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Richard Hankins, VMARS Archivist, Summer 2004

W/S code 1049

**WIRELESS SET No. 12 Mk. II**  
**ZA 21887**

**GENERAL DESCRIPTION, WORKING INSTRUCTIONS,  
AERIALS AND MAINTENANCE**

**ZA 3047**

**NOT TO BE PUBLISHED**

**NOTE**

The information given in this document is not to be communicated, either directly or indirectly, to the Press or to any person not holding an official position in His Majesty's Service.



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## **CHAPTER I.—GENERAL DESCRIPTION.**

### **1. Purpose and Facilities.**

The Wireless Set No. 12 is a general purpose low power sender with an R.F. output of about 25 watts on C.W. In particular, it may be used with a Reception Set R.107 in a Class B vehicle as an alternative to Wireless Set No. 9, although it is primarily intended for use as a ground station.

The circuit permits "local" operation of the sender on C.W., M.C.W., and R.T. In conjunction with Wireless Remote Control Unit C, the sender may be switched on and off, keyed on C.W. or M.C.W., and modulated by any V.F. system, including teleprinter, from a remote point. Hand and high-speed keying may be used. The sender may be connected directly to the following aerials :—

- (i) Half-wave horizontal aerial, single wire fed (i.e. Wyndom Aerial).
- (ii) Single wire aerial of any length up to 100 ft.
- (iii) An aerial system fed by 100 ohm feeders with one side earthed.

Connection to an aerial at some distance from the sender may be made by means of a feeder cable and "Aerial Coupling Equipment—Aerial Unit F." Provision is made for "break-in" working on all systems. This facility means that when the key is up or the microphone pressel switch is released the receiver becomes automatically operative. In this case the receiver aerial circuit is connected to the sender and uses the same aerial. When the sender is radiating the receiver is muted. Sidetone is also fed back to the receiver.

### **2. Frequency Band.**

The frequency band of 17.5 M.c/s to 1.2 M.c/s is covered in four overlapping ranges as follows :—

Range 1—17.5 M.c/s to 10 M.c/s.
Range 2—10.5     "     "     5.2     "
Range 3— 5.3     "     "     2.5     "
Range 4— 2.6     "     "     1.2     "

The frequency is governed by that of the master oscillator which may be either self-excited or crystal controlled. When self-excited the frequency of the master oscillator is variable, being half the emitted frequency on each range.

The ranges are selected by switches which rotate coil turrets or select coilappings, thus obviating coil changing.

### **3. Power Supply.**

The sender may be energised from any available single phase A.C. supply of between 100V. and 250V. at 45–60 c/s. A stand-by petrol-electric set is normally provided.

The power taken by the sender is about 250 watts when tuned on C.W. with the output valve loaded to 80 mA. anode current.

THE POWER UNIT 250 WATT A.C./D.C. No. 1 AMERICAN HAS NOT SUFFICIENT OUTPUT TO DRIVE A RECEIVER OR OTHER EQUIPMENT WHEN SUPPLYING POWER TO THE No. 12 SET.

### **4. Composition and Construction.**

- (i) With the sender the following items are supplied :—
  - (a) The Aerial Coupling Equipment, comprising Aerial Unit F and Connectors Twin No. 56 (in 50 ft. lengths), and Set Unit F.
  - (b) Aerial gear.
  - (c) The Wireless Remote Control Unit C, and Adaptor C.
  - (d) A Power Unit D.C./A.C. 250 watts No. 1A.
  - (e) A Receiver, e.g. Reception Sets R.107.
  - (f) Dummy Aerial.



(ii) The Sender.

The sender is mounted on a steel chassis which, with the front panel holding the controls, may be completely withdrawn from its case after unscrewing two draw bolts.

Two doors, with safety switches, are provided on the front panel so that valves may be changed without taking the chassis out of the case.

Case consists of a container made from sheet steel with removable top, back and front covers. The back and front covers keep the top cover in position, and are themselves fixed to the chassis and case by coin-slot screws. The case has double carrying handles each side.

(iii) The Aerial Unit F, Wireless Remote Control Unit C, and the Dummy Aerial are similarly contained in steel boxes with removable lids.

## 5. Weights and Dimensions.

TABLE 1.—Weights and Dimensions.

UNIT	Weight	Length	Height	Depth
Sender in case ...	134 lbs.	24 in.	12½ in.	17½ in.
Aerial Unit F. ...	13½ lbs.	9 in.	8 in.	9 in.
Connectors, Twin No. 56		50 ft.		
Remote Control Unit C.	8¾ lbs.	8¼ in.	7¼ in.	7¾ in.
Dummy Aerial ...	2 lbs.	5½ in.	2¼ in.	7¾ in.

## 6. Sender Circuits (see Fig. 5).

### 6.(1). R.F. Stages.

There are three R.F. stages—Master Oscillator, Buffer (amplifier and frequency multiplier), and Power Amplifier.

#### (a) Master Oscillator (Valve V2A, type A.T.S. 25 or 25A).

The oscillator is crystal controlled or self-excited according to the setting of the OSCILLATOR switch (S1). The frequency range required is selected by the OSCILLATOR RANGE switch (S6), which by rotating a coil turret, connects the correct coil in the anode circuit.

When self-excited the M.O. frequency on a given range is determined by the setting of the OSCILLATOR TUNING Control, which has a dial calibrated with the radiated frequency in M.c/s and which rotates the variable condenser (C9A) connected across the coil in use. Normally the M.O. frequency is half the radiated frequency.

When crystal controlled this stage is tuned to the crystal frequency and resonance is indicated by an indicator lamp (PIA) labelled CRYSTAL TUNING, which is in series with the crystal.

The H.T. supply to the M.O. valve is stabilised by two type A.W.3 neon stabilisers (V1A and V1B), which also control the voltage applied to the screen grid of the valve (V2B) in the following stage.

#### (b) Buffer stage (Valve V2B, type A.T.S. 25 or 25A).

This stage acts as an amplifier or frequency multiplier and is usually tuned to the second harmonic of the oscillator frequency. With crystal control this stage may be tuned to any harmonic within the frequency band of the sender.

The frequency range is selected by the BUFFER RANGE switch (S7) which rotates a second coil turret in the buffer valve anode circuit. Tuning is accomplished by the BUFFER TUNING Control which rotates a variable condenser (C.9B) connected across the coil in use. Resonance is indicated by the maximum glow of a white indicator

lamp (PIB) which is energised from a winding loosely coupled to the anode coil.

(c) Power Amplifier (Valve V3A, type A.T.P. 35).

This stage amplifies at the buffer frequency.

The frequency range is selected by the P.A. RANGE switch (S8) which short circuits a suitable amount of the anode coil. Tuning is carried out by adjustment of the P.A. TUNING control which rotates a variable condenser (C12A) connected in parallel with the coil. In this case resonance is indicated by maximum dip in the reading of the P.A. ANODE CURRENT meter (M1A).

The Aerial is coupled through a condenser to an adjustable tap on the P.A. anode coil. The tap is continuously variable for matching the impedance of the aerial or feeder line and its position is shown by the setting of the AERIAL COUPLING control. The P.A. valve and the Buffer valve have a standing bias on the control grid to cut off the cathode current until it is released by the drive from the previous stage.

The P.A. valve is suppressor grid controlled both for keying and modulation.

6.(2). Modulator.

There are two valves in the modulator. The first (V4A type A.R.P. 34) is arranged to work as an oscillator for M.C.W. operation and as an amplifier for R.T. This valve is followed by the output valve (V2C, type A.T.S. 25 or 25A) which is transformer coupled into the suppressor grid circuit of the P.A. valve (V3A). For M.C.W. an oscillatory circuit is made up of a choke and condenser connected between anode and control grid of V4A giving a frequency of 900 c/s. The output of the modulator is fixed so that the depth of the modulation is about 95 per cent.

For R.T. operation an input transformer is connected in the place of the choke and condenser. The secondary of the transformer is connected to the control grid of valve V4A via a variable potentiometer. The setting of this potentiometer determines the depth of modulation on R.T., and it is adjusted by means of the R.T. MOD. CONTROL on the front panel. The input transformer has two primary windings, one for the microphone and one for the V.F. signals from the remote control unit.

6.(3). Power Supplies.

One mains transformer with the primary winding tapped for voltages between 100V and 250V, has four separate secondary windings. Two high voltage for H.T. and G.B. supplies, and two low voltage, one for the heater of the rectifying valve, and the other, suitably tapped, for the heaters of the remaining valves. The rectification for the H.T. supply is accomplished by a full wave rectifying valve type AU.1 The D.C. voltage is about 550V.

Two selenium rectifiers, connected to form a full wave bridge, rectify the voltage for the G.B. supply. This supply develops the bias for the P.A. suppressor grid, the P.A. control grid and the Buffer control grid. The keying relay and the microphone are also energised from this source.

The red POWER SUPPLY pilot lamp is connected between one side of the P.A. valve heater and the chassis.

6.(4). Switching and Relay Systems.

(a) The OSCILLATOR switch (S1) in the M.O. position arranges the tuned anode circuit of the valve V2A as a Hartley oscillator. In the CRYSTAL position the crystal is switched in the grid circuit and the anode coil reconnected.

- (b) The BREAK-IN SWITCH (S2) is in a sense a Send-Receive Switch. In the BREAK-IN position, when the key is "up," the receiver becomes automatically operative and is connected to the same aerial as the sender. Also, the H.T. supply to the M.O. is cut off so that the M.O. does not interfere with the incoming signal. When the key is pressed the coil of the change-over relay (REL.1A) is unshorted and operates instantaneously—muting the receiver, switching on the H.T. to the M.O. and disconnecting the aerial from the receiver—but when the key is lifted, the coil of the relay (REL.1A) is shorted by the contacts of the keying relay (REL.3A) and there is a time delay of about  $\frac{1}{4}$  second before the relay (REL.1A) moves to give "receive conditions." This changing over is also accomplished by means of the pressel switch incorporated in microphone (Microphone, Hand No. 4).

In the NORMAL position, the switch is open, and this change-over facility is cut out, since the connection between the coil of the relay (REL.1A) and the contacts of the relay (REL.3A) is open circuited. The receiver is always muted and the H.T. supply to the M.O. left on. Sidetone from the anode circuit of the P.A. valve is rectified and fed to the receiver telephones. During periods of high speed keying it is preferable to operate the sender with S2 at NORMAL to avoid the danger of clipping the beginning of the message after a short space in the transmission. In this condition it becomes necessary to return to BREAK-IN when it is required to operate the receiver.

- (c) The SYSTEM switch (S3) has four positions—TUNE, C.W., M.C.W., and R.T. In the TUNE position about -50 volts are applied to the P.A. valve suppressor grid to limit the anode current when the P.A. stage is driven but untuned, and the Morse Key contacts are shorted to earth. In the C.W. position the suppressor bias is sufficient to cut off the anode current when the key is up. With the key down the suppressor grid is connected to cathode by the keying relay, for full power operation. For M.C.W. the 900 c/s tone is introduced in series with the suppressor grid of the P.A. valve, and when the key is down a suitable value of bias is retained to permit satisfactory modulation. On R.T. the microphone pressel switch replaces the morse key and the speech frequencies take the place of the 900 c/s modulating frequency.
- (d) The CONTROL switch (S5) in the Remote position reconnects a polarised relay and the keying relay to allow switching on and off and keying of the Sender from a Remote Control Unit.

6.(5). Sidetone. (Valve V6A—Type EA.50 or Metal Rectifier W3A—Type J.50).

A fraction of the modulated output on M.C.W. and R.T. at the anode of the P.A. valve is led off by a small capacity to a rectifying circuit containing a transformer and a diode valve or metal rectifier. The audio output is normally fed to the output circuit of the receiver used with the sender.

6.(6). Connections to the Receiver. (See Fig. 4.)

There are five connector wires between the Sender and the Receiver. Two for the aerial and earth connections, a muting line, a sidetone line, and an earth link. The aerial connection terminates at the contacts of the change-over relay, which connects it to the sender aerial or to earth.

The muting line is shorted to earth when the key is pressed and sidetone is carried by the sidetone line and earth.

6.(7). Connections to Wireless Remote Control Unit C. (See Fig. 4.)

The Sender and Remote Control Unit C are connected by a twisted pair (Cable Electric D8 Twisted). In the Sender the line socket is con-

nected to the Polarised Relay and via the CONTROL Switch to the Keying Relay, and by two  $1\mu\text{F}$  condensers to the 600 ohm winding on the input transformer of the modulator.

**7. Aerial Coupling Equipment. Aerial Unit F.** (See Plate 8 and Fig. 7.)

This unit consists of a coil similar to that in the anode circuit of the P.A. valve of the Sender, a tuning condenser, an ammeter, a tuning lamp, and switches. It is connected to the Sender by means of a feeder cable (Connectors, Twin No. 56).

The circuit and switching permits any normal aerial to be matched to the feeder cable, and correct tuning and coupling to be effected, indication being given by a lamp and current meter respectively.

**8. Wireless Remote Control Unit C.** (See Plate 10 and Fig. 9.)

8.(1). General.

This unit consists essentially of switches, terminals and sockets, and a high speed relay. It is normally connected to the Sender by a twisted pair (Cable Electric D8 Twisted).

A battery is clamped in the unit and by sending impulses of current of the correct polarity it enables the sender to be switched on and off and keyed from a remote point.

If audio frequency currents are generated from an external source they can be made to modulate the sender.

8.(2). Facilities.

Connections to the following are made by terminals or sockets :—

- (a) Morse key ;
- (b) Wheatstone Transmitter ;
- (c) External Cells ;
- (d) Teleprinter ;
- (e) Receiver (for muting the receiver).

Switches are provided for NORMAL or BREAK-IN working, and keying of the sender by Morse key or by Wheatstone Transmitter.

Three switches are provided—

- (a) SENDER CONTROL (ON—WORK—OFF).
- (b) NORMAL—BREAK IN.
- (c) KEY—AUTO.

Two wires are brought out to a socket for connection to the receiver for muting purposes. The muting is effected by the short circuiting of these wires by contacts on the high speed relay. Since the coil of this relay is in series with the line to the sender, for high speed keying this coil should be shorted out by setting the switch to NORMAL. In this condition no muting of the receiver is then possible and the gain of the receiver must be adjusted by hand.

## CHAPTER II.—WORKING INSTRUCTIONS.

### I. Setting Up the Sender. (See Plates I and II and Figs. 4 and 5.)

- (1) Place the set on a table, or on the flattest ground available, seeing that it is firm and does not rock.
- (2) By means of a screwdriver, or suitable coin, screw back the bolts holding the front and back covers.
- (3) Remove front and back covers and then the top cover which is automatically released when the front and back covers are removed.
- (4) Unfasten the draw bolts on the front panel, and withdraw the sender from its case.
- (5) Adjust the leads to the primary windings of the Transformers T.4A and T.5A for the voltage of the A.C. supply.
- (6) Connect 5 amp. fuse wire in the two fuses (F.1A and F.1B) mounted on the contactor transformer.
- (7) Insert the eight valves and three lamps in their appropriate sockets, seeing that the cap connections are in position. For positions and types of valves and lamps see Table II, and Plates I and II.

TABLE II.

Sch. No.	Position.	Army Type.	Maker's Type.
V1A	Neon Stabiliser	A.W.3	S.130
V1B	Neon Stabiliser	A.W.3	S.130
V2A	M.O.	A.T.S.25 or 25A	807
V2B	Buffer	A.T.S.25 or 25A	807
V3A	P.A.	A.T.P.35	PV1.35
V2C	Mod. Amp. 2	A.T.S.25 or 25A	807
V4A	Mod. Amp. 1	A.R.P.34	EF.39
V5A	H.T. Rectifier	A.U.1	FW4/500

- (8) See that the knurled nut, clamping the screen between the M.O. and Buffer Valves (V2A and V2B), is tightly fastened.
- (9) Replace sender in its case and refasten the draw bolts.
- (10) Close and fasten the two doors.
- (11) Insert in the appropriate sockets (KEY and MIC) the plugs from the Morse Key and from the Microphone (Microphone Hand No. 4).
- (12) Connect the sidetone and muting leads from the receiver to the four point socket marked REC'R MUTING and S/T.
- (13) Connect REC'R AE. and E. Terminals to the aerial and earth terminals of the Receiver.
- (14) See that POWER SUPPLY switch is at OFF.
- (15) Connect the A.C. supply to the two large pins of the three point socket labelled POWER SUPPLY.
- (16) Erect the required aerial and bring the feeders or leads-in to the set, but do not connect. (See Chapter III.)
- (17) If Aerial Coupling Equipment is to be used, place the Aerial Coupling Equipment Unit F at the foot of the aerial. Connect aerial to Aerial lead and earth the EARTH lead by earthing pin.
- (18) Run the feeder cable (Connector Twin 56) from Aerial Coupling Equipment Unit F to the Sender and by the Niphan plug connect to the coupling equipment, but not to the Sender.
- (19) Connect E terminal of the Sender to earth by earthing pin or earth mat.

## 2. To Operate.

### 2.(1) Preliminary.

- (a) Set R.T. MOD. CONTROL to 0.
- (b) From Table III below determine the range in which the desired frequency occurs and set the OSCILLATOR RANGE, BUFFER RANGE, and P.A. RANGE switches to correspond.

TABLE III.

Frequency	Range
17.5 M.c/s to 10 M.c/s	1
10.5 " " 5.2 "	2
5.3 " " 2.5 "	3
2.6 " " 1.2 "	4

- (c) Set OSCILLATOR switch to M.O.
- (d) Set SYSTEM switch to TUNE.
- (e) Set CONTROL switch to LOCAL.
- (f) Set BREAK/IN switch to BREAK-IN.
- (g) Set AERIAL COUPLING control to the point of minimum coupling as set out in Table IV.

TABLE IV.

Range.	Ae. Coupling Control.	Amount of Coupling.
1	13.1	Zero.
2	9.1	Zero.
3	0	Zero.
4	0	Zero.

- (h) Unfasten the knurled locking nuts and rotate BUFFER TUNING and P.A. TUNING controls to 180°.

### 2.(2) Tuning the Sender.

- (a) Master Oscillator Control.

**NOTE :** With master oscillator control the buffer stage and the P.A. stage are tuned to the second harmonic frequency of the oscillator stage, and with these conditions all the RANGE switches are at the same number.

- (i) Set POWER SUPPLY switch to ON.
- (ii) Unfasten the knurled locking nut and set OSCILLATOR TUNING control to the desired frequency.
- (iii) Tuning the Buffer stage. If the BUFFER TUNING indicator lamp is not at maximum brilliance rotate the BUFFER TUNING control slowly in an anticlockwise direction until the BUFFER TUNING lamp has attained maximum brilliance.

Note the readings on the 0-180° scale. If this reading corresponds approximately with that given in the table fixed to the door on the left-hand side of the set, proceed to tune the P.A. TUNING control as set out below.

If the dial reading corresponds approximately to that given in the table against half the desired frequency, then continue to rotate the Buffer tuning control in an anticlockwise direction until another point of maximum brilliance of the lamp is obtained.

The P.A. ANODE CURRENT Meter will probably be indicating 70 mA. very approximately.

- (iv) Tuning the P.A. stage. Rotate the P.A. TUNING Control slowly in an anticlockwise direction until the P.A. ANODE CURRENT Meter indicates a minimum.

Note this dial reading. It should be approximately the same as that of the BUFFER TUNING Control. If it is of a much higher value continue to rotate the control in an anticlockwise direction until a second point of minimum P.A. anode current. The current at these points of minimum current should be approximately the value set out in Table V.

TABLE V.

Range.	P.A. Anode Current.	
	SYSTEM Switch at TUNE. Anode Circuit Unloaded.	
	Anode Circuit Untuned.	Anode Circuit Tuned.
1	80 mA. (approx.)	25 mA. (approx.)
2	80 mA.	15 mA.
3	80 mA.	10 mA.
4	80 mA.	30 mA.

- (v) Proceed to load the sender as in 2(3), Page 12.

(b) Crystal Control.

**NOTE :** With crystal control the buffer stage may be tuned to the fundamental or any harmonic frequency of the crystal within the range of the sender. When switching and tuning the oscillator stage it must be remembered that its actual frequency of oscillation is half that inscribed on the OSCILLATOR TUNING Control.

- (i) Open door on left-hand side of set and insert crystal in the holder. Close and fasten door.
- (ii) Switch OSCILLATOR switch to CRYSTAL.
- (iii) Switch OSCILLATOR RANGE switch to the range in which twice the fundamental frequency of the crystal occurs.
- (iv) Unfasten the knurled nut and set the OSCILLATOR TUNING Control to approximately twice the fundamental frequency of the crystal.
- (v) By means of the tables on the doors, set the BUFFER TUNING Control and the BUFFER RANGE switch to approximately the desired frequency, fundamental, 2nd, 3rd, etc. harmonic frequency of the crystal.
- (vi) Set the P.A. TUNING Control and the P.A. RANGE switch to a setting similar to those of the buffer stage.
- (vii) Adjust the AERIAL COUPLING Control for minimum coupling as given in Table IV (page 10).
- (viii) Set the POWER SUPPLY switch to ON and allow  $\frac{1}{2}$  minute for valve heaters to warm up, before proceeding to tune the sender.
- (ix) Make a slight adjustment to the OSCILLATOR TUNING

Control clockwise or anticlockwise, so as to cause the CRYSTAL TUNING lamp to glow.

- (x) Adjust the OSCILLATOR TUNING Control to setting about the line AB in Fig. 1 below.

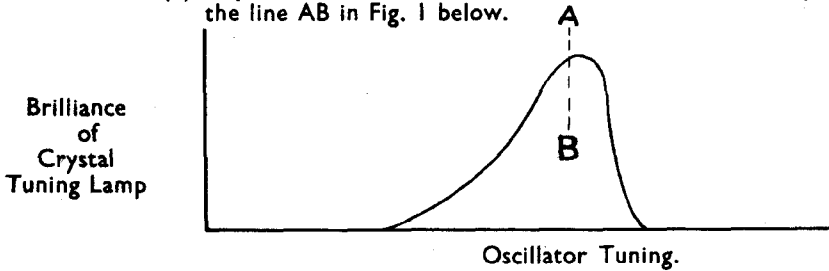


Fig. 1.

- (xi) Adjust the BUFFER TUNING Control for maximum brilliance of the BUFFER TUNING lamp. This control should require a small adjustment only.
- (xii) Adjust the P.A. TUNING Control for minimum P.A. Anode current.
- (xiii) Proceed to load the Sender.

### 2.(3). Loading the Sender.

- (a) With Aerial Directly Coupled to Sender.

- (i) POWER SUPPLY switch to OFF.
- (ii) Connect aerial to Sender AE Terminal.
- (iii) POWER SUPPLY switch to ON.

On ranges 1, 2, 3 and 4, if the AERIAL COUPLING Control has been correctly adjusted for minimum coupling, the connection of the aerial should have little effect on the P.A. Anode Current other than a slight increase of current.

- (iv) Readjust P.A. TUNING Control for minimum P.A. Anode Current.
- (v) Switch SYSTEM switch to C.W.
- (vi) Holding the Morse Key down load the Sender by rotating the AERIAL COUPLING Control by small increments in a clockwise direction, readjusting the P.A. TUNING Control for a minimum P.A. Anode Current after each adjustment of the AERIAL COUPLING Control until an anode current of 80 mA. is reached.
- (vii) Tighten up the clamping devices on the TUNING Controls taking care not to alter the settings.

- (b) With the Aerial Connected to the Sender by Feeder Cable (Connectors, Twin No. 56) and Aerial Coupling Equipment, Aerial Unit F.

- (i) Loading the Sender.

1. POWER SUPPLY switch to OFF.
2. Connect Dummy Aerial to Sender AE and E terminals.
3. Load Sender as under section 2(3) (iii) to (viii), above.
4. POWER SUPPLY switch to OFF.
5. Disconnect Dummy Aerial and connect feeder cable from the Aerial Coupling Equipment to AE and E terminals by the special fitment provided. (Set Unit F.)
6. Switch SYSTEM switch to TUNE.
7. POWER SUPPLY switch to ON.



(ii) Loading the Aerial Coupling Equipment.

1. **Preliminary.**

- (a) WAVE RANGE switch to the same number as the P.A. RANGE switch on Sender. For Range 4 set this switch to position 4B in the first instance.
- (b) FEEDER TAP SWITCH to the same position as WAVE RANGE switch.
- (c) AERIAL TUNING Control to 180° (maximum capacity).
- (d) AERIAL COUPLING Control to position indicated in Table VI below.

TABLE VI.

Range.	Aerial Coupling Control.
1	12.8
2	9.8
3	0
4B	0
4A	0

2. **Tuning and Loading. Ranges 1, 2, 3 and 4.**

- (a) Rotate the AERIAL TUNING Control in an anticlockwise direction until a position of maximum brilliance of the lamp is reached. Further adjustment of the AERIAL TUNING Control and the AERIAL COUPLING Control should be made by reference to the meter only.
- (b) Set SYSTEM switch of Sender to C.W.
- (c) With the Morse Key held down, rotate clockwise the Aerial Unit F AERIAL COUPLING Control until the needle of the meter begins to move.
- (d) Readjust the AERIAL TUNING Control to give a maximum deflection of the meter.
- (e) By first rotating AERIAL COUPLING Control, and readjusting the TUNING Control, vary these two controls until a maximum reading of the meter is obtained.

NOTE : On Range 4 if aerial insufficiently loaded when AERIAL TUNING Control is turned fully clockwise, switch WAVE RANGE switch and FEEDER TAP switch to 4A and repeat above procedure. 1(a) to 2(e).

2.(4). **Final Adjustment on the Sender.**

- (a) Small adjustments of AERIAL COUPLING Control of the Sender and the P.A. TUNING Control may be found to give an increase in aerial current as indicated by the meter on the AERIAL COUPLING EQUIPMENT.
- (b) A small adjustment of the BUFFER TUNING Control to increase the P.A. anode current may be effected.

2.(5). **C.W. Working.**

- (a) SYSTEM switch to C.W.
- (b) Press the Morse Key ; the P.A. anode current should rise to 80 mA. (approx.).
- (c) Release the Morse Key ; the P.A. anode current should fall to zero.
- (d) Operate Morse Key in normal manner.

**2.(6). M.C.W. Working.**

- (a) Proceed as under 2(1) to 2(4).
- (b) SYSTEM switch to M.C.W.
- (c) Press Morse Key ; the P.A. anode current should rise to 50 mA. (approx.).
- (d) Release Morse Key ; the P.A. anode current should fall to zero.
- (e) Operate Morse Key in normal manner.

**2.(7). R.T. Working.**

- (a) Proceed as under 2(1) to 2(4).
- (b) SYSTEM switch to R.T.
- (c) Set R.D. MOD. CONTROL to position 5 (approx.).
- (d) Press pressel switch on microphone ; P.A. anode current should rise to 50 mA. (approx.).
- (e) Release Pressel Switch on Microphone ; P.A. anode current should fall to zero.
- (f) Speak in a normal voice close to the microphone. Depth of modulation may be varied by R.T. MOD. CONTROL.

**2.(8). Normal Working.**

- (i) Switch BREAK-IN switch to NORMAL.
- (ii) This position is preferable for High Speed Keying.

**2.(9). Break-in Working.**

- (i) Switch BREAK-IN Switch to BREAK-IN.
- (ii) Press the Morse Key or Pressel Switch on microphone. The P.A. anode current should rise to its normal value immediately. The receiver should be muted.
- (iii) Release the Morse Key or Pressel Switch. About  $\frac{1}{4}$  second should elapse before the P.A. anode current falls to zero. The receiver should become operative.

**3. Remote Control Working.**

**3.(1). The Sender.**

NOTE : The Sender may only be switched on and off, keyed and modulated from a remote point. Previous to operating from a remote point, therefore, the Sender must be tuned to the desired frequency and loaded and all the switches preset.

- (a) Tune and Load the Sender as indicated in 2(1) to (4).
- (b) Switch SYSTEM switch to C.W., M.C.W., or R.T. (R.T. for teleprinter working).
- (c) Set BREAK-IN switch to NORMAL or BREAK-IN.
- (d) Plug Adaptor C in LINE Jack.
- (e) Switch CONTROL switch to REMOTE.
- (f) Leave the POWER SUPPLY switch at ON.

NOTE : With the CONTROL switch at REMOTE the Sender is switched on and off by the polarised relay REL.4. which is energised from batteries in the Remote Control Unit C. This relay may have been left in the OFF position or in the ON position. In the former position the Sender switches itself off when the CONTROL switch is set to REMOTE.

**3.(2). Setting Up the Remote Control Point and Connection with the Sender.**

- (a) The Remote Control Unit C.
  - (i) Place the unit in a suitable position.

- (ii) Unfasten locking bolts and withdraw the unit from its case.
  - (iii) Insert four Batteries Dry Refill 8 Cell No. 1 and clamp in position.
  - (iv) Connect the batteries in series.
  - (v) Connect the free negative lead of the batteries to the terminal with the knurled nut behind the EXTRA CELLS Terminal.
  - (vi) Connect the wander lead from switch S.1 to the positive terminal of the batteries.
  - (vii) Replace the Unit in its case and refasten locking bolts.
  - (viii) Short circuit terminals marked EXTRA CELLS.
- (b) The Receiver.
- (i) Place the Receiver beside the Unit.
  - (ii) Set up the Receiver for working with the Remote Control Unit as indicated in Manual.
  - (iii) Connect the muting pins of the S T and Muting Plug to those of the Unit (see Fig. 4).
- (c) Connection of Remote Control Unit C and Sender.
- (i) Connect SENDER LINES Terminals S & T on Unit C to terminals S & T respectively on Adaptor C at Sender, using twisted D8 cable.
  - (ii) Plug Adaptor C in LINE Jack.
  - (iii) Note Sender frequency.

### 3.(3). Testing the Remote Control Unit and Sender Lines.

#### (a) To Test the Polarity of the Lines.

NOTE : This test should be done in conjunction with test (b) below.

