The VMARS Archive

VMARS is a not-for-profit organisation specialising in all types of vintage communications electronics. We maintain an archive of documentation to help our members understand, research, repair and enjoy their vintage radio equipment. Access by non-members is extended as a gesture of goodwill, but not as a right.

Rare documents are frequently provided free of charge by VMARS members, and all scanning and document processing is carried out on a voluntary basis. Accordingly, we do not expect others to profit from the hard work of volunteers, who give their time freely without charge.

This is a gentle reminder that the document attached to this notice is provided to you **for your personal use only**. This edition remains copyright of VMARS, and while you may sell or give your copy to someone else, this right does not extend to making further copies of this information, either to give or sell to others. This includes a prohibition on placing it on websites, or printing it for sale at rallies, boot fairs or similar public events. **If our goodwill is abused, then withdrawal of public access to our archive will be the result.**

Please refer anyone else wanting a copy back to VMARS – either to our website at http://www.vmars.org.uk/ or by email to the Archivist at archivist@vmarsmanuals.co.uk. If you want to know more about our copyright, please see the FAQ below.

FAQ on copyright of VMARS documents

Q How can you copyright a document that is already in the public domain?

A. *Plainly the original copyright of the content has expired, or we have obtained permission to copy them. What we copyright is our own edition of the document.*

Q. Surely your "own edition" is identical to the original document, so cannot be copyrighted?

A. *Our editions are **not** identical to the original document. You will find that full advantage has been taken of electronic publishing facilities, so pages are cleaned up where possible (rendering them better than originals in some cases!), and large diagrams are prepared for both on-screen viewing and for easy printing at A4 format.*

Q. Why do you not just give your manuals away, as so many do via the internet these days?

A. *We do make all our manuals available free of charge (in soft copy) to VMARS members. These members have already covered the costs of running the archive via their subscriptions. The only time members are charged for copies is when they request them on paper, in which case charges are restricted to the cost of paper, ink and postage.*

The VMARS archive is not a "shoe-string" operation. Money is spent on computing facilities to make copies available, and on shipping original documents securely (usually costing several pounds per shipment) to carry out the scanning. As members have already contributed to these costs, it is only reasonable that non-members should do likewise – and thus a very moderate charge is levied for copies provided to non-members. With typical commercial photocopying charges starting at 5 pence per A4 side, it will be evident that paying 4 pence for our equivalent on paper is excellent value (amounts current at Spring 2004). We also think "you get what you pay for" – we invite you to make the comparison and draw your own conclusions!

Despite the above, we will be making copies of essential technical information (circuit diagram, parts list, layout) freely available to all via our website from Summer 2004 onwards. This will be done to try and encourage and enable the maintenance of our remaining stock of vintage electronic equipment.

Guidance on using this electronic document

Acrobat Reader version

You need to view this document with Acrobat Reader **version 5.0** or later. It is possible that the document might open with an earlier version of the Acrobat Reader (thus allowing you to get this far!), but is also likely that some pages will not be shown correctly. You can upgrade your Acrobat Reader by direct download from the internet at http://www.adobe.com/products/acrobat/readermain.html or going to http://www.adobe.com/ and navigating from there.

Don't miss the index!

This document has had "bookmarks" added – which provide you with an "on-screen index". These allow you to quickly move to particular parts of the document, a numbered section or maybe the circuit diagrams for instance, merely by clicking on the page title. Click on the "Bookmarks" tab on the left hand side of the Acrobat Viewer window to access this feature – move the cursor over these titles and notice it change shape as you do so. Click on any of these titles to move to that page.

Large diagrams

The large diagrams are given in two formats – in A4 size sheets to allow easy printing, and complete as originally published to allow easy on-screen viewing. These versions are in different sections of the document, which can be found within the bookmarks.

Printing the document on an A4 format printer

The document has been optimised for printing on A4 size paper (this is the common size available in UK and Europe, which measures 29.7cm by 21.0cm). Please follow these steps (these are based on Acrobat Reader version 6.0 – other versions may differ in detail):

1. Work out the page numbers you want to print. If you want to print the whole document, then within "Bookmarks" (see above), first click on "**Front**", and note the page number given at the bottom of the Acrobat window – this will give you the page number of the first page to be printed. Similarly click on "**End of A4 printable copy**", to determine the last page to be printed.

