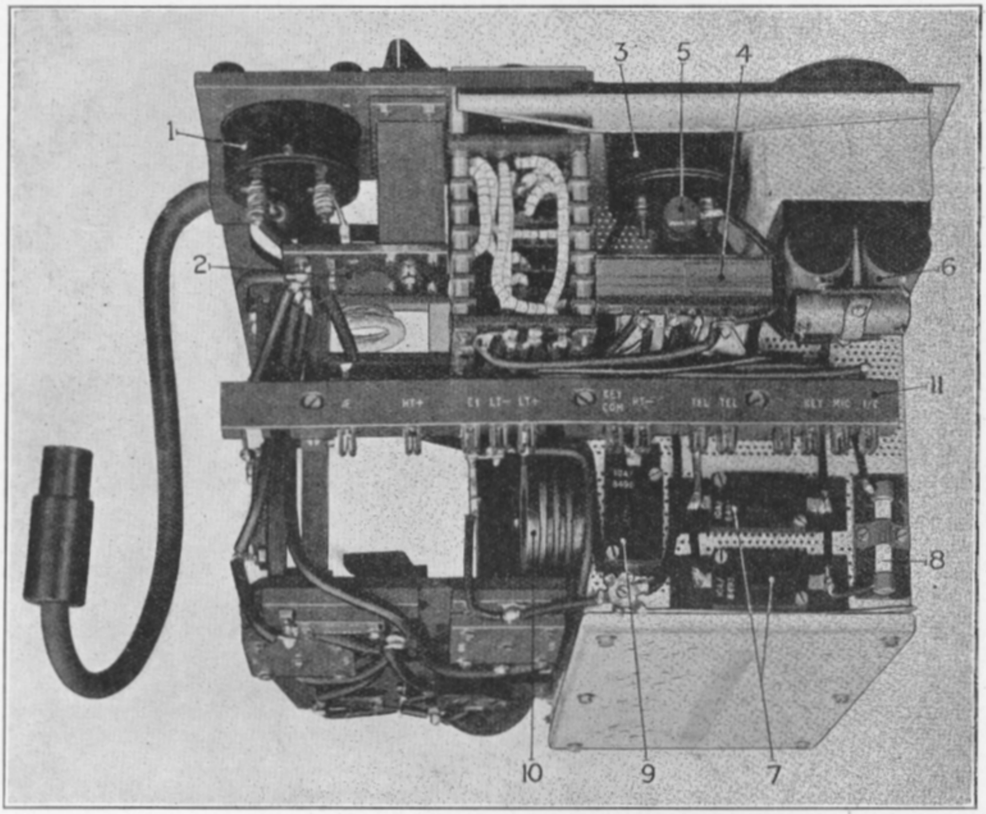
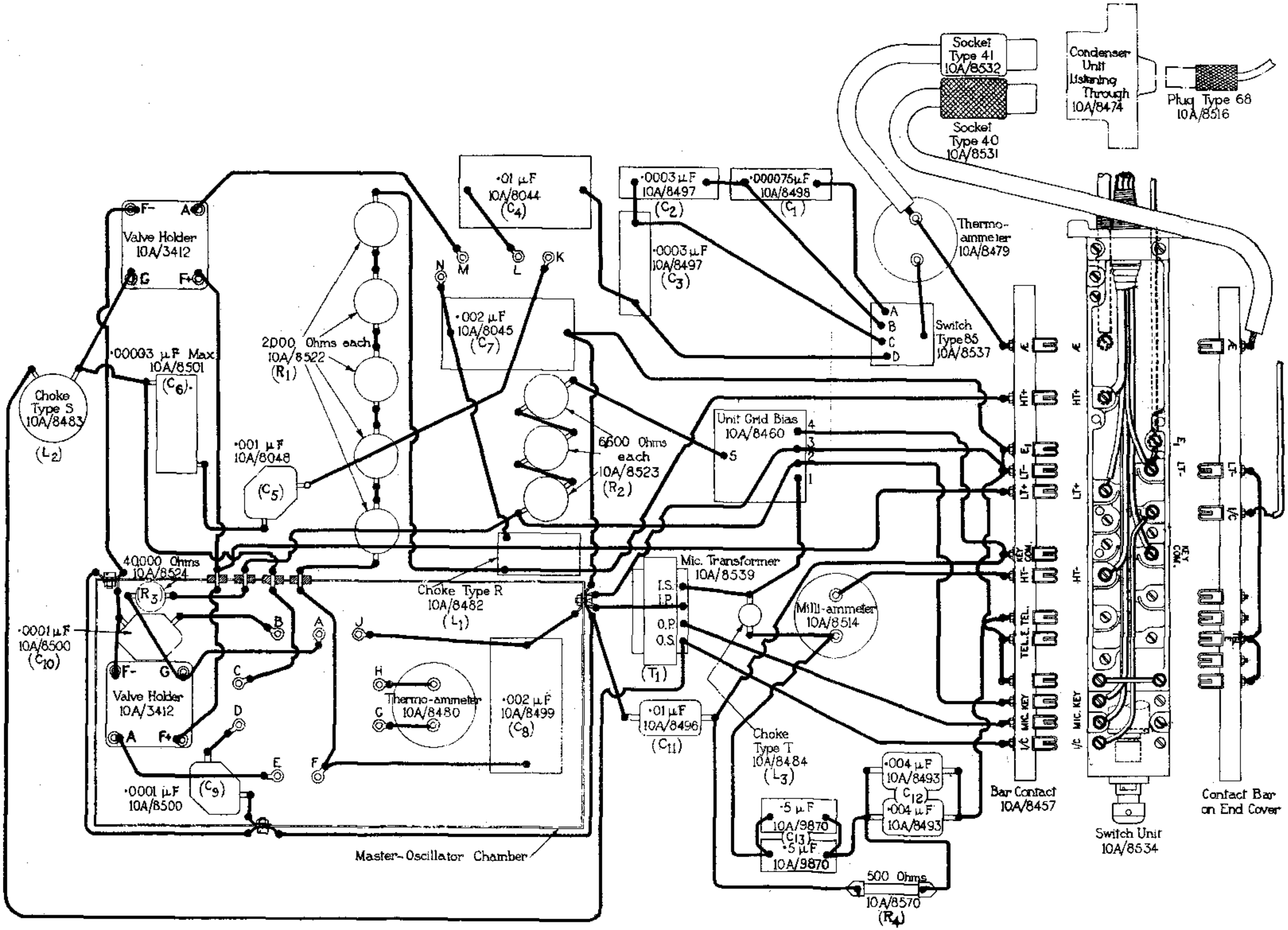



FIG. 9. Interior view of transmitter, M/O components.

and form with the resitance unit (9) the grid-bias resistance for the amplifier valve. In the right-hand foreground can be seen two condensers (10) and (11) having values of ·000075μF and ·0003μF respectively. These condensers are connected to the series aerial condenser switch (10, fig. 1). In the centre foreground can be seen the amplifier coil-holder (12), the sockets of which are engraved K, L, M and N. They are connected up as shown in the bench wiring diagram (fig. 10).

42. Fig. 9 is an interior view of the transmitter showing the aerial ammeter (1) in the top left-hand corner and beneath this the series aerial condenser switch (2). Adjacent to this switch on the right-hand side is the grid-bias resistance unit (9, fig. 8). To the right of this unit can be seen the input milliammeter (3) and below this the microphone transformer (4). The primary winding is earthed at one end and the other end is connected to the microphone. The secondary winding is connected at one end to the grid-bias resistance and at the other end,




**NOTE:** Annotations in parenthesis, for example (C5), refer to the corresponding annotations in Fig. 2

FIG 10 BENCH WIRING DIAGRAM T 1083

through a choke, to the grid of the amplifier valve. Above the transformer (4) is a choke (5) connected between the H.T. circuit and the secondary winding of the transformer. To the right of the choke is a group of condensers (6). Although three condensers may be seen in the illustration, the bottom one is left disconnected, while the other two which have a value of 0·5μF each, are connected in parallel and are indicated as $C_{13}$ in the theoretical circuit diagram fig. 2. The two condensers (7) seen on the bottom right-hand side of fig. 9, have values of ·004μF each and are connected in parallel, giving a value of ·008μF. These two condensers are represented by $C_{12}$ in fig. 2. To the right of these two condensers is a resistance (8) having a value of 500 ohms. It is connected on one side to the condensers (6) and (7) and on the other side to KEY COM. The condenser (9) has a value of ·01μF and is connected between KEY COM and earth. The choke (10) to the left of this condenser may also be seen in fig. 8 and has been referred to previously.

43. The contact bar (11) which can be seen across the centre of the illustration lies alongside the switch unit when the transmitter is placed in the case. The blades on the switch rotor make contact at the various points when the switch is in the send position. Starting from the left-hand side, the contact engraved AE. is connected to one side of the aerial ammeter. H.T.+ is connected to one side of the choke, E. and L.T.− are connected by a strip of metal behind the contacts and are connected to the metal screen. The contact L.T.+ is connected to the filaments of the valves. The contact KEY COM is connected to the top of the condenser (9), and H.T.− is connected to one side of the milliammeter (3). Of the two contacts engraved TEL, the left-hand one is connected to the condensers (7) and the other is connected, at the back of the bar, to the fourth contact from the right. The contact engraved KEY is connected to the grid-bias resistance unit. The contact engraved MIC is connected to the transformer primary and the contact engraved I/C is connected to the transformer secondary.

44. Fig. 11 is another interior view of the transmitter showing the components from the underside. The cover on the metal screen surrounding the M/O valve, which can be seen in the right-hand bottom corner of fig. 9, has been removed. The two condensers (1) and (2) seen in the top right-hand corner, are two of the series aerial condensers. The smaller one (2) on the right has a value of ·0003μF, and the larger one a value of ·01μF. The condenser (3) seen below these two aerial condensers has a value of ·002μF and is connected between the socket engraved N on the amplifier coil-holder, and earth. The ·001μF condenser (4) seen in the middle of the panel is connected on one side to the amplifier coil socket engraved K and on the other side, in series with the neutralizing condenser, to the grid of the amplifier valve. These condensers are represented by $C_5$ and $C_6$ respectively in the theoretical circuit diagram, fig. 2.

45. The group of components located in the lower half of the figure are associated with the M/O valve. In the centre of the group can be seen the underside of the M/O coil-holder with the various sockets engraved A, B, C, D, E, F and J. The ·002μF condenser (5) seen on the right is connected across the socket J and F, the socket J being bonded to the metal screen. The ·0001μF condenser (6) is connected between the socket D and the metal screen. In the bottom left-hand corner is the M/O valve-holder (7). The grid terminal is connected to the coil socket A, the anode terminal to the socket E, and, of the two filament terminals, the top left-hand one is earthed to the metal screen and the bottom right-hand one is connected to L.T. +. The ·0001μF condenser (8) above the valve-holder, is earthed to the screen on one side and connected to the coil socket B on the other side.