- (i) Put NORMAL/BREAK-IN switch to NORMAL.
- (ii) KEY/AUTO switch to KEY.
- (iii) Plug Morse Key into KEY jack.
- (iv) Press SENDER CONTROL switch to ON and release.
- (v) Wait half minute for Sender to warm up.
- (vi) Disconnect muting leads and adjust gain of receiver.
- (vii) Whilst listening with the receiver press the SENDER CONTROL switch to ON and release. One should hear the Sender being keyed.
- (viii) If the Sender is not heard repeat from (iv) above pressing the control switch to OFF instead of ON.
- (ix) If the Sender is now heard interchange the leads to the SENDER LINES terminals.

#### (b) To Test the Line Voltage.

- (i) The Sender should be switched on, and keyed at the highest speed obtained in practice. A low line voltage will give clipped dots and dashes. In this case additional cells should be connected to the EXTRA CELLS terminals.
- (ii) The test should be carried out with the NORMAL BREAK-IN switch at BREAK-IN for hand speed keying and NORMAL for high speed keying.
- (iii) Switch Sender off by operating SENDER CONTROL switch to OFF and releasing. Pull out Morse Key plug.
- (iv) Reconnect receiver muting leads.

### 3.(4). To Operate.

CAUTION : After being switched on the sender must be allowed a half minute to warm up before it is keyed.

(a) To Key the Sender.

- (i) Switch Sender on by pressing SENDER CONTROL switch to ON and releasing.
- (ii) Put KEY/AUTO switch to KEY for hand keying to AUTO for Wheatstone transmitter.
- (iii) Set NORMAL/BREAK-IN switch. NORMAL is preferable for high speed keying.
- (iv) Plug in Morse Key and if required connect Wheatstone Transmitter (Z & U) to AUTO terminals.
- (v) Operate key and transmitter in normal manner.

(b) Teleprinter Working with Apparatus Telegraph Two Tone.

- (i) Connect TONE terminals on unit to SENDER terminals on Apparatus Telegraph Two Tone.
- (ii) Put NORMAL/BREAK-IN Switch to NORMAL.
- (iii) Put KEY/AUTO Switch to KEY.
- (iv) Pull out Morse Key Plug.
- (v) With Sender adjusted for R.T., switch on by pressing SENDER CONTROL Switch to ON then releasing.
- (vi) Wait  $\frac{1}{2}$  minute. Then keying relay in the Sender may be controlled from switch at teleprinter.
- (vii) To ensure satisfactory depth of modulation, set OSC. OUT control of Apparatus Telegraph Two Tone at "5."
- (viii) Set R.T. MOD. CONTROL on Sender at "6." Observe that the meter in the Aerial Coupling Unit (if in use) shows an increase as R.T. MOD. CONTROL is rotated from "0" to "6."

The normal position is "6" for lines up to 1 mile in length, rising to "8" if the line is very long and (or in bad conditions) the exact setting should be finalised by collaboration with the remote operator.

(c) To Switch Sender Off.

- (i) Switch the Sender off by pressing SENDER CONTROL switch to OFF and releasing.
- (ii) Pull out key plug and put KEY/AUTO switch to KEY.

**4. Closing Down.**

- (i) Switch SYSTEM switch to TUNE.
- (ii) Switch MAINS switch to OFF.

**EMERGENCY USE OF REMOTE R/T (OR M.C.W.)**

1. It is possible to transmit R/T or M.C.W. from a Wireless Set No. 12 from a remote point, by means of the Wireless Remote Control Unit "C" and the Telephone Set D Mk.V.
2. Connect as follows :—
  - (1) Connect the terminals marked "TO SENDER" on the Control Unit to the "LINE" socket on the sender via the remote control line.
  - (2) Connect the terminals marked "TONE" on the Control Unit to the terminals  $L_1$  and  $L_2$  of the Telephone D Mk.V. Do not use an earth connection at any part of the remote system.
3. Connected in this way the key of the No. 12 Set is automatically held down and speech from the telephone modulates the Sender.
4. Keying the telephone through its buzzer will transmit M.C.W.

5. The Sender cannot be switched off from the remote point while the telephone is connected.  
To switch off—disconnect the telephone and then put the switch on the Control Unit to " OFF."
6. It is not recommended that any line equipment—e.g. telephone exchange be interposed between the Telephone Set D Mk.V and the Remote Control Unit " C."

## CHAPTER III.—AERIALS.

### 1. General.

In a stationary condition the Wireless Set No. 12 may use several types of aerial, viz. :—

- (i) A half wave dipole fed through a 100 ohm feeder line cable.
- (ii) A half wave matched impedance aerial with single feeder (commonly referred to as Wyndom aerial).
- (iii) An end-fed horizontal aerial.

All the above aerials are erected on the 36 ft. steel masts provided. (See Appendix II).

### 2. The Half Wave Dipole Aerial. (See Fig. 10.)

Two sizes of this aerial are provided with the equipment—one to cover frequencies of 5–10 M.c/s and the other from 9–18 M.c/s.

The adjustment for length to suit a given frequency of transmission is made by folding back the arms of the dipole, clamping pieces being provided for this purpose.

The dimensions for such an aerial for a particular frequency are given by :—

$$l \text{ (total length in feet)} = \frac{467.4}{F}$$

where F is in M.c/s.

The aerial should be adjusted carefully so that the two arms are of equal length.

The aerial is supported by two masts suitably disposed, and a third mast, offset 4 ft. from the line joining the two, is used to support the feeder cable, thus avoiding sag. (See Fig. 10.)

The feeder cable is connected to the aerial by a Niphan plug which fits a socket on a special fitment at the centre of the aerial. The feeder cable is provided in two lengths of 50 ft. terminating in Niphan plugs and sockets which may be connected together to form a continuous 100 ft. length. At the Sender, the feeder cable terminates in a Niphan plug which fits into a special fitment having two short leads and lugs for connection to the AE terminal.

One side of the dipole is earthy, i.e. connected to the Sender chassis, which, in turn, is connected to the vehicle chassis.

In order that extra protection may be given against static charges on the aerial, a terminal is provided in the left-hand chassis member beneath the vehicle body at the rear, which may be connected to an earth pin or earth mat. It is suggested that, where possible, the feeder cable be supported on poles to avoid damage due to vehicles driving over it.

### 3. The Half-wave matched-impedance Aerial (with single feeder Wyndom Aerial). (See Fig. 10.)

An aerial of this type may be erected between two masts and provides an efficient high-angle radiator for long range working by sky wave.

The horizontal length for the aerial is given by :—

$$l \text{ (total length in feet)} = \frac{467}{F}$$

where F is the frequency in M.c/s.

The feeder is tapped on to the horizontal portion at a distance D from one end and this distance is given by :—

$$D \text{ (distance from one end in feet)} = \frac{169.2}{F}$$

where F is the frequency in M.c/s.

The length of the feeder may be any number of quarter-waves long and it may be connected directly to the "AE" terminal of the Sender or, if required through

the Aerial Coupling Equipment (Aerial Unit F) and feeder cable, in a similar manner to that shown in Fig. 10. In this latter case the procedure for tuning is given under Chapter II 2(3) (b) (pages 12 et seq).

**4. The end-fed horizontal Aerial.** (See Fig. 10.)

An aerial of this type may be used for general working of the Sender over its complete frequency band. An aerial erected between two 36 ft. masts, and having a horizontal length of 50 ft., and a lead-in direct to the Sender, of length 50 ft. gives satisfactory operation.

As shown in Fig. 10 the aerial can, if desired, be used with the Aerial Coupling Equipment (Aerial Unit F), the Instructions for use in this manner being dealt with in Chapter II 2(3) (b) (pages 12 et seq).

**5. Vertical Rod Aerials.**

These aerials may be used with the Sender when it is required to operate in moving vehicle. The Sender is coupled to the aerial through a blocking condenser, and an aerial coupling unit. Aerial Coupling Equipment H has been developed for use with a 12 ft. vertical rod aerial (3 sections of Antennae Rods F) but may also be used with 6 ft. or 8 ft. rods.

## CHAPTER IV.—WIRELESS SET No. 12 IN VEHICLES.

### I. Brief Description.

#### (1) General.

The Wireless Set No. 12 Sender equipment, together with the Reception Set R.107 equipment form a complete station No. 12A for ground station use and No. 12B for vehicle use. Equipment lists are given at the end of this pamphlet.

12B station is contained in two "Trucks, 15-cwt., 4-wheeled, wireless" which have been equipped with special fittings. Vehicles are so fitted as to be interchangeable for either a send/receive station or a receive station with remote control of the sender (see Fig. 6).

The apparatus in the truck containing the send/receive station (referred to as Vehicle A) may be operated in the truck when stationary or abstracted from the vehicle to form a ground station (see Figs. 2 and 3). Reception on the move is possible using the horizontal roof aerial.

The second truck (referred to as Vehicle B) carries a R107 receiver and equipment for the remote control of the Sender in Vehicle A which is only possible when both vehicles are stationary (Fig. 2). The apparatus in Vehicle B may also be abstracted from the vehicle to form a remote receiver ground station. Reception on the move is possible as in Vehicle A.

Provision is made for quick removal of the necessary apparatus from each vehicle for setting up as a ground station and vice versa.

The remote control facilities provided permit Vehicle B station to be located up to one mile from Vehicle A station, using a D8 twisted cable for the control line. The distance may be increased if an additional supply of cable is obtained. Over very long distances a higher line voltage will be required at the remote control unit.

Once the Sender has been tuned it can be switched on and off and operated from the remote station. No further attention is necessary at the Sender stations except that to the power plant, until it is required to change the Sender frequency or the system on which it is working.

No intercommunication telephone link is provided.

Various types of vehicles, including modified Vehicle A types described above, have been fitted up for both sending and receiving on the move. Separate information will be issued for each special case. Generally the only modifications are to the aerial circuit of the Sender and to the power supply fittings. Otherwise the equipment for all types of vehicles is similar to that in Vehicle A. If required to work on the move only, redundant gear for stationary work such as masts, feeder cables, etc., are dispensed with.

#### (2) Power Supplies.

As already stated, the Sender requires an A.C. supply but the Receiver can be worked from either an A.C. supply or a 12V. D.C. supply (refer to the R.107 instructional pamphlet). A petrol-driven power unit providing A.C. or D.C. outputs is carried in the housing at the rear of each vehicle. This unit, the Power Unit D.C./A.C. 250 watt No. 1 has not sufficient output to drive the Sender and and Receiver at the same time. When it is used for the Sender, the Receiver must be set to use 12V. D.C. Two 12V. accumulator batteries (batteries, secondary, portable 12V. 75 AH) are carried in each vehicle.

The power unit provides an A.C. supply at 230V. 60 c/s or a D.C. supply suitable for charging the batteries. **A.C. and D.C. supplies must never be taken from the unit at the same time.**

The batteries in Vehicle A have to be charged from the unit when the Sender is closed down or from some other source if necessary when the Sender is operating.

The power unit in the remote receiver station truck (Vehicle B) is primarily a stand-by unit for the station in Vehicle A which is dependent upon an A.C. supply. Besides use with Vehicle B station for battery charging it may in an



emergency be used for the same purpose, with Vehicle A when the Sender is running continuously.

Power units D.C./A.C. 250 watt No. 1 (American) may be supplied in some equipments and these require the attachment of Power Units, D.C./A.C. 250 watt No. 1 Filter Units, D.C. for suppression purposes. Power Units D.C./A.C., 250 watt, No. 1 (American) (1A) embody all additional screening and smoothing apparatus to meet the required standard of suppression for the R.107 Receiver. These units are also known as Generating Sets BMB D.C./A.C. 250 watt.

The power units are placed outside the vehicles when required for work, except in the special cases where the vehicles are fitted for sending on the move. To run the unit in a vehicle extra ventilation is provided and the engine is accessible from inside the vehicle main cabin for general attention. It is impracticable to fill up the power unit with petrol and oil while on the move.

An additional facility for charging wireless batteries is fitted on some vehicles (Trucks, 15-cwt., 4-wheeled, wireless MK.I and MK.II). It is known as "power take-off" and embodies an auxiliary dynamo (under floor of body) with automatic voltage control driven from the truck gearbox. Where provided, "power take-off" may be used to charge the batteries both when the vehicle is on the move and when stationary.

Such vehicles have a Switchboard Charging No. 5 fitted under the wireless table for control of charge and discharge of batteries. Vehicles without "power take-off" have no charging switchboard but the battery connections are changed over by hand.

To bring the vehicles up to a screening and suppression standard suitable for the R.107 Receiver, it is necessary to screen the ignition equipment of the vehicle engine and in addition to suppress the "power take-off" equipment where fitted. Inspection, under the engine bonnet near side, will show whether or not the ignition apparatus and wiring have been screened. Inside the vehicle body it may be seen whether an auxiliary dynamo control board is fitted and if so whether Wireless Sets No. 12 Smoothing Units D.C. is in position.

### (3) Aerials.

Vehicle A needs eighteen interchangeable 6 ft. sections of masts 36 ft. steel, thirteen of which are carried outside the vehicle, and the other five are carried on Vehicle B. These are sufficient for three masts to support a dipole aerial and feeder as stated in Chapter III and as shown in Fig. 10. Alternatively, two masts may be erected for the end-fed aerial using the Aerial Coupling Equipment F, also illustrated. The Receiver normally uses the same aerial as the Sender, utilising the "break-in" facility.

Vehicle B carries twelve 6 ft. sections outside for the two masts to support the receiving dipole aerial, and five 6 ft. sections inside which are the overload from Vehicle A.

Earthing arrangements are arbitrary according to local sites, but those shown in Figs. 2 and 3 have proved satisfactory.

Horizontal roof aerials (Aerials Roof No. 5) are fitted to 15 cwt. wireless trucks and may be used for reception on the move.

Mobile stations adapted for sending on the move use vertical rod aerials coupled to the Sender through a blocking condenser and aerial coupling equipment. Aerial Coupling Equipment, Set Unit H has been developed for use with 6 ft., 8 ft., or 12 ft. vertical rod aerials. Charts are fixed on the unit giving settings for various frequencies and correct loading is indicated by a lamp. The Set Unit H is not required when working on Range I of the Sender and using 12 ft. of Antennae Rods F.

## 2. Procedure.

- (1) Vehicle A or Vehicle B on the move, reception only. (Figs. 2 and 3.)
  - (a) Switch Receiver to work from D.C.

- (b) Connect Receiver to roof aerial (Connector Twin No. 21A). Refer also to Receiver pamphlet.
  - (c) According to facilities provided, switch or plug Receiver supply from BATT No. 1 or BATT No. 2, whichever is in the better condition.
  - (d) Operate Receiver according to its pamphlet.
- (2) Vehicle A stationary without remote control of Sender. (Fig. 3.)
- (a) Use Receiver as above until the Sender is ready for operation.
  - (b) Erect aerial system required.
  - (c) See that Sender is switched off and adjusted for A.C. voltage to be used. Adjust to 250 volts for working from Power Units D.C./A.C. 250 watt No. 1.
  - (d) If suitable local A.C. supply is available connect to the A.C. switchboard by means of Connector Twin No. 65, extended if necessary. The Receiver may also use this supply.
  - (e) If no local A.C. supply is available or if the batteries are to be charged, remove the power unit from its stowage position. Either connect the A.C. output to the A.C. switchboard (Connectors Twin No. 66) or connect the D.C. output for battery charging (Sec. 3 Battery Charging). **Both leads must never be connected to the unit at the same time.** The Receiver must work from batteries when this unit is used to supply A.C. to the Sender. Start up the engine when required. (An instructional manual is supplied.)
  - (f) Before switching on the Sender, disconnect the Receiver AE lead from the roof aerial and connect it to RECR. AE. on the Sender for "break-in" working on the Sender aerial.
  - (g) If the ground is suitable drive in the earth pin and connect it to the terminal at the rear of either chassis member under the vehicle body. Alternatively the vehicle earth connection may be made to any good earthing system which already exists locally.
  - (h) Operate station as detailed in Chapter II.
- (3) Vehicle A stationary with remote control of Sender.
- (a) Proceed as above and adjust the Sender to work on the frequency and system required.
  - (b) Feed in cable from remote Receiver station through the hole in the floor near left-hand end of wireless table and connect it to Adaptor C Plug adaptor in LINE socket of Sender.
  - (c) Operate station as detailed in Chapter II 3.
- (4) Vehicle B stationary. (Fig. 2.)
- (a) Proceed as in (1) above, using the roof aerial until the dipole aerial is erected.
  - (b) Erect dipole aerial and connect feeder to terminal batten on front of vehicle body. Disconnect Receiver from roof aerial and connect to dipole. Refer also to Receiver pamphlet.
  - (c) For remote control of the Sender in Vehicle A, feed in the control line through the hole in the floor near left-hand end of wireless table and connect to SENDER LINES terminals on remote control unit. Operate as in Chapter II 3.
- (5) Vehicles on the move, send and receive.
- (a) Before setting out see that the power unit is fully supplied with petrol and oil. Also check the condition of the batteries. Remove rear cover of engine compartment.
- The power unit may be used to charge one of the 12V. batteries until it is required to operate the Sender. Before switching on the Sender

the charging lead must be disconnected from the battery or from the power unit.

- (b) To receive, connect the receiver D.C. supply lead to the 12V. battery, switch on and operate the Receiver according to its pamphlet. The Receiver aerial circuit is normally connected to the Sender and works on the "break-in" system.
- (c) To send, see that the battery charging lead is disconnected from the power unit and start the engine if it is not already running. Switch on the Sender and if it is pre-set on a given frequency it should be ready for operation. If the Sender has not been pre-set, tune as in Chapter II 2(2) with the aerial lead disconnected. Switch off the Sender and connect to the aerial coupling equipment according to the instructions issued with it. Aerial Coupling Equipment F is dealt with in this pamphlet II 2(3), and Aerial Coupling Equipment H has tuning charts and instructions attached.

Switch on the Sender and readjust the P.A. TUNING control for minimum P.A. anode current. Adjust the aerial coupling equipment as instructed, readjusting the P.A. TUNING control for minimum anode current.

A lamp is fitted to the Aerial Coupling Equipment to indicate when maximum current is flowing in the aerial. The P.A. anode current must not exceed 80 mA. when correctly tuned.

- (6) Apparatus as ground station.
  - (a) Removal from Vehicle A. (See Fig. 3.)
    - (i) Disconnect all external connections at Sender and Receiver. Remove the two sets from their carriers by slacking off the fly nuts at top to detach the top clamp and then the side straps. Fit front case on Receiver and the top back and front covers on Sender. The back and front covers of the Sender keep the top cover in position. Each case has double carrying handles at the sides which aid handling. Stow both top clamps and eight side straps on top of engine housing for safe keeping but leave the carriers fixed to the wireless table.  
  
Detach Switchboards A.C. No. 1 by swinging the metal button catch at left-hand bottom corner so as to enable the switchboard to be slid vertically to clear the heads of the four fixing screws. Do not remove the four screws or catch. Stow switchboard in the accessories case, together with the other items under "Sender Station" heading on the list fixed to the left-hand door of the case, for transport to ground station site. Other items associated with the Sender equipment of 12A stations such as hammer, pins earth, Aerial Coupling Equipment Aerial Unit F, Connectors twin No. 56, mast sections, nets earth, pickets, satchels signal with contents, Adaptor C, dummy aerial, working instructions, accumulator batteries, power unit outfit and fire extinguisher (without mounting bracket) require to be carried to the ground station site by other means. The wireless table with seat may be removed from the vehicle if required. Wireless Sets No. 12, Cases, Accessories, is removed by swinging the two turn buttons at the right-hand end (on wheel arch) and then sliding the case about one inch towards the buttons so that the base irons on case clear their retaining fixtures.  
  
Keep spare roof aerial insulators (Insulators W.T. stand off, No. 7 ZA.0874) in the vehicle, and see that all remaining connectors are secure and the vehicle ready for the return of the ground station equipment. In addition to component fittings provided in/on the vehicles for Wireless Sets No. 12, Complete Stations, other

fittings are in position for use should the vehicle be required for stations such as Wireless Sets No. 9 and other later types for which the vehicle is suitable.

Do not, therefore, remove fittings which may appear redundant for No. 12 conditions.

- (ii) Set up the Sender and Receiver, side by side, Receiver to the left, in the desired position and, if necessary, lengthen the two existing connectors between the sets by using P.13 wire supplied together with terminal fittings taken from original connectors. Reconnect up station items as on Fig. 11.
  - (iii) Power may be obtained from power unit or local mains as previously explained.
  - (iv) Lamps, operators, No. 3 (with Slides No. 3) may be fixed or otherwise located to suit operating conditions and wired direct to the 12 volt battery, using the P.11 wire supplied. Spare bulbs, 12/14 volts, 6 watt, S.B.C. are contained in Cases, spare parts No. 5A.
- (b) Removal from Vehicle B. (See Fig. 2.)

- (i) Disconnect all external connections at the Receiver and remote control unit and remove Receiver from its carrier proceeding as in para. 6(a) (i). Removal from Vehicle A. Detach Switchboards A.C. No. 1 and stow in Cases, accessories, together with the other items under heading "Remote receiver station" on the list fixed to the left-hand door of the case for transport to ground station site. Other items associated with the remote Receiver part of No. 12A stations, such as hammer, pins earth, mast sections, pickets, satchels, signals with contents, wireless remote control unit, working instructions, accumulator batteries, power unit outfit and fire extinguisher (without mounting bracket) require to be carried to the ground station site.

The wireless table with seat may be removed from the vehicle if required. Remove cases, accessories, tie up mast retaining strap clear of floor and secure remaining connectors, and leave the vehicle in readiness for the return of the ground station equipment.

NOTE : The power unit outfit, carried in Vehicle B (together with pourer, petrol 15 inch) may be required with the Sender Station.

- (ii) Set up Receiver in the desired position together with remote control unit (to right of Receiver) and reconnect station items as on Fig. 2.
- (iii) Power may be obtained from local mains, as previously explained, but normally the D.C. Battery Supply should be used.
- (iv) Lamps, Operators, No. 3 (with slides No. 3) may be fixed or otherwise located to suit operating conditions and wired direct to the 12 volt battery using the P.11 wire supplied. Spare bulbs, 12/14 volts, 6 watt S.B.C. are contained in Cases, spare parts.

### **3. Battery Charging.**

#### **(1) General.**

On the move the wireless batteries can be charged from the auxiliary dynamo, when this is fitted, which is driven from the gearbox. A clutch is provided for engaging and disengaging this dynamo. It is advisable to charge only one battery of 12 volts at a time. This means may also be used when the vehicle is stationary. The Power Unit D.C./A.C. may be used as an alternative on the move, only when the vehicle has been equipped for this purpose, but may always be used when the vehicle is stationary. In all cases, A.C. and D.C. must not be drawn simultaneously from the Power Unit.

(2) Procedure.

- (a) On the move, using "Power take-off" in 15 cwt. trucks.
- (i) By pulling up the small rod projecting through the floor to the left of the air filter near the driver's seat engage the drive to the wireless dynamo when the vehicle engine is running in neutral, NEVER when the engine is in gear. (The drive is disengaged after the engine has stopped by pushing down the small rod).
  - (ii) Put the appropriate switch on Switchboard, charging No. 5 to DYN. (BATT. CHARGE FROM).
  - (iii) Close switch corresponding to the battery which required charging (CHARGE BATT. No. 1 or No. 2). The charging dynamo will charge at all engine speeds greater than 800 r.p.m. The output is compensated by a regulator.
- (b) On the move, using the 250 watt power unit.
- (i) See that the Sender is switched off.
  - (ii) According to the facilities provided, switch or plug the battery to be charged to the charging lead from the unit.
  - (iii) Remove the rear outer cover of the power unit compartment and start the engine.
- (c) Vehicle stationary.

To use the auxiliary dynamo proceed as in (a) above, but the vehicle engine should never be run faster than is required to produce a steady reading on the charging ammeter. The engine speed may be controlled from inside the vehicle. Charging may be discontinued when the ammeter has been reading only between 1 and 2 amperes for an hour.

To use the 250 watt charging set in the vehicle proceed as in (b) above. In vehicles which are not fitted for using this unit in the vehicle, remove the unit and place it on the ground. Connect the charging lead (Connector Twin No. 64) with the correct polarity to the battery charging terminals on the unit, normally using the High Charge for the positive connection. Connect the other end of the cable to the terminals inside the compartment in which the unit is carried. If desired the battery may be removed from the vehicle and connected directly to the unit by means of this cable. Connect the exhaust pipe and start up the engine.

**GENERAL NOTE :** When the Power Unit is operating inside the vehicle the rear cover of its engine compartment should always be removed to assist ventilation of the engine and prevent overheating.

## CHAPTER V.—MAINTENANCE AND REPAIRS.

### I. Maintenance.

#### 1.(1). General Maintenance Notes.

The interior of the set should be kept clean and dry and the exterior as free from dirt and wet as circumstances permit. In particular the following points should be checked from time to time.

- (a) Knob Fixing Screws : Tighten if necessary the grub screws holding control and switch knobs to shafts.
- (b) Nuts and Bolts : All nuts and bolts should be checked but in particular those holding together the internal screening between stages and soldering tags to component terminals.
- (c) Earthing Tags : It is very important to keep tight those bolts by which an earth connection is made to the metal chassis. These will be found to be mainly underneath the chassis. (See Plate II.)
- (d) Anode Leads and Caps : It is possible that, after much handling, the anode lead may become partially or completely broken at the point where it is fixed to the anode cap.
- (e) Aerial and Earth Leads and Feeder Cables : The connections to the aerial or feeder leads and to the earth should be checked to make sure the spring loaded terminals are not binding. The feeder cables should be checked occasionally, particularly for an open circuit of one or both of the conductors.
- (f) Indicator Lamps : After transport or vibration the bulbs may work loose in their holders and should, if necessary, be screwed tightly into the holders.
- (g) Key, Microphone, Line, Sidetone and Mains Plugs : Examine all these plugs and the sockets into which they fit. Faulty contacts may sometimes be remedied by slightly opening the pins, but this operation should be performed with great care.

Examine the leads for breaks and wear, particularly at points where they join connecting elements such as plugs, etc.

#### 1.(2). OSCILLATOR RANGE AND BUFFER RANGE Switches.

The contact pins and springs should be kept clean and clear of dirt or grit, and from any burning caused by the accidental changing of OSCILLATOR RANGE and BUFFER RANGE switches with the set in operation. The contacts can be cleaned with a burnishing tool or, if one is not available, with a clean rag moistened with carbon tetrachloride. The tension of the contact springs should be adjusted so that the movement of the end of the spring, from the open to the make positions, is approximately  $\frac{1}{8}$  to  $\frac{3}{16}$  of an inch. If it is made more than this, there is danger of fouling the coils during coil switching. Do not forget the coil shorting contacts on the left-hand side of each coil assembly.

#### 1.(3). P.A. Anode Coil and Coupling Coil in Aerial Coupling Equipment, Aerial Unit F.

The coil and contact arm should be kept clean and clear of dust, grit or metal particles. The coil can be cleaned with carbon tetrachloride on a rag. On no account should oil be used to ease the movement between the arm and the coil turns as it is designed to work without lubricant and any harshness or jamming indicates some fault which should be cured by a proper overhaul of the coil. The spindle bearing may have to be lubricated.

The cams and contacts of the P.A. RANGE switch and also of the RANGE switch in the Aerial Coupling Equipment, Unit F should be kept clean and free of dirt or metal particles.

#### 1.(4). Relays.

The relays should be inspected from time to time and all dirt and grit removed. In the case of the polarised relay REL.4A care should be taken to see that no

particles of grit or iron filings are lodged between the pole pieces and the armature.

The contacts should be carefully examined. If they are dirty, they should be cleaned preferably with a burnishing tool and if this is not available, with a piece of rag moistened with carbon tetrachloride.

No adjustments of contacts should be made except by skilled personnel.

Operating staff are warned that, when the sender is working, the break-in relay REL.1A, has approximately 250 volts on certain contacts, since one of its functions is to make and break the oscillator H.T. voltage during break-in operation. Care should therefore be exercised when handling the Sender when there is power on and the Sender is out of its case.

#### 1.(5). Switches.

Apart from the coil switches, which have already been mentioned in Sections (2) and (3) above, the rest of the switches are mainly of the "Magnum" type. The contacts of these switches should be kept clean and, as a result of the way these switches have been mounted, it is comparatively easy to see whether there is a bad contact which may result if the metal of the moving member has become fatigued. Great care should be taken in adjusting these contacts if a poor contact is discovered.

#### 1.(6). Meters.

In the Aerial Coupling Equipment, Aerial Unit F, the meter used is a millimeter with a full scale reading of 1 milliampere.

### 2. Test Figures.

#### 2.(1). Voltages Measured at Anode Caps of Valves.

- (a) Put SYSTEM switch to C.W. and press key down.
- (b) Now put oscillator out of action by putting OSCILLATOR switch to CRYSTAL and removing any crystal from the holder.
- (c) Voltages will then measure approximately :—
  - (i) Oscillator Anode = 255–275 volts
  - (ii) Buffer Anode = 580–650 "
  - (iii) P.A. Anode = 580–650 "
- (d) Release Morse Key.
- (e) Put SYSTEM switch to R.T. and measure Modulator Output Valve Anode Voltage which should be 230 volts.

#### 2.(2). Grid and Suppressor Bias Voltages.

- (a) Remove rectifier valve from holder.
- (b) Put SYSTEM switch to C.W. when voltages are approximately as follows :—
  - (i) P.A. grid = -150 to -175 volts
  - suppressor = 0 " key down
  - = -270 to -300 " key up
  - (ii) Buffer grid = -40 "
- (c) Put SYSTEM switch to M.C.W.
  - (i) P.A. grid = -150 to -175 volts
  - suppressor = -58 to -65 " key down
  - = -270 to -300 " key up
  - (ii) Buffer grid = -40 volts
- (d) The same figures as (c) should also be obtained with SYSTEM switch put to TUNE and R.T.

2.(3). Screen Voltages with Morse Key down.

(a) Off Tune

P.A. Screen = 590 volts  
Buffer Screen = 250 volts

(b) Tuned

P.A. Screen = 325 volts  
Buffer Screen = 220 volts

2.(4). Valve Anode, Screen and Grid Currents under working conditions.

These current figures will vary slightly from band to band and also from one end of a band to the other. The figures listed below are average values.

(a) Oscillator Valve (V2A).

(i) Anode Current = 25 to 45 mA.  
(ii) Screen Current = 5 mA.  
(iii) Grid Current = 0.2 mA.