2. Select "File – Print" or click on the printer icon. This will bring up the print dialog box.

3. Select the correct printer if necessary.

4. In the area marked "Print Range" click on the radio button marked "Pages from..", then enter the first and last page numbers worked out in step 1 into the "from" and "to" boxes.

5. In the "Page Handling" area, next to "Page Scaling", select "Fit to paper". The press "OK"

Printing the document on an US Letter format printer

Since A4 and US Letter sizes are similar, it is expected that this document should print satisfactorily on the latter format paper. This has not been tested however, and is not guaranteed. Follow the steps as for A4 printing, and make doubly sure that "Fit to paper" is selected (step 5).

Any other problems?

Please get in touch with me at archivist@vmarsmanuals.co.uk.

Richard Hankins, VMARS Archivist, Summer 2004

The VMARS Archive

VMARS is a not-for-profit organisation specialising in all types of vintage communications electronics. We maintain an archive of documentation to help our members understand, research, repair and enjoy their vintage radio equipment. Access by non-members is extended as a gesture of goodwill, but not as a right.

Rare documents are frequently provided free of charge by VMARS members, and all scanning and document processing is carried out on a voluntary basis. Accordingly, we do not expect others to profit from the hard work of volunteers, who give their time freely without charge.

This is a gentle reminder that the document attached to this notice is provided to you **for your personal use only**. This edition remains copyright of VMARS, and while you may sell or give your copy to someone else, this right does not extend to making further copies of this information, either to give or sell to others. This includes a prohibition on placing it on websites, or printing it for sale at rallies, boot fairs or similar public events. **If our goodwill is abused, then withdrawal of public access to our archive will be the result.**

Please refer anyone else wanting a copy back to VMARS – either to our website at http://www.vmars.org.uk/ or by email to the Archivist at archivist@vmarsmanuals.co.uk. If you want to know more about our copyright, please see the FAQ below.

FAQ on copyright of VMARS documents

Q How can you copyright a document that is already in the public domain?

A. *Plainly the original copyright of the content has expired, or we have obtained permission to copy them. What we copyright is our own edition of the document.*

Q. Surely your "own edition" is identical to the original document, so cannot be copyrighted?

A. *Our editions are **not** identical to the original document. You will find that full advantage has been taken of electronic publishing facilities, so pages are cleaned up where possible (rendering them better than originals in some cases!), and large diagrams are prepared for both on-screen viewing and for easy printing at A4 format.*

Q. Why do you not just give your manuals away, as so many do via the internet these days?

A. *We do make all our manuals available free of charge (in soft copy) to VMARS members. These members have already covered the costs of running the archive via their subscriptions. The only time members are charged for copies is when they request them on paper, in which case charges are restricted to the cost of paper, ink and postage.*

The VMARS archive is not a "shoe-string" operation. Money is spent on computing facilities to make copies available, and on shipping original documents securely (usually costing several pounds per shipment) to carry out the scanning. As members have already contributed to these costs, it is only reasonable that non-members should do likewise – and thus a very moderate charge is levied for copies provided to non-members. With typical commercial photocopying charges starting at 5 pence per A4 side, it will be evident that paying 4 pence for our equivalent on paper is excellent value (amounts current at Spring 2004). We also think "you get what you pay for" – we invite you to make the comparison and draw your own conclusions!

Despite the above, we will be making copies of essential technical information (circuit diagram, parts list, layout) freely available to all via our website from late 2004 onwards. This will be done to try and encourage and enable the maintenance of our remaining stock of vintage electronic equipment.

Guidance on using this electronic document

Acrobat Reader version

You need to view this document with Acrobat Reader **version 5.0** or later. It is possible that the document might open with an earlier version of the Acrobat Reader (thus allowing you to get this far!), but is also likely that some pages will not be shown correctly. You can upgrade your Acrobat Reader by direct download from the internet at http://www.adobe.com/products/acrobat/readermain.html or going to http://www.adobe.com/ and navigating from there.

Don't miss the index!

This document has had "bookmarks" added – which provide you with an "on-screen index". These allow you to quickly move to particular parts of the document, a numbered section or maybe the circuit diagrams for instance, merely by clicking on the page title. Click on the "Bookmarks" tab on the left hand side of the Acrobat Viewer window to access this feature – move the cursor over these titles and notice it change shape as you do so. Click on any of these titles to move to that page.