### Case

46. Fig. 12 is a view of the transmitter case showing the send-receive switch (3) in the background. The contact bar (1) can be removed from the case along with the perforated side to which it is secured. The send-receive switch consists of a barrel (3) carrying blades, and rotation of the barrel engages the blades with the fixed contacts on the bar (1), or with the fixed contacts (11, fig. 9) on the transmitter when the latter is in position. The base (2) of the send-receive switch has a number of fixed contacts in which the blades engage. The contacts are connected

by a group of leads, which can be seen on the right of the case, to various components outside the transmitter, for example, the H.T. and L.T. supply, key, microphone, etc. The blades on the switch rotor (3) make contact with the fixed contacts on the base and the contacts on the transmitter and case in the send and receive positions respectively and thus connect the external

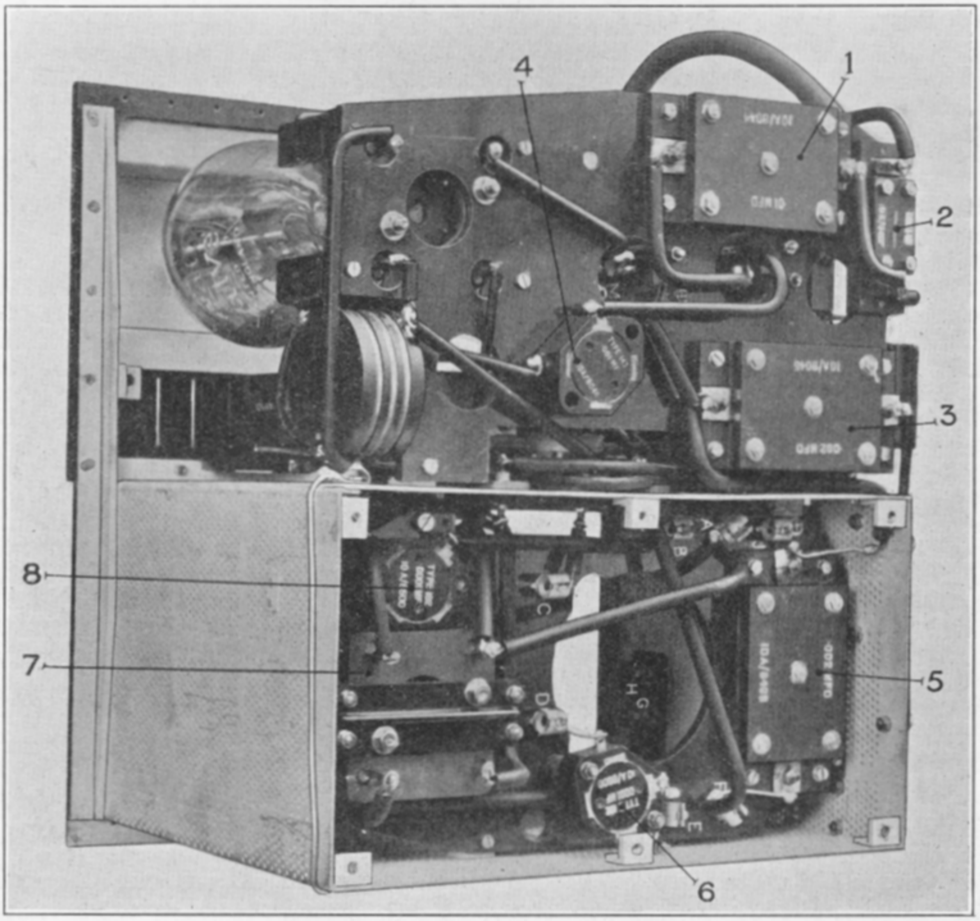



FIG. 11. Interior view of transmitter, underside.

apparatus in circuit as required. The case itself is a canvas covered wooden structure with perforated paxolin sides and bottom. The side carrying the receive contact bar can be removed by undoing four screws. It is necessary to remove this side before the switch unit (barrel (3) and base (2)) can be inserted. Dowel pins are provided at convenient points on the case to facilitate correct assembly and alignment.

**47.** The contact bar secured to the removable side of the case has eight contacts engraved (from the right) AE, L.T.—, I/C, L.T.+Rec, TEL, TEL/E, H.T.+ REC. The aerial plug-in lead (4) is connected to the contact AE, and another lead (5) terminating in a plug, type 86, is secured to the I/C contact. The contacts L.T.— and TEL/E are connected together inside the case. Another piece of wire connects the contact TEL/E to the last contact on the bar. This contact engages a fixed blade contact on the base (2). The switch base (2) is provided with thirteen spring jaw contacts and six fixed blades. The two fixed blades on the right are not used in this transmitter. Six of the spring jaw contacts, reading from the right, are engraved AERIAL, H.T.+ TRANS, L.T.+ TRANS and MIC, H.T.– TRANS, TEL, H.T.+ REC. Of the fixed

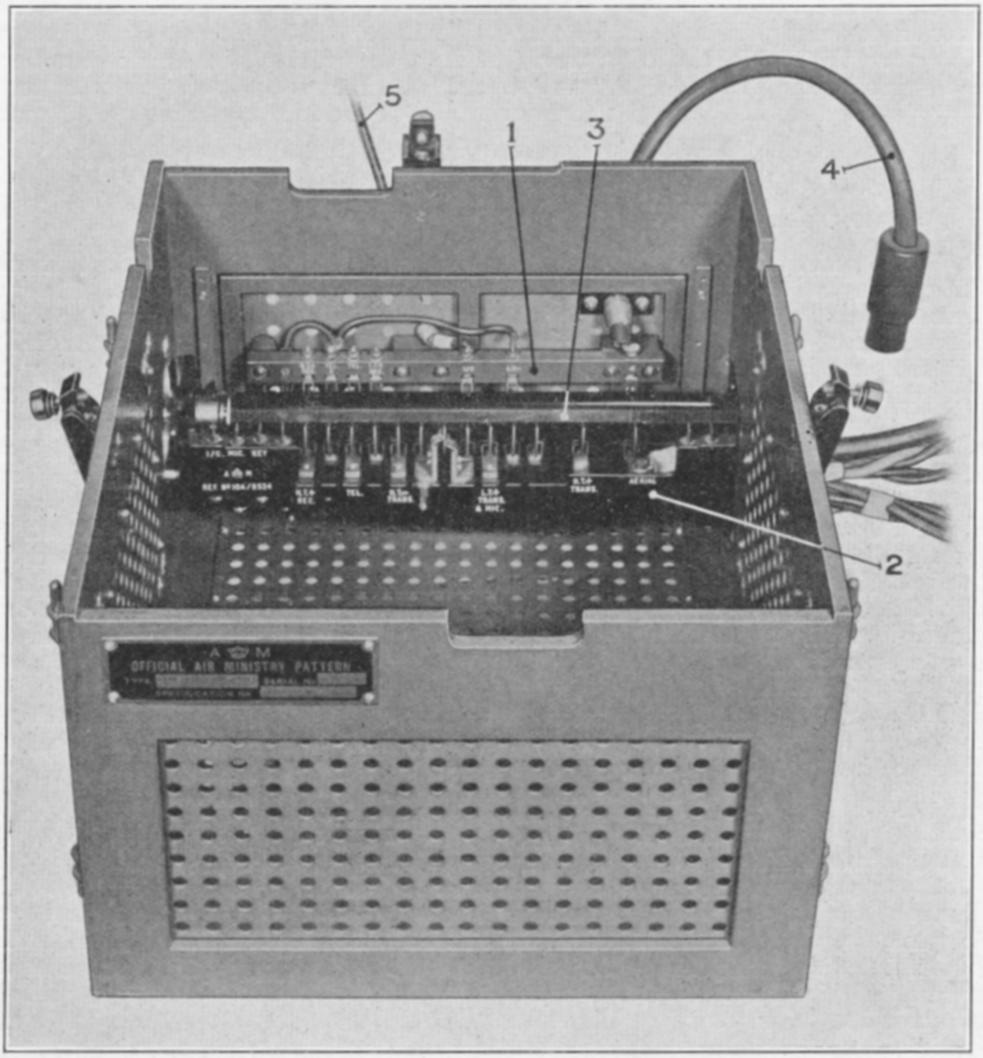



Fig. 12. Case and contact bar.

blades on the left, one is not engraved and is connected under the base to the corresponding blade contact on the receive side. The next three fixed blades are engraved, KEY, MIC, and I/C. These blades are always in engagement with the corresponding contacts on the transmitter contact bar (11, fig. 9) when the transmitter is in the case.

48. On the other side of the switch base (2) which may be seen by removing the side carrying the receive contact bar, the contacts are engraved (from the right) TEL E, L.T. + REC,

KEY COM, L.T.—TRANS, and $E_1$; also on the extreme right are four blade contacts, of which only the fourth one from the right is used. When the switch barrel (3) is in the receive position the blades make contact with the various contacts on the base as well as with the appropriate contacts on the bar (1). The barrel of the switch is provided with a coupling so that the switching over from send to receive and *vice versa* may be remote controlled. When the switch is in the intermediate position the circuits to the transmitter and receiver are broken as the blades are not engaged with either contact bar. The top left-hand corner of the front panel (fig. 1) is engraved S-OFF-R. and this engraving refers to the positions of the switch coupling. In the send position the blades on the barrel connect the external apparatus to the transmitter contact bar, and in the " R " position the blades connect the external apparatus to the " receive " contact bar (1).

## Coils

49. The amplifier coil unit range A, consists of a former, built up from composite insulating material, carrying two coils and a top cover of synthetic-resin varnish-paper board. The connections from the coils are taken to plugs secured in the former base. A variable tap is provided on the inductance coil, which is controlled by a knob engraved in degrees (0°–360°). An indicator device is also provided by means of which the number of complete turns made by the tap brush is registered. Two lifting knobs are also provided on the top cover. The base and top of the former are held together by three pillars of composite insulating material. The main inductance consists of a coil, formed of $\frac{1}{8}$ inch o/d, 22 s.w.g. silver-plated copper tube having $10\frac{1}{2}$ turns approximately. Two fixed anode taps are provided, one $3\frac{1}{2}$ turns and the other $4\frac{1}{2}$ turns from the top of the coil. Each anode tap is brought to a separate plug. The neutralizing winding is wound on the same former and in the same direction as the inductance coil and consists of $2\frac{1}{4}$ turns of 20 s.w.g. double cotton-covered copper wire. The finish of the neutralizing winding is connected to the start of the inductance coil and the junction brought to two plugs. Similarly the start of the neutralizing winding is also brought to two plugs in the base. From the disposition of the plugs it is possible to insert the coil unit in two different positions in the coil-holder. Two slots are provided on the top of the coil, one engraved 15,000 to 12,500 kc/s and the other engraved 13,000 to 10,000 kc/s, and when either slot is engaged with the projection (11, fig. 1) the anode tapping for that particular frequency band is engaged in the appropriate coil socket. The variable tap is brought to a central plug in the base of the coil. The various connections are shown in fig. 13.

50. The M/O coil unit range A consists of a tubular coil with a variable tap and two fixed taps, a tapped rotatable coupling coil, two fixed condensers and a choke all mounted within a framework consisting of a base plate of composite insulating material and a top plate of duralumin assembled together by four duralumin columns mounted one at each corner. The necessary operating knobs are mounted on the top plate. The control knob for the variable inductance is provided with an indicating device which registers each complete turn of the movable contact on the coil. In addition the knob is engraved in degrees from 0 to 360. A similar indicating device is provided for the coupling coil.

51. There are six pins or plugs secured to the base plate and engraved J, A, C, D, E, F, and two further plugs fixed in a bracket secured to the top plate and engraved H, and G. The variable inductance consists of a helical coil of 14 turns of $\frac{1}{8}$ inch o/d silver-plated 22 s.w.g. copper tube. Two fixed taps are provided, one at 3 turns from the bottom and one at 9 turns from the bottom, the former is connected to the plug F and the latter to the plug E. The movable contact is connected to one side of a ·00003μF fixed air dielectric condenser, the other side of the condenser being connected to the plug G. The bottom turn of the variable inductance is connected through a ·00007μF condenser and choke to the plug A. The plug J is connected to one of the duralumin columns. The plug H is connected to the start of the inductance.