(b) Buffer Valve (V2B).

(i) Anode Current = 27 mA.  
(ii) Screen Current = 10 mA.  
(iii) Grid Current = 0.75 mA.

(c) P.A. valve (V3A).

(i) Anode current, anode detuned and unloaded = 115 mA.  
(ii) Anode current, anode tuned but unloaded = 25 mA.  
(iii) Anode current, anode tuned and loaded = 90 mA.  
(iv) Screen current = 10 mA.  
(v) Grid current = 3 mA.

(d) Modulator Output Valve (V2C).

(i) Anode Current = 35 mA.  
(ii) Screen Current = 10 mA.

(e) Modulator Amplifier Valve (V4A).

(i) Anode Current = 3 mA.  
(ii) Screen Current = 2 mA.

(f) Neon Stabiliser Current (V1A and V1B) = 20 mA.

(g) Total Anode Current (measured in series with Choke L.17A).

(i) On TUNE = 180 mA.  
(ii) On C.W., R.T. & M.C.W. = 225 mA.

(h) Total Bias Supply Current (measured in series with L.18A).

(i) Key down = 85 mA.  
(ii) Key up = 70 mA.

(i) Microphone current = 20 mA.

3. Location of Faults.

3.(1). General.

1. The following tests are intended rather to indicate how a fault may best be localised rather than that they should indicate the actual faulty component itself. Having ascertained in what part of the Sender the fault probably exists, components where possible can receive the ordinary electrical tests such as insulation, continuity, resistance, value, etc., depending on the test apparatus available.
2. In tracing faults, use should be made of the fact that the Sender has more than one wave-range. By going over to another range, it should be possible to ascertain whether the fault is peculiar to one range only, in which case the possible causes are immediately limited, or whether it applies to all ranges when the following tests can be made.



- 3.(2). Contactor does not operate though Power Supply connected (i.e., there is no click from contactor on putting down POWER SUPPLY switch).
  1. Gate circuit open through doors being left open.
  2. CONTROL switch in "REMOTE" instead of "LOCAL" position.
  3. Fuses burnt out.
- 3.(3). Contactor goes on (as indicated by click) but POWER SUPPLY indicator lamp does not light.
  1. POWER SUPPLY Indicator Lamp loose in socket.
  2. Primary tapping lead of main transformer loose.
- 3.(4). No output from Sender although there is a reading on P.A. ANODE CURRENT meter and BUFFER TUNING lamp lights.
  1. Range switches set on wrong numbers.
  2. Slider of P.A. coil on wrong portion of coil. It is possible to get some output and appearance of loading when this is on a shorted part of the coil. Refer to the Table IV giving slider positions for minimum coupling, i.e. when slider is at commencement of live part of coil.
- 3.(5). No output from Sender and no reading on P.A. ANODE CURRENT meter though BUFFER TUNING lamp lights.
  1. It is possible there is a break in the anode circuit of the P.A. valve since the BUFFER LAMP indicates that the P.A. valve should be receiving grid drive. Check the flexible connection to the anode of the P.A. valve, particularly where it joins anode cap.
  2. The Sender may be on "C.W." or "M.C.W." in which case there will be no reading of P.A. ANODE CURRENT and no output if there is a break in the keying circuit. Confirm Sender is working by switching to "TUNE" and then check external keying circuit including plug.
- 3.(6). No output from Sender and no reading on P.A. ANODE CURRENT meter and no indication from BUFFER TUNING lamp.
  1. Check RANGE switch positions and make sure that OSCILLATOR and BUFFER RANGE switches have engaged correctly into the "click" position. It is possible that, if the tension of the contact springs has been made excessive, the coil turret may have come to rest against one or more of the springs giving the appearance of having reached its correct operating position. Under this condition one or more of the contacts may not be making contact.
  2. OSCILLATOR switch may be set wrongly. Check that it is in "M.O." position or "CRYSTAL" position according to which method of control is being used.
  3. Check that, in case of crystal operation, the CRYSTAL indicator lamp is making good contact in its holder, as a bad contact here will open the crystal circuit.
- 3.(7). No output from Sender on one range and no reading on P.A. ANODE CURRENT meter though BUFFER TUNING lamp lights.
  1. Confirm by going over to another range that the trouble is confined to one range only. Then examine the wave range cams and contacts of the P.A. coil for signs of a bad contact on the range concerned, or of break in the wire joining the contact to the tapping on the coil.
  2. Check that, in the case of the higher frequency bands, i.e. 1, 2 and 3, the contacts shorting out the unused part of the coil are also making good contact. A fault here would be indicated if output was obtained from the Sender on the required range but the setting of the P.A. tuning condenser was different from the expected setting.
  3. Check that the output slider of the P.A. coil is on the correct part of the coil.

- 3.(8). No output from Sender on one range and no reading on P.A. ANODE CURRENT meter and no indication from BUFFER TUNING lamp.
  1. Examine the contact pins of the coil concerned in both Oscillator and Buffer Coil Turrets. Examine also the contact springs, for while defects here should show up on all ranges, it is possible that a weak or strained spring might give a bad contact on one range only if there is a discrepancy in the size of one of the contact pins due to wear or excessive burning.
  2. Examine wires joining contact pins to the eyelets on the coil former, particularly at the soldered joints at each end of the wire.
  3. In the case of the higher frequency ranges, i.e. 1, 2 and 3, it is useful to remember that if there is a fault in one of the Oscillator and/or buffer coils, use can sometimes be made of one of the other range coils. This is possible because the buffer valve will not only work as a doubler, which is its normal function, but also a straight amplifier or as a frequency multiplier for higher order harmonics than the second.
- 3.(9). Intermittent results with Aerial Coupling Equipment (Aerial Unit F).
  1. If this occurs at the same position or positions of the AERIAL TUNING Control, it is possible for the moving split end vanes of the variable condenser to be touching the adjacent fixed vanes, due to the unit having been taken out of its case with the vanes of the condenser out of mesh. Always set condenser scale  $180^\circ$  before taking out or putting back the unit into its case.
- 3.(10). Sender works on C.W. but not on M.C.W. and/or R.T.
  1. Check whether the Sender operates satisfactorily on "TUNE." If it does, this indicates that the bias circuit for the suppressor grid of the P.A. valve is in order. If it does not work satisfactorily either by giving low or no output or by giving full output, the various resistances comprising the bias potentiometer should be tested, also the contacts of the SYSTEM switch.
  2. If the Sender operates satisfactorily on "TUNE" the modulator should be checked by connecting a pair of high resistance headphones to the output winding of the modulator output transformer, while a signal is being fed into the modulator either externally, when the SYSTEM switch must be in "R.T.," or internally, when the SYSTEM switch must be in "M.C.W."
  3. If the fault is not on both "M.C.W." and "R.T." but is with either one, then the trouble will be confined to the input circuit of the first valve in the modulator and the SYSTEM switch, since the rest of the modulator is common to both systems. The appropriate components should therefore be carefully checked, i.e. the input transformer and the microphone leads and plug in the case of "R.T." or the M.C.W. oscillation circuit in the case of "M.C.W."

**SENDER ONLY.**

Condensers.		Resistances.		Valves.		Inductances.	
C. 1A.	C. 1.	R. 1A.	R. 1.	V. 1A.	L. 1A.	L. 1.	
B.	C. 11.	B.	R. 1.	B.	L. 2A.	L. 2.	
C.	C. 12.	R. 2A.	R. 2.	V. 2A.	L. 3A.	L. 3.	
D.	C. 13.	B.	R. 2.	B.	L. 4A.	L. 4.	
E.	C. 14.	C.	R. 2.	C.	L. 5A.	L. 22.	
F.	C. 15.	D.	R. 2.	V. 3A.	L. 7.	L. 7.	
G.	C. 19.	R. 3C.	R. 39.	V. 4A.	B.	L. 16.	
H.	C. 20.	D.	R. 40.	V. 5A.	C.	L. 6.	
J.	C. 21.	R. 4A.	R. 3.	*V. 6A.	L. 6A.	L. 17.	
K.	C. 24.	R. 5A.	R. 4.		L. 7A.	L. 8.	
L.	C. 26.	B.	R. 9.		L. 8A.	L. 9.	
M.	C. 27.	C.	R. 12.		L. 9A.	L. 10.	
N.	C. 43.	R. 6A.	R. 5.	<b>Lamps.</b>	L. 10A.	L. 11.	
C. 2A.	C. 2.	B.	R. 33.		L. 11A.	L. 12.	
C. 3A.	C. 3.	R. 7A.	R. 6.	P. 1A.	L. 12A.	L. 13.	
C. 4A.	C. 4.	B.	R. 16.	B.	L. 13A.	L. 14.	
B.	C. 4.	R. 8A.	R. 7.	C.	L. 14A.	L. 15.	
C. 5A.	C. 4.	R. 9A.	R. 8.		L. 15A.	L. 18.	
C. 6A.	C. 5.	B.	R. 15.		L. 16A.	L. 19.	
C. 7A.	C. 6.	R. 10A.	R. 10.		L. 17A.	L. 20.	
C. 8A.	C. 6.	R. 11A.	R. 11.		L. 18A.	L. 21.	
C. 9A.	C. 6.	B.	R. 13.		L. 19A.	L. 23.	
B.	C. 7.	R. 13A.	R. 14.				
C. 10A.	C. 8.	R. 14A.	R. 17.				
B.	C. 8.	R. 15A.	R. 18.				
C.	C. 30.	B.	R. 29.				
C.	C. 9.	R. 16A.	R. 39.				
C.	C. 17.	B.	R. 20.				
C.	C. 16.	R. 17A.	R. 22.				
C.	C. 22.	R. 18A.	R. 23.				
C.	C. 23.	B.	R. 24.				
D.	C. 25.	R. 19A.					
E.	C. 32.						
I. A.	C. 18.						

\*This is replaced by a metal rectifier in later sets. (See Page 40 for details.)

## SENDER.

## Condensers.

		Use.	Maker.	Capacity.	Type, Rating and Remarks.
C. 1.	C. 1A.	M.O. Anode Bypass	T.C.C.	0.01 $\mu$ F	M.3. Mica.
C. 2.	C. 2A.	M.O. Anode-Grid Coupling Con. (M.O. Pos.).	T.C.C.	30 $\mu$ F $\pm$ 2%	Disc Ceramic.
C. 3.	C. 3A.	M.O. Padding Condenser.	T.C.C.	70 $\mu$ F $\pm$ 5%	Silvered Mica. Moulded.
C. 4.	C. 4A-B.	M.O. Padding Condenser.	T.C.C.	25 $\mu$ F $\pm$ 2%	Two 50 $\mu$ F Cup Ceramics in Series.
C. 5.	C. 5A.	M.O. Padding Condenser.	T.C.C.	50 $\mu$ F $\pm$ 5%	Silvered Mica. Moulded.
C. 6.	C. 6A-B.	M.O. Padding Condenser.	T.C.C.	50 $\mu$ F $\pm$ 2%	Two 100 $\mu$ F Cup Ceramics in Series.
C. 7.	C. 7A.	M.O. Cathode Bypass (Crystal Regen.).	T.C.C.	450 $\mu$ F $\pm$ 10%	Silvered Mica. Moulded.
C. 8.	C. 8A.	M.O. Anode-Grid Coupling (Crystal)	Phillips	2.2 $\mu$ F	Ceramic Tubular.
C. 9.	C. 9A.	M.O. Tuning Condenser.	Wingrove & Rogers.	500 $\mu$ F + 500 $\mu$ F	*Type C.1704 two-gang.
C.10.	C. 5B.	M.O.—Buffer Coupling Con.	T.C.C.	50 $\mu$ F $\pm$ 10%	Silvered Mica. Moulded.
C.11.	C. 1B.	M.O. Heater Bypass.	T.C.C.	0.01 $\mu$ F	M.3. Mica.
C.12.	C. 1C.	M.O. Heater Bypass.	T.C.C.	0.01 $\mu$ F	M.3. Mica.
C.13.	C. 1D.	M.O. Cathode Res. Bypass.	T.C.C.	0.01 $\mu$ F	M.3. Mica.
C.14.	C. 1E.	M.O. Screen Bypass.	T.C.C.	0.01 $\mu$ F	M.3. Mica.
C.15.	C. 1F.	Buffer Grid Bypass.	T.C.C.	0.01 $\mu$ F	M.3. Mica.
C.16.	C.10A.	Buffer Anode Bypass.	T.C.C.	0.01 $\mu$ F	M.4. H.V. Test. Mica.
C.17.	C. 9B.	Buffer Tuning Condenser.	Wingrove & Rogers.	500 $\mu$ F + 500 $\mu$ F	*Type C.1704 two-gang (in series).
C.18.	C.11A.	Buffer—P.A. Coupling.	T.C.C.	50 $\mu$ F	M.2. H.V. Test. Mica.
C.19.	C.1G.	Buffer Heater Bypass.	T.C.C.	0.01 $\mu$ F	M.3. Mica.
C.20.	C. 1H.	Buffer Heater Bypass.	T.C.C.	0.01 $\mu$ F	M.3. Mica.
C.21.	C. 1J.	Buffer Screen Bypass.	T.C.C.	0.01 $\mu$ F	M.3. Mica.
C.22.	C.10B.	P.A. Screen Bypass.	T.C.C.	0.01 $\mu$ F	M.4. H.V. Test. Mica.

SENDER.

Condensers (Contd.).

	Use.	Maker.	Capacity.	Type, Rating and Remarks.
C.23.	P.A. Anode Bypass.	T.C.C.	0.01 $\mu$ F	M.4. H.V. Test. Mica.
C.24.	P.A. Grid Bypass.	T.C.C.	0.01 $\mu$ F	M.3. Mica.
C.25.	Aerial Coupling Con.	T.C.C.	0.01 $\mu$ F	M.4. H.V. Test. Mica.
C.26.	P.A. Heater Bypass.	T.C.C.	0.01 $\mu$ F	M.3. Mica.
C.27.	P.A. Heater Bypass.	T.C.C.	0.01 $\mu$ F	M.3. Mica.
C.28.	P.A. Tuning Condenser.	Plessey.	500 $\rho$ F	† G. Special Wide Plate. Spacing = 0.035".
C.29.	P.A. Suppressor Bypass.	T.C.C.	0.002 $\mu$ F	M.3. Mica.
*C.30.	Sidetone Coupling Con.	Phillips.	2.2 $\rho$ F	Ceramic.
C.31.	Sidetone Transformer			
C.32.	R.F. Bypass.	T.C.C.	0.001 $\mu$ F	M.2. Mica.
C.33.	Mod. Amp. 1-Mod. Amp. 2. Coupling Con.	T.C.C.	0.01 $\mu$ F	M.4. H.V. Test. Mica.
C.34.	Mod. Amp. 2. Anode Bypass.	B.I.	4 $\mu$ F	Type 365. 1000V. D.C.
C.36.	Mod. Amp. 1. Screen Bypass	T.C.C.	0.1 $\mu$ F	Type 444. 350V. D.C.
C.37.	Mod. Amp. 1. Anode Grid Coup. (Osc. Pos.).	T.C.C.	0.02 $\mu$ F	Type 444. 350V. D.C.
C.38.	Mod. Amp. 1. Tuning Con. (Osc. Pos.).	T.C.C.	0.04 $\mu$ F	Type 444. 350V. D.C.
C.39.	Mod. Amp. 1. Grid Coup. (Osc. Pos.).	T.C.C.	0.01 $\mu$ F	Type 544.
C.40.	Main H.T. Smoothing.	B.I.	8 $\mu$ F	Type 365. 1000V. D.C.
C.41.	Main H.T. Smoothing. Bias Supply Smoothing.	B.I.	8 $\mu$ F	Type 365. 1000V. D.C.
		B.I.	4 $\mu$ F	400V. D.C. working. Type 82.

† Rotor end vanes without trimming slots.

\* See page 40.

**SENDER.**

**Condensers (Contd.).**

	Use.	Maker.	Capacity.	Type, Rating and Remarks.
C.42.	Bias Supply Smoothing.	B. I.	4 $\mu$ F	400V. D.C. working. Type 82.
C.43.	Key Shunt Cir. Con.	T.C.C.	0.01 $\mu$ F	M.3. Mica.
C.44.	Mod. Input—Remote Control Line A.F. Coupling Con.	B. I.	1 $\mu$ F	Type 209. 250V. D.C.
C.45.	Mod. Input—Remote Control Line A.F. Coupling Con.	B. I.	1 $\mu$ F	Type 209. 250V. D.C.
C.46.	Mic. Smoothing.	T.C.C.	25 $\mu$ F	25 50 Type C. Electrolytic Dry.
C.47.	Mod. Amp. 2 Cathode Resistance Bypass.	T.C.C.	0.1 $\mu$ F	Type 444. 350V. D.C.

NOTE : C.35 has been deleted since the making of this list.

SENDER.

Resistances.

		Use.	Maker.	Resistance.	Type, Rating and Remarks.
R. 1.	R. 1A-B.	Rel. I Series Res.	Welwyn.	30,000 $\Omega$	Two 15000 $\Omega$ AW.3112 in series.
R. 2.	R. 2A-D.	Neon Stab. Dropping Res.	Welwyn.	4,250 $\Omega$	Four 5000 $\Omega$ AW.3112 in series parallel.
R. 3.	R. 4A.	Neon Striking Res.	Erie	0.25 $\text{M}\Omega$	1W.
R. 4.	R. 5A.	M.O. Anode Blocking Res.	Erie.	100 $\Omega$	$\frac{1}{2}$ W.
R. 5.	R. 6A.	M.O. Grid Leak Res.	Erie.	50,000 $\Omega$	2W.
R. 6.	R. 7A.	M.O. Grid Parasitic Stopper.	Erie.	500 $\Omega$	$\frac{1}{2}$ W. insul. Used with L6 in parallel.
R. 7.	R. 8A.	M.O. Cathode Bias Res.	Erie.	400 $\Omega$	2W.
R. 8.	R. 9A.	M.O. Screen Dropping Res.	Erie.	20,000 $\Omega$	2W.
R. 9.	R. 5B.	Buffer Anode Blocking Res.	Erie.	100 $\Omega$	2W.
R. 10.	R. 10A.	Buffer Grid Leak Res.	Erie.	150,000 $\Omega$	2W.
R. 11.	R. 11A.	Buffer Screen Dropping Res.	Welwyn.	10,000 $\Omega$	AW.3112.
R. 12.	R. 5C.	P.A. Anode Blocking Res.	Erie.	100 $\Omega$	2W.
R. 13.	R. 11B.	P.A. Screen Dropping Res.	Welwyn.	10,000 $\Omega$	AW.3112.
R. 14.	R. 13A.	Part of P.A. Grid Leak Res.	Erie.	10,000 $\Omega$	2W.
R. 15.	R. 9B.	Part of P.A. Grid Leak Res. (Shorted Out Range I).	Erie.	20,000 $\Omega$	2W.
R. 16.	R. 7B.	P.A. Grid Parasitic Stopper.	Erie.	500 $\Omega$	$\frac{1}{2}$ W. insul. Used with L.17 in parallel.
R. 17.	R. 14A.	P.A. Suppress. Block Res.	Erie.	100 $\Omega$	1W.
*R. 18.	R. 15A.	Sidetone Res.	Erie.	50,000 $\Omega$	$\frac{1}{2}$ W. insul.
R. 19.	R. 30B.	Mod. Output Trans. Sec. Load.	Welwyn.	2,000 $\Omega$	AW.3112.
R. 20.	R. 17A.	Mod. Amp. 2. Cathode Bias Res.	Erie.	500 $\Omega$	1W.
R. 22.	R. 18A.	Mod. Amp. 1 Screen Dropping Res.	Erie.	100,000 $\Omega$	1W.
R. 23.	R. 18B.	Mod. Amp. 1. Screen Pot. Res.	Erie.	100,000 $\Omega$	1W.
R. 24.	R. 19A-C.	Mod. Amplifiers Dropping Res.	Welwyn.	7,500 $\Omega$	Three 2500 $\Omega$ . AW.3112 in series.
R. 26.	R. 21A.	Mod. Amp. 1 Anode Res.	Erie.	50,000 $\Omega$	1W.
R. 27.	R. 22A.	Part of Mod. Amp. 1 Cathode Bias Res.	Erie.	300 $\Omega$	$\frac{1}{2}$ W. insul.

\* See page 40.

SENDER.

Resistances (Contd.).

	Use.	Maker.	Resistance.	Type, Rating and Remarks.
R.28.	Part of Mod. Amp. 1 Cathode.	Erie.	300 $\Omega$	$\frac{1}{2}$ W. insul.
R.29.	Mod. Amp. 1 Grid Leak (Osc. Pos.).	Erie.	50,000 $\Omega$	$\frac{1}{2}$ W insul.
R.30.	Mod. Input Trans. Sec. Input Control.	Morganite. Stackpole.	50,000 $\Omega$	MINAR. 50310 Graded.
R.32.	Key Shunt Circuit Res.	Erie.	100 $\Omega$	$\frac{1}{2}$ W. insul.
R.33.	Part of Suppressor Bias Keying Pot.	Erie.	50,000 $\Omega$	2W.
R.34.	Part of Supp. Bias Keying Pot.	Erie.	15,000 $\Omega$	1W.
R.36.	Buffer Grid Stopper.	Erie.	60 $\Omega$	$\frac{1}{2}$ W. insul.
R.37.	Mod. Amp. 2 Grid Res. (Top Part).	Erie.	15,000 $\Omega$	$\frac{1}{2}$ W. insul.
R.38.	Mod. Amp. 2 Grid Res. (Bottom Part).	Erie.	35,000 $\Omega$	$\frac{1}{2}$ W. insul.
R.39.	Bias Supply Pot. (part of).	Welwyn.	7,500 $\Omega$	3500 $\Omega$ +3000 $\Omega$ +1000 $\Omega$ in series. AW.3112.
R.40.	Bias Supply Pot. (part of).	Welwyn.	8,500 $\Omega$	3500 $\Omega$ +3000 $\Omega$ +2000 $\Omega$ in series. AW.3112.
R.41.	Res. Shunting Coil of Rel.4.	Erie.	2,000 $\Omega$	$\frac{1}{4}$ W. insul.
R.42.	Mod. Amp. 2 Grid Stopper.	Erie.	100 $\Omega$	$\frac{1}{4}$ W. insul.

NOTE : R.21, R.25, R.31 and R.35 have been deleted since the making of this list.



**SENDER.**

**Relays and Contractors.**

		Use.	Maker.	Value.	Type, Rating and Remarks.
Rel.1.	Rel.1A.	Break-In Aerial and H.T. Change-over and Muting.	Siemens.		Y.878 1.
Rel.2.	Rel.2A.	Mains Contactor.	Arrow.		28306. 100V. 50 c. s.
Rel.3.	Rel.3A.	Keying Relay.	Siemens.		Type RD.3045, High Speed.
Rel.4.	Rel.4A.	Remote Control.	S.T. & C.		Polarised 4151P.
	<b><u>Valves.</u></b>				
V.1.	V.1A.	Neon Stab. for M.O. Supply and Buffer Screen Supply.	Cossor.		S.130=AW3.
V.2.	V.1B.	Neon Stab. for M.O. Supply and Buffer Screen.	Cossor.		S.130=AW3.
V.3.	V.2A.	Master Oscillator.			ATS.25 or 25A.
V.4.	V.2B.	Buffer.			ATS.25 or 25A.
V.5.	V.3A.	Power Amplifier.			PV.1 35.=ATP.35.
V.6.	V.2C.	Mod. Amp.2.	Mullard.		ATS.25 or 25A.
V.7.	V.4A.	Mod. Amp.1.	Mullard.		EF.39=ARP.34.
V.8.	V.5A.	Main H.T. Supply Rectifier.	Mullard.		F.W.4 500=AU1.
V.9.	V.6A.	Sidestone.	Mullard.		EA.50 with special holder. NOTE: This is replaced by a metal rectifier in later Sets. (See page 40 for details.)

**SENDER.**

**Metal Rectifiers.**

		Use.	Maker.	Value.	Type, Rating and Remarks.
W.1.	W.3A.	Sidetone.	Westinghouse S.T. & C.		J50. (See note on page 40.) Selenium D18-18-1 TF. (for full wave bridge) used per Sender.
W.2.	W.2A-B.	Bias Supply.			
		<b><u>Lamps.</u></b>			
P.1.	P.1A.	Crystal Tuning.	Bulgin.		6V. 06A. Army Vocab. J.
P.2.	P.1B.	Buffer Tuning.	Bulgin.		6V. 06A. Army Vocab. J.
P.3.	P.1C.	Power Supply On.	Bulgin.		6V. 06A. Army Vocab. J.
		<b><u>Switches.</u></b>			
S.1.	S.1.	Crystal-M.O. Switch.	Magnum.		3 Bank 2 Pos.
S.2.	S.2.	Normal-Break In.	Arrow.		Type 8102. Single Pole.
S.3.	S.3.	System Switch.	Magnum.		5 Bank 4 Pos.
S.4.	S.4.	Mains On Off.	Arrow.		Type 8102. Double Pole.
S.5.	S.5.	Control Switch.	Magnum.		3 Bank 2 Pos.
S.6.	S.6.	Oscillator Range.	R.T.E.	Turret	Y.97095/54.
S.7.	S.7.	Buffer Range.	R.T.E.	Turret.	Y.97095/55.
S.8.	S.8.	P.A. Range.	R.T.E.	Cam.	Y.97096.
		<b><u>Meters.</u></b>			
M.1.	M.1A.	P.A. Anode Current.	Victoria Instr. Co.	0-150 mA.	2" Flush.

**SENDER.**

**Inductances.**

			Inductance.	Type, Rating and Remarks.
L. 1.	M.O. Anode Coil. (Range 4.)	R.T.E.		28T + 28T unspaced Litz.
L. 2.	M.O. Anode Coil. (Range 3.)	R.T.E.		16T + 8T dia. spac. 23 S.W.G. enal.
L. 3.	M.O. Anode Coil. (Range 2.)	R.T.E.		12T + 6T dia. spac. 18 S.W.G. enal.
L. 4.	M.O. Anode Coil. (Range 1.)	R.T.E.		8 $\frac{1}{2}$ T + 4T dia. spac. 18 S.W.G. enal.
L. 6.	M.O. Grid Parasitic Stopper.	R.T.E.		12T of 22 S.W.G. on 500 $\mu$ insul. res. R.6.
L. 7.	Buffer Grid Choke.	Eddystone.	1.5 mH.	Type 1022. Domilac Impreg.
L. 8.	Buffer Anode Coil. (Range 4.)	R.T.E.		56T unspaced Litz.
L. 9.	Coupling Coil. (Range 4.)	R.T.E.		2T.
L. 10.	Buffer Anode Coil. (Range 3.)	R.T.E.		27T dia. spac.
L. 11.	Coupling Coil. (Range 3.)	R.T.E.		1T.
L. 12.	Buffer Anode Coil. (Range 2.)	R.T.E.		10T dia. spac.
L. 13.	Coupling Coil. (Range 2.)	R.T.E.		1T 23 S.W.G.
L. 14.	Buffer Anode Coil. (Range 1.)	R.T.E.		6T dia. spac. 17 S.W.G. enal.
L. 15.	Coupling Coil. (Range 1.)	R.T.E.		$\frac{1}{2}$ T 23 S.W.G. enal.
L. 16.	P.A. Grid Choke.	Eddystone.	1.5 mH.	Type 1022. Domilac Impreg.
L. 17.	P.A. Grid Parasitic Stopper.	R.T.E.		12T of 22 S.W.G. on 500 $\mu$ insul. res. R.16.
L. 18.	P.A. Anode Coil.	R.T.E.		Mod. Wavemeter. 17T + 13T of 1 mm. tinned copper.
L. 19.	Mod. Osc. Coil.	Brian Savage.	1 H.	Tapped Choke—P.O. Type L2.
L. 20.	Main H.T. Smoothing.	Haynes.	12 H.	250mA. D.C.
L. 21.	Bias Supply Smoothing.	Haynes.	15 H.	100mA. D.C.
L. 22.	Crystal Regenerative Circuit Cathode.	Eddystone	1.5 mH.	Type 1022. Domilac Impreg.
L. 23.	Wavemeter Coupling Coil.	R.T.E.		1 turn on former of L.15A.

NOTE : L.5. has been deleted since the making of this list.

SENDER.

Fuse.

		Use.	Maker.	Value.	Type, Rating and Remarks.
F.1.	F.1A.	Mains.	Slydlok.		Slydlok 5-15 amp. fuse wire, type 1533.
F.2.	F.1B.	Mains.			
<u>Transformers.</u>					
T.1.	T.1A.	Sidetone Trans.	Cosmocord.		Trans. Tel. Mk.III.
T.2.	T.2A.	Mod. Output Trans.	Ferranti.		OPMI.
T.3.	T.3A.	Mod. Input Trans.	Sign Trans. Co.		Transformers Mic. and Line No. 3.
T.4.	T.4A.	Contacto Trans.	Haynes.		100V. 150mA.
T.5.	T.5A.	Mains Trans. H.T. Supply.	Haynes.		500-0-500.
		Bias Supply.			300V.
		Filament Supply (1).			6-3.15-0-0-3.15-6.
		(2).			4V.

\*When a J50 is fitted in the sidetone circuit the following alterations occur in the Components List :-

C8B becomes C26A.  $20\mu\mu\text{F} \pm 5\%$ . Similar to United Insulator Co. Type 401 SMP.

R15A " L5D. 1.5 mH. Eddystone. Type No. 1022.

V6A. " J50. Rectifier Metal. Westinghouse. No. 1.

C27A added.  $40\mu\mu\text{F} \pm 5\%$ . Similar to United Insulator Co. Type 401 SMP.

AERIAL UNIT F.

Switches.