Large diagrams

The large diagrams are given in two formats – in A4 size sheets to allow easy printing, and complete as originally published to allow easy on-screen viewing. These versions are in different sections of the document, which can be found within the bookmarks.

Printing the document on an A4 format printer

The document has been optimised for printing on A4 size paper (this is the common size available in UK and Europe, which measures 29.7cm by 21.0cm). Please follow these steps (these are based on Acrobat Reader version 6.0 – other versions may differ in detail):

1. Work out the page numbers you want to print. If you want to print the whole document, then within "Bookmarks" (see above), first click on "**Front**", and note the page number given at the bottom of the Acrobat window – this will give you the page number of the first page to be printed. Similarly click on "**End of A4 printable copy**", to determine the last page to be printed.

2. Select "File – Print" or click on the printer icon. This will bring up the print dialog box.

3. Select the correct printer if necessary.

4. In the area marked "Print Range" click on the radio button marked "Pages from..", then enter the first and last page numbers worked out in step 1 into the "from" and "to" boxes.

5. In the "Page Handling" area, next to "Page Scaling", select "Fit to paper". The press "OK"

Note that the document is set up for double-sided printing – if you print it out single-sided then you will find a number of blank pages present, which may be removed and reused.

Printing the document on an US Letter format printer

Since A4 and US Letter sizes are similar, it is expected that this document should print satisfactorily on the latter format paper. This has not been tested however, and is not guaranteed. Follow the steps as for A4 printing, and make doubly sure that "Fit to paper" is selected (step 5).

Any other problems?

Please get in touch with me at archivist@vmarsmanuals.co.uk.

Richard Hankins, VMARS Archivist, Summer 2004

W.O. CODE No. 12051

RESTRICTED

The information given in this document is not to be communicated either directly or indirectly to the Press or to any person not authorised to receive it.

USER HANDBOOK

for

RECEPTION SET R210

WARNING

When this equipment is operated on an AC supply the voltage employed is sufficiently high to endanger human life. Every reasonable precaution has been observed in design to safeguard operating personnel. Do not tamper with supply leads and switch the power supply off before removing connectors. In case of electric shock refer to the inside front cover of this handbook.

PUBLISHED UNDER THE AUTHORITY
OF THE SIGNAL OFFICER-IN-CHIEF
THE WAR OFFICE.

NOVEMBER 1957

FIRST AID IN CASE OF ELECTRIC SHOCK

1. ***SWITCH OFF.*** If this is not possible, ***PROTECT YOURSELF*** with dry Insulating material and pull the victim clear of the conductor.

DON'T TOUCH THE VICTIM WITH YOUR BARE HANDS until he is clear of the conductor, but ***DON'T WASTE TIME.***

2. ***(a)*** Lay patient face down with head to one side, arms bent and forehead on his hands, to keep mouth and nose clear. **See Fig. 1**

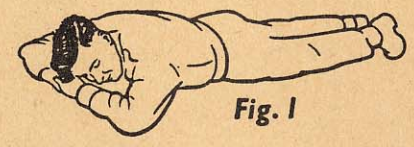


Fig. 1

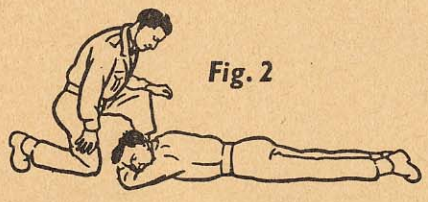


Fig. 2

(b) Give one or two firm thumps with flat of hand between his shoulders.

(c) Kneel at his head, one knee near the head and your other foot alongside the elbow. **See Fig. 2**

(d) Place your hands on his shoulder blades with thumbs touching on the mid-line and fingers pointing towards his feet. **See Fig. 3**

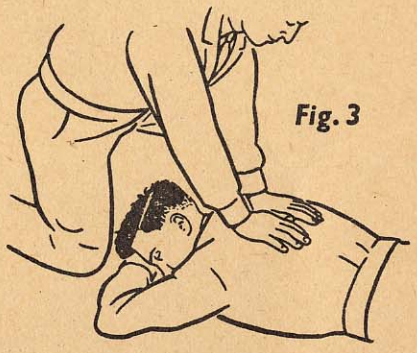


Fig. 3

3. ***(a)*** Bend forward with arms straight and apply your weight lightly **See Fig. 4** counting "One, Two, Three" This movement takes $2\frac{1}{2}$ seconds.