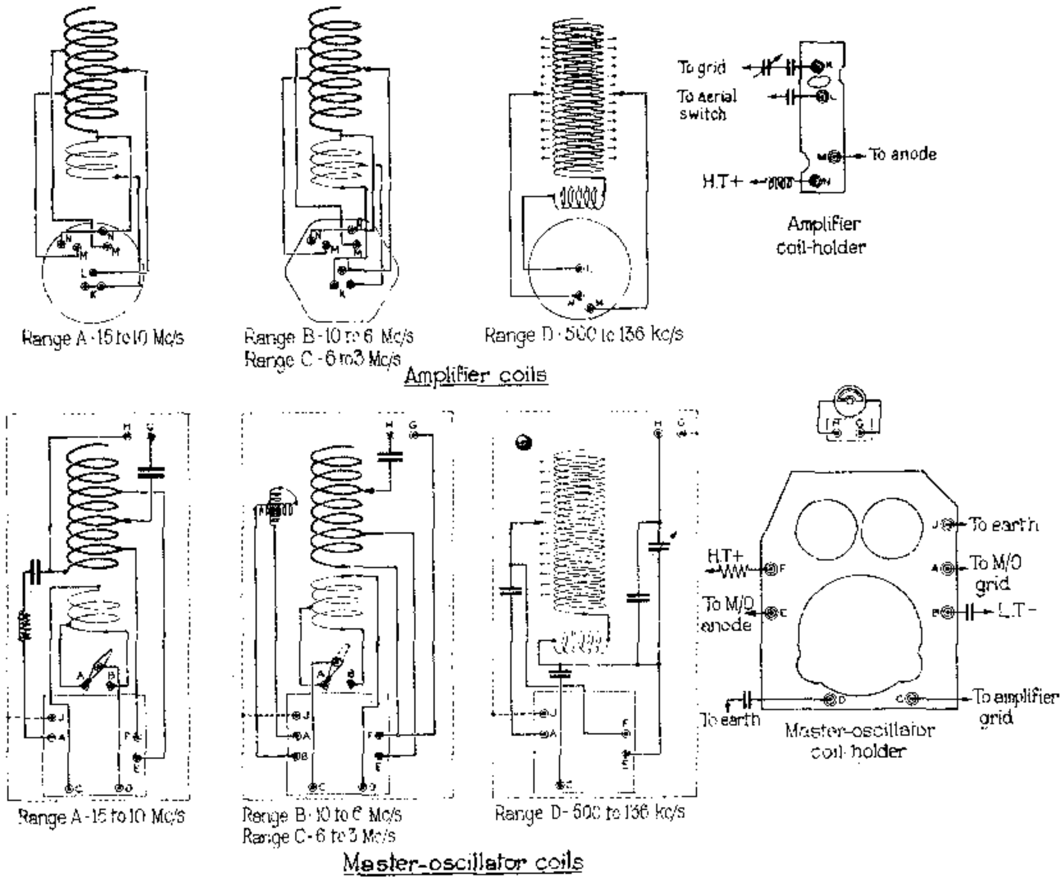



FIG. 13. M/O AND AMPLIFIER COILS, CIRCUIT DIAGRAM

52. The coupling coil is wound on a former of composite insulating material and is constructed so as to be variable with respect to the inductance coil. It is wound with $4\frac{3}{4}$ turns of 26 s.w.g. double cotton-covered copper wire and tapped at $3\frac{1}{2}$ turns. The start of the coil is connected to the plug C by a flexible copper connection, while the plug D is connected to a movable arm on the coil former. This arm can be set to one of two positions engraved A and B. The finish of the winding is connected to B and the tap to A.

53. The amplifier coil unit range B (10,000 to 6,000 kc/s) consists of a former, built up from composite insulating material carrying two coils, enclosed in a perforated tube. A top cover of synthetic-resin varnish-paper board carries a control knob engraved in degrees from 0 to 360 and an indicating device. The knob controls the movable contact on the variable inductance, and the indicating device registers the number of complete turns made by the brush on the coil. The top cover is provided with two slots engraved 4,400 to 3,000 kc/s and 6,000 to 4,300 kc/s. One or the other of these two slots register with the projection (11, fig. 1), when the coil is in position, thus giving two positions in which the coil may be plugged into its socket. A suitable number of pins are provided on the coil base for this purpose, only four of the seven pins being in use for each frequency band.

54. The inductance coil consists of a helix of silver-plated 22 s.w.g. copper tubing of $\frac{1}{8}$ inch o/d having 19 turns. Two fixed taps are taken off the coil, one at $8\frac{1}{3}$ turns from the top of the coil, and one at $9\frac{1}{3}$ turns from the top of the coil, each tap being connected to a separate pin in the base. The neutralizing winding is wound with $3\frac{1}{2}$ turns of 20 s.w.g. double cotton-covered copper wire in the same direction as the main coil and a tapping is taken off at one turn and connected to one of the pins, the start of the neutralizing winding being connected to an adjacent pin. Thus $3\frac{1}{2}$ or $2\frac{1}{2}$ turns of the neutralizing winding may be used, depending on which way the coil is inserted in its socket. The movable contact is connected to a central pin which is common to both positions of the coil. The end of the neutralizing winding is connected to the start of the main winding and the junction taken to two separate pins so that one or the other will be in use, depending on the position of the coil in its socket.

55. The M/O coil unit range B (10,000 to 6,000 kc/s) consists of a tubular coil with a variable tap, a tapped coupling coil, a variometer and a fixed condenser mounted within a framework consisting of a base plate of composite insulating material and a top plate of duralumin assembled together by four duralumin columns mounted one at each corner. The necessary operating knobs fitted with locking devices are mounted on the top plate. The variable inductance has an indicating device showing the number of turns made by the movable tap and a scale engraved in degrees from 0 to 360. The grid variometer scale is engraved from 0° to 180° and the coupling coil control has a scale engraved from 0 to 9. Two lifting knobs are also provided on the top plate. The base of the coil is provided with seven pins, engraved J, A, B, C, D, E and F. Two further pins are mounted in a bracket secured to the underside of the top plate and engraved G and H.

56. The variable inductance consists of a helical coil wound with 18 turns of $\frac{1}{8}$ inch o/d silver-plated 22 s.w.g. copper tube, tapped at the seventh turn from the top of the coil. This tap is connected to the pin engraved E. The start of the coil is connected to the pin F and another connection is made from here to the pin G. The movable tap of the coil is connected to one side of a ·000065μF fixed air dielectric condenser, the other side of the condenser being connected to the pin H. The grid variometer is connected between the pins A and B. The stator and rotor are each wound in two parts on ebonite formers. The stator has $11\frac{3}{4}$ turns ($5\frac{7}{8}$ turns on each part) of 24 s.w.g. double cotton-covered copper wire, wound in a clockwise direction. The rotor has 13 turns ($6\frac{1}{4}$ and $6\frac{3}{4}$ turns) of 24 s.w.g. double cotton-covered wire wound in a clockwise direction. The coupling coil, which is wound on a movable former of composite insulating material, consists of a winding of $7\frac{4}{7}$ turns of 26 s.w.g. double cotton-covered copper wire, tapped at $4\frac{11}{12}$ turns from the start and wound in the same direction as the main coil. The finish of the coil is brought to a contact engraved B on the coil former and the tap is

brought to a contact engraved A. A movable arm on the former can be placed on either contact, thus all, or a part of the coupling coil, can be used as desired. The start of the coil is connected to the pin D and the tapping arm is connected to the pin C.

57. The amplifier coil unit range C (6,000 to 3,000 kc/s) is similar to the coil unit range B as regards construction and internal connections. The two slots in the top cover are engraved 6,000 to 4,300 kc/s and 4,400 to 3,000 kc/s. The main inductance is wound with $22\frac{1}{2}$ turns of 22 s.w.g. silver-plated copper tubes, $\frac{1}{8}$ inch o/d.. One tap is taken at $6\frac{1}{3}$ turns from the top of the coil and another tap is taken at $10\frac{1}{3}$ turns from the top of the coil. The neutralizing winding is wound with $8\frac{1}{2}$ turns of 22 s.w.g. double cotton-covered copper wire in the same direction as the main coil and tapped at 2 turns from the start. The disposition of the pins and the way in which they are connected to the various windings can be seen in fig. 13.

58. The M/O coil unit range C (6,000 to 3,000 kc/s) is constructed in a similar manner to the coil unit range B, the connections also being similar. The main inductance is wound with 24 turns of $\frac{1}{8}$ inch o/d silver-plated 22 s.w.g. copper tube, tapped at the sixth turn from the top of the coil. The coupling winding is wound in the same direction as the main coil and consists of $14\frac{5}{7}$ turns of 34 s.w.g. double cotton-covered copper wire, tapped at $8\frac{11}{13}$ turns from the start. The grid variometer and fixed condenser are of similar construction to those fitted in the range B unit, but are of different values. The condenser is a ·000115μF fixed air-dielectric condenser, the variometer rotor is wound with 26 turns ($13\frac{1}{4}$ and $12\frac{3}{4}$ turns) of 28 s.w.g. double cotton-covered copper wire, and the stator is wound with $22\frac{3}{4}$ turns ($10\frac{7}{8}$ and $11\frac{7}{8}$ turns) of 28 s.w.g. double cotton-covered copper wire. All the windings on the grid variometer are in a clockwise direction from the start. The disposition of the pins and the connections to the various windings are illustrated in fig. 13.

59. The amplifier coil unit range D (500 to 136 kc/s) comprises a variable inductance consisting of rotor and stator, having 28 tapping points brought out to 14 pairs of contacts on a coarse tuning switch, the coil and switch being mounted between end plates of synthetic-resin varnish-paper board and enclosed within a perforated tube and cover of the same material. The operating knobs project through the top cover and are each provided with a device to indicate the positions of the switch and rotor respectively. Both stator and rotor are wound with 27/40 Litz wire. Each strand is single silk-covered and the 27 strands are covered overall with a double silk covering. There are 14 aerial and 14 anode taps taken from the stator, which is wound counter-clockwise looking at the coil from the rotor end, each section having 9 turns. The 14 aerial tappings 1, 2, 3, etc., are taken at the following sections, 6, 8, 11, 15, 19, 23, 27, 31, 35, 39, 43, 47, 51 and 55, the 14 anode taps 1, 2, 3, etc., are taken at the sections 1, 3, 4, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35 and 38 respectively. The coarse tuning switch controls both the aerial and anode taps. The fine tuning is accomplished with the rotor, which is wound in halves, each half comprising five sections of eight turns per section. Three pins are secured to the base of the coil engraved L, M, and N. The pin L is connected to the start of the rotor winding, the pin M is connected to the movable anode tap, and the pin N is connected to the movable aerial tap. The finish of the rotor winding and the start of the stator winding are joined together inside the coil.