		Use.	Maker.	Value.	Type, Rating and Remarks.
S.101.	S.1.	Lamp Switch.	R.T.E.		Single Pole.
S.102.	S.2.	Feeder Tap Switch.	R.T.E.		Cam Type.
S.103.	S.3.	Wave Range.	R.T.E.		Cam Type.
		<u>Meters.</u>			
M.101.	M.1A.	Aerial Current Indicator.	Victoria Instrument Co.	0-1mA.	2" Flush type. Use in conjunction with rectifier.
		<u>Inductances.</u>			
L.101.	L.1A.	Tuned Circuit Inductance.	R.T.E.		Modified wavemeter. 17 turns 3/16 Tubular + 13 turns 1 mm. tinned copper.
L.102.	L.2A.	Tuning Lamp Coupling Coil.	R.T.E.		1 turn on former of L.101.
L.103.	L.3A.	Meter Loop. •	R.T.E.		Y.21026/83.
		<u>Condensers.</u>			
C.101.	C.1A.	Tuning Capacity.	Plessey.	500 $\mu$ F. variable	G. Special Wide Plate. Spacing=0.035".
C.102.	C.2A.	Meter R.F. Bypass.	T.C.C.	0.01 $\mu$ F.	M.3. Mica.

## AERIAL UNIT F.

### Resistances.

	Use.	Maker.	Value.	Type, Rating and Remarks.
R.101.	R.1.A. Rectifier Series Res.	Erie.	160 ± 5%	$\frac{1}{4}$ W.
R.102.	R.2.A. Rectifier Series Res.	Erie.	80 ± 10%	$\frac{1}{4}$ W.
R.103.	R.3.A. Meter Shunt Res. (Issued with W.101. W.1A.)	Erie.	100 to 300 $\Omega$	$\frac{1}{4}$ W.
	<b><u>Metal Rectifiers.</u></b>			
W.101.	W.1A. Used in conjunction with aerial current meter.	Westinghouse.	0.5mA.	Instrument Type.
	<b><u>Lamp.</u></b>			
P.101.	P.1.A. Tuning Indicator.	Bulgin.		6V. 06A. Army Vocab. J.
	<b><u>REMOTE CONTROL UNIT C.</u></b>			
	<b><u>Switches.</u></b>			
S.201.	S.1. Sender Control. (On—Work—Off.)		Key 216 Black.	4 Pole Change-over. Ringing Key.
S.202.	S.2. Normal—Break In.	Arrow.		21534. Bakelite Lever. S.P. change-over.
S.203.	S.3. Key—Auto.	Arrow.		21534. Bakelite Lever. S.P. change-over.

**REMOTE CONTROL UNIT C.**

**Relays.**

		Use.	Maker.	Value.	Type, Rating and Remarks.
Rel.201.	Rel.1A.	Muting Relay.	Siemens.		RD.3045. High Speed Relay.
B.1.	<u>Batteries.</u> B.1A-D.	Line working.	Siemens.	48V.	Four 8 Cell Batteries.
R.301.	R.1A-H.	Dummy Load.	<u>DUMMY AERIAL.</u> Erie.	100 <sup>n</sup> .	Eight 50 <sup>n</sup> 3 watt res. in series parallel.

In later sets this compartment includes a metal rectifier. (See page 40).

## APPENDIX I.

### Using Sender with Power Unit D.C./A.C. 250 Watts No. I and No. IA.

- (1) When using these power units set the generator voltage to 230V.
- (2) Set the Sender transformer taps to 250V.
- (3) Limit anodé current to 80mA. on C.W. (40 mA. on R.T. and M.C.W.).
- (4) If the engine is being used for the first time it is advisable to add  $\frac{1}{4}$  pint of oil as used in the engine to two gallons of petrol when filling the tank. Use M.120 oil in temperate climates and SAE 10W. in cold climates.

## APPENDIX II.

### ERECTION OF MASTS, STEEL, 36 FT.

#### 2-man Drill.

On the site of each mast, together with six sections 6 ft., place the following :—

- 1 Shoe with 1 Antennae Rods A peg.
- 1 Stayplate No. 1 complete with guy ropes.
- 1 Stayplate No. 2     "     "     "     "
- 1 Halyard.
- 5 Pickets.

Each mast may be erected by two men and the following drill is recommended.

No. 1 will note in which direction the aerial is to run and select the positions of the masts. Then action will be taken by each man as shown in the columns below.

No. 1.	No. 2.
<p>(a) Fixes the mast shoe in the position selected, with the open end at 45° to the direction of the aerial, by means of the peg.</p> <p>(b) Drives in 4 pickets, each 6 full paces from the shoe and 90° round from its neighbour. The first picket is in the direction of the open end of the shoe, i.e. alongside the mast.</p> <p>(c) Drives in 1 picket 2 ft. from the shoe in the direction of the aerial for each halyard.</p> <p>(d) Puts stayplate No. 2 on top section of mast with halyard ring(s) in correct position.</p> <p>(e) Runs out the two side guys from stayplate No. 2 to the pickets on either side of the mast and tightens these guys.</p> <p>(f) Puts the ring from the underneath guy over the picket near the mast and runs the fourth guy out along the mast to its full extent past the shoe.</p>	<p>(a) Assembles 4 mast sections on the ground, laid out in the direction of the open end of the mast shoe with belled ends at bottom. Puts base of mast near shoe.</p> <p>(b) Slides the stayplate No. 1 over the fourth section.</p> <p>(c) Completes assembly of mast sections.</p> <p>(d) Runs out two side guys from stayplate No. 1 to the pickets on either side of the mast and tightens these guys.</p> <p>(e) Puts the ring from the underneath guy over the picket near the mast and runs the fourth guy out along the mast to its full extent past the shoe.</p> <p>(f) Attaches halyard(s) and runs it (them) out in continuation of the mast.</p>



## APPENDIX II (Contd.).

No. 1.	No. 2.
<p>(g) Picks up both free guys and faces in the direction of the mast.</p>	<p>(g) Sees that base of mast is in shoe and then takes up a position near the top of the mast.</p>
<p>(h) Puts his foot against the base of the mast to keep it in the shoe, and gives the order "Hoist." Pulls on the two free guys as No. 2 raises the mast.</p>	<p>(h) When given the order "Hoist" lifts the mast and "walks up" it with his hands until it is vertical.</p>
<p>(j) Puts the two guy rings over the picket behind him and tightens the guys as No. 2 holds the mast. Regulates all the guys until the mast is truly vertical.</p>	<p>(j) Steadies the mast while No. 1 regulates the guys.</p> <p>(k) Gets each halyard in correct position, clear of guys and ties it to the picket at foot of mast.</p>

**NOTE :** In wet weather the guy ropes may shrink and tighten irregularly. Constant attention should be given to the adjustment of the guys.



**APPENDIX III.**

**WIRELESS SETS No. 12.**

**PROVISIONAL LIST OF COMPONENTS AND ACCESSORIES.**

(This list does not constitute an authority to draw stores.)

This list is based on the assumption that the Complete Station is as follows :—

No. 12A (Ground Station). The complete station, i.e. Sender with local receiving and remote receiver station.

No. 12B (Vehicle Station). Vehicle A Complete Sender and local receiving stations (Sender cannot be operated on the move). Vehicle B remote receiver station allowing reception on the move or stationary.

Item No.	Vocab. Catalogue No.	DESIGNATION.	No. 12A. For use on the ground.			No. 12B. General purpose normally carried in Trucks 15-cwt. 4-wheeled wireless.					
			Min. for Work	Essential Spares	Total	VEHICLE " A "			VEHICLE " B "		
						Min. for Work	Essential Spares	Total	Min. for Work	Essential Spares	Total
1	2	3	4	5	6	7	8	9	10	11	12
		<b>SECTION F.</b>									
1	FA 2185	Hammers, Smith, hand 3 lbs. ....	2	—	2		—			—	
2	FA 2229	„ Handles No. 5 .....	2	—	2		—			—	
		<b>SECTION V.2.</b>									
3	VC 2512	Watches, G.S. Mk. II .....	2	—	2		—			—	
4	VC 2290	Tapes measuring metallic, woven, 50.....(m)	1	—	1		—		—	—	—
		<b>SECTION W.2.</b>									
5	WB 0027	Batteries, dry, refill, 8 cell, No. 1 Mk. I...	4 (d)	4 (m)	8	—	—	—	4 (d)	4 (m)	8
6	WB 0071	Bulbs, 6 volt J .....	3	15	18	2 (c)	11 (a)	13	1 (c)	4 (b)	5
7	WB 1057	Wire, electric, R.4 (123 feet).....(m)	—			—			—	—	—
8	WB 1042	„ „ P.11, Mk. I (36 feet).....(m)	—			—	—	—	—	—	—
9	WB 1043	„ „ P.13, Mk. I (36 feet).....(m)	—	2	2	—			—		
		<b>SECTION X.</b>									
10	XA 0927	Fuse, wire, 5 amp., 36 S.W.G. copper ( $\frac{1}{4}$ lb. Reel).....(a)	—			—			—	—	—
		<b>SECTION Y.</b>									
11	YA 1152	Pins, earth, small .....	2	—	2		—			—	
		<b>SECTION Z.1.</b>									
12	ZA 0905	Aerials, 100 ft. No. 1.....(m)		—			—		—	—	—
13	ZA 0885	„ Dipole No. 4A (52 ft.).....(m)		—			—		—	—	—
14	ZA 0886	„ „ No. 4B (94 ft.).....(m)		—			—		—	—	—
15	ZA 0909	„ „ No. 5 (50 ft.).....(m)		—		—	—	—		—	
16	ZA 0841	Aerial Coupling equipment, Aerial Unit F		—			—		—	—	—
17	ZA 0986	Aerial Coupling equipment Set Unit F... (m)		—			—		—	—	—
18	ZA 0899	Battens, terminal 3-point No. 4.....	—	—	—		—			—	
19	ZA 0120	„ „ 4-point No. 1.....(j)	—	—	—		—			—	
20	ZA 0942	Cases, spare parts, No. 5A.....(m)		—			—		—	—	—
21	ZA 0943	„ „ „ No. 5B.....(m)		—		—	—	—		—	
22	ZA 2250	Connectors, single No. 10 .....	—	—	—		—		—	—	—
23	ZA 0973	„ „ No. 12A .....	—	—	—		—		—	—	—
24	ZA 0975	„ „ No. 21A.....(m)			2		—			—	
25	ZA 3127	„ „ No. 22 .....	—	—	—	2	—	2		—	
26	ZA 10017	„ „ No. 25.....(h)	—	—	—		—			—	



1	2	3	4	5	6	7	8	9	10	11	12
		SECTION Z.1 (Contd.).									
27	ZA10712	Connectors, single No. 26A .....(h)	—	—	—	1	—	1	1	—	1
28	ZA10047	" " No. 27 .....	—	—	—	1	—	1	1	—	1
29	ZA10713	" " No. 28 .....(h)	—	—	—	1	—	1	1	—	1
30	ZA 2417	" Twin, No. 28A .....	—	—	—	2	—	2	2	—	2
31	ZA 0987	" " No. 56 .....(g)	2	—	2	2	—	2	—	—	—
32	ZA 0976	" " No. 60 .....	—	—	—	1	—	1	1	—	1
33	ZA 0977	" " No. 61 .....	2(m)	—	2	1	—	1	1	—	1
34	ZA 0978	" " No. 62 .....	2(m)	—	2	1	—	1	1	—	1
35	ZA 0979	" " No. 63 .....	1(m)	—	1	1	—	1	—	—	—
36	ZA 0981	" " No. 64 .....	2(m)	—	2	1	—	1	1	—	1
37	ZA 0982	" " No. 65 .....	2(m)	—	2	1	—	1	1	—	1
38	ZA 0983	" " No. 66 .....	2(m)	—	2	1	—	1	1	—	1
39	ZA10740	" " No. 83 .....(h)	—	—	—	1	—	1	1	—	1
40	ZA 0984	" 3-point No. 9 .....	2(m)	—	2	1	—	1	1	—	1
41	ZA 0891	Insulators, W.T. Aerial lead-in No. 12 ...	—	—	—	—	—	1	1	—	1
42	ZA 0874	" " Stand-off, No. 7 .....	—	—	—	—	2	2	—	2	2
43	ZA 4444	" Chain, small, 3 link .....(m)	—	12	12	—	6	6	—	6	6
44	ZA 4500	Key and Plug Assemblies, No. 2B .....(e)	2	—	2	1	—	1	1	—	1
45	ZA 4381	" " " " Slides No. 1 .....(e)	2	—	2	1	—	1	1	—	1
46	ZA 4524	Lamps, Operators, No. 2' .....(ab)	2	—	2	1	—	1	1	—	1
47	ZA 4600	" " No. 3 .....(m)	2	—	2	1	—	1	1	—	1
48	ZA 3291	" " No. 3 Slides .....(m)	2	—	2	1	—	1	1	—	1
		Masts, 36 ft. Steel, comprising :—									
49	ZA 3224	Sections, 6 ft. ....6	30	—	30	18	—	18	12	—	12
50	ZA 3225	Shoes.....1(m)	5	—	5	3	—	3	2	—	2
51	ZA 3226	Stayplates, No. 1.....1(m)	5	—	5	3	—	3	2	—	2
52	ZA 3227	" No. 2.....1(m)	5	—	5	3	—	3	2	—	2
53	ZA 3120	Halyards .....2(m)	6	—	6	6	—	6	4	—	4
54	ZA 0374	Antennae Rod A, Pegs .....2(m)	5	5	10	3	3	6	2	2	4
55	WA 1890	Pickets, angle short Mk. III (Section W.1.).....5	25	—	25	15	—	15	10	—	10
56	ZA 5313	Microphones, hand, No. 4 .....(e)	1	—	1	1	—	1	—	—	—
57	ZA 5484	Nets, earth, 14 feet .....	1	—	1	1	—	1	—	—	—
58	ZA 3050	Reception Sets, R.107 .....	2	—	2	1	—	1	1	—	1
59	ZA 3221	" " " Carriers No. 1 ...	—	—	—	1	—	1	1	—	1
60	ZA 2965	" " " Cases, spare valve	2	—	2	1	—	1	1	—	1
61	ZA 3220	" " " Working Instruc- tions	2	—	2	1	—	1	1	—	1
62	ZA 3238	Receivers, headgear, D.L.R. double Nos. 1 or 2 or C.L.R. Mk. III.....(e)	4	—	4	2	—	2	2	—	2
63	ZA 3292	Satchels, signal .....	2	—	2	1	—	1	1	—	1
64	ZA 3497	Valves, W.T. type A.R.21 .....	8	8	16	4	4	8	4	4	8
65	ZA 3493	" " " A.R.P.34.....	9	9	18	5	(l) (k) (l)	10	4	(l) (l)	8
66	ZA 7012	" " " A.T.P.35.....	1	1	2	1	(k) (l)	2	—	—	—
67	ZA 7001	" " " A.U.1 .....	1	1	2	1	(k) (k)	2	—	—	—
68	ZA 7013	" " " A.W.3.....	2	2	4	2	(k) (k)	4	—	—	—
69	ZA 3494	" " " 6X5G.....	2	2	4	1	(l) (l)	2	1	(l)	1
70	ZA 3496	" " " A.T.S.25 or Z.A.10813 A.T.S.25A	3	3	6	3	3 (k)	6	—	—	—









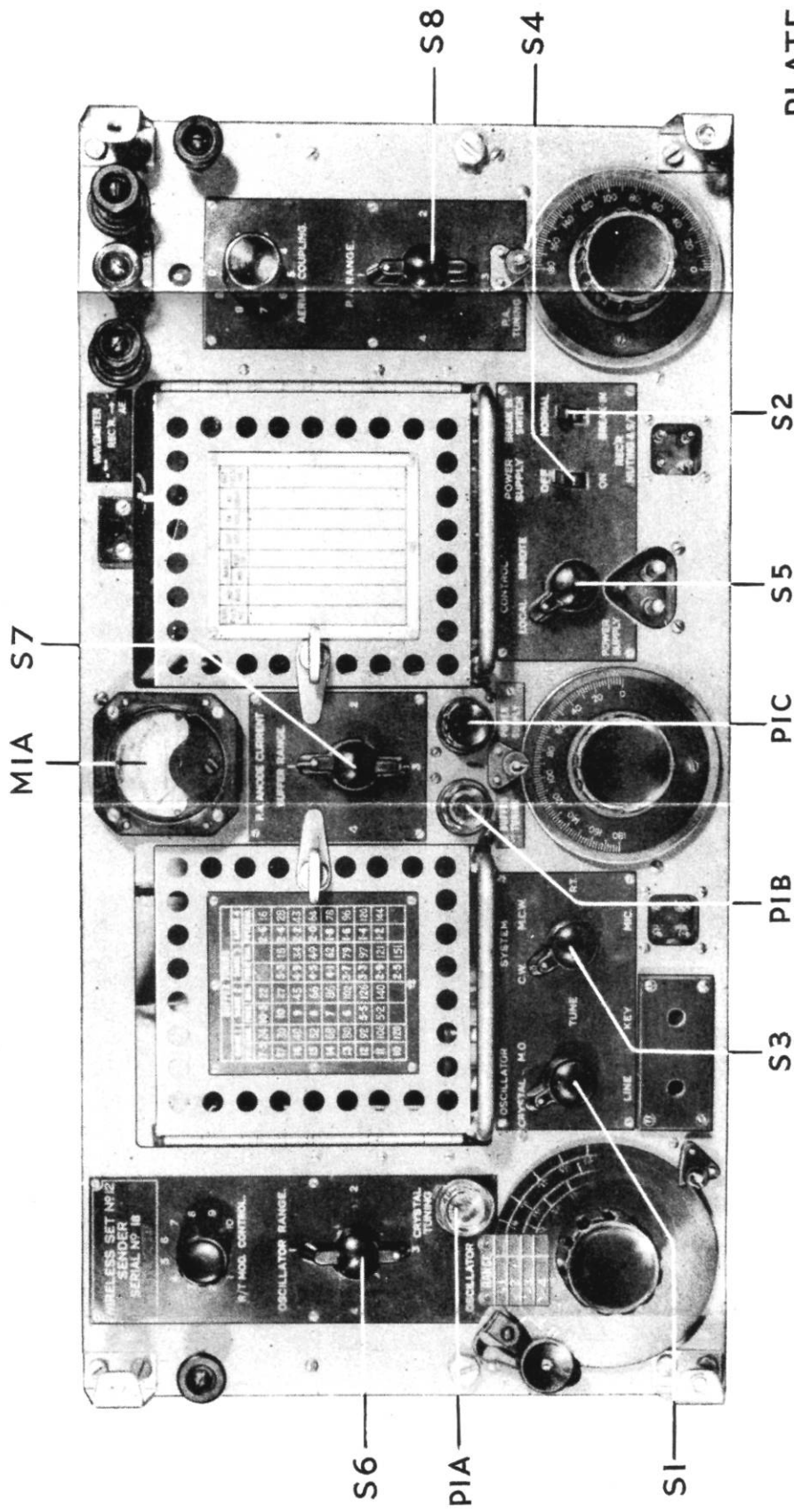
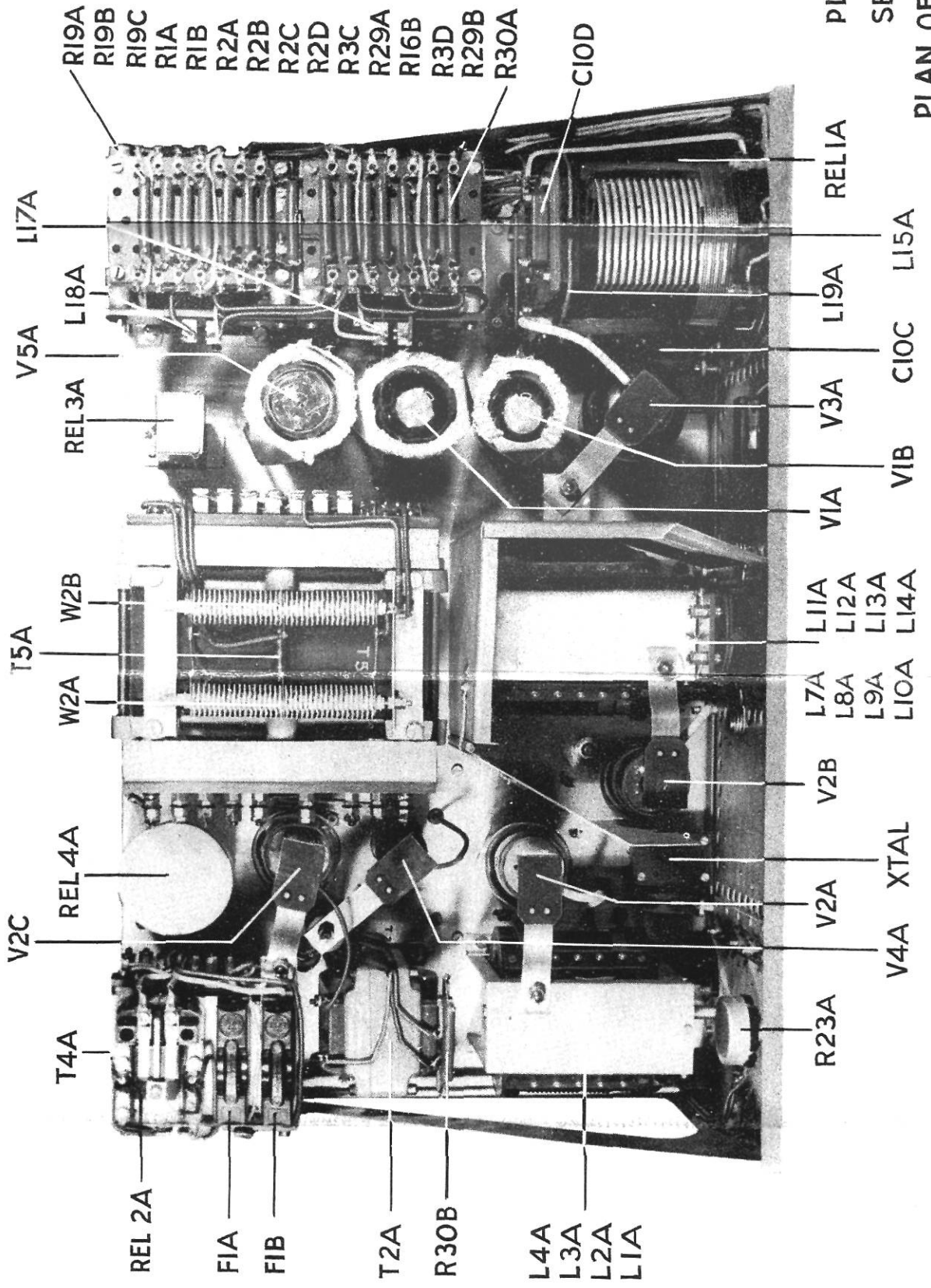


PLATE I  
SENDER.  
FRONT PANEL





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PLAN OF INTERIOR

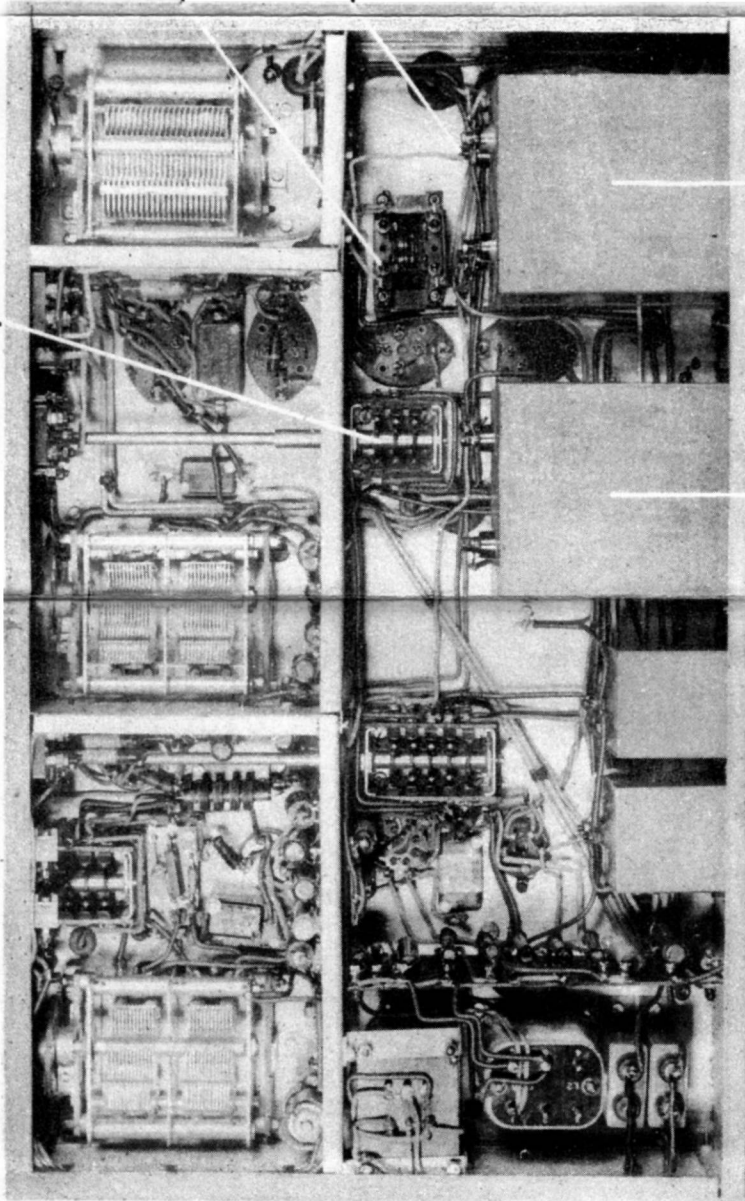
PLATE II  
SENDER.



S5

T1A

C15A



C21B

C21A

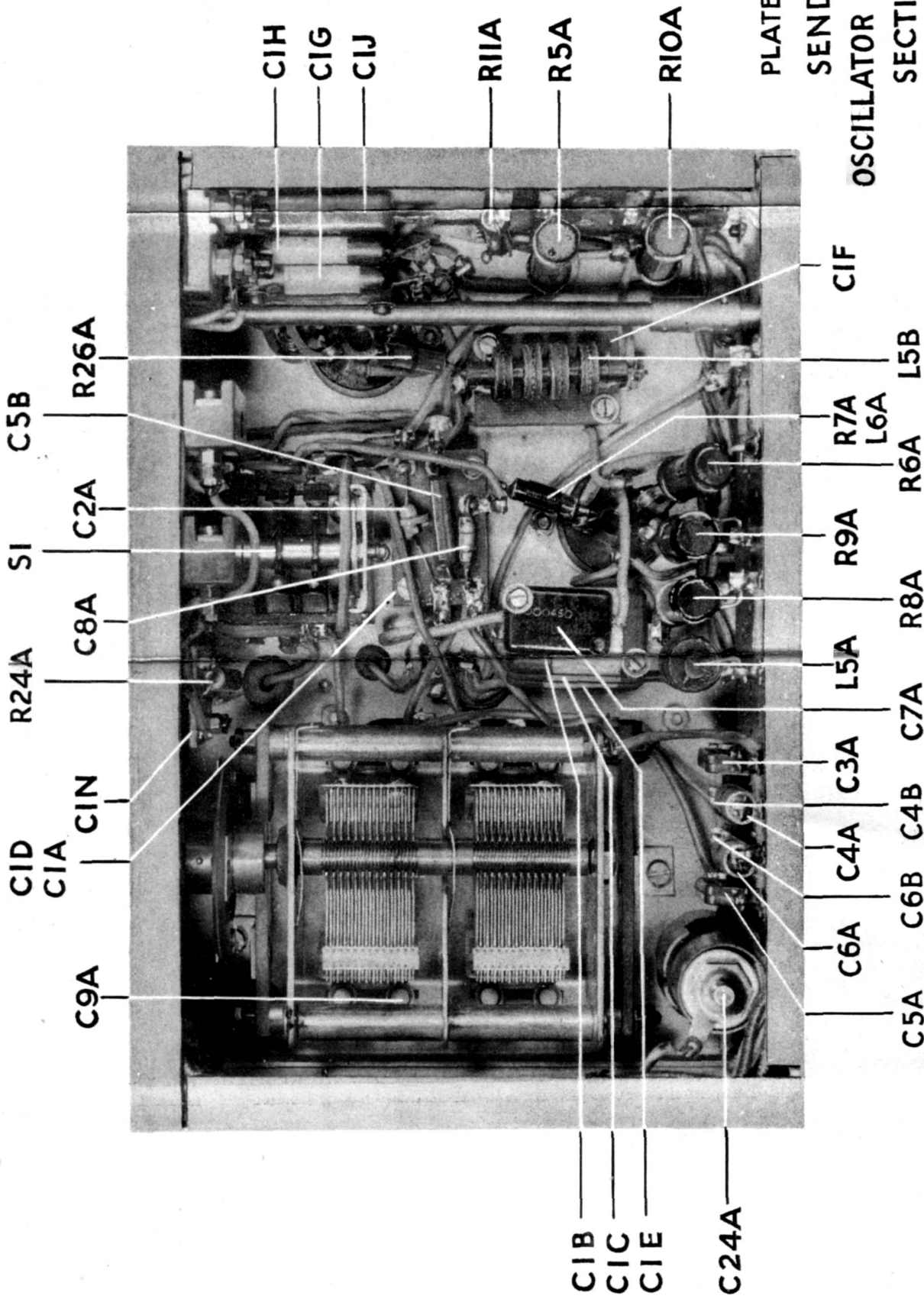
PLATE III

SENDER.

UNDERSIDE OF CHASSIS

1/5/41.