Fig. 4

(b) Release pressure gradually and slide your hands to grip him just above his elbows, counting "Four". **See Fig. 5**

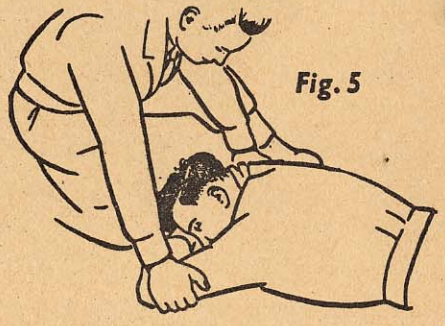


Fig. 5

(c) Draw his arms and shoulders towards you by leaning backwards with your arms straight till you feel resistance, but without lifting his chest off the ground, counting "Five, Six, Seven". This movement takes $2\frac{1}{2}$ seconds. **See Fig. 6**

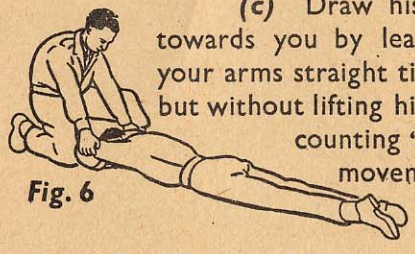


Fig. 6

(d) Lay his arms down and slide your hands on to the shoulder blades, counting "Eight".

4. Keep repeating paragraph 3 with rhythmic rocking nine times to the minute until breathing is re-established.

5. When breathing is re-established, omit the back pressure and continue the arm raising and lowering alone, at the rate of 12 times to the minute, counting "One, Two, and Three" whilst raising and "Four, Five, and Six" whilst lowering.

6. While Artificial Respiration is being applied, have someone else:-

(a) Loosen patient's clothing. ***(b)*** ***SEND FOR DOCTOR.*** ***(c)*** Keep patient warm.

7. DO NOT GIVE LIQUIDS UNTIL PATIENT IS CONSCIOUS.

W.O. CODE No. 12051

RESTRICTED

The information given in this document is not to be communicated either directly or indirectly to the Press or to any person not authorised to receive it.

USER HANDBOOK

for

RECEPTION SET R210

WARNING

When this equipment is operated on an AC supply the voltage employed is sufficiently high to endanger human life. Every reasonable precaution has been observed in design to safeguard operating personnel. Do not tamper with supply leads and switch the power supply off before removing connectors. In case of electric shock refer to the inside front cover of this handbook.

PUBLISHED UNDER THE AUTHORITY
OF THE SIGNAL OFFICER-IN-CHIEF
THE WAR OFFICE.

NOVEMBER 1957

S Y N O P S I S

The Reception Set R210 is a single superheterodyne receiver covering 2 to 16 Mc/s in seven bands.

Facilities are provided for VOICE, CW or Frequency shift operation, an IF output being obtainable at 460 kc/s.

The set has been primarily designed for use, in conjunction with the Wireless Sender C11, for operation in Command and Wireless Vehicle installations.

Frequency stability and tuning accuracy is of a very high order.

A DC power supply unit is built in the set for operation from a 24 volt battery supply. A separate AC power supply unit for operation from AC mains 100/125 volts or 200/250 volts at 45/65 c/s is also available when required.

CONTENTS

CONTENTS (continued)