60. The M/O coil unit range D (500 to 236 kc/s) consists of a variable inductance comprising a rotor and a stator having 14 tapping points brought out to the contacts of a coarse tuning switch, three fixed condensers and one adjustable condenser mounted on a panel. All these components are mounted within a framework consisting of a base and top plate of synthetic-resin varnish paper board assembled together by four supports of duralumin mounted one at each corner. The top of the unit is enclosed by a cover of duralumin through which the knobs operating the switch and rotor project. The knobs are each provided with a device to indicate the positions of the switch and rotor respectively. The rotor is wound in halves having 5 sections each and 8 turns per section of 27/42 Litz wire. The stator is wound in sections, each

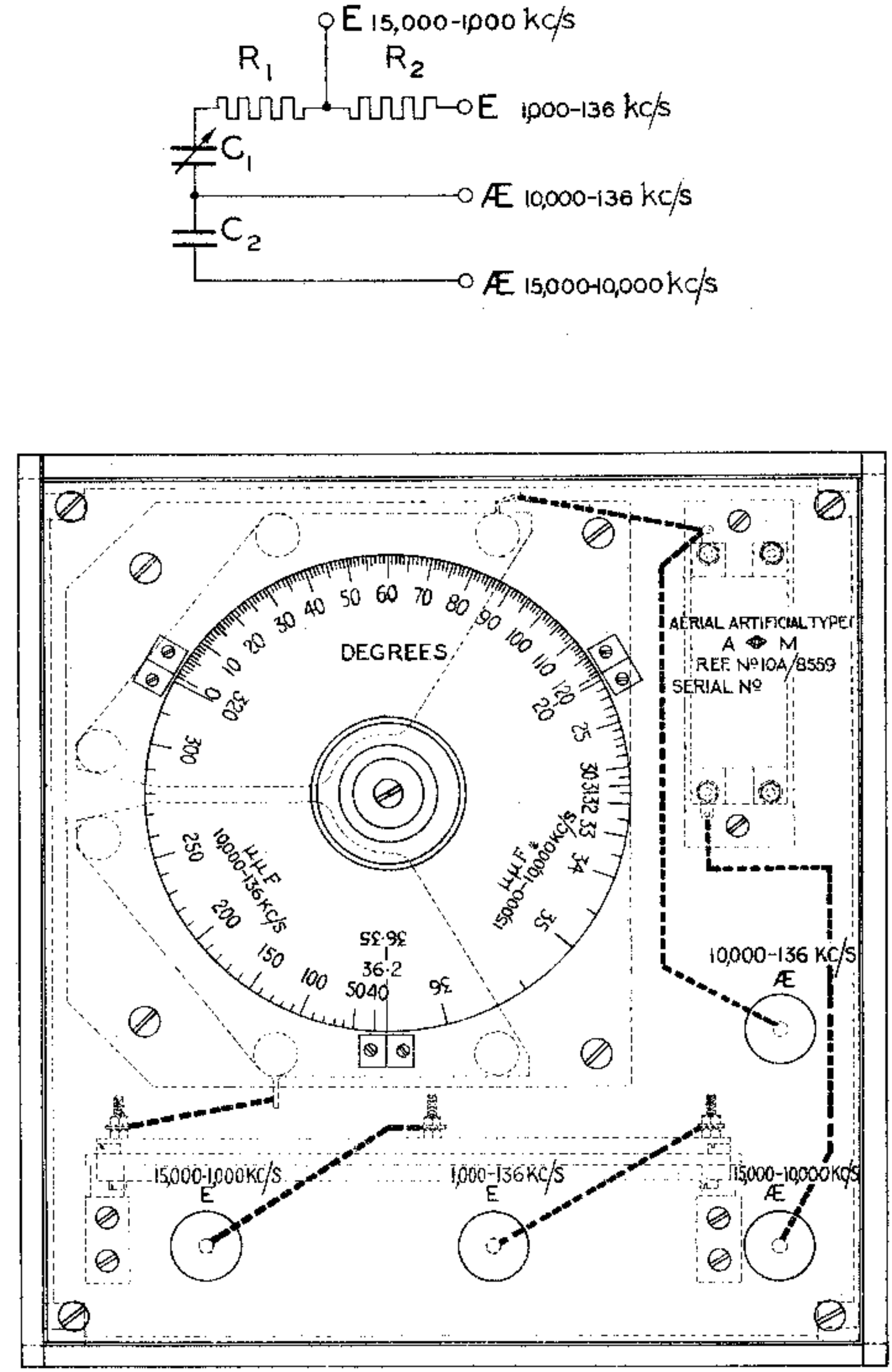



FIG.14, ARTIFICIAL AERIAL TYPE I

section having 9 turns of 27/40 Litz wire. There are 14 taps provided in the following order from the bottom of the coil: sections 6, 8, 11, 15, 19, 23, 27, 31, 35, 39, 43, 47, 51 and 55. The start of the stator winding is connected to the end of the rotor winding.

61. The base of the coil is provided with five pins engraved J, A, C, E, F; two further pins carried in a bracket on the condenser panel are engraved H and G. The pin J is connected to one of the duralumin columns and the pin G is also connected to one of these columns. The pin E is connected through a ·000038μF condenser to the pin C. The pin F is connected through a ·001μF condenser to the pin A. The pin H is connected through an adjustable condenser ·00002μF max. to the pin E in parallel with a ·00026μF condenser. The finish of the rotor winding is also connected to the pin E. The disposition of the pins and the various connections can be seen in fig. 13.

**Artificial aerial**

62. The artificial aerial, an illustration of which is given in fig. 14, comprises a variable condenser, a fixed condenser and a tapped resistance, all mounted on a panel with the necessary aerial and earth terminals, and fitted into a wooden case. As can be seen from the diagram, two aerial and two earth connections are employed. When it is required to employ the instrument on frequencies above 1,000 kc/s, the earth terminal marked 15,000–1,000 kc/s is used, and the resistance $R_1$ (8 ohms) only is in circuit with the capacitance. For the frequencies below 1,000 kc/s the earth terminal marked 1,000–136 kc/s is used, and the resistance $R_2$ (7 ohms) is added in series. In a similar way the series capacitance is altered for the different frequency bands by selecting the appropriate aerial terminal. For frequencies below 10,000 kc/s the aerial terminal marked 10,000–136 kc/s is used, and the variable condenser $C_1$ (·0003μF) only is in circuit with the resistance. For frequencies above 10,000 kc/s the aerial terminal marked 15,000–10,000 kc/s is used, and the fixed condenser $C_2$ (·00003μF) is connected in series.

63. The dial of the condenser is provided with a scale engraved from 0–120 degrees. In addition, two other scales are engraved on the dial giving values of capacitance in micro-microfarads. One of these is used for settings on the 15,000–10,000 kc/s range and the other is used on the 10,000–136 kc/s range. The actual calibrations of capacitance are made with the 15,000–1,000 kc/s earth terminal and 15,000–10,000 aerial terminal in use for the former scale and with the 1,000–136 kc/s earth terminal and 10,000–136 kc/s aerial terminal in use for the latter scale. Three indicator blocks, each of which is engraved with a datum line, are carried on the panel, equidistant around the periphery of the dial. Each scale is set or read against the appropriate datum line.

64. As will be seen from the circuit diagram in the upper part of fig. 14 the effect of connecting up the instrument is to place across the aerial and earth terminals of the transmitter a capacitance and resistance in series. The values used are a compromise of those actually required for the various aerial systems used on aircraft and consequently when the aircraft aerial system is again connected to the transmitter, re-tuning of the aerial circuit of the latter will in general be necessary. Where master-oscillator transmitters are used, it will generally be found that re-tuning of the master-oscillator stage is not necessary although it is still necessary for the aerial circuit.

65. The lengths of the leads between the transmitter and artificial aerial should be as short as possible, especially on the higher frequencies and should be spaced well apart. Further, the type of wire used for the leads should be similar to that normally used between the transmitter and aerial reel, i.e. cable, electric, uniplug 12, red braided (Stores Ref. 5A/917).

## TABLE 1

(Key to installation diagram, fig. 15)

| Item No. | Stores Ref. | Nomenclature. | Quantity. | Remarks. |
|---|---|---|---|---|
| 1 | 10A/8415 | Receiver R.1082 | | Without valves, coils or lamps. Complete with plugs, leads and sockets. |
| 2 | 5A/1333 | Battery, dry, 120 volts, type A | 1 | |
| 3 | 10A/488 | Plug, type 1, telephone | 1 | |
| 4 | 10A/8516 | Plug, type 68 | 1 | |
| 5 | 10A/3387 | Terminal, 2 B.A., type A | 1 | |
| 6 | 10A/8456 | Transmitter T.1083 | 1 | Without valves and coils. Complete with plugs, sockets and leads. |
| 7 | 10A/9871 | Switch unit, type D, wired for Battle aeroplane. | 1 | Complete with plugs, sockets, leads and choke unit (10A/8464). |
| 8 | 10A/8580 | Adaptor, ring, switch coupling | 1 | |
| 9 | 10A/7741 | Key, Morse, type F | 1 | |
| 10 | 10A/8533 | Socket, type 42, 4-point, H.T. type | 1 | |
| 11 | 10A/8551 | Disc, indicating, type D | 1 | For 10A/8533. |
| 12 | 5A/81 | Cable, H.T., uniplug, unbraided | | As required. |
| 13 | 5A/916 | Cable, L.T., unisheath 4, red unbraided | | As required. |
| 14 | 10A/8525 | Smoothing unit, H.F., type A | 1 | |
| 15 | 5A/91 | Cable, L.T., duflex 19, yellow braided | | As required. |
| 16 | 10A/7997 | Starter, type A | 1 | For T.1083. |
| 17 | 10A/8118 | Plug, type 62, 2-point | 1 | |
| 18 | 10A/8051 | Disc, indicating, type E | 1 | For 10A/8118. |
| 19 | 10A/7437 | Socket, type 19, 2-point | 1 | |
| 20 | 10A/8120 | Disc, indicating, type E | 1 | For 10A/7437. |
| 21 | N.I.V. | Socket, jacelite, 3-pin, 5 amp. | 1 | Cat. No. 7170. |
| 22 | N.I.V. | Plug, jacelite, 3-pin, 5 amp. | 1 | Cat. No. 7110. |
| 23 | 10A/3387 | Terminal, 2 B.A., type A, spring type | 1 | Bonded to longeron. |
| 24 | 5A/1387 | Accumulator, 2-V, 20Ah., type B | 1 | For R.1082. |
| 25 | 10A/3387 | Terminal, 2 B.A., type A, spring type | 1 | |
| 26 | 10A/7532 | Generator-motor, 80-watt, type C | 1 | |
| 27 | N.I.V. | Crate, power supply | 1 | |
| 28 | 5A/1387 | Accumulator, 2-V, 20-Ah., type B | 4 | For T.1083. |
| 29 | N.I.V. | Crate, accumulator | 1 | For 5A/1387. |
| 30 | 10A/8475 | Neutralizing unit | 1 | |
| 31 | 5A/1385 | Lamp, filament, 4-V, 1·2 watts | 1 | For 10A/8475. |
| 32 | 10A/8473 | Condenser unit, earth | 1 | |
| 33 | 10A/3387 | Terminal, 2 B.A., type A | 2 | Bonded to panel. |
| 34 | 10A/8474 | Condenser unit, listening-through | 1 | |
| 35 | 10A/9000 | Plug, type 72, S.P. unispark cable | 2 | |
| 36 | 10A/7437 | Socket, type 19, 2-point | 1 | |
| 37 | 10A/7962 | Disc, indicating type D | 1 | For 10A/7437. |
| 38 | 5A/919 | Cable, L.T., uniflex 4, red-braided | | As required. |
| 39 | 5C/430 | Block terminal, type B, two-way, No. 1 | 6 | |
| 40 | 10A/7971 | Socket, type 29, Tel-Mic. parallel type | 3 | |
| 41 | 10A/9005 | Aerial winch, type 5 (frame) | 1 | For trailing aerial. |
| 42 | 10A/9123 | Aerial winch reel, type B | 1 | For aerial trailing |
| 43 | 10A/8531 | Socket, type 40, S.P. unispark cable | 1 | Trailing aerial to R.1082. |
| 44 | 10A/8531 | Socket, type 40 | 1 | For aerial winch. |
| 45 | N.I.V. | Aerial fairlead clamp | 1 | |
| 46 | 10A/7986 | Aerial fairlead bush, insulating | 1 | |
| 47 | N.I.V. | Aerial fairlead bush, steady | 1 | |
| 48 | 10A/216 | Aerial fairlead, tube, Dexine, 1 in. | 1 | |
| 49 | 10A/8913 | Aerial fairlead bush, steel 1 in., type 3, flared. | 1 | |
| 50 | 10A/8235 | Aerial wire, stainless steel | | As required. |
| 51 | 10A/7298 | Aerial weight, bead type, No. 1 | | As required. |
| 52 | 5A/82 | Cable, H.T., unispark 7, unbraided | | As required. |
| 53 | 10A/8093 | Aerial insulator, type 16, lead-in | 1 | For fixed aerial. |
| 54 | 10A/4589 | Aerial wire R.4 | | As required. |