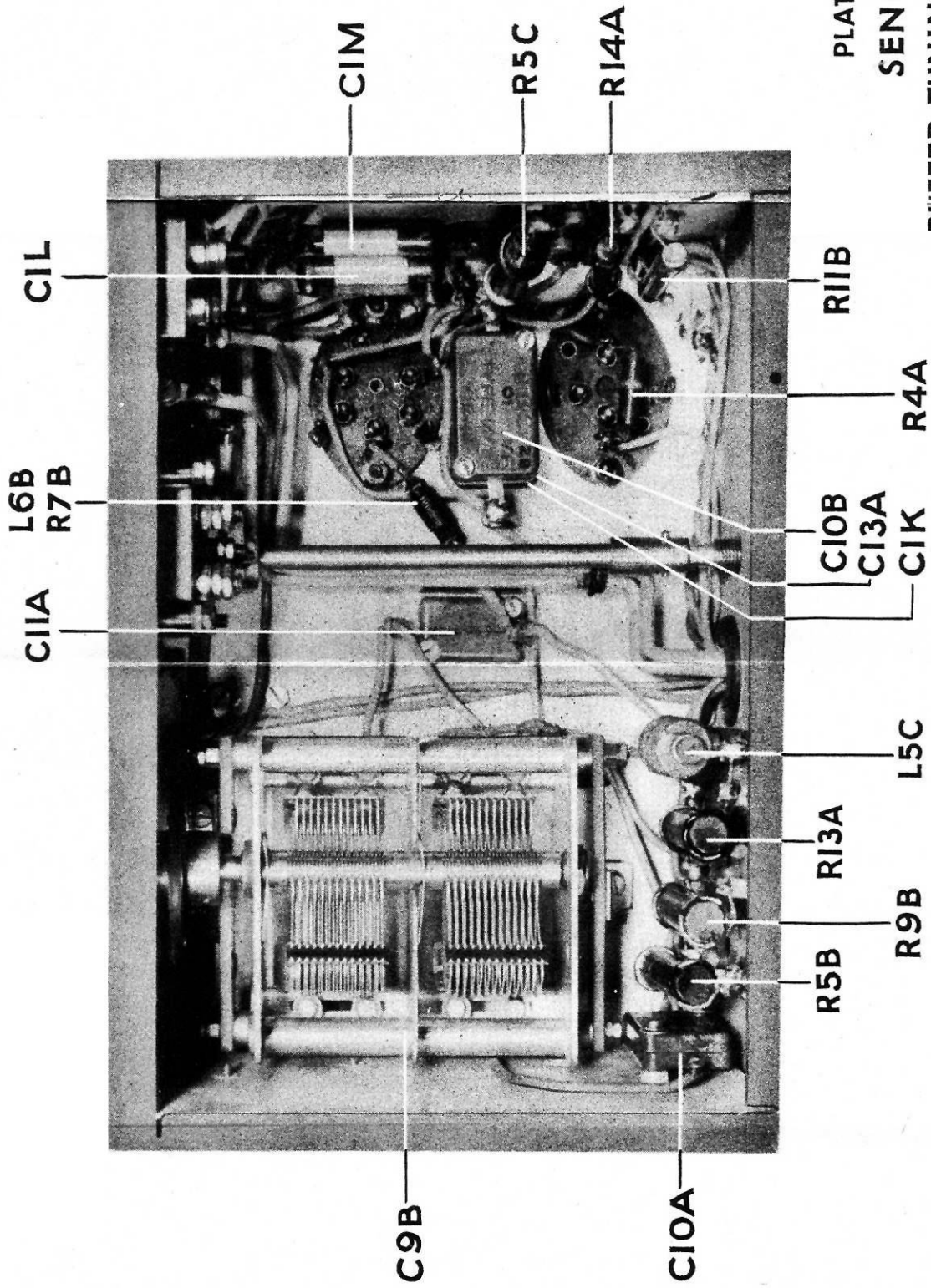




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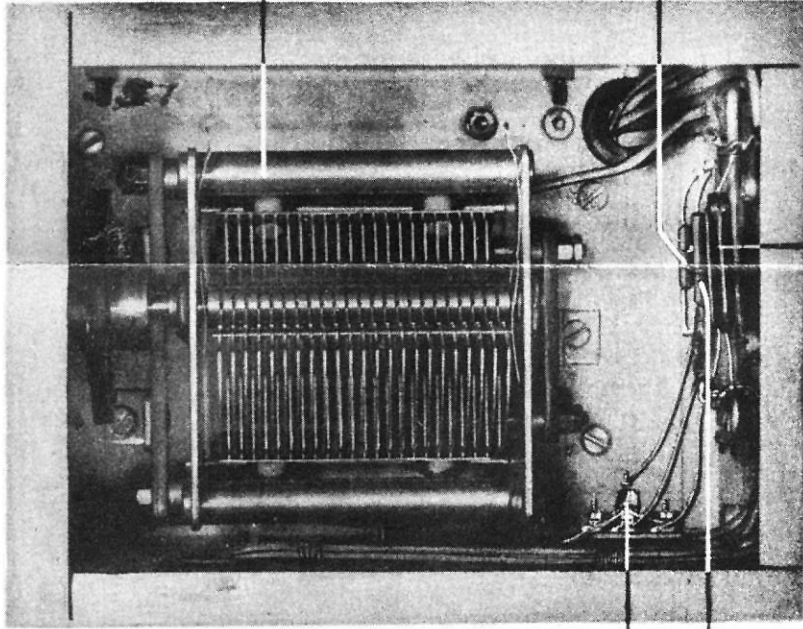






BUFFER TUNING CONDENSER  
 AND P.A. SECTION





C12A

C8B

V6A

R15A

C14A

In later sets this compartment includes  
a metal rectifier. (See Page 41).

PLATE VI

SENDER.

P.A. TUNING CONDENSER  
& SIDETONE SECTION



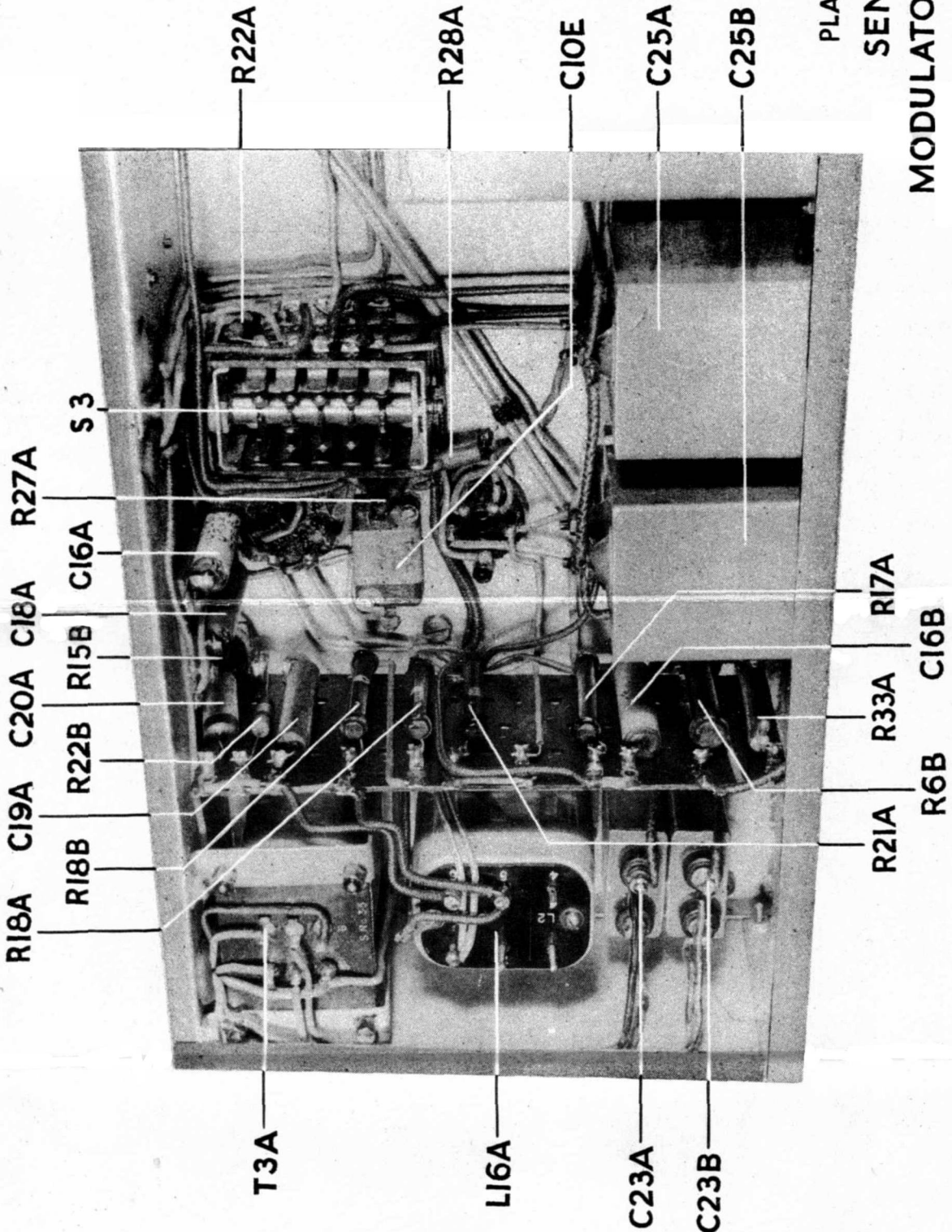
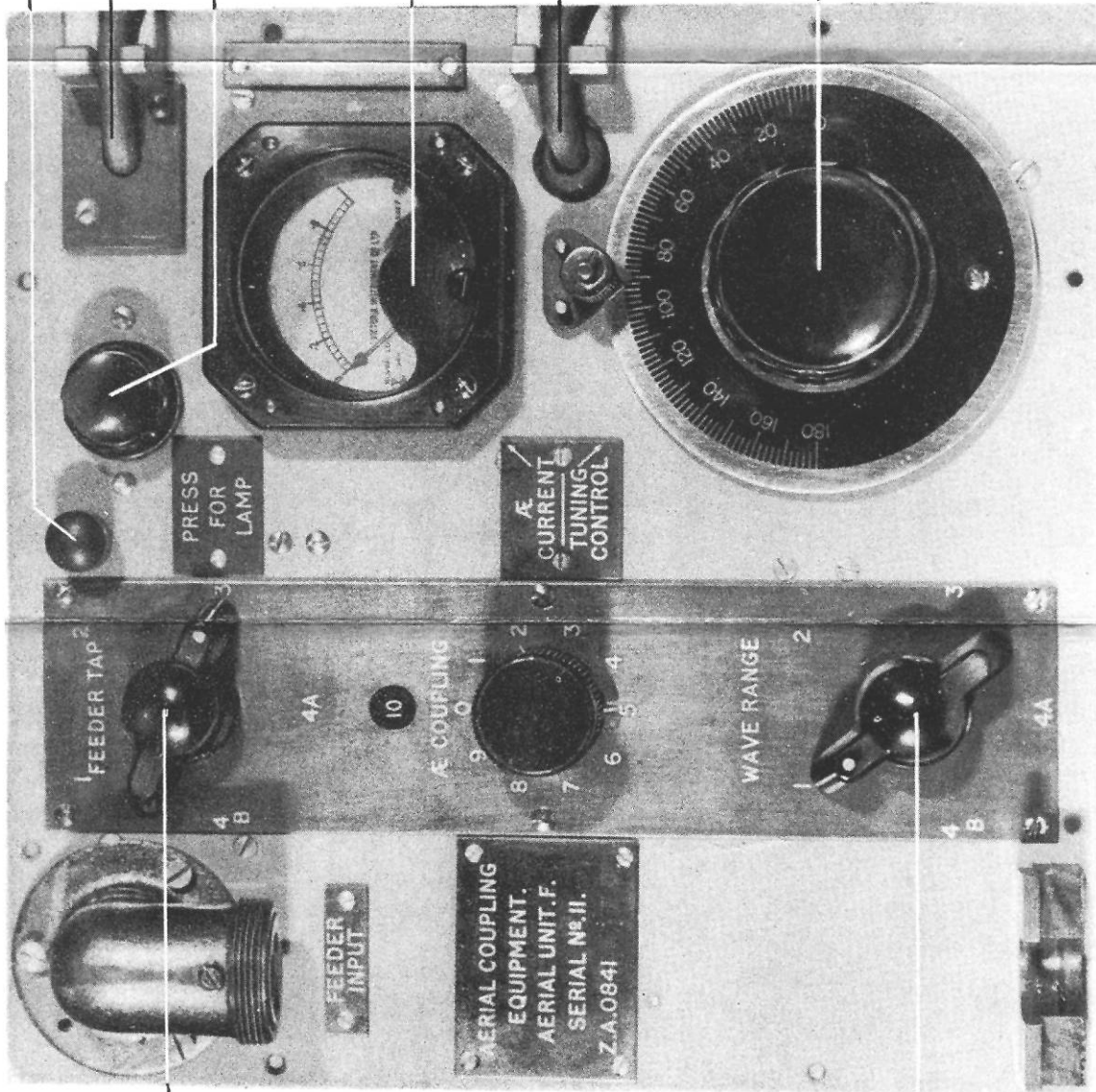


PLATE VII  
 SENDER.  
 MODULATOR SECTION





S1

AERIAL LEAD

PIA

MIA

EARTH LEAD

CIA

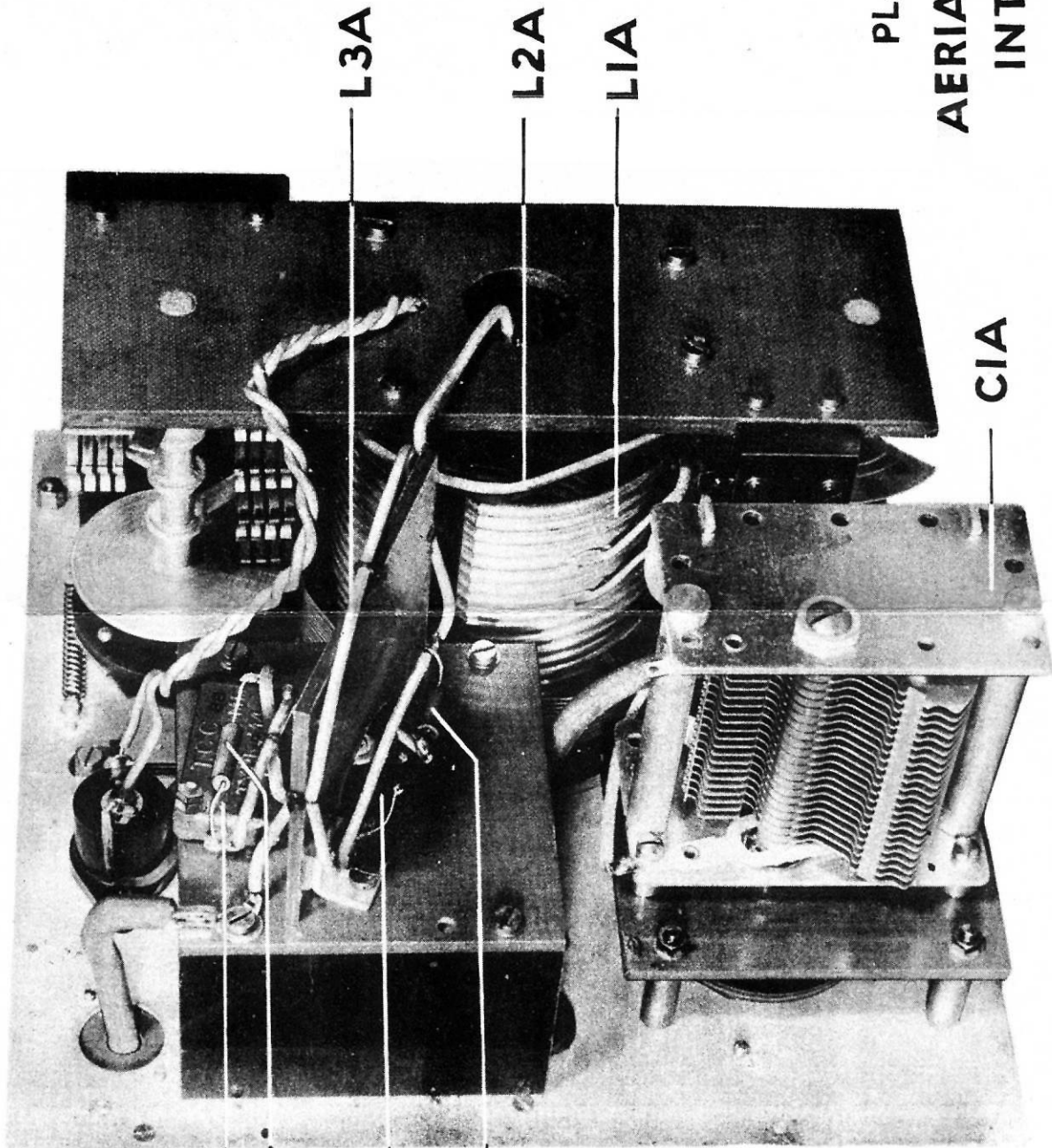
S2

S3

PLATE VIII  
 AERIAL UNIT F  
 FRONT PANEL







C2A

R3A

W1A

R1A

L3A

L2A

L1A

CIA

PLATE IX  
AERIAL UNIT F  
INTERIOR



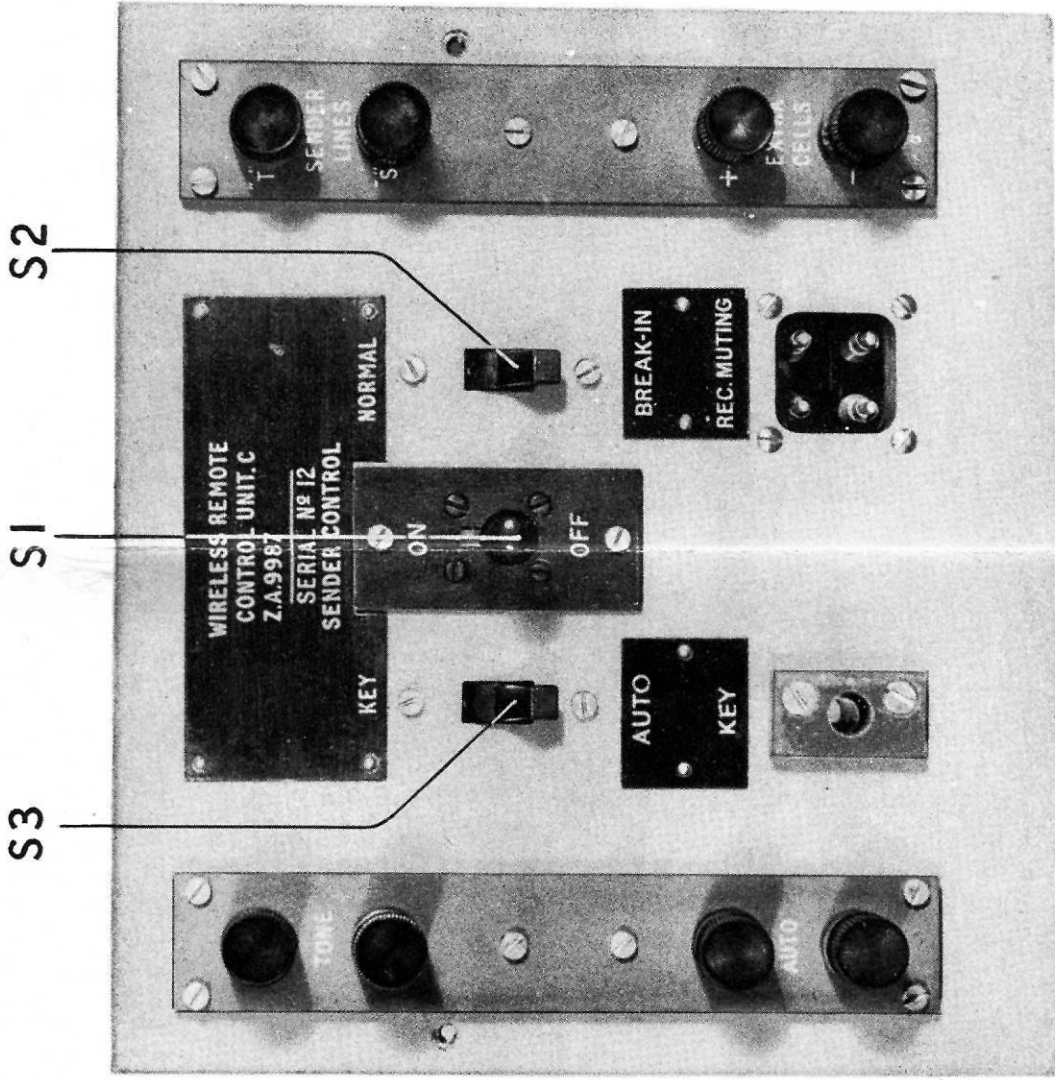


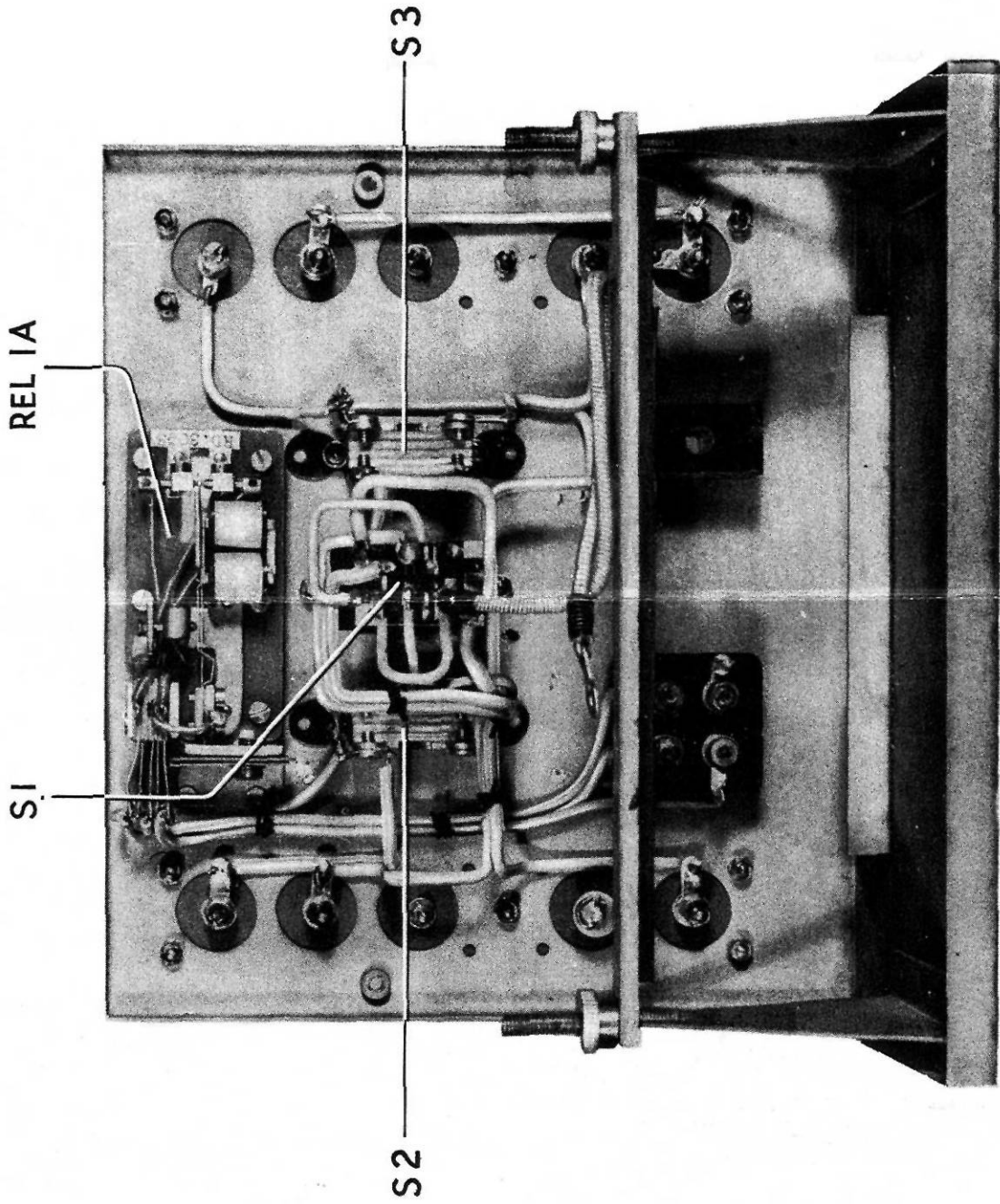
PLATE X

WIRELESS REMOTE CONTROL UNIT C.

FRONT PANEL

1/5/41





1/5/41

WIRELESS REMOTE CONTROL UNIT C.



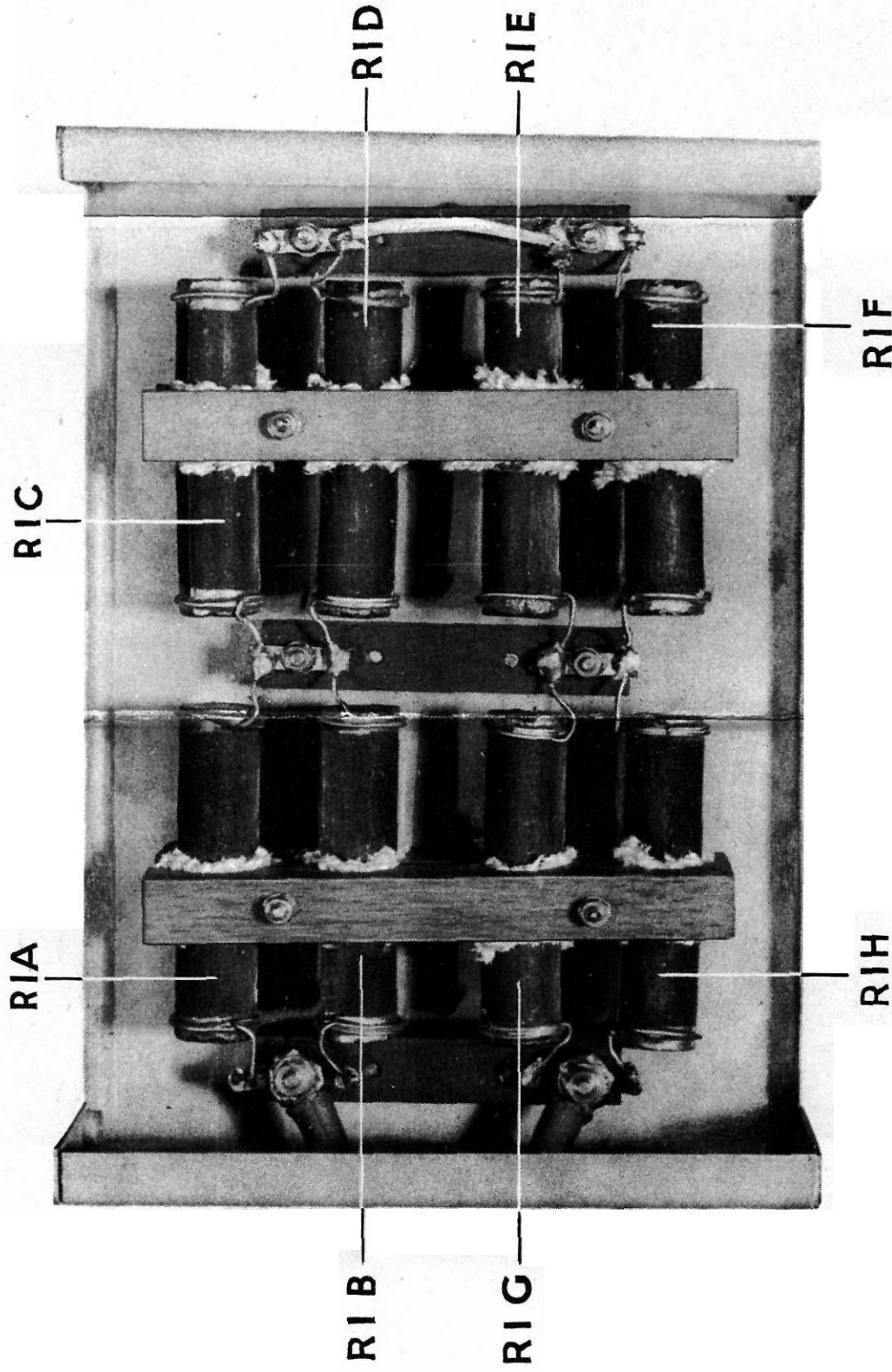


PLATE XII

DUMMY AERIAL. INTERIOR

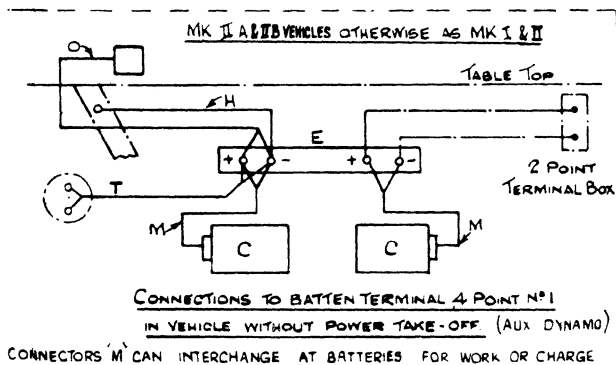
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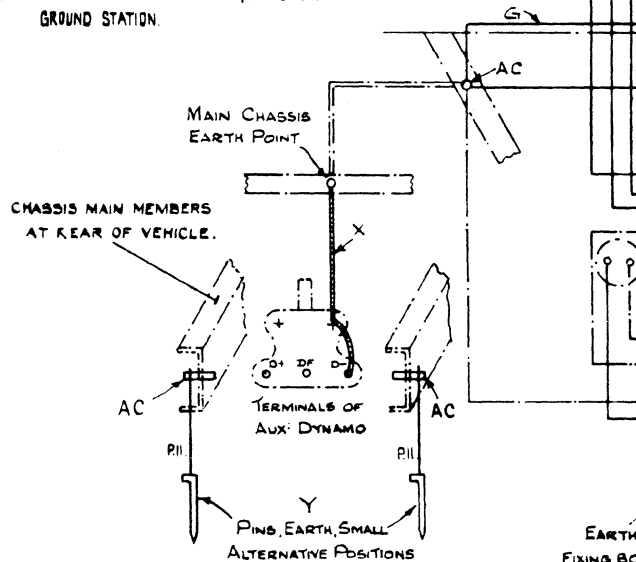
FIG. 2. WIRING

CAT. N°	EQUIPMENT	LETTER	N° OFF		REMARKS
			MARK I	MARK II	
ZA 0909	AERIALS DIPOLE N° 5	A	1	1	
* ZA 10706	AERIALS ROOF N° 5	B	1	-	ALREADY FITTED ON MK I, II & III VEHICLES
ZB 0220	BATTERIES, SEC. PORT 12 V 75 A.H.	C	2	2	
* ZA 0899	BATTENS TERMINAL, 3 POINT, N° 4	D	1	1	
* ZA 10120	BATTENS TERMINAL, 4 POINT, N° 1.	E	-	1	SWITCHBOARD CHARGING N° 5 FITTED IN MK I & II VEHICLES.
* ZA 0875	CONNECTOR, SINGLE, N° 21 A.	F	1	1	
* ZA 3127	CONNECTOR, SINGLE, N° 22	G	1	1	
* ZA 10017	CONNECTOR, SINGLE, N° 25	H	1	1	
* ZA 10712	CONNECTOR, SINGLE, N° 26 A	J	1	-	MK II & III VEHICLES NOT FITTED WITH AUX DYNAMO CONTROL BOARD.
* ZA 10047	CONNECTOR, SINGLE, N° 27	K	1	1	
* ZA 10713	CONNECTOR, SINGLE, N° 26	L	1	-	MK II & III VEHICLES NOT FITTED WITH AUX DYNAMO CONTROL BOARD.
* ZA 2417	CONNECTOR, TWIN, N° 28 A	M	2	2	
* ZA 0976	CONNECTOR, TWIN, N° 60	N	1	1	
ZA 0977	CONNECTOR, TWIN, N° 61	O	1	1	
ZA 0978	CONNECTOR, TWIN, N° 62	P	1	1	
ZA 0981	CONNECTOR, TWIN, N° 64	Q	1	1	
ZA 0982	CONNECTOR, TWIN, N° 65	R	1	1	
ZA 0983	CONNECTOR, TWIN, N° 66	S	1	1	
* ZA 10740	CONNECTOR, TWIN, N° 83	T	1	1	LIGHTING CIRCUIT IS CONNECTED TO VEHICLE BATTERY IN MK II & III VEHICLES.
ZA 0984	CONNECTOR, 3 POINT N° 9	U	1	1	
* ZA 0891	INSULATORS W/T AERIAL LEAD IN N° 12	V	1	1	FITTED TO VEHICLE BUT NOT IN USE
ZA 4500	KEY & PLUG ASSEMBLIES N° 2 B	W	1	1	WITH SLIDE N° 1, Z.A. 4381.
* ZA 10737	LEADS, EARTHING	X	1	-	MK II & III VEHICLES NOT FITTED WITH AUX DYNAMO.
YA 1152	PINS, EARTH, SMALL	Y	1	1	
ZB 0170	POWER UNITS DC/AC 250 WATT N° 1	Z	1	1	(POWER UNITS DC/AC 250 WATT N° 1 (AMERICAN) EITHER POWER UNITS DC/AC 250 WATT REF. (AMERICAN) 11A)
ZA 3060	RECEPTION SETS R 107	AA	1	1	WITH CARRIER N° 1, Z.A. 3221.
ZA 3236	RECEIVERS HEADSAR CLR DOUBLE N° 1 OR 2 OR CLR, MK III	AB	2	2	
* ZA 10735	STUDS, EARTHING	AC	4	4	
ZB 0239	SWITCHBOARDS A.C. N° 1	AD	1	1	
ZA 0987	WIRELESS REMOTE CONTROL UNITS 'C'	AE	1	1	
ZA 10079	WIRELESS SETS N° 12, LEADS N° 2	AF	1	1	
ZA 10020	WIRELESS SETS N° 12 SMOOTHING UNITS D.C.	AG	1	-	MK II & III VEHICLES NOT FITTED WITH AUX DYNAMO CONTROL BOARD.
* ZB 0183	SWITCHBOARDS CHARGING N° 5	AH	1	-	BATTENS TERMINALS 4-POINT N° 1 FITTED IN MK II & III VEHICLES.