ILLUSTRATIONS

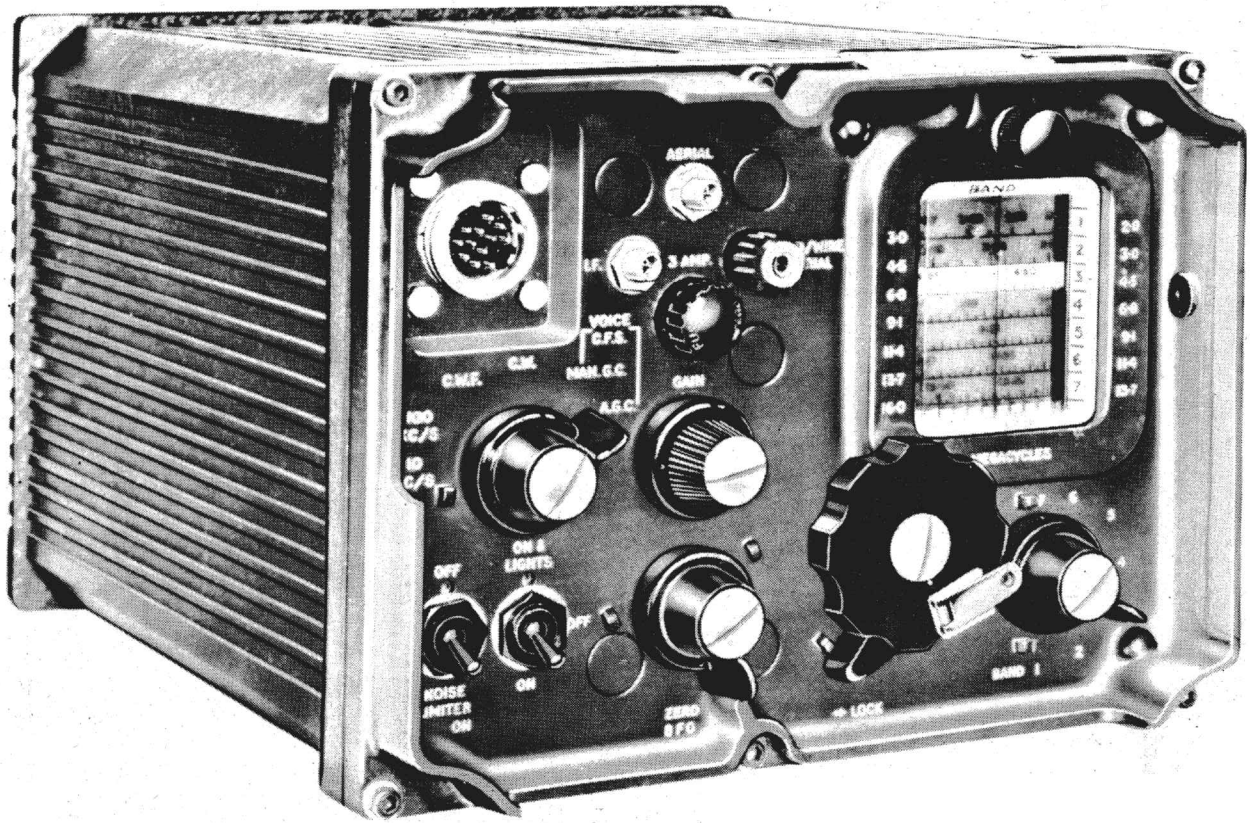


FIG.1 GENERAL VIEW

CHAPTER I- GENERAL DESCRIPTION

1. Purpose and Facilities

The Reception Set R210 is a highly sensitive single superheterodyne receiver with a frequency coverage of 2 Mc/s to 16 Mc/s spread over seven bands.

It is designed primarily for operation with the Wireless Sender C11 in Command Wireless vehicle installations.

Facilities are provided for VOICE, CW and Frequency Shift operation, an IF output being obtained at 460 kc/s.

An audio filter centred on 1000 c/s is incorporated in the set for use with CW signals.

Special attention has been paid to frequency stability to enable the set to be used for prolonged periods without the necessity of re-tuning, and it is capable of being tuned to a given frequency with much greater accuracy than is usual in this type of receiver, a film scale being used giving a total scale length of 50 inches. This enables each 10 kc/s channel to be separated by almost a quarter of an inch.

The reception set, which includes a built-in DC power supply unit for 24 volt operation, is housed in an hermetically sealed die-cast aluminium case.

A separate AC power supply unit is necessary for operation from AC mains.

A general view of the Reception Set R210 is shown at Fig. 1.

2. Frequency Range

The reception set covers the frequency range 2 to 16 Mc/s in seven bands as shown in Table 1 below.

Table 1

Band	Frequency in Mc/s
1	2.0 - 3.0
2	3.0 - 4.5
3	4.5 - 6.8
4	6.8 - 9.1
5	9.1 - 11.4
6	11.4 - 13.7
7	13.7 - 16.0

The tuning scale is graduated in 5 kc/s markings.

The intermediate frequency of the receiver is 460 kc/s.