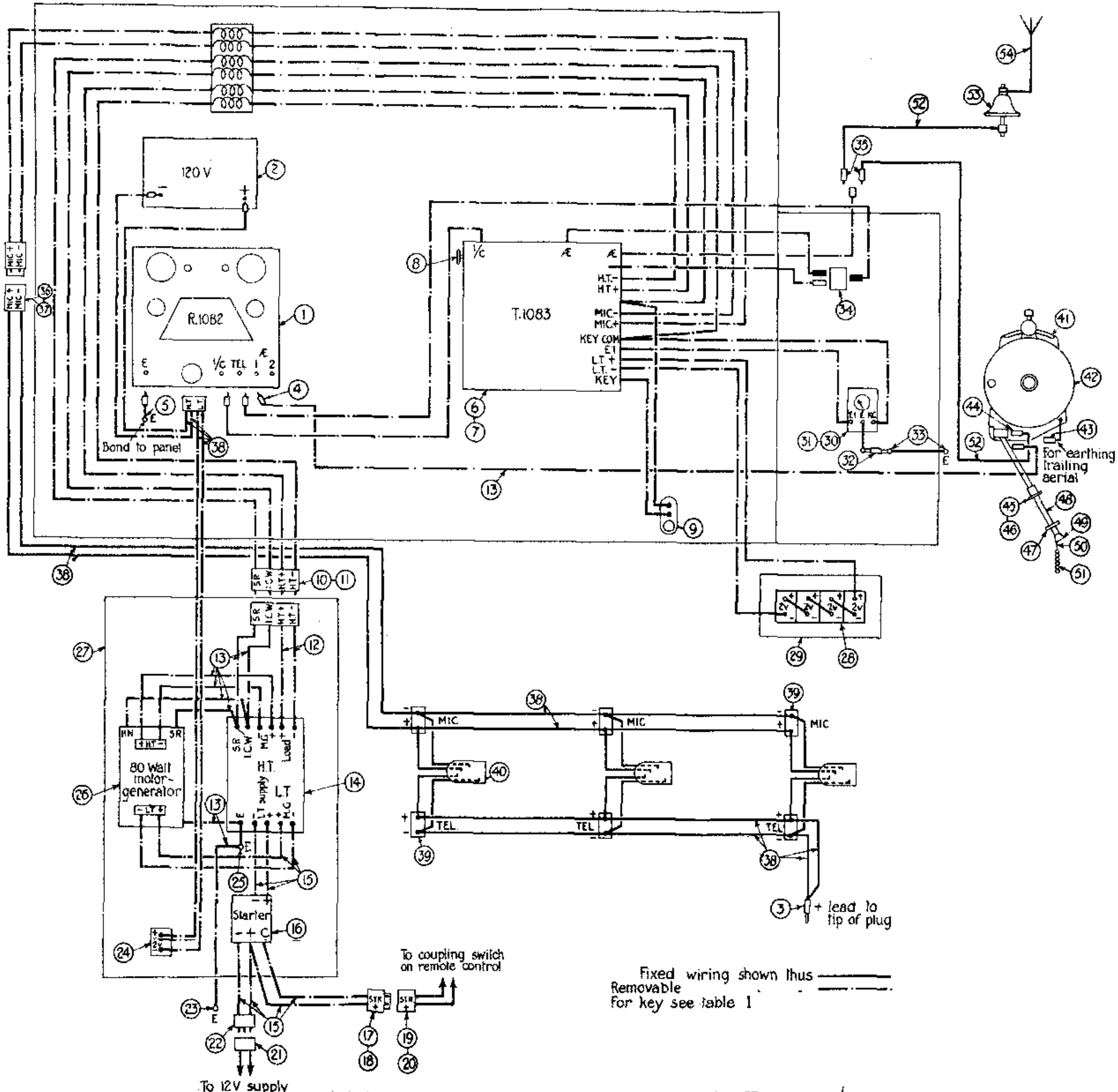



FIG. 15. INSTALLATION DIAGRAM (WITHOUT I/C)

## VALVES, BATTERY AND H.T. SUPPLY

66. The transmitter employs two type V.T.25 valves (8 volts, 2·2 amps). One valve is used as an oscillator and one as an amplifier. The H.T. supply is obtained from an 80-watt motor-generator, type C, driven by the 12-volt aeroplane supply, while the L.T. is obtained from four 2-volt accumulators 5A/1387 stored in the same crate as the receiver L.T. and H.T. supply.

## INSTALLATION

67. Figs. 15 and 16 are typical installation diagrams for transmitter T.1083 and receiver R.1082. It will be seen that a plug and socket connection enables either a fixed or trailing aerial to be selected. The H.T. supply to the transmitter is obtained from an 80-watt motor-generator. The L.T. supply for the filaments is obtained from four 2-volt accumulators. A plug and socket connection is provided between the transmitter and the accumulators.

68. When a motor-generator, type B or C, is used a smoothing unit is necessary for listening-through. This smoothing unit (Stores Ref. 10A/8525) consists of a system of chokes and condensers connected in the L.T. and H.T. circuits, of the motor-generator. The unit has two terminal blocks. One is engraved E : L.T. supply, + and − ; and M.G. + and − ; and another is engraved S.R. ; I.C.W. ; M.G. − and + ; and Load, + and −. On the L.T. side the terminal engraved E is connected to a suitable earth. A choke is connected internally between the terminals marked supply + and M.G. +, and another choke is connected between the terminals marked supply − and M.G. −. Two condensers, with their junction-point earthed, are connected in series across the terminals marked M.G. + and −. On the H.T. side of the smoothing unit, a choke is connected between the terminals marked Load − and M.G. −, and another choke is connected between the terminals marked M.G. + and Load +. Two condensers in series have their junction-point earthed and are connected between the terminals marked M.G. + and −. The terminal marked S.R. is connected externally to the S.R. terminal on the motor-generator, and the terminal I.C.W. is connected to the terminal H.X. on the motor-generator. A small ·01μF condenser inside the smoothing unit is connected between the terminal marked S.R. and earth. A switch is provided to short-circuit the terminals S.R. and I.C.W. If it is desired to change from I.C.W. to C.W. at a remote position, a pair of leads is taken from these two terminals to a tumbler switch (Stores Ref. 5C/621), and in this case the switch on the unit is locked in the off position. The L.T. to the smoothing unit and hence to the motor-generator is obtained from the aeroplane 12-volt supply. Two leads are brought to an automatic starter, type A (Stores Ref. 10A/7997), which is wired up in series with the switch, type 89, on the remote controls (*see* fig. 6). From the starter two leads are taken to the L.T. side of the smoothing unit and from there to the L.T. or motor side of the motor-generator. An alternative starting arrangement is sometimes employed. The 12-volt supply is taken to a switch, type 49, which is manually operated and has three positions: "start," "run", "off". In the "start" position a resistance is included in the armature circuit and in the "run" position it is cut out. It should be noted that motor-generators, types A, B and C, should receive their L.T. supply from the 12-volt battery and not from the "lighting load" connections (*see* A.P. 1095/G.12). If a motor-generator, type E, is used the L.T. supply is taken from the "lighting load" circuit. The smoothing unit (Stores Ref. 10A/8525) will probably be dispensed with when type E motor-generators are brought into service.

69. There are fourteen connections from the transmitter, six of which, namely, the H.T. supply, the microphone and key, are taken through a choke unit (Stores Ref. 10A/8464). Of the other eight, one is the I/C connection which is taken to the receiver, and two other connections terminate in sockets and are taken to the listening-through unit. The earth connection is taken through a neutralizing unit (Stores Ref. 10A/8473) external to the transmitter. This unit comprises a sensitive thermo-ammeter in series with a pea-lamp and a D.P.D.T. switch. The pea-lamp serves both as a visual indicator and as a fuse. In one position the switch connects

the filament circuit directly to the earth condenser unit, and in the other position it connects the filament circuit to earth through the pea-lamp and ammeter in series. The aerial lead to the transmitter terminates at a plug and socket connection which enables either the fixed aerial or the trailing aerial to be used. The remaining two connections are the L.T. leads to the accumulators.

70. An examination of the connections to the listening through unit will show that, in addition to the two connections from the transmitter, another plug-in connection is taken to the aerial socket on the receiver. This connection of the listening-through unit ensures that the receiver is always connected to the transmitter inductance through a small condenser. The receiver being connected up through a condenser whilst the transmitter is actually in operation, the operator is enabled to listen between pauses in transmission without having to operate the change-over switch. To obtain " free receiver " (independent connection of the receiver to the aerial) sockets, type 41 and 40 (*see* fig. 15 or 16), should be removed from the listening-through unit and plug, type 68, should be mated with socket, type 40.

71. The I/C connection between the transmitter and receiver enables the audio-frequency amplifying portion of the receiver to be utilized for telephonic communication between the occupants of the aeroplane. This is accomplished by providing a 4-point jack at each position in the aircraft, one pair of contacts of each jack being wired in parallel to a telephone plug engaging with a socket on the receiver. The 4-way cord connected to the telephone and microphone worn by each occupant terminates in a 4-way plug. When this plug is inserted into the above-mentioned jack, the microphones are connected to the microphone transformer in the transmitter and the telephones are connected in the output circuit of the receiver. Thus, during transmission any one of the occupants, by speaking into his microphone, may transmit R/T, and during reception he may speak through the receiver to the other occupants.

72. Remote control may be provided on the send-receive switch and also on the tuning of the receiver. Incorporated in the send-receive remote control is a switch which gives remote operation on the motor-generator, starting the motor-generator when in the send position and stopping the motor-generator in the receive and " off " positions.

**TABLE 2**

(Key to Installation Diagram, fig. 16)

| Item No. | Ref. No. | Nomenclature. | Quantity. | Remarks. |
|---|---|---|---|---|
| 1 | 10A/8415 | Receiver, type R.1082 .. .. .. | 1 | Without valves, coils or dial lamps |
| 2 | N.I.V. | Crate receiver .. .. .. .. | 1 | Complete with plugs, lead and sockets. |
| 3 | 10A/3387 | Terminal, 2 B.A., type A, spring type .. | 1 | For receiver, earth. |
| 4 | 10A/8516 | Plug, type 68 (S.P.) .. .. .. | 1 | |
| 5 | 5A/1333 | Battery, dry, 120-V, type A .. .. | 1 | For R.1082 |
| 6 | 10A/7437 | Socket, type 19 (2-point) .. .. | 1 | |
| 7 | 10A/8602 | Disc indicating, type H .. .. .. | 1 | For 10A/7437. |
| 8 | 5A/1387 | Accumulator, 2-V, 20-A.H., type A .. | 5 | One for R.1082, four for T.1083. Type B for tropical use. |
| 9 | N.I.V. | Crate battery .. .. .. .. | 1 | |
| 10 | 10A/7437 | Socket, type 19 (2-point) .. .. | 1 | |
| 11 | 10A/8603 | Disc indicating, type J .. .. .. | 1 | For 10A/7437. |
| 12 | 10A/8456 | Transmitter, type T.1083 .. .. | 1 | Without valves and coils, complete with plugs, sockets and leads. |
| 13 | 10A/9871 | Switch unit, type D, wired for Wellington aeroplane. | 1 | Complete with plugs, sockets, leads and choke unit. |