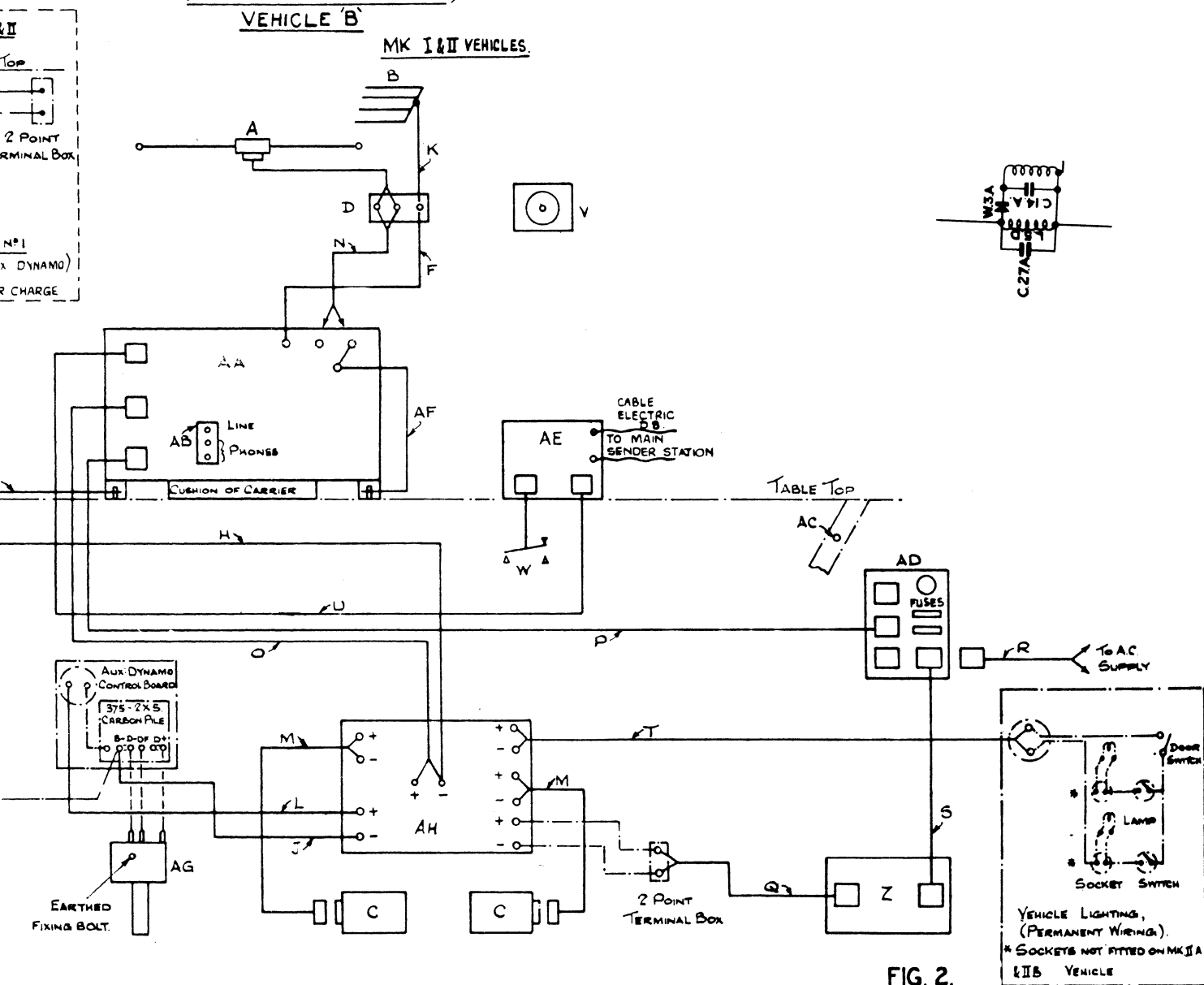
NOTES:-

- ITEMS SHOWN CHAIN-DOTTED ARE EXISTING FITTINGS ON VEHICLE
- ITEM Z ALSO KNOWN AS GENERATING SETS D.M.B DC/AC 250 WATT
- STARRED ITEMS NOT REQUIRED FOR GROUND STATION.





**FIG. 2. WIRELESS SETS No 12, COMPLETE STATIONS, 12 B IN TRUCKS, 15 CWT. 4 WHEELED, WIRELESS MK I, II, IIA & IIB (REMOTE RECEIVER STATION)**

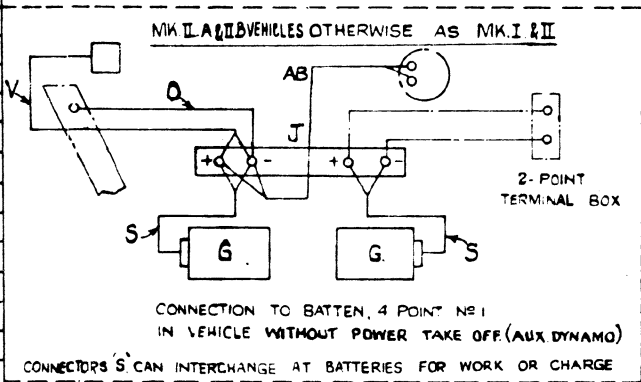


**FIG. 2.**



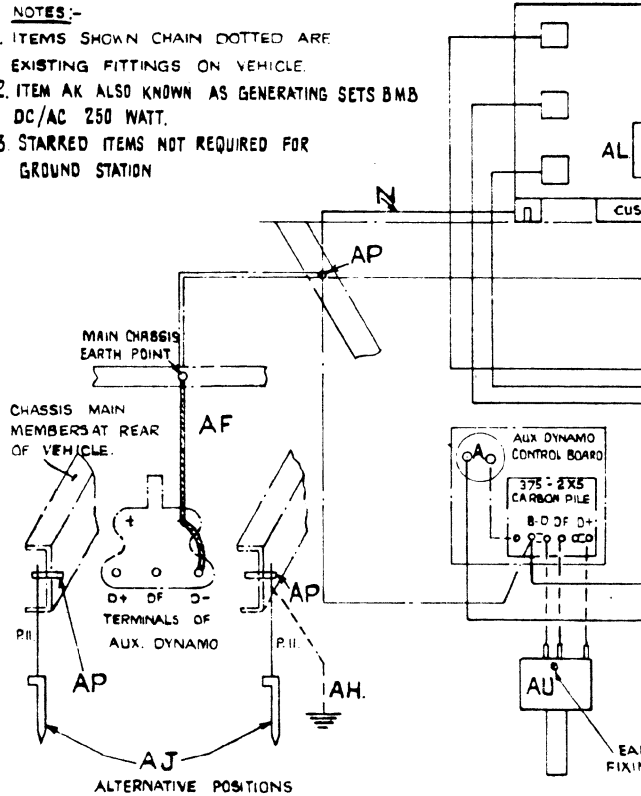
FIG. 3. WIRELESS  
15 CW

CAT. NO.	EQUIPMENT	LETTER	N° OFF		REMARKS.
			MK I & II VEHICLES	MK I & II VEHICLES	
Z.A.0905	AERIAL, 100 FT. N° 1.	A	1	1	
Z.A.0841	AERIAL COUPLING EQUIPMENT, AERIAL UNIT F.	B	1	1	
Z.A.0986	AERIAL COUPLING EQUIPMENT, SET UNIT, "F".	C	1	1	
Z.A.0885	AERIALS DIPOLE N° 4 A	D	1	1	
Z.A.0886	AERIALS DIPOLE N° 4 B	E	1	1	
Z.A.10706	AERIALS, ROOF N° 5.	F	1	-	ALREADY FITTED ON MK I, IA & IB VEHICLES.
Z.B.0220	BATTERIES SEC. PORT. 12.V. 75 A.H.	G	2	2	
* Z.A.0899	BATTENS, TERMINAL, 3 POINT N° 4	H	1	1	
* Z.A.10120	BATTENS, TERMINAL, 4 POINT N° 1.	J	-	1	SWITCHBOARD CHARGING N° 5 FITTED IN MK I & II VEHICLES.
* Z.A.2250	CONNECTORS, SINGLE, N° 10	K	1	1	
* Z.A.0973	CONNECTORS, SINGLE, N° 12 A	L	1	1	
* Z.A.0975	CONNECTORS, SINGLE, N° 21 A	M	1	1	
* Z.A.3127	CONNECTORS, SINGLE, N° 22	N	2	2	
* Z.A.10017	CONNECTORS, SINGLE, N° 25	O	1	1	
* Z.A.10712	CONNECTORS, SINGLE, N° 26 A	P	1	-	MK I & II VEHICLES NOT FITTED WITH AUX. DYNAMO CONTROL BOARD
* Z.A.10047	CONNECTORS, SINGLE, N° 27	Q	1	1	
* Z.A.10713	CONNECTORS, SINGLE, N° 28	R	1	-	MK I & II VEHICLES NOT FITTED WITH AUX. DYNAMO CONTROL BOARD.
* Z.A.2417	CONNECTORS TWIN, N° 28 A	S	2	2	
Z.A.0987	CONNECTORS, TWIN, N° 56	T	2	2	
* Z.A.0976	CONNECTORS, TWIN, N° 60	U	1	1	
Z.A.0977	CONNECTORS, TWIN, N° 61	V	1	1	
Z.A.0978	CONNECTORS TWIN, N° 62	W	1	1	
Z.A.0979	CONNECTORS, TWIN, N° 63	X	1	1	
Z.A.0981	CONNECTORS, TWIN, N° 64	Y	1	1	
Z.A.0982	CONNECTORS, TWIN, N° 65	Z	1	1	
Z.A.0983	CONNECTORS TWIN, N° 66	AA	1	1	
* Z.A.10740	CONNECTORS TWIN, N° 83	AB	1	1	LIGHTING CIRCUIT IS CONNECTED TO VEHICLE BATTERY IN MK II A VEHICLE
Z.A.0984	CONNECTORS 3 POINT N° 9	AC	1	1	
* Z.A.0881	INSULATORS W.T. AERIAL, LEAD-IN N° 12	AD	1	1	
Z.A.4500	KEY & PLUG ASSEMBLIES N° 2B	AE	1	1	WITH SLIDE N° 1. Z.A. 4381
* Z.A.10179/7	LEADS, EARTHING	AF	1	-	FOR EARTHING AUX. DYNAMO IN MK I & II VEHICLES
Z.A.5313	MICROPHONES, HAND, N° 4	AG	1	1	
Z.A.5484	NETS, EARTH, 14 FT.	AH	1	1	USED ALTERNATIVELY WITH SENDER OR AERIAL COUPLING EQUIPT. AE UNIT F.
YA.1152	PINS, EARTH, SMALL	AJ	1	1	
Z.B.0170	POWER UNITS DC/AC 250 WATT N° 1	AK	1	1	(POWER UNITS DC/AC 250 WATT N° 1 (AMERICAN) EITHER (POWER UNITS DC/AC 250 WATT N° 1 (AMERICAN) A
Z.A.3236	RECEIVERS, HEADGEAR OLR DOUBLE N° 1, OR 2, OR C.L.R. MK. II.	AL	2	2	
Z.A.3050	RECEPTION SETS, R. 107	AM	1	1	WITH CARRIERS N° 1 Z.A. 3221
Z.B.0230	SWITCHBOARDS A.C. N° 1.	AN	1	1	
* Z.B.0183	SWITCHBOARDS CHARGING N° 5	AO	1	-	BATTENS TERMINALS 4-POINT N° 1 FITTED IN MK. II A & IB VEHICLES.
* Z.A.10179/5	STUDS, EARTHING	AP	4	4	
Z.A.3219	WIRELESS REMOTE CONTROL UNIT ADAPTOR C	AQ	1	1	
Z.A.3252	WIRELESS SETS, N° 12 DUMMY AERIAL	AR	1	1	
Z.A.3222	WIRELESS SETS N° 12. LEADS N° 1.	AS	1	1	
Z.A.3244	WIRELESS SETS N° 12. SENDER	AT	1	1	WITH CARRIERS N° 1 Z.A. 3128.
* Z.A.10020	WIRELESS SETS N° 12. SMOOTHING UNITS DC	AU	1	-	MK I & II VEHICLES NOT FITTED WITH AUX. DYNAMO CONTROL BOARD.



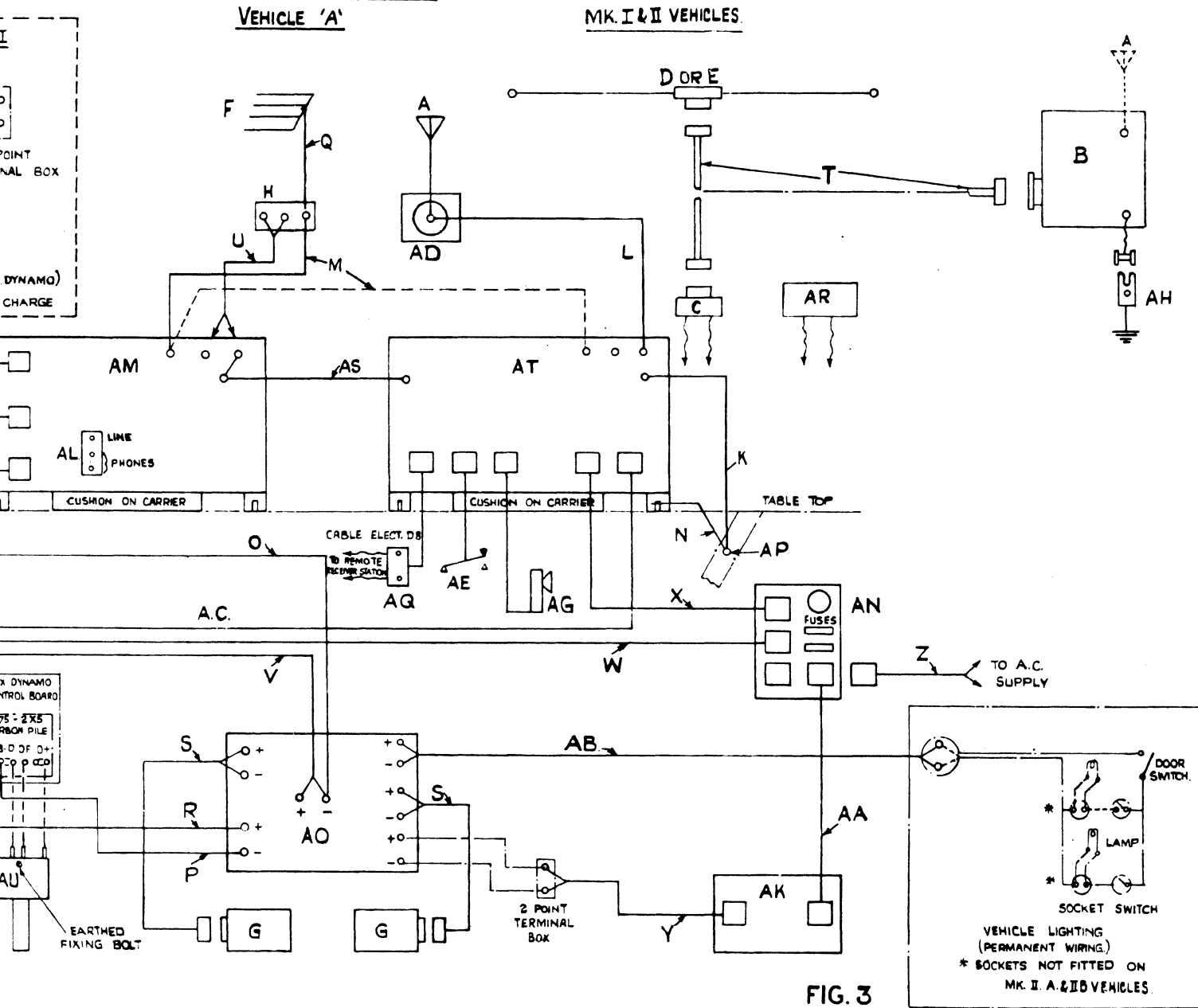
NOTES:-

1. ITEMS SHOWN CHAIN DOTTED ARE EXISTING FITTINGS ON VEHICLE.
2. ITEM AK ALSO KNOWN AS GENERATING SETS BMB DC/AC 250 WATT.
3. STARRED ITEMS NOT REQUIRED FOR GROUND STATION





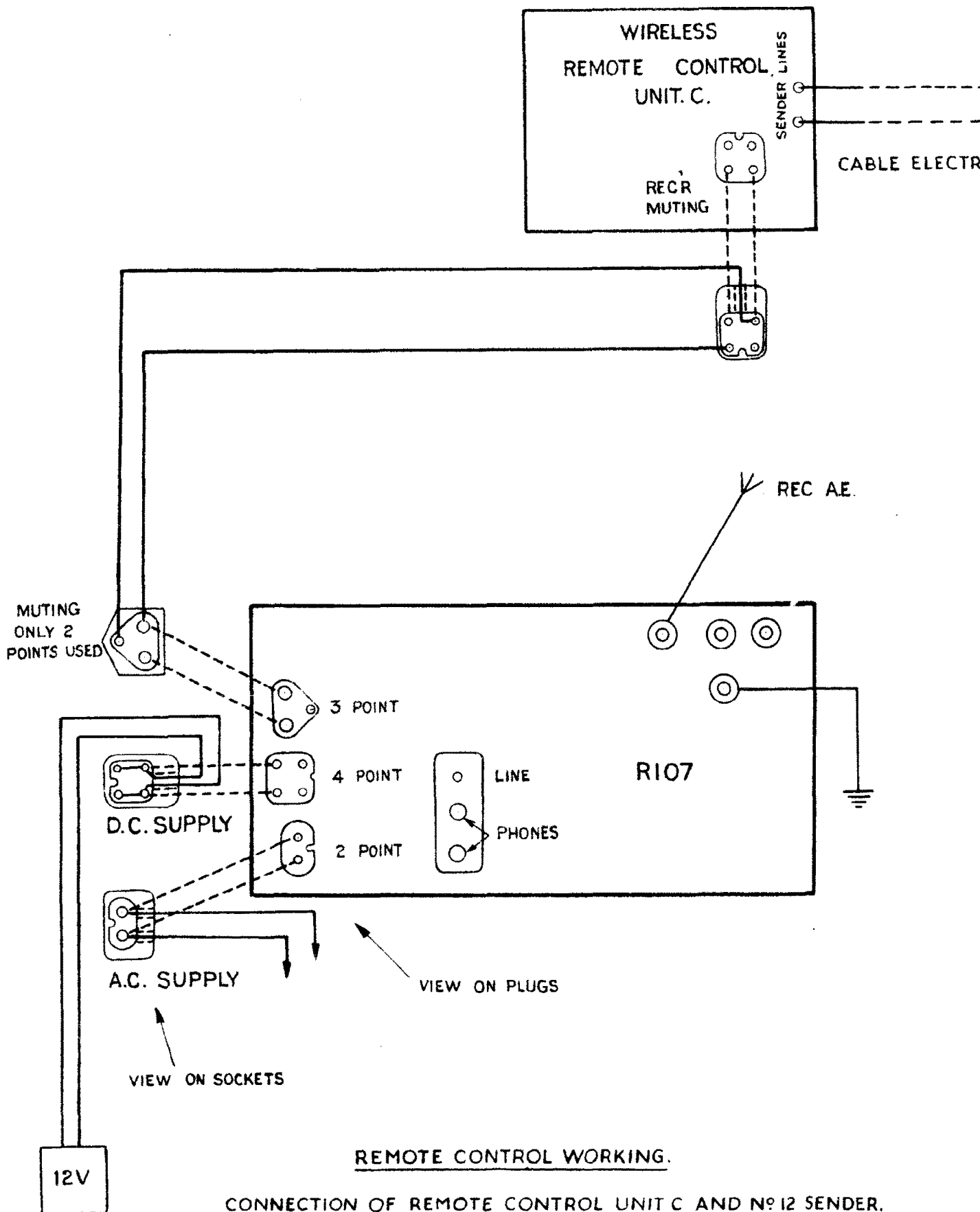
**WIRELESS SETS No 12, COMPLETE STATIONS 12 B IN TRUCKS**  
**15 CWT. 4 WHEELED, WIRELESS, MK I & MK II, IA & IB.**  
**(MAIN SENDER STATION)**



**FIG. 3**



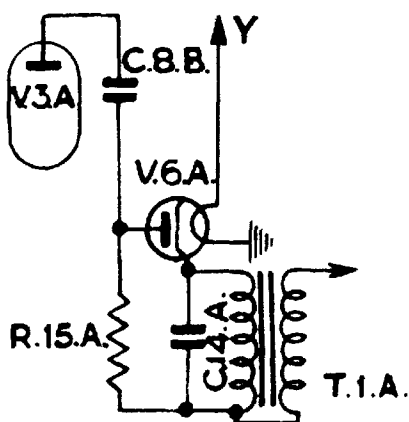




**FIG. 4.**

## CIRCUIT CHANGE

Below is the modified Sidetone Circuit in which the Rectifier J.50 (W3A) is now replaced by a Diode Valve E.A.50 (V.6A).



This circuit replaces that shown in Fig. 5 and cancels the notes on Pages 31, 37 and Plate VI. which illustrates the above Sidetone arrangement.

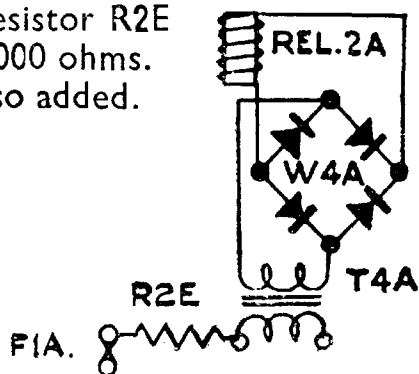
The following components are also affected.

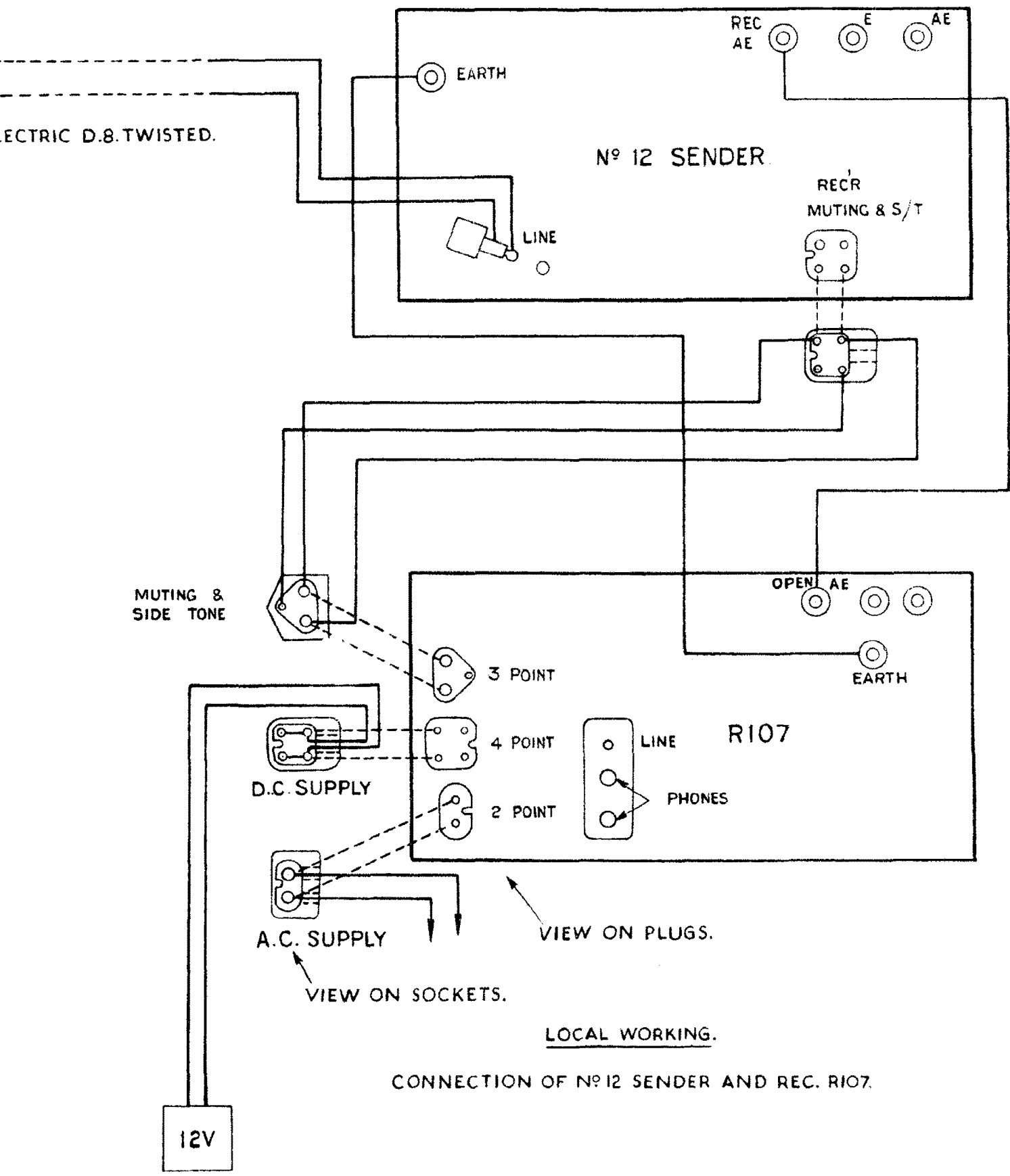
- C.8B Replaces C.26A
- R15A „ L.5D
- C.27 is deleted

## WIRELESS SET No. 12 Mk. II ZA 21887

In this series only, a Rectifier W.4.A. (ZA22059) has been added between Relay 2A and Transformer T.4.A. for use with single Phase A.C. Supply of between 100V. and 250V. at 45-500 c/s. As shown below :-

Resistor R2E  
5,000 ohms.  
also added.