3. Performance

(1) Inputs

The receiver provides facilities for connection to two alternative inputs:

(a) 80 ohms unbalanced input via coaxial connector

(b) high impedance input for rod and wire aerials via terminals.

When the set is used with the Wireless Set C11 on simplex, a common aerial and aerial coupling unit is used.

When the set is used with the Wireless Set C11 on duplex, remote from the aerial, a special tuning unit at the aerial is used with the receiver, and is connected to the reception set by a length of 80 ohm feeder (up to 100 yards in length).

(2) Outputs

The output of the reception set is 150 mW with a 50 ohm load and 70 mW with a 150 ohm load.

When the reception set is used with the Wireless Set C11 the audio output is connected via the C11 to the control harness.

When the reception set is used as a monitoring receiver the audio output is fed to an adaptor unit 'A' which is fitted with phone sockets.

Negative feedback automatically maintains correct output in each of the headsets according to the number in use at any given time.

An IF output is provided for connection via a coaxial termination, to carrier frequency shift equipment. The output level of this IF is nominally 0.1 volt RMS.

(3) Sensitivity

(a) Signal to Noise Ratio

The sensitivity of the receiver is limited by the first circuit noise.

(b) Overall Gain

The overall gain at any frequency will give maximum audio output from a 30% modulated signal giving a 20 dB signal to noise ratio.

(4) AGC

The receiver is fitted with an AGC system capable of operating on all signals likely to be received.

(5) Selectivity

(a) Adjacent Channel Rejection

Only one bandwidth of 6 kc/s overall at -6 dB is provided.

The cut-off slope measured between -6 and -40 dB is not less than 10 dB per kc/s on both sides of the response curve.

(b) Image Discrimination

Image discrimination varies from 60 dB on range 1 to 30 dB on range 7.

(6) Audio Characteristics

(a) AM and CW

The output measured just prior to the detector does not vary by more than 3 dB between 300 c/s and 3000 c/s relative to the level at 1000 c/s.

(b) CWF

With the CW filter switched in circuit, the audio characteristic peak is 1000 c/s and has a bandwidth, at -3 dB of approximately 150 c/s.

(7) Frequency Stability Characteristics

The reception set has been so designed that the frequency stability, with temperature and input voltage variations, is of a very high order, thus enabling the set to be used for prolonged periods without re-tuning being necessary.

(8) Calibrator Accuracy

A built-in crystal calibrator giving check points at 100 kc/s and 10 kc/s enables the operator to check the calibration of the set and an adjustable cursor is provided to correct the dial readings if necessary.

4. Power Supply and Consumption

(1) DC Operation

An internal DC power supply unit is incorporated in the reception set and operates from a nominal 24 volts.

When the reception set is used alone on DC only, the 24 volt battery supply is passed, via the adaptor unit 'A' (see Section 7 para (3)), to the power supply unit built in the reception set.

When the reception set is used with the Wireless Sender C11 on DC, a voltage sensitive relay situated in the sender power supply unit operates a slave relay in the receiver power supply unit to keep the input voltages within reasonable working limits should the voltage from the supply source fluctuate excessively.

(2) AC Operation

When the reception set is used with the Wireless Sender C11 on AC, the AC power supply unit of the sender provides HT, LT and GB direct to the reception set.

When it is required to operate the reception set alone from an AC supply,

a separate AC power supply unit is available. This unit will operate from AC mains 100/125 volts or 200/250 volts at 45/65 cycles. The unit is described at Section 5.

The total power consumption of the reception set using AC supply is approximately 150 milliamps.

5. The AC Power Supply Unit for Reception Set R210

The unit has been designed to provide suitable power supplies for operating the Reception Set R210 from AC mains when the receiver is used separate from the Wireless Sender C11. In addition, to cover the possibility of mains failure, facilities have been provided for the rapid changeover to DC operation, i.e. 24 volt DC battery. The unit also acts as a terminating unit for the reception set, sockets being provided for the attachment of headphones.

Three fuses are provided on the front panel, two 1 amp fuses being in the AC input and a 3 amp fuse being in the DC input.

A humidity indicator, fitted in the left hand side of the case, provides a visual warning when moisture is present in the interior of the unit.

Fig. 2 shows a general view of the unit and Fig. 3 shows the unit connected to the reception set.