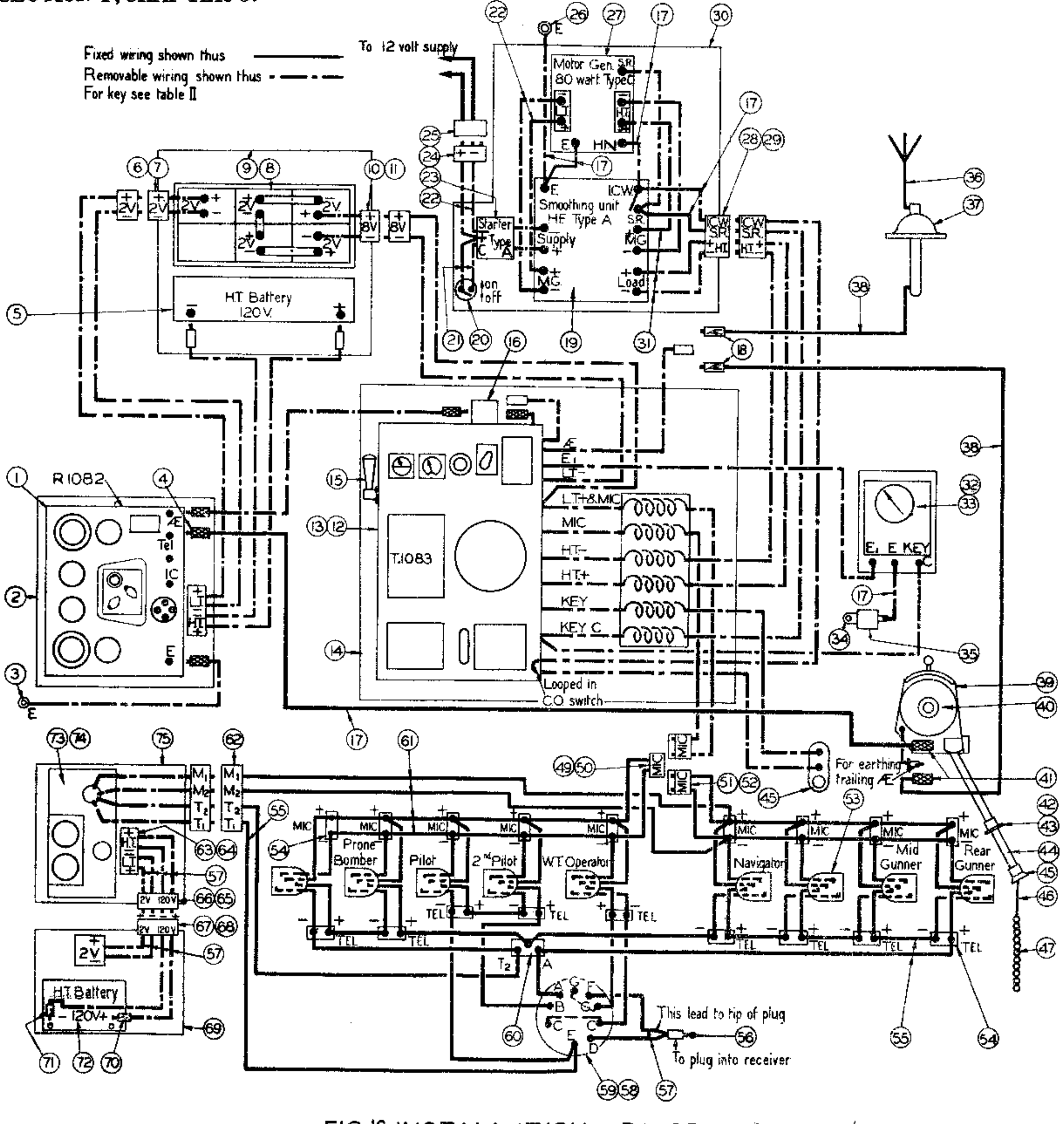



FIG. 16, INSTALLATION DIAGRAM (WITH I/C)

**TABLE 2**—*contd.*

| Item No. | Ref. No. | Nomenclature. | Quantity. | Remarks. |
|---|---|---|---|---|
| 14 | N.I.V. | Crate transmitter .. .. .. .. | 1 | |
| 15 | 10A/8050 | Handle, operating, switch unit, type 2 .. | 1 | |
| 16 | 10A/8474 | Condenser unit, listening-through .. | 1 | |
| 17 | 5A/916 | Cable, L.T., unisheath 4, red-braided .. | | As required. |
| 18 | 10A/8118 | Plug, type 62 (2-point, shielded) .. | 2 | |
| 19 | 10A/8525 | Smoothing unit H.F., type A .. .. | 1 | |
| 20 | 5C/622 | Switch, tumbler, 5 amp. .. .. .. | 1 | |
| 21 | 5A/89 | Cable, L.T., duflex 4, red-braided .. | | As required. |
| 22 | 5A/91 | Cable, L.T., duflex 19, red-braided .. | | As required. |
| 23 | 10A/7997 | Starter, type A .. .. .. .. | 1 | |
| 24 | N.I.V. | Plug, jacelite, 3-point, 5-amp. .. .. | 1 | Cat. No. 7110, Crabtree. |
| 25 | N.I.V. | Socket, jacelite, 3-point, 5-amp. .. | 1 | Cat. No. 7170, Crabtree. |
| 26 | 10A/3387 | Terminal, 2 B.A., type A, spring type .. | 1 | |
| 27 | 10A/7532 | Generator, motor, 80-watt, type C .. | 1 | |
| 28 | 10A/8533 | Socket, type 42 (4-point) .. .. | 1 | |
| 29 | 10A/8551 | Disc indicating, type D .. .. .. | 1 | For 10A/8533. |
| 30 | N.I.V. | Crate, smoothing unit .. .. .. | 1 | |
| 31 | 5A/81 | Cable, H.T., uniplug 12, unbraided .. | | As required. |
| 32 | 10A/8475 | Neutralizing unit .. .. .. .. | 1 | |
| 33 | 5A/1385 | Lamp filament, 4-V, 1·2 watts .. .. | 1 | For neutralizing unit. |
| 34 | 10A/3387 | Terminal, 2 B.A., type A, spring type .. | 1 | |
| 35 | 10A/8473 | Condenser unit, earth .. .. .. | 1 | |
| 36 | 10A/4589 | Aerial wire R.4 .. .. .. .. | | As required. |
| 37 | 10A/8093 | Aerial insulator, type 16, lead-in .. | 1 | |
| 38 | 5A/82 | Cable, H.T., unispark 7, unbraided .. | | As required. |
| 39 | 10A/9005 | Aerial winch, type 5, frame .. .. | 1 | |
| 40 | 10A/9123 | Aerial winch reel, type B.. .. .. | 1 | |
| 41 | 10A/8531 | Socket, type 40 (S.P., H.T.) .. .. | 2 | |
| 42 | N.I.V. | Aerial fairlead tube clamp, floor.. .. | 1 | |
| 43 | 10A/7986 | Aerial fairlead tube bush, insulating .. | 1 | |
| 44 | 10A/216 | Aerial fairlead tube, Dexine .. .. | | Length as required. |
| 45 | 10A/8913 | Aerial fairlead bush, flared steel, type 3 | 1 | |
| 46 | 10A/8235 | Aerial wire, stainless steel 7/28 .. | | For trailing aerial. |
| 47 | 10A/7298 | Aerial weight, bead type, No. 1 .. | | |
| 48 | 10A/7741 | Key, Morse, type F .. .. .. | 1 | |
| 49 | 10A/7437 | Socket, type 19 (2-point) .. .. | 1 | |
| 50 | 10A/7962 | Disc indicating, type D. .. .. .. | 1 | For 10A/7437. |
| 51 | 10A/8118 | Plug, type 62 (2-point, shielded) .. | 1 | |
| 52 | 10A/7961 | Disc indicating, type D .. .. .. | 1 | For 10A/8118. |
| 53 | 10A/7837 | Socket 28 (Tel-Mic), series .. .. | 9 | |
| 54 | 5C/430 | Block terminal, type B 2-way, No. 1 .. | 18 | |
| 55 | 5A/1353 | Cable, L.T., unicel 4, black-braided .. | | As required. |
| 56 | 10A/488 | Plug, type 1, Tel. .. .. .. .. | 1 | |
| 57 | 5A/919 | Cable, L.T., uniflex, red 4 .. .. | | As required. |
| 58 | 10A/7275 | Switch, type 25, I/C .. .. .. | 1 | |
| 59 | 10A/7282 | Switch, type 25, I/C base .. .. | 1 | |
| 60 | 5C/432 | Block terminal, type B, 3-way, No. 1 .. | 1 | |
| 61 | 5A/1362 | Cable, L.T., ducel 4, black-braided .. | | As required. |
| 62 | 10A/7283 | Socket, type 12 (4-point) .. .. | 1 | |
| 63 | 10A/7280 | Plug, type 33 (4-point) .. .. .. | 1 | |
| 64 | 10A/7265 | Disc indicating, type A .. .. .. | 1 | For 10A/7280. |
| 65 | 10A/8517 | Plug, type 69 .. .. .. .. | 1 | |
| 66 | 10A/8908 | Disc indicating, type F .. .. .. | 1 | For 10A/8517. |
| 67 | 10A/8533 | Socket, type 42 .. .. .. .. | 1 | |
| 68 | 10A/8909 | Disc indicating, type F .. .. .. | 1 | For 10A/8533. |
| 69 | N.I.V. | Crate, I/C amp., batteries .. .. | 1 | |
| 70 | 10A/8261 | Plug, type 64 (S.P. battery) .. .. | 1 | |
| 71 | 10A/8262 | Plug, type 65 (S.P. battery) .. .. | 1 | |
| 72 | 5A/1333 | Battery, dry, 120-V, type A .. .. | 1 | For I/C amplifier. |
| 73 | 10A/9130 | Amplifier, I/C, type B .. .. | 1 | |
| 74 | 5A/1548 | Battery, dry, 3-V .. .. .. .. | 3 | For I/C amplifier grid bias. |
| 75 | N.I.V. | Crate, I/C amplifier .. .. .. | 1 | |

73. Referring to fig. 16 it will be seen that the main difference between this installation and that shown in fig. 15 is in the intercommunication arrangements. No connection is made from the transmitter side-tone system to the I/C socket on the receiver. The audio-frequency portion of the receiver is not, therefore, used for intercommunication but a separate amplifier, known as amplifier I/C, type B, is employed together with a 4-way switch ; Switch, I/C Control, type 25. Nine positions are shown, each of which is provided with a microphone and telephone jack. Each of the occupants is provided with a flexible lead and plug connected to his microphone and telephone receivers, the plug being inserted in the appropriate jack. The I/C switch is provided with a two-way plug which is engaged with the telephone jack on the receiver, and the four positions of the switch are engraved I/C ; I/C and W/T ; W/T ; I/C, W/T and PILOT. The amplifier, complete with the necessary transformers, switches and resistances, is contained in a canvas-covered wooden case and employs two valves (V.R.32 and V.R.19). One of the resistances is variable and serves as a volume control. A 120-volt dry battery is used for H.T., a 2-volt accumulator for L.T. and three 3-volt dry batteries are provided for grid bias. The L.T. and H.T. connections are made to the amplifier by means of one 4-way socket, and the connections between the amplifier and inter-communication system are made through another. An examination of the diagram will show that the microphone circuit may be broken at a plug and socket connection (49 and 51). When the plug and socket connection is made all the microphone circuits are in parallel on the intercommunication system but are not connected to the transmitter. By breaking this connection and connecting the socket (49) to the microphone plug on the transmitter, five of the occupants have their microphones connected to the transmitter and may thus transmit R/T. The remaining four who are not connected to the transmitter are, however, still left on the intercommunication system. The switch controls the telephone circuits only and operates in the following way. When the switch is in the I/C position all the telephone receivers are connected in series to the last stage of the amplifier, and there is no W/T reception. When the switch is moved to the I/C and W/T position, the telephones of the W/T operator are connected to the wireless receiver, while the telephones of the other occupants are all connected, in series with the I/C amplifier, across them. In the W/T position the W/T operator alone is on W/T reception, and all the other occupants are connected on the intercommunication system. In the fourth position of the switch the telephones of the W/T operator and the two pilots are connected in series across the wireless receiver, and the telephones of the other occupants are all connected, in series with the I/C amplifier, across the same circuit.