**FIG. 4.**







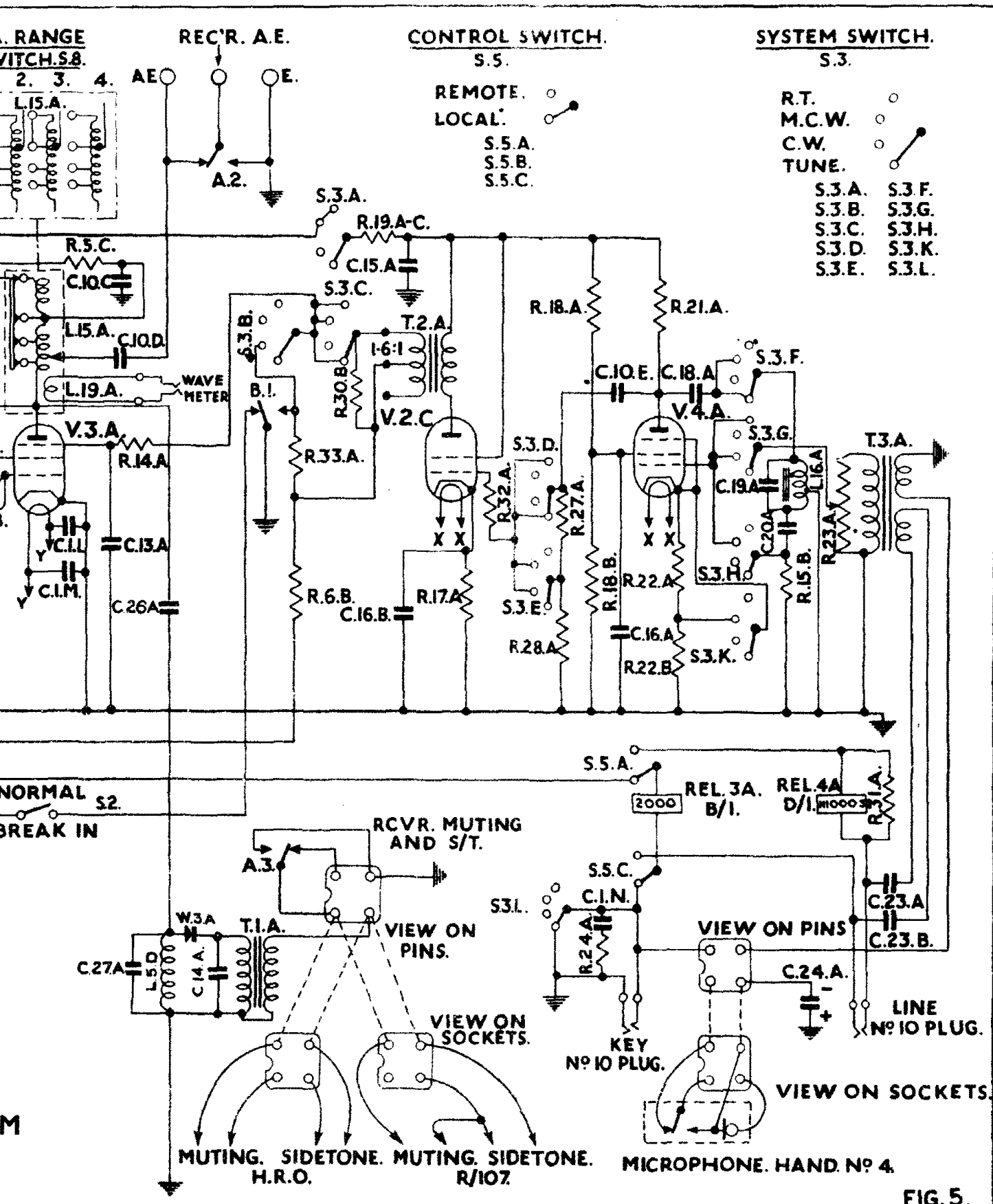
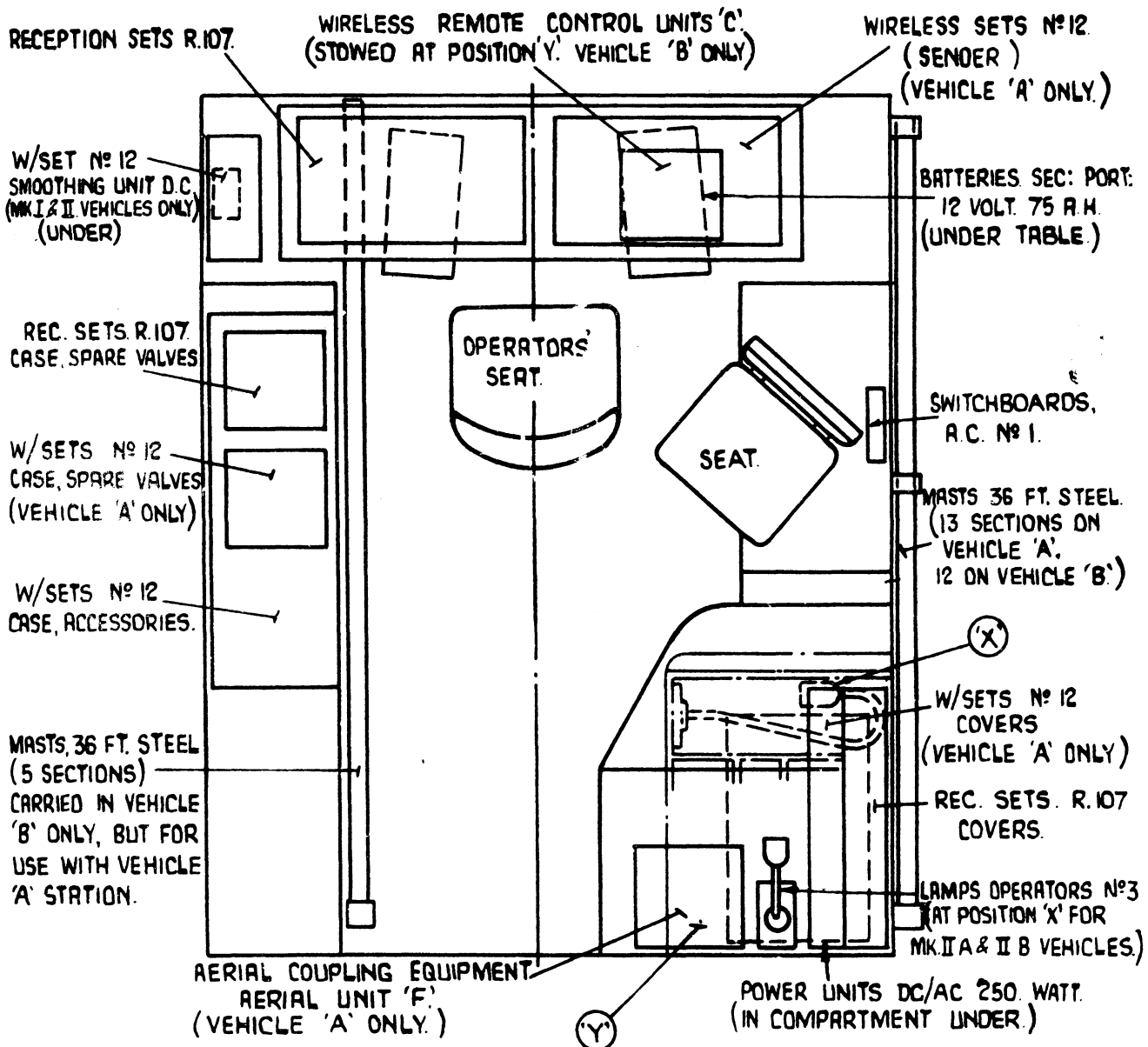
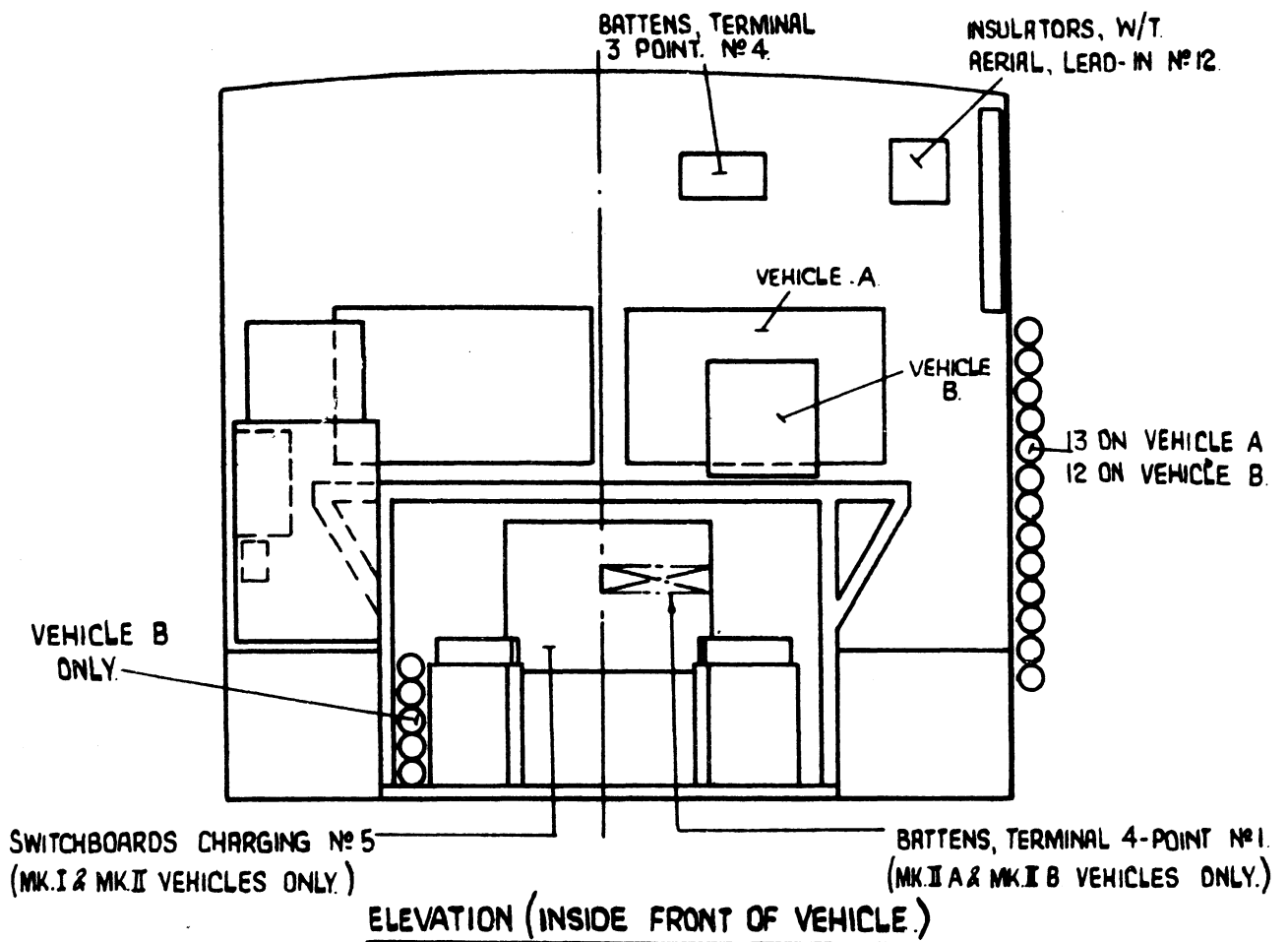


FIG. 5.

C10.C	C10.D	C15.A	C10.E	C18.A	C19.A	C23.A
C1.L	C26.A	C16.B	C1.N	C18.A	C20.A	C23.B
C1.M	C27.A		C16.A			
R5.C	R14.A	R33.A	R18.B	R21.A	R23.A	R31.A
		R19.A-C	R18.B	R22.A	R15.B	
		R30.B	R27.A	R22.A		
		R6.B	R28.A	R22.B		
S2.	A2.	A3.B1.S3B.S3C.S3A.	S3L.S3E.S3D.S5A.S5C.S3K.S3H.S3G.S3F.REL.3A.REL.4A			
6B.L15A.L19A.L5.D	T1A.	T2A.			L16.A.T3A	







**FIG. 6. WIRELESS SETS No. 12**  
**IN TRUCKS, 15 CWT. 4 WHEELED, WIRELESS, MK.I, II, II A, & II B.**



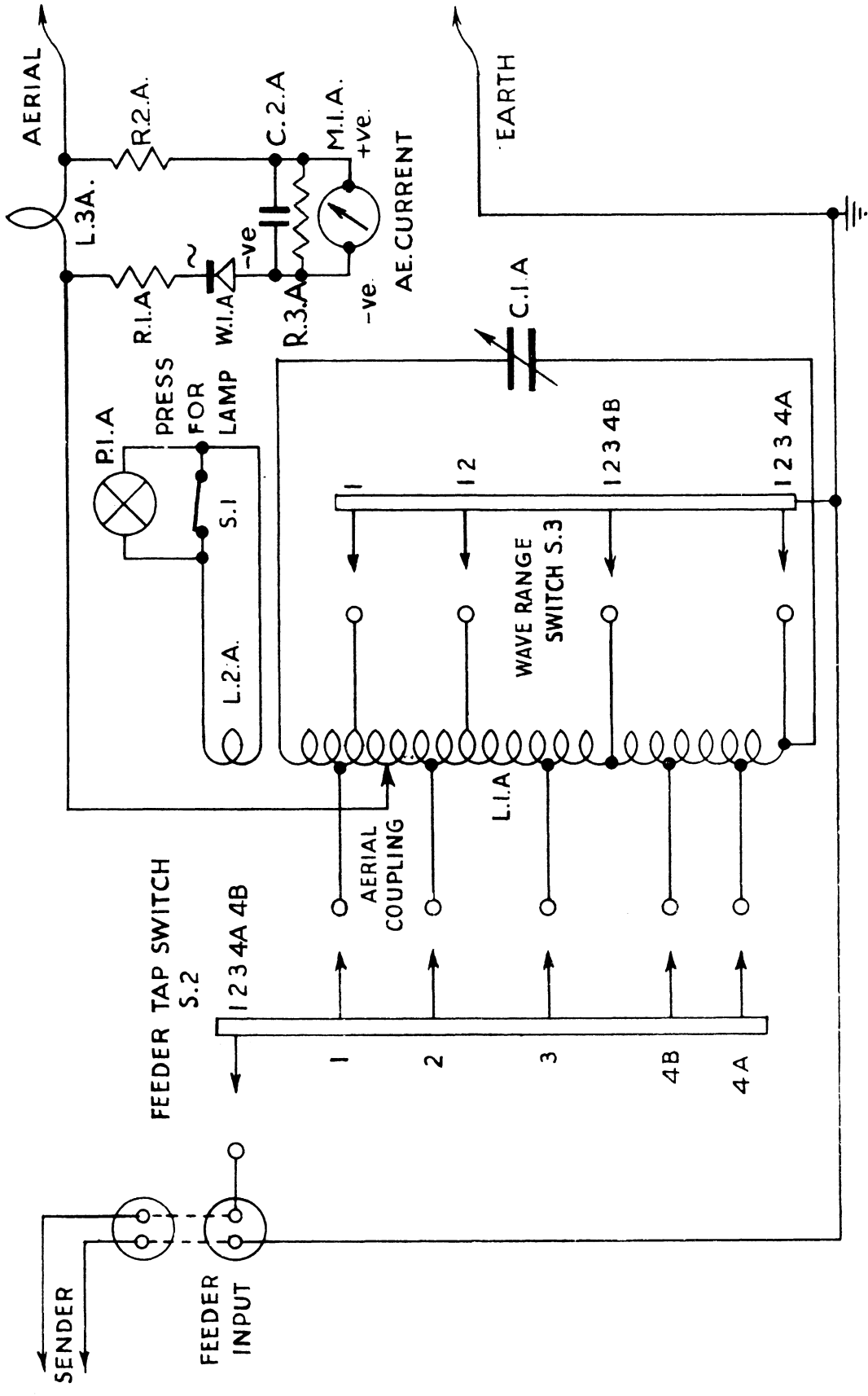


FIG.7

CIRCUIT DIAGRAM OF AERIAL UNIT 'F.'



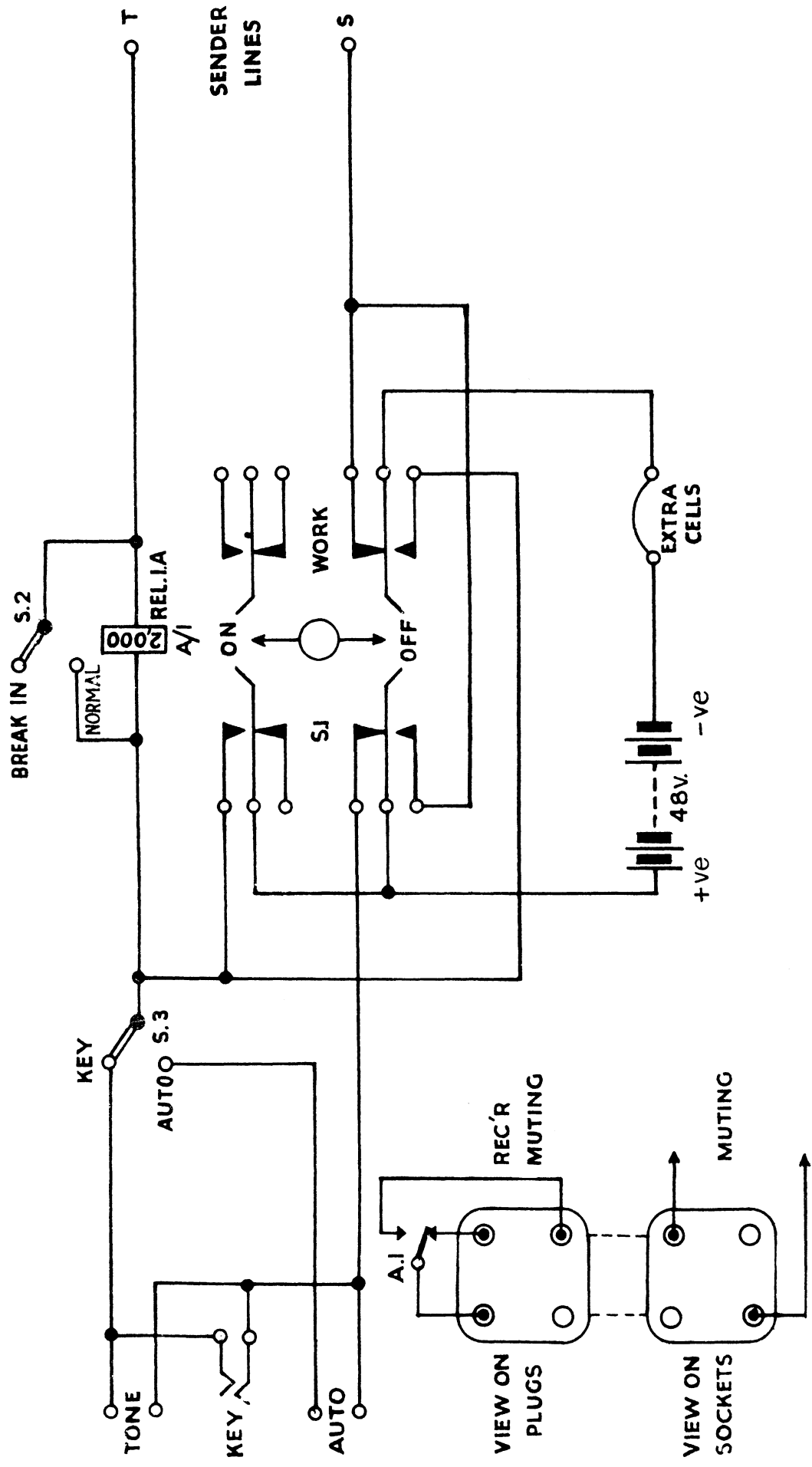
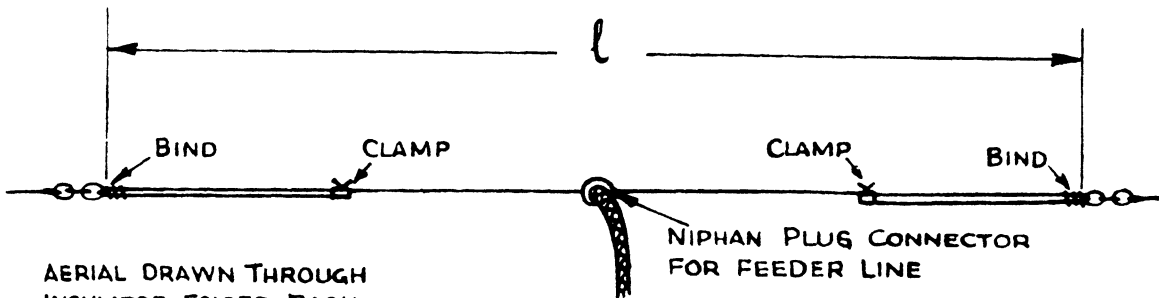
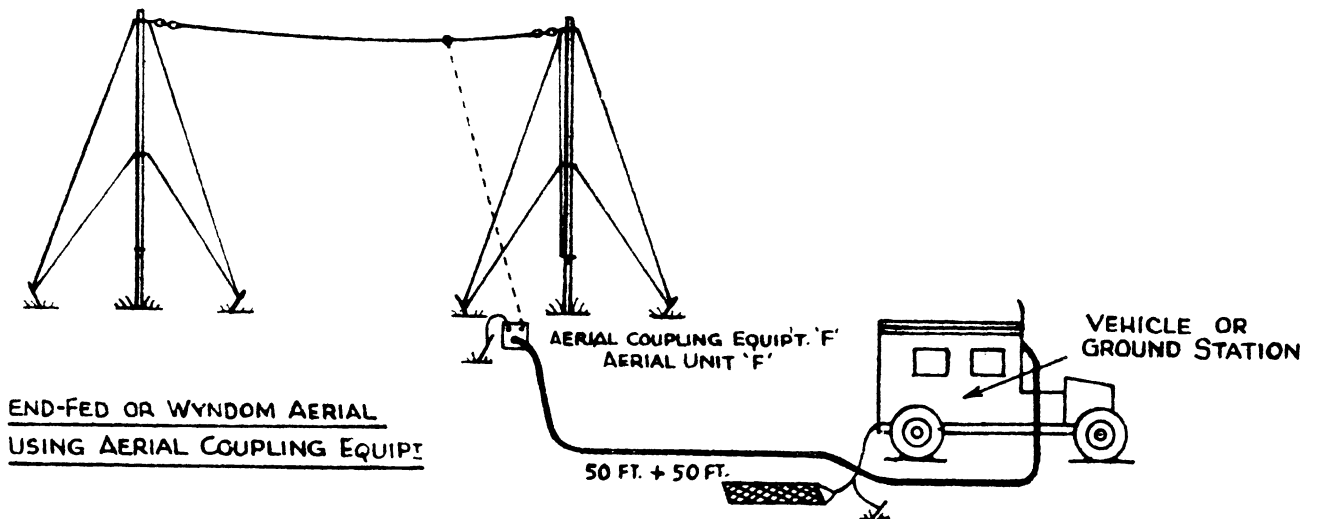
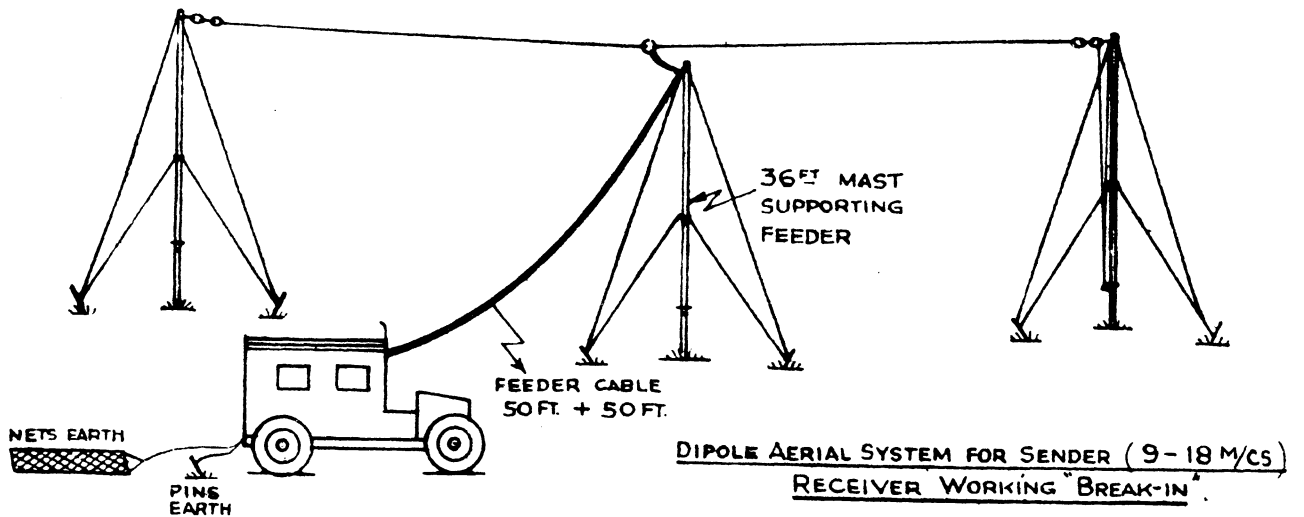


FIG. 9

CIRCUIT DIAGRAM  
OF WIRELESS REMOTE CONTROL UNIT C



# AERIALS



AERIAL DRAWN THROUGH INSULATOR, FOLDED BACK ALONG ITSELF TO GIVE THE CORRECT LENGTH, AND CLAMPED.

$$l \text{ (in feet)} = \frac{467.4}{F}$$

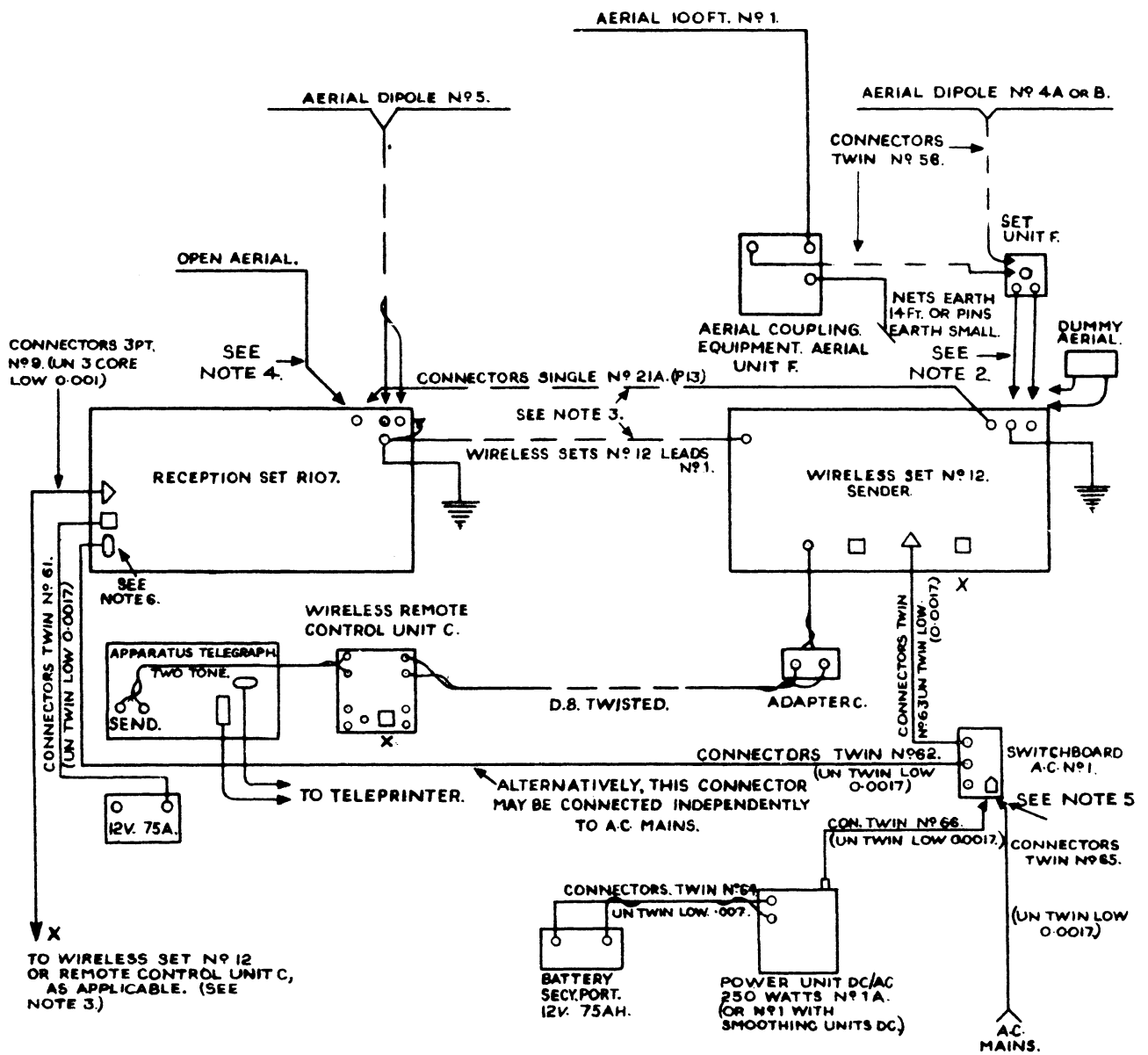
where F = frequency in MC/s

ADJUSTABLE DIPOLES FOR  
5-10 MC/S AND 9-18 MC/S

FIG 10







**NOTES:**

1. All connectors, except Connectors Twin No.56, may easily be lengthened as required. The connectors were originally intended for use in a vehicle.
2. Wireless Set No.12 may be connected directly to dipole aerial or to Aerial Unit F via Set Unit F and Connectors Twin No.56.
3. When Receiver is near Sender for break-in working Connectors 3 point No.9 and Single 21A are connected between Sender and Receiver; also Wireless Sets No.12 Leads No.1 may be used. When Receiver is remote from Sender Connector 3 Point No.9 is connected to Remote Control Unit and other two mentioned above are dispensed with.
4. Reception Set R.107 may be connected to sender aerial as above, to short open aerial or to dipole. See R.107 pamphlet.
5. The A.C. Supply may be obtained from Mains or Power Unit.
6. The Receiver may be operated from batteries or A.C. Supply.

FIG. 11.

**WIRELESS SET N° 12.**

ARRANGMENT AS GROUND STATION IN CONJUNCTION WITH RECEPTION SET RIO7 USING SPECIAL CONNECTIONS.