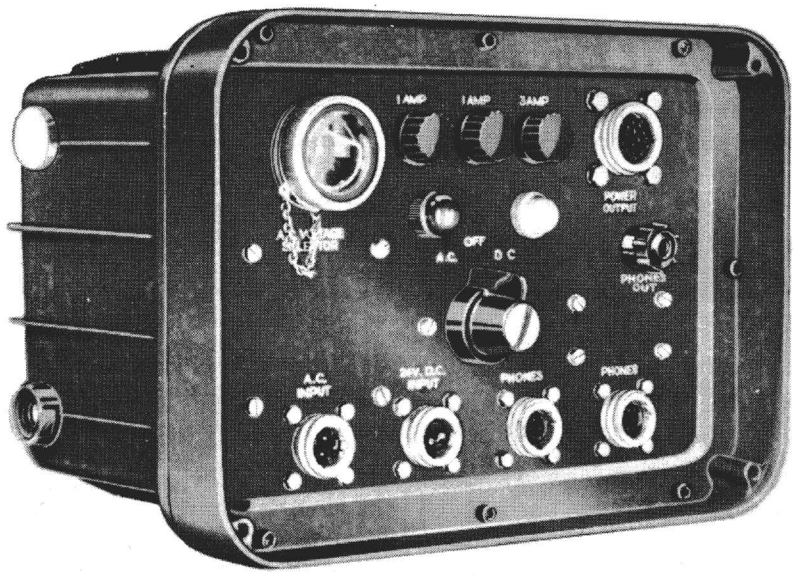


FIG.2 GENERAL VIEW OF A.C./P.S.U.

With the power selector switch at the DC position and a 24 volt battery connected, the 24 volt DC is passed via the 2-way input plug of the supply unit and selector switch, through the 12 point output connector and out to the receiver.

In this condition the HT, LT and grid bias leads of the 12 point connector are linked by the Selector switch position, so that the 24 volt DC battery supply is merely routed through the AC power unit and connected to the DC power unit in the receiver and the DC power unit in the receiver actually supplies the HT, LT and grid bias.

Visual indication of 'Power ON' is provided by two indicator lamps on the front panel. When AC is used, the red lamp is illuminated and when DC is used the green lamp is illuminated.

When the AC power supply unit is in use the set is controlled by the power selector switch of the supply unit and the reception set ON/OFF switch is inoperative except for scale lighting.