## OPERATION

74. There are three methods of tuning the transmitter. Wavemeter W.1081 may be used, or the master-oscillator may be used as a standard, or receiver R.1082 may be used. When familiarity with the apparatus has been achieved the normal method will be by use of the master-oscillator as described in the following paragraphs.

### 136–500 kc/s

75. Connect the transmitter to a suitable aerial and set the ABCD switch to D. Set the grid-bias switch to TUNE, remove from the earth circuit the series earth condenser and plug in oscillator and amplifier coils (Range D). Set oscillator by calibration chart or by experience (*see* Tables 3, 4, 5 and 6), and set amplifier tuning, both rough and fine, to zero. Switch on receiver and transmitter L.T. and H.T. The M/O input should be about 20 mA. The M/O oscillatory current should be just readable.

76. If a standard trailing aerial is in use the rough tuning settings of oscillator and amplifier will be about the same. If this is remembered, the presence of harmonics need cause no confusion. It is not sufficient to use the coarse amplifier tuning, since this is merely a tapping switch. The fine tuning must also be used after selecting the nearest tapping.

77. The neutralizing unit should now be set to TRANSMIT and the grid-bias switch set to C.W.1 or R/T.1. Check that total input is normal, not more than 70 mA. and check that aerial current is about 1 amp. Lock the controls and check I/C.

### 3–15 Mc/s

78. Connect the transmitter to a suitable aerial and set ABCD switch by calibration chart or experience (*see* Tables 3, 4, 5 and 6). Insert the series earth condenser (if necessary). Set the grid-bias switch to TUNE, the neutralizing unit to TUNE and the neutralizing condenser to zero. Insert the appropriate amplifier coil, choosing the anode tap A or B appropriate to the frequency. Set the amplifier coil to zero and set the AB switch on the base of the appropriate oscillator coil to correspond with the A or B anode tap. Now set the oscillator tuning and variometer, and the coupling coil by calibration chart or by experience. As a rough guide it may be said that if working near the highest frequency for which the selected anode tap is correct, a loose coupling is required; towards the bottom of the frequency range (of the selected anode tap) a tight coupling is required.

79. Switch on the receiver and switch on transmitter L.T. and H.T. The M/O input should be about 30 mA. and the oscillatory current about 1·5–2 amps. Tune the amplifier coil for maximum reading in the neutralizing ammeter. Harmonics may give false readings. Ensure that a true maximum is being used. Increase the setting of the neutralizing condenser until the neutralizing ammeter reads zero. Now set the neutralizing unit to TRANSMIT, and the bias switch to C.W.1. Press the key and slightly re-tune the amplifier coil for maximum aerial current. The total input should not exceed 70 mA. The aerial current should be about 2 amps. Slight adjustment of the coupling and slight retuning of the amplifier may increase the output. If using R/T, observe aerial ammeter for modulation. Lock the controls and check side tone and I/C.

80. To tune the transmitter by the wavemeter method, proceed as described in para. 78, and measure the transmitted frequency on W.1081. If in error, estimate the change required in oscillator setting, and repeat tuning from the beginning. This method should rarely be necessary.

81. To tune the transmitter to the frequency of a received signal making use of the receiver, tune the R.1082 to the "dead space" of the incoming signal (*see* appropriate chapter on R.1082). Reduce the volume considerably. Noting the approximate frequency, insert suitable coils in the transmitter. Set the ABCD switch, and put the bias switch to TUNE, switch on the transmitter H.T. and L.T. and tune the master-oscillator until its heterodyne note is heard in the receiver. Adjust the master-oscillator to the "dead space". Tune the amplifier to the master-oscillator in the usual way. The transmitter frequency should now be very close to that of the incoming signal. To cover any small error, make the first call on I.C.W. At the lower radio frequencies this method of tuning is very satisfactory, but above 5,000 kc/s the tuning of the master-oscillator becomes increasingly difficult due to frequency pulling, and care must be taken to keep the receiver gain down to the lowest practical value during these adjustments.

82. The amplifier grid-bias switch must be finally adjusted to give the necessary power. Never use more power than the circumstances require. On R/T, do not attempt to use studs 3, 4 or 5; in these positions a strong current with negligible modulation is transmitted, and the range is less than that obtainable on studs 1 or 2. The depth of modulation may be increased, and the range usually increased, by reducing the coupling between the oscillator and the amplifier.

## PRECAUTIONS AND MAINTENANCE

83. Troubles in the transmitter are often quickly found by studying the indications on the four meters. For example, if in the tune position on range B an oscillator feed current of 45 mA. is observed and there is no oscillatory current, there is probably a break in the master-

oscillator oscillatory circuit. Check pins and sockets F, G and H, or if there is no master-oscillator feed current, check that the H.T. is on to the transmitter, check H.T. contacts of S/R switch ; check pins and sockets A, B, E and F.

84. If the master-oscillator is oscillating, but no aerial current is observed when tuning the amplifier, make sure that :—

(i) the correct aerial is connected,
(ii) the aerial and earth series capacitances are correct,
(iii) the amplifier is not neutralized ; the neutralizing condenser should be in the zero position.
(iv) the fuse in the neutralizing unit is not blown,
(v) the coupling coil tap is correctly set,
(vi) the transmitter chassis is not earthed (*via* the front panel, perhaps).

85. If the amplifier appears to tune naturally, but the aerial current is low, the amplifier is probably tuned to a harmonic of the M/O. If the amplifier tunes at two adjacent points (" double hump ") then the coupling is too tight. This may be reported by a receiving operator as a bad note, or as transmission on two frequencies. When the coupling coil setting is changed, the M/O. will usually require slight retuning.

86. The optimum setting of the ABCD switch and the use of the earth condenser are matters for experience on a particular aircraft and frequency. Earthing of the transmitter chassis will short-circuit the earth condenser.

87. Faults in the grid-bias switch might account for—

(i) No anode current.
(ii) Excessive anode current.
(iii) Key short-circuited.
(iv) No carrier when switched to R/T.
(v) Intermittent failure of amplifier.

88. If, in an emergency, only one V.T.25 is available, and transmission on range A, B or C is likely to be useful, put the serviceable valve in the amplifier stage. Plug in the appropriate coils with their usual settings for the desired frequency. If available, put the discarded valve in the oscillator stage. Put the G.B. switch to C.W.1. Set the neutralizing condenser to zero or 100°, and the amplifier will probably oscillate near the desired frequency.

89. Ensure, while sending dots, that the anode current is not excessive, and that the better extreme setting of the neutralizing condenser has been chosen. Make the first call on I.C.W. The presence of the oscillator coil and of the discarded valve ensures that the frequency calibrations hold fairly well. If a wavemeter is available the valve and coil are unnecessary. Without them, the amplifier can be made to oscillate over a wider band. If the neutralizing unit fuse or meter is blown, tune on the aerial ammeter with the G.B. switch at " tune " and the neutralizing unit at " transmit ".

90. If the L.T. voltage is badly down, both power and frequency stability will be reduced. If the M.G. input voltage is badly down, starter, type A will run the M.G. at half speed only. If the input voltage to the M.G. is much above 14 volts, there is a slight risk on range D of a breakdown of aerial circuit insulation. Set transmitter to C.W.1. Beware of reversed polarity at M.G. input terminals.

91. It should be remembered that the neutralizing unit is in the lead between the earth terminal of the transmitter and the earth connection of the installation. An accidental earth on the transmitter will, therefore, short-circuit the neutralizing unit. Such a short-circuit may

occur if the suspension of the transmitter is allowed to sag and cause the metalwork of the master-oscillator chamber to touch an "earthed" part of the installation. As a consequence, tuning with the neutralizing switch in the tune position will be rendered difficult if not impossible.

92. The microphone transformer (4) shown in fig. 9 has four soldering tags punched into the terminal strip. Some transmitters (serial Nos. 1260–1630) have, in addition, four 8 B.A. nuts and bolts through the strip. The presence of these nuts and bolts constitutes a potential source of insulation failure. The transmitter should be inspected and if these nuts and bolts are present they should be removed from the terminal strip. Difficulty may occur in starting the thread, and it is essential for the whole instrument and nut to be firmly held while bearing on the bolt, and also to ensure that the soldering tags in the terminal strip are not loosened.

93. The microphone transformer has been found to fail under sea-going conditions, for example when the transmitter is used with the Fleet Air Arm. Since R/T is not required in these circumstances, the transformer may be put out of action by short-circuiting the secondary winding with a piece of 16 s.w.g. copper wire. Before the transmitter is returned to stores, the short-circuit should be removed.

94. Owing to certain insulation failures, a number of modifications have been made to the coils and general transmitter wiring. These modifications are in all cases in the nature of constructional details. Except for these changes, the transmitter is exactly as described in the earlier paragraphs. To provide against the eventuality of an earth occurring on the MIC-TEL circuit, a fuse is now inserted in the positive L.T. lead between the switch terminal engraved LT + & MIC and choke unit, as shown in fig. 7.

**TABLE 3**

**Typical Calibrations of T.1083**

**Taken on a Swordfish Aeroplane**

**Range D. Aerial : 200 feet trailing.**
**"ABCD" Switch : D.**
**Earth Condenser Unit not in circuit.**

| Frequency kc/s. | Master-Oscillator. | | Amplifier. | | Input (mA.). | Output ($I_{AE}$). |
|---|---|---|---|---|---|---|
| | Coarse. | Fine. | Coarse. | Fine. | G.B. switch at C.W.5. | |
| 132 | 14 | 5·5 | 14 | 3·4 | 58 | ·9 |
| 137 | 13 | 5·5 | 13 | 4·5 | 60 | 1·0 |
| 144 | 12 | 5·5 | 12 | 5·2 | 60 | 1·0 |
| 149 | 11 | 5·5 | 11 | 5·5 | 60 | 1·0 |
| 160 | 10 | 5·5 | 10 | 5·8 | 60 | 1·0 |
| 170 | 9 | 5·5 | 9 | 5·8 | 57 | 1·05 |
| 184 | 8 | 5·5 | 8 | 5·9 | 57 | 1·1 |
| 200 | 7 | 5·5 | 7 | 5·9 | 55 | 1·1 |
| 223 | 6 | 5·5 | 6 | 5·8 | 57 | 1·2 |
| 252 | 5 | 5·5 | 5 | 5·6 | 57 | 1·2 |
| 295 | 4 | 5·5 | 4 | 5·6 | 57 | 1·25 |
| 358 | 3 | 5·5 | 3 | 5·4 | 50 | 1·2 |
| 412 | 2 | 5·5 | 2 | 5·3 | 60 | 1·25 |
| 475 | 1 | 5·5 | 1 | 5·2 | 55 | 1·2 |