CAT: N°	EQUIPMENT	LETTER	N° OFF		REMARKS
			MAINTENANCE	VEHICLES	
Z.A. 0909	AERIALS DIPOLE N° 5	A	1	1	
* Z.A. 10706	AERIALS ROOF N° 5	B	1	-	ALREADY FITTED ON MK I, II, IA & IB VEHICLES.
Z.B. 0220	BATTERIES SEC. PORT 12V 75 A.H.	C	2	2	
* Z.A. 0899	BATTENS TERMINAL, 3 POINT, N° 4	D	1	1	
* Z.A. 10120	BATTENS TERMINAL, 4 POINT, N° 1.	E	-	1	SWITCHBOARD CHARGING N° 5 FITTED IN MK I & II VEHICLES.
* Z.A. 0975	CONNECTOR, SINGLE, N° 21 A.	F	1	1	
* Z.A. 3127	CONNECTOR, SINGLE, N° 22	G	1	1	
* Z.A. 10017	CONNECTOR, SINGLE, N° 25	H	1	1	
* Z.A. 10712	CONNECTOR, SINGLE, N° 26 A	J	1	-	MK IA & IB VEHICLES NOT FITTED WITH AUX DYNAMO CONTROL BOARD.
* Z.A. 10047	CONNECTOR, SINGLE, N° 27	K	1	1	
* Z.A. 10713	CONNECTOR, SINGLE, N° 28	L	1	-	MK IA & IB VEHICLES NOT FITTED WITH AUX DYNAMO CONTROL BOARD.
* Z.A. 2417	CONNECTOR, TWIN, N° 28 A	M	2	2	
* Z.A. 0976	CONNECTOR, TWIN, N° 60	N	1	1	
Z.A. 0977	CONNECTOR, TWIN, N° 61	O	1	1	
Z.A. 0978	CONNECTOR, TWIN, N° 62	P	1	1	
Z.A. 0981	CONNECTOR, TWIN, N° 64	Q	1	1	
Z.A. 0982	CONNECTOR, TWIN, N° 65	R	1	1	
Z.A. 0983	CONNECTOR, TWIN, N° 66	S	1	1	
* Z.A. 10740	CONNECTOR, TWIN, N° 83	T	1	1	LIGHTING CIRCUIT IS CONNECTED TO VEHICLE BATTERY IN MK IA & IB VEHICLES.
* Z.A. 0984	CONNECTOR, 3 POINT, N° 9	U	1	1	
* Z.A. 0891	INSULATORS W/ AERIAL LEAD IN N° 12	V	1	1	FITTED TO VEHICLE BUT NOT IN USE
Z.A. 4500	KEY & PLUG ASSEMBLIES N° 2 B	W	1	1	WITH SLIDE N° 1, Z.A. 4381.
* Z.A. 10717	LEADS, EARTHING	X	1	-	MK IA & IB VEHICLES NOT FITTED WITH AUX DYNAMO.
Y.A. 1152	PINS, EARTH, SMALL	Y	1	1	
Z.B. 0170	POWER UNITS DC/AC, 250 WATT N° 1	Z	1	1	EITHER POWER UNITS DC/AC 250 WATT (AMERICAN) OR DC/AC 250 WATT (EUROPEAN) I.A.
Z.A. 3060	RECEPTION SETS R. 107	AA	1	1	WITH CARRIER N° 1, Z.A. 3221.
Z.A. 3236	RECEIVERS HEADSAR DLR DOUBLE N° 1 OR 2 OR C.L.R. MK II.	AB	2	2	
* Z.A. 10716	STUDS, EARTHING	AC	4	4	
Z.B. 0239	SWITCHBOARDS A.C. N° 1	AD	1	1	
Z.A. 9987	WIRELESS REMOTE CONTROL UNITS 'C'	AE	1	1	
Z.A. 10079	WIRELESS SETS N° 12, LEADS N° 2	AF	1	1	
Z.A. 10020	WIRELESS SETS N° 12 SMOOTHING UNITS DC	AG	1	-	MK IA & IB VEHICLES NOT FITTED WITH AUX DYNAMO CONTROL BOARD.
* Z.B. 0183	SWITCHBOARDS CHARGING N° 5	AH	1	-	BATTENS TERMINALS 4-POINT N° 1 FITTED IN MK IA & IB VEHICLES.

FIG. 2 WIRELESS SETS N° 12, COMPLETE STATIONS, 12 B IN TRUCKS, 15 CWT, 4 WHEELED, WIRELESS MK I, II, IA & IB (REMOTE RECEIVER STATION)

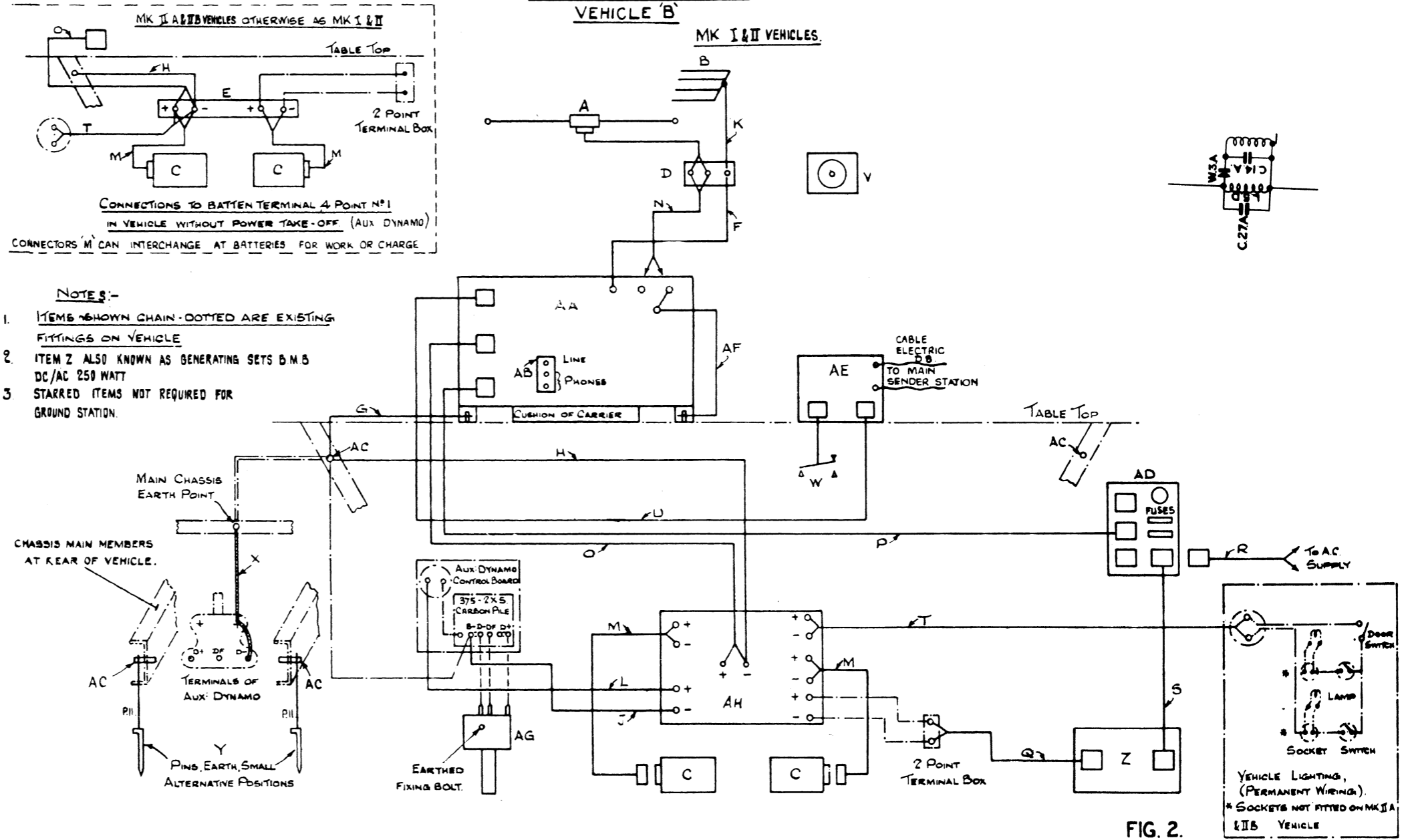
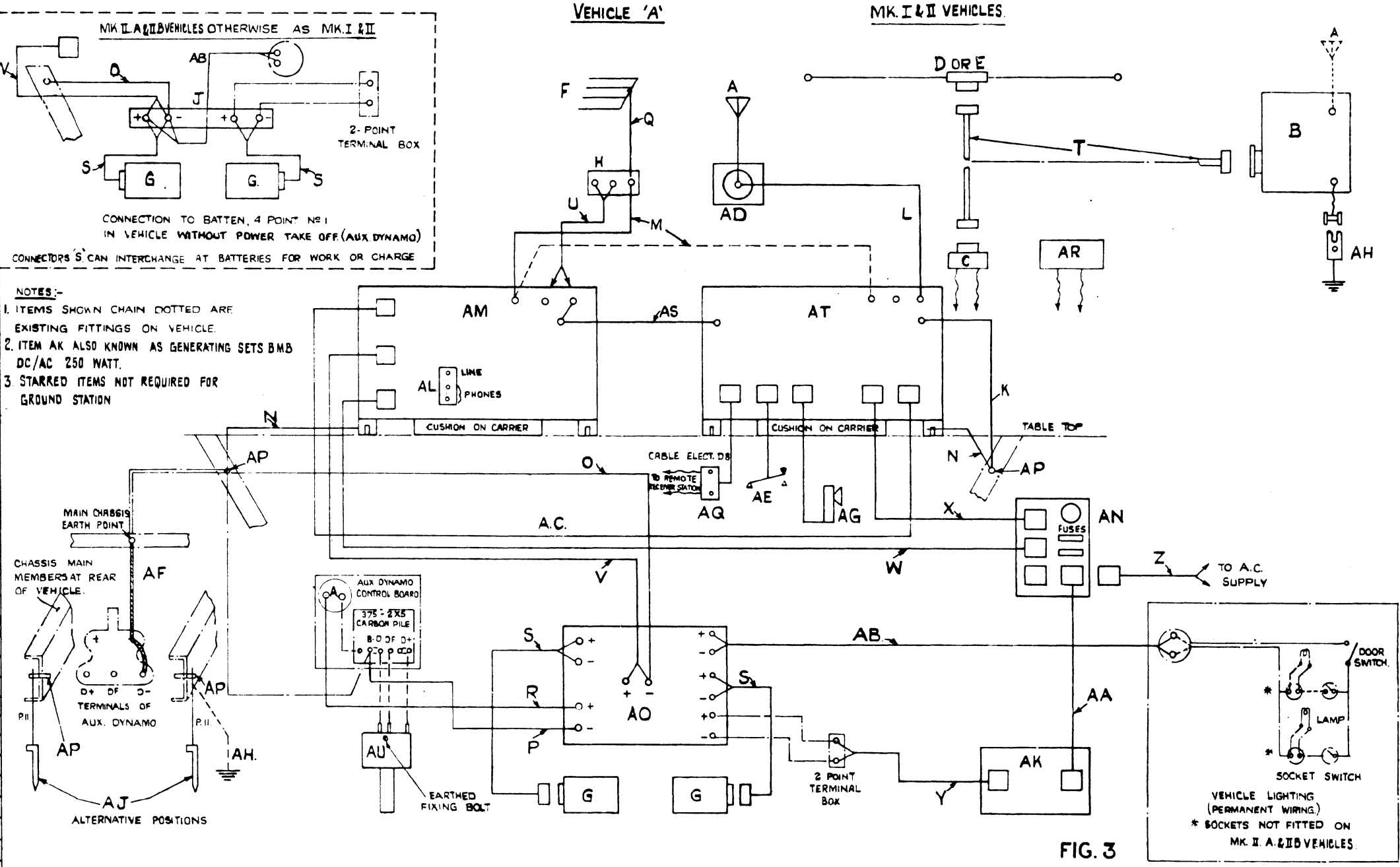


FIG. 2.

CAT. NO.	EQUIPMENT	LETTER	NO. OFF		REMARKS.
			MK I & II VEHICLE	MK II VEHICLE	
Z.A.0905	AERIAL, 100 FT. N° 1.	A	1	1	
Z.A.0841	AERIAL COUPLING EQUIPMENT, AERIAL UNIT F.	B	1	1	
Z.A.0986	AERIAL COUPLING EQUIPMENT, SET UNIT F.	C	1	1	
Z.A.0885	AERIALS DIPOLE N° 4 A	D	1	1	
Z.A.0886	AERIALS DIPOLE N° 4 B	E	1	1	
Z.A.10706	AERIALS, ROOF N° 5.	F	1	1	ALREADY FITTED ON MK I, II & II B VEHICLES.
Z.B.0220	BATTERIES SEC. PORT. 12 V. 75 A.H.	G	2	2	
* Z.A.0899	BATTENS, TERMINAL, 3 POINT N° 4	H	1	1	
* Z.A.10120	BATTENS, TERMINAL, 4 POINT N° 1.	J	1	1	SWITCHBOARD CHARGING N° 5 FITTED IN MK I & II VEHICLES.
* Z.A.2250	CONNECTORS, SINGLE, N° 10	K	1	1	
* Z.A.0973	CONNECTORS, SINGLE, N° 12 A	L	1	1	
Z.A.0975	CONNECTORS, SINGLE, N° 21 A	M	1	1	
* Z.A.3127	CONNECTORS, SINGLE, N° 22	N	2	2	
* Z.A.10017	CONNECTORS, SINGLE, N° 25	O	1	1	
* Z.A.10712	CONNECTORS, SINGLE, N° 26 A	P	1	1	MK I & II B VEHICLES NOT FITTED WITH AUX. DYNAMO CONTROL BOARD.
* Z.A.10047	CONNECTORS, SINGLE, N° 27	Q	1	1	
* Z.A.10713	CONNECTORS, SINGLE, N° 28	R	1	1	MK I, A & II B VEHICLES NOT FITTED WITH AUX. DYNAMO CONTROL BOARD.
* Z.A.2417	CONNECTORS TWIN, N° 28 A	S	2	2	
Z.A.0987	CONNECTORS, TWIN, N° 56	T	2	2	
* Z.A.0976	CONNECTORS, TWIN, N° 60	U	1	1	
Z.A.0977	CONNECTORS, TWIN, N° 61	V	1	1	
Z.A.0978	CONNECTORS TWIN, N° 62	W	1	1	
Z.A.0979	CONNECTORS, TWIN, N° 63	X	1	1	
Z.A.0981	CONNECTORS, TWIN, N° 64	Y	1	1	
Z.A.0982	CONNECTORS, TWIN, N° 65	Z	1	1	
Z.A.0983	CONNECTORS TWIN, N° 66	AA	1	1	
* Z.A.10740	CONNECTORS TWIN, N° 83	AB	1	1	LIGHTING CIRCUIT IS CONNECTED TO VEHICLE BATTERY IN MK II A VEHICLE.
Z.A.0984	CONNECTORS 3 POINT N° 9	AC	1	1	
* Z.A.0891	INSULATORS W.T. AERIAL, LEAD IN N° 12	AD	1	1	
Z.A.4500	KEY & PLUG ASSEMBLIES N° 2B	AE	1	1	WITH SLIDE N° 1. Z.A. 4381 FOR EARTHING AUX. DYNAMO IN MK I & II VEHICLES.
* Z.A.10179/7	LEADS, EARTHING	AF	1	1	
Z.A.5313	MICROPHONES, HAND, N° 4	AG	1	1	
Z.A.5484	NETS, EARTH, 14 FT.	AH	1	1	USED ALTERNATIVELY WITH SENDER OR AERIAL COUPLING EQUIPT. AE UNIT F.
YA 1152	PINS, EARTH, SMALL	AJ	1	1	
Z.B.0170	POWER UNITS DC/AC 250 WATT N° 1	AK	1	1	(POWER UNITS DC/AC 250 WATT N° 1/AMERICAN EITHER POWER UNITS DC/AC 250 WATT N° 1/AMERICAN)
Z.A.3238	RECEIVERS, HEADGEAR D.L.R. DOUBLE N° 1, OR 2, OR C.L.R. MK II.	AL	2	2	
Z.A.3050	RECEPTION SETS, R. 107	AM	1	1	WITH CARRIERS N° 1 Z.A. 3221
Z.B.0239	SWITCHBOARDS A.C. N° 1.	AN	1	1	
* Z.B.0183	SWITCHBOARDS CHARGING N° 5	AO	1	1	BATTENS TERMINALS 4-POINT N° 1 FITTED IN MK I & II B VEHICLES.
* Z.A.10179/5	STUDS, EARTHING	AP	4	4	
Z.A.3219	WIRELESS REMOTE CONTROL UNIT ADAPTOR C	AQ	1	1	
Z.A.3252	WIRELESS SETS, N° 12 DUMMY AERIAL	AR	1	1	
Z.A.3222	WIRELESS SETS N° 12, LEADS N° 1.	AS	1	1	
Z.A.3244	WIRELESS SETS N° 12, SENDER	AT	1	1	WITH CARRIERS N° 1 Z.A. 3128.
* Z.A.10020	WIRELESS SETS N° 12, SMOOTHING UNITS DC	AU	1	1	MK I, A & II B VEHICLES NOT FITTED WITH AUX. DYNAMO CONTROL BOARD.

**FIG. 3. WIRELESS SETS N° 12, COMPLETE STATIONS 12 B IN TRUCKS 15 CWT. 4 WHEELED, WIRELESS, MK I & MK II, II A & II B. (MAIN SENDER STATION)**



**FIG. 3**

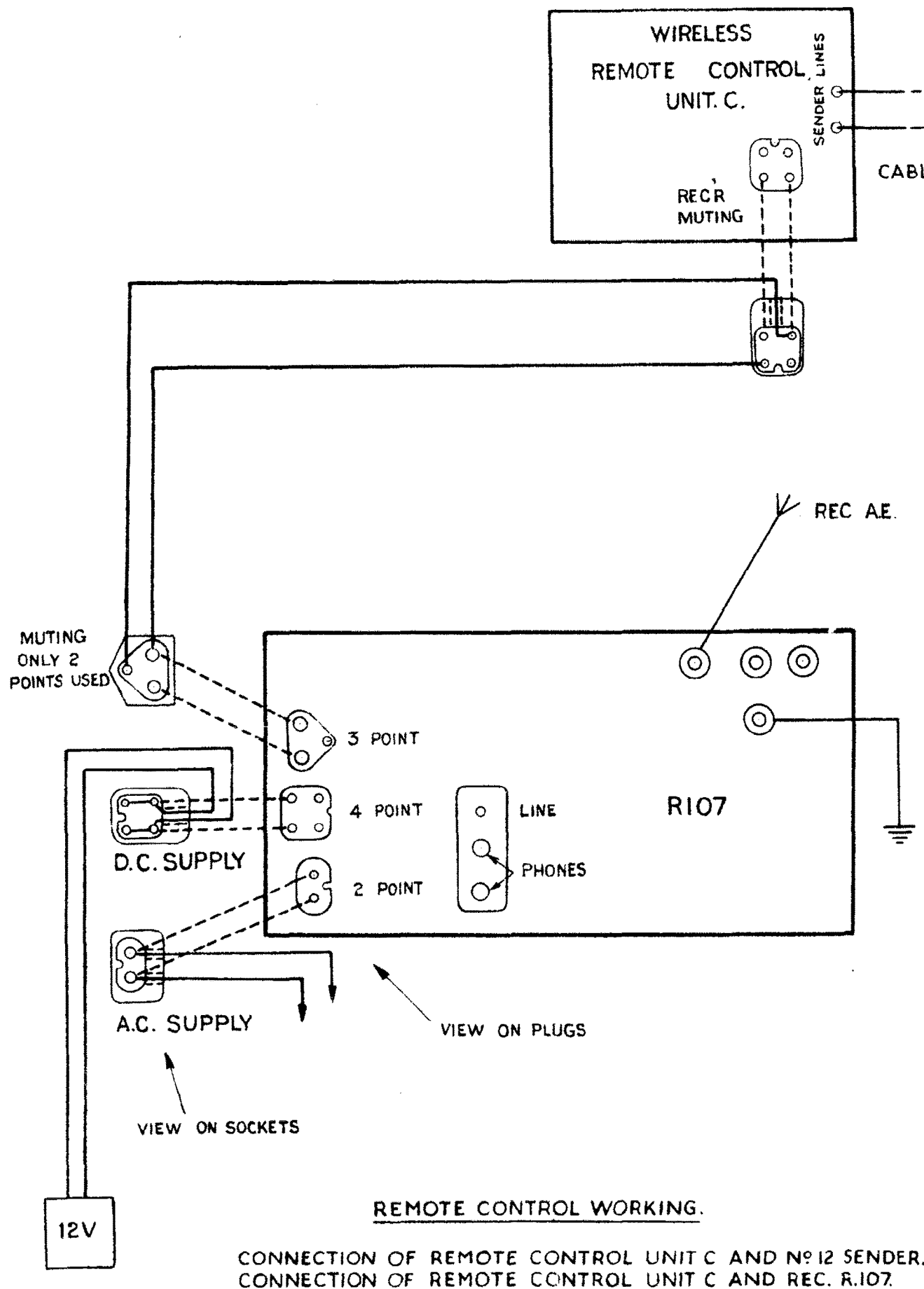


FIG. 4.

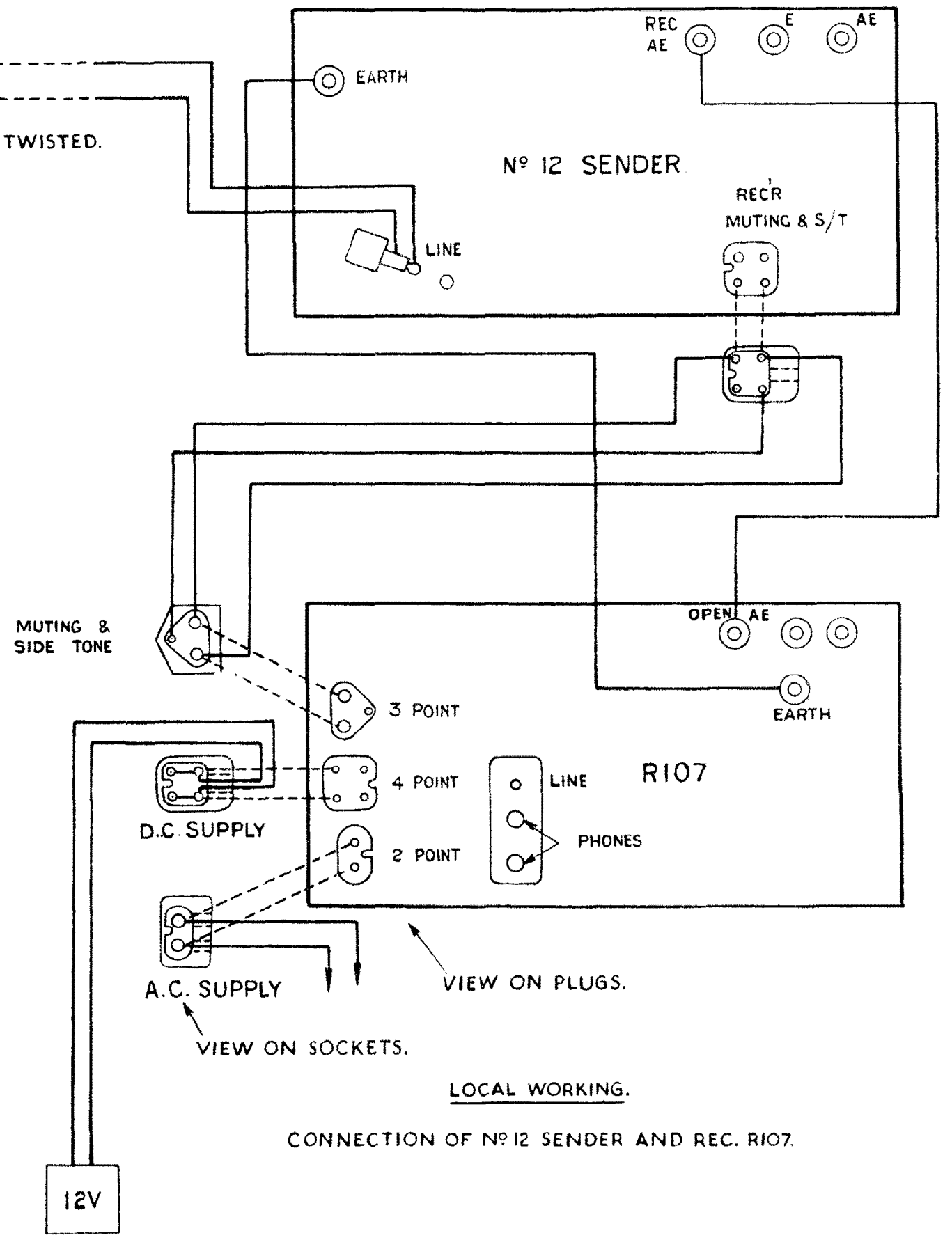
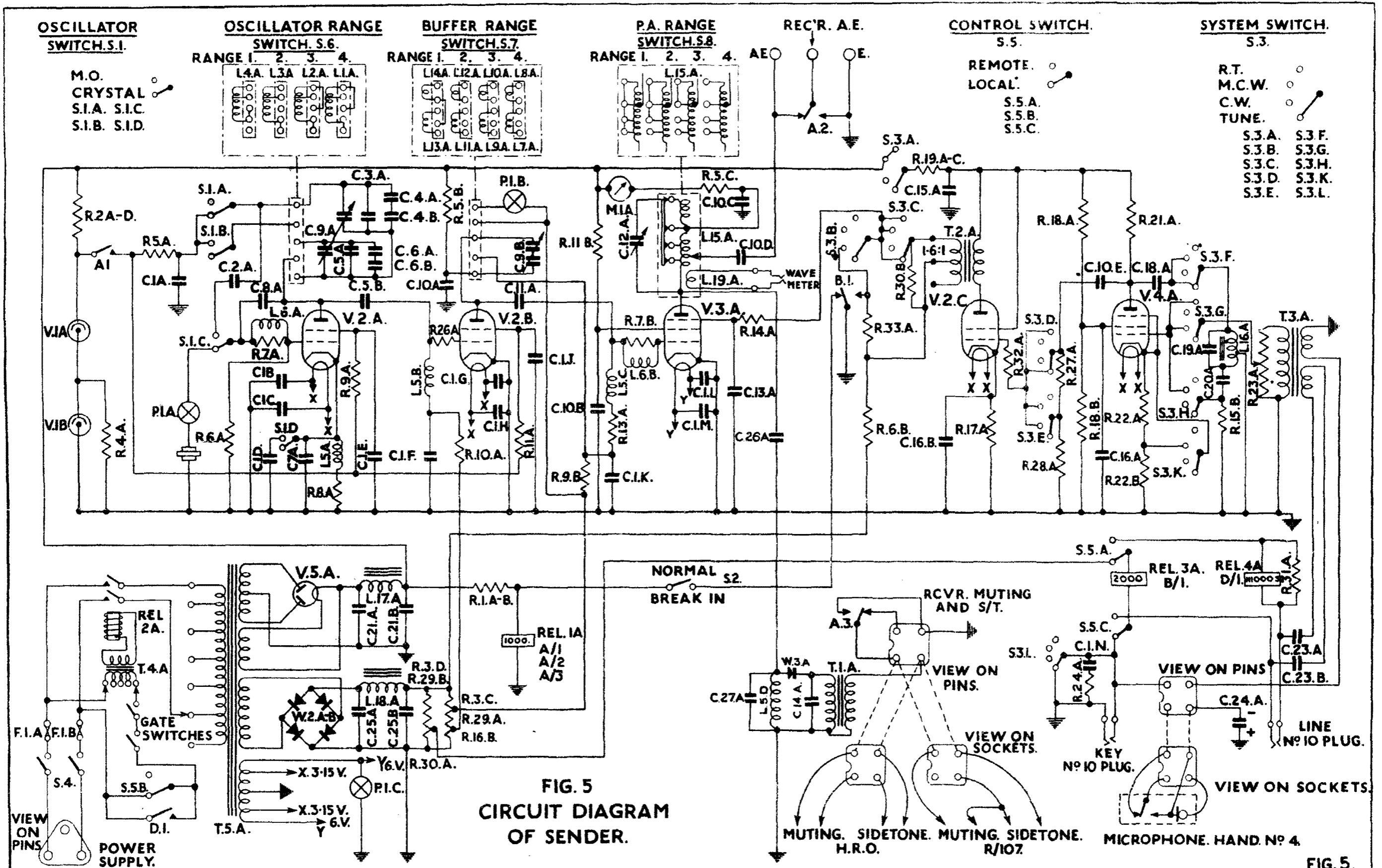


FIG. 4.



CONDENSERS.	C.1.A	C.1.B C.9.A C.5.A C.1.E C.21.B C.6.A C.6.B C.11.A C.1.J C.12.A C.10.C C.10.D C.15.A C.16.B C.10.E C.18.A C.19.A C.23.A C.23.B	C.2.A C.1.C C.8.A C.5.B C.25.A C.4.A C.4.B C.10.A C.9.B C.1.D C.7.A C.3.A C.21.A C.25.B C.1.F C.1.G C.1.H	C.1.I C.10.B C.13.A C.14.A C.15.A C.16.A C.17.A C.18.A C.19.A C.20.A C.24.A
RESISTANCES.	R.2.A-D R.4.A R.5.A R.6.A R.7.A R.8.A	R.9.A R.3.D R.26.A R.10.A R.29.B R.5.B R.29.A R.16.B R.30.A	R.11.B R.7.B R.5.C R.14.A R.17.A R.19.A-C R.30.B R.17.A R.32.A R.18.A R.27.A R.22.A R.15.B R.31.A	R.28.A R.22.A R.22.B R.23.A R.24.A R.25.A R.25.B R.29.A R.30.A
RELAYS & SWS.	S.4. A1. S.5.B. REL. 2A. S.I.A. S.I.B. S.I.C. S.I.D.	REL. 1A. A/1 A/2 A/3	S.2. A.2. A.3. B.1. S.3.B. S.3.C. S.3.A.	S.3.L. S.3.E. S.3.D. S.5.A. S.5.C. S.3.K. S.3.H. S.3.G. S.3.F. REL. 3A. REL. 4A
INDUCTANCES & TRANS.	T.4.A. T.5.A. L.4.A. L.6.A. L.3.A. L.2.A. L.1.A. L.5.A. L.17.A. L.18.A. L.5.B. L.7.A to L.14.A. L.5.C. L.6.B. L.15.A. L.19.A. L.5.D	T.1.A.	T.2.A.	L.16.A. T.3.A