## TABLE 4

### Range C. Aerial : Fixed. Three-limbed umbrella

| Frequency Mc/s. | Master-Oscillator | | Coupling and Anode Tap. | | Neut. Cond. | Bias C.W. | ABCD. | Amplifier Turns. | Earth Cond. | Input mA. | Output Amps. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Turns. | Vario. | | | | | | | | | |
| 2·98 | 17·240 | | B | 9 | 36 | 4 | D | 16·200 | Dis. | 65 | 1·7 |
| 3·16 | 15·180 | | B | 8 | 36 | 4 | D | 15·200 | Dis. | 65 | 2·0 |
| 3·25 | 14·180 | | B | 7 | 34 | 4 | D | 14·140 | Dis. | 65 | 2·0 |
| 3·35 | 13·180 | | B | 6·5 | 32 | 4 | D | 13·210 | Dis. | 65 | 2·0 |
| 3·44 | 12·180 | | B | 6 | 32 | 4 | D | 12·310 | Dis. | 65 | 2·0 |
| 3·55 | 11·180 | | B | 5·5 | 30 | 4 | D | 12·400 | Dis. | 65 | 2·1 |
| 3·67 | 10·180 | | B | 5 | 30 | 5 | D | 11·120 | Dis. | 65 | 2·2 |
| 3·83 | 9·180 | | B | 4 | 28 | 5 | D | 10·200 | Dis. | 65 | 2·2 |
| 3·98 | 8·180 | | B | 2·5 | 28 | 5 | D | 9·220 | Dis. | 65 | 2·2 |
| 4·15 | 7·180 | | A | 9 | 30 | 4 | D | 9·120 | Dis. | 65 | 2·1 |
| 4·35 | 6·180 | | A | 8 | 30 | 4 | D | 8·500 | Dis. | 65 | 2·1 |
| 4·62 | 5·180 | | A | 7 | 30 | 4 | D | 7·800 | Dis. | 65 | 2·2 |
| 4·86 | 4·180 | | A | 6 | 26 | 4 | D | 6·120 | Dis. | 65 | 2·2 |
| 5·20 | 3·180 | | A | 5 | 26 | 4 | D | 5·160 | Dis. | 65 | 2·2 |
| 5·54 | 2·180 | | A | 4 | 26 | 3 | D | 4·196 | Dis. | 65 | 2·0 |
| 5·92 | 1·180 | | A | 3 | 22 | 4 | C | 5·500 | Dis. | 65 | 1·9 |
| 6·12 | 1·000 | | A | 2 | 22 | 4 | C | 4·180 | Dis. | 65 | 1·6 |

## TABLE 5

### Range B. Aerial : Fixed. Three-limbed umbrella

| Frequency Mc/s. | Master-Oscillator. | | Coupling and Anode Tap. | | Neut. Cond. | Bias C.W. | ABCD. | Amplifier Turns. | Earth Cond. | Input mA. | Output Amps. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Turns. | Vario. | | | | | | | | | |
| 5·7 | 15·000 | | B | 9 | 62 | 4 | C | 8·320 | In | 65 | 1·75 |
| 5·95 | 13·180 | | B | 7·5 | 60 | 4 | C | 7·330 | In | 65 | 1·6 |
| 6·13 | 12·180 | | B | 7 | 60 | 4 | C | 7·160 | In | 65 | 1·6 |
| 6·30 | 11·180 | | B | 6 | 58 | 4 | C | 6·320 | In | 65 | 1·55 |
| 6·55 | 10·180 | | B | 5 | 56 | 3 | C | 6·110 | In | 65 | 1·5 |
| 6·80 | 9·180 | | B | 4 | 56 | 3 | C | 5·360 | In | 65 | 1·5 |
| 7·20 | 8·180 | | B | 2 | 56 | 4 | C | 5·300 | In | 65 | 1·5 |
| 7·5 | 7·180 | | A | 9 | 66 | 4 | C | 4·200 | In | 65 | 1·5 |
| 7·94 | 6·180 | | A | 8 | 68 | 4 | C | 3·260 | In | 65 | 1·5 |
| 8·42 | 5·180 | | A | 7 | 68 | 4 | C | 2·240 | In | 65 | 1·5 |
| 9·00 | 4·180 | | A | 6 | 68 | 4 | C | 2·000 | In | 65 | 1·5 |
| 9·72 | 3·180 | | A | 4 | 68 | 4 | B | 1·120 | In | 65 | 1·4 |
| 10·30 | 2·180 | | A | 2 | 68 | 3 | B | 0·140 | In | 70 | 1·0 |

## TABLE 6

**Range A. Aerial : Fixed. Inverted L ; transmitter to fin, 12 feet.**
**Aerial series condenser : A.**
**Earth condenser unit in circuit.**
**Bias : C.W.5.**

| Frequency Mc/s. | M.O. Turns. | Coupling and Anode Tap. | Neutralizing Condenser. | Amplifier Turns. | Input mA. | Output Amps. |
|---|---|---|---|---|---|---|
| 9·88 | 12·80 | B 10 | 50 | 6·340 | 55 | 1·3 |
| 10·09 | 11·180 | B 9 | 50 | 6·200 | 55 | 1·4 |
| 10·40 | 10·180 | B 8 | 48 | 6·30 | 56 | 1·4 |
| 10·83 | 9·180 | B 7 | 48 | 5·20 | 56 | 1·4 |
| 11·24 | 8·180 | B 6 | 46 | 5·0 | 56 | 1·4 |
| 11·67 | 7·180 | B 5 | 46 | 4·140 | 56 | 1·4 |
| *12·24 | 6·180 | *B 4 | 44 | 3·280 | 60 | 1·3 |
| *12·59 | 6·180 | *A 8 | 42 | 3·240 | 60 | 1·2 |
| 13·20 | 5·180 | A 7 | 42 | 3·50 | 60 | 1·2 |
| 13·98 | 4·180 | A 5 | 42 | 2·130 | 60 | 1·2 |
| 14·50 | 3·340 | A 4 | 44 | 1·320 | 60 | 1·2 |
| 15·10 | 3·70 | A 3 | 44 | 1·80 | 65 | 1·0 |

* Note change of M/O frequency with change of coupling coil tap.

## APPENDIX

## NOMENCLATURE OF PARTS

The following list of parts is issued for information only. In ordering spares for this transmitter, the appropriate Section of AIR PUBLICATION 1086 must be used.

| Ref. No. | Nomenclature. | Quantity. | Remarks |
|---|---|---|---|
| 10A/8456 | Transmitter T.1083 .. .. .. .. | | Without valves, coils or switch unit. |
| | Principal components :— | | |
| | Ammeter, thermo :— | | |
| 10A/8479 | 0-2·5, type B .. .. .. .. | 1 | Aerial. |
| 10A/8480 | 0-3, type B .. .. .. .. | 1 | Master-oscillator. |
| 10A/8457 | Bar, contact .. .. .. .. | 1 | With 13 contacts. |
| 10A/8458 | Case .. .. .. .. | 1 | |
| | Choke, H.F. :— | | |
| 10A/8482 | Type R .. .. .. .. | 1 | |
| 10A/8483 | Type S .. .. .. .. | 1 | |
| 10A/8484 | Type T .. .. .. .. .. | 1 | |
| | Condenser :— | | |
| 10A/8044 | Type 139 .. .. .. .. | 1 | ·01μF. |
| 10A/8045 | Type 140 .. .. .. .. | 1 | ·022μF. |
| 10A/8048 | Type 143 .. .. .. .. | 1 | ·001μF. |
| 10A/8493 | Type 185 .. .. .. .. | 2 | ·004μF. |
| 10A/8496 | Type 188 .. .. .. .. | 1 | ·01μF. |
| 10A/8497 | Type 189 .. .. .. .. | 2 | ·0003μF. |
| 10A/8498 | Type 190 .. .. .. .. | 1 | ·000075μF. |
| 10A/8499 | Type 191 .. .. .. .. | 1 | ·002μF. |
| 10A/8500 | Type 192 .. .. .. .. | 2 | ·0001μF. |
| 10A/8501 | Type 193 .. .. .. .. | 1 | ·00003μF. (max.) |
| 10A/9870 | Type 344 .. .. .. .. | 2 | 0·5μF. |
| 10A/8459 | Cover, end .. .. .. .. | 1 | With contact bar. |
| 10A/3412 | Holder, valve, V.T.13 .. .. .. | 2 | |
| 10A/8514 | Milliammeter :— | | |
| | 0-150, type B .. .. .. .. | 1 | |
| | Resistance :— | | |
| 10A/8522 | Type 148 .. .. .. .. | 5 | 2,000 ohms each. |
| 10A/8523 | Type 149.. .. .. .. .. | 3 | 6,600 ohms each. |
| 10A/8524 | Type 150.. .. .. .. .. | 1 | 40,000 ohms. |
| 10A/8570 | Type 152.. .. .. .. .. | 1 | 500 ohms. |
| 10A/8537 | Switch, type 85 .. .. .. .. | 1 | Series aerial condenser. |
| 10A/8539 | Transformer, microphone, type H .. | 1 | |
| 10A/8460 | Unit, grid-bias .. .. .. .. | 1 | |
| | Accessories :— | | |
| 10A/8571 | Case, stowage, coils .. .. .. | 8 | One case takes one M/O or one amplifier coil. |
| | Case, transit :— | | |
| 10A/8461 | Coil .. .. .. .. .. | 1 | |
| 10A/8462 | Transmitter .. .. .. .. | 1 | |
| | Coil :— | | |
| | Amplifier :— | | |
| 10A/8465 | Range A .. .. .. .. | 1 | 15,000 to 10,000 kc/s. |
| 10A/8466 | Range B .. .. .. .. | 1 | 10,000 to 6,000 kc/s. |
| 10A/8467 | Range C .. .. .. .. | 1 | 6,000 to 3,000 kc/s. |
| 10A/8468 | Range D .. .. .. .. | 1 | 500 to 136 kc/s. |
| | Master oscillator :— | | |
| 10A/8469 | Range A .. .. .. .. | 1 | 15,000 to 10,000 kc/s. Fitted with coupling coil and one each types 196 and 200 condensers. |

APPENDIX—*continued*

| Ref. No. | Nomenclature. | Quantity. | Remarks. |
|---|---|---|---|
| | Transmitter T.1083—*continued* | | |
| | Accessories—*continued.* | | |
| | Master-oscillator—*continued.* | | |
| 10A/8470 | Range B .. .. .. .. | 1 | 10,000 to 6,000 kc/s. Fitted with one each range B variometer and type 195 condenser. |
| 10A/8471 | Range C .. .. .. .. | 1 | 6,000 to 3,000 kc/s. Fitted with coupling coil and one each range C variometer and type 194 condenser. |
| 10A/8472 | Range D .. .. .. .. | 1 | 500 to 136 kc/s. Fitted with one each types 142, 197, 198 and 199 condensers. |
| 10A/8534 | Switch unit (unwired) .. .. .. | 1 | Send-receive. |
| | Valve :— | | |
| 10A/7312 | Type V.T.25 .. .. .. .. | 2 | One M/O and one amplifier. |
| | Accessories, installation :— | | For use when T.1083 is used together with R.1082. |
| 10A/8559 | Aerial, artificial .. .. .. .. | 1 | For ground setting-up of T.1083. |
| 10A/8487 | Aerial, screened loop .. .. .. | 1 | For D/F with R.1082. |
| | Choke unit :— | | |
| 10A/8463 | Filament .. .. .. .. | 1 | For use with 12-V filament supply. |
| | Controls, remote, comprising :— | | |
| 10A/8580 | Adaptor, ring, change-over switch .. | | On which a switch coupling, type E, is mounted. |
| 10A/8189 | Casing, flexible, type C .. .. | | |
| 10A/8190 | Casing, rigid, type C .. .. .. | | |
| 10A/8585 | Cleat, type C .. .. .. .. | | For securing casing rigid to aeroplane structure. |
| 10A/8187 | Control switch and tuning, type C .. | | |
| 10A/8592 | Coupling, pedestal .. .. .. | | For remote control of coil, anode, S.50, on R.1082. |
| 10A/8590 | Coupling, tuning .. .. .. | | (see above) |
| 10A/4178 | Gun, lubricator, type B .. .. | | For use with 10A/9119. |
| 10A/9515 | Pin, key, type C .. .. .. .. | | For use with union, casing, type B. |
| 10A/8192 | Shafting, flexible, type C .. .. | | |
| 10A/8745 | Switch, type 89 .. .. .. .. | | Mounted on underside of switch, coupling. |
| 10A/8746 | Switch, coupling, type E .. .. | 2 | For " send-receive ". |
| 10A/8193 | Union, casing, type B .. .. .. | | Quantity as required. |
| 10A/9119 | Union, lubricating, type C .. .. | | Quantity as required. |