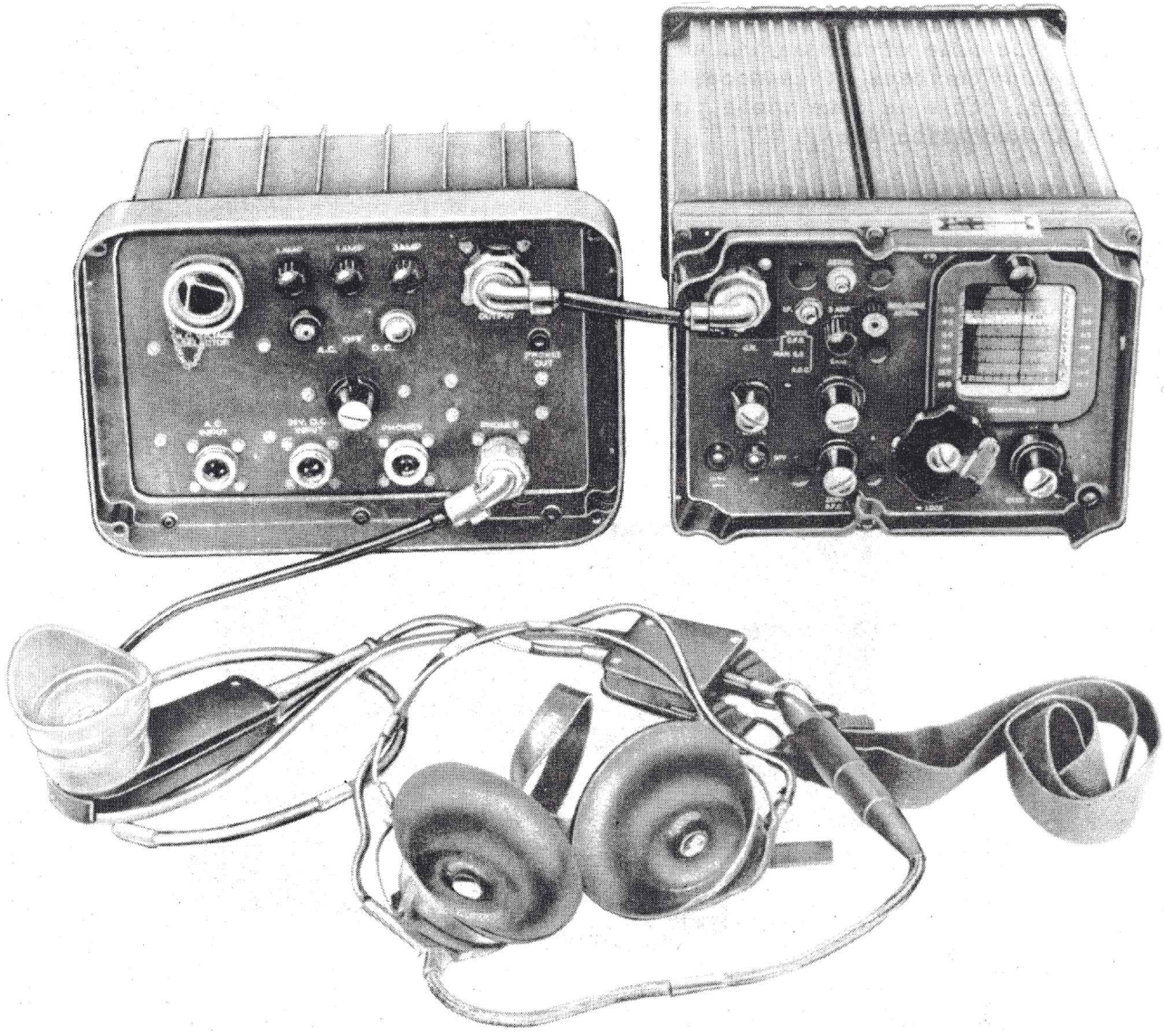


FIG.3 A.C./P.S.U. CONNECTED TO RECEIVER

6. Aerials

When the reception set is used with the Wireless Sender C11 it is fed, via an 80 ohm feeder, from an aerial coupling unit.

When the reception set is used alone, it can be operated from either 80 ohm feeders or aerials, or from rod or wire aerials. With the latter, however, the ATU described at Section 7 para (2) below, should be utilized to obtain maximum efficiency. For this condition, the connections of the ATU are as described at Section 19 using short coaxial connector.

7. Aerial Tuning Equipment

(1) General

The Reception Set R210 may be used with a remote aerial up to a distance of 100 yards from the set. For this condition it is necessary, except when using a dipole cut to frequency to have a remote aerial tuning unit situated at the base of the aerial and connected to the set by an 80 ohm feeder. For tuning purposes it is necessary to feed the phones output back to the tuning unit; this is done via a phones distribution unit designated Adaptor Unit 'A' Reception Set.

Both units are described below:

(2) The Aerial Tuning Unit (Fig. 4)

The Aerial Tuning Unit consists of three tapped coils, a six position switch to select the required coil and tapping on the coil, and a variable capacitor to tune the selected coil. An insulated terminal engraved AE is

FIG.4 AERIAL TUNING UNIT FOR RECEPTION SET R210

provided for the attachment of the aerial, a coaxial termination engraved AE ON R210 is for connection to the 80 ohm coaxial plug on the front panel of the reception set (the connection may be up to 100 yards in length), and an insulated terminal engraved PHONES IN is for connection via D10 cable to the adaptor unit described at (3) below. A six point Mk. 4 socket on the front of the ATU provides means of connecting phones to the unit. A screw terminal is fitted on the rear right hand flange for earth connection.

(3) Adaptor Unit 'A' Reception Set (Fig. 5)

This unit, which forms part of the Wireless Control Harness Type B, has been designed for use with the Reception Set R210 when the set is to be used alone, i.e. without its associated sender (W. Sender C11). It provides the means of connecting the 24 volt DC input to the reception set and also provides means of connecting the headphones to the audio output of the set.

In addition, an insulated terminal on the front panel is connected internally to the phones output and this terminal provides the means of connecting the output, via D10 or similar cable, to the Aerial Tuning Unit, thus an operator at the remote aerial tuning unit can tune for maximum output of the set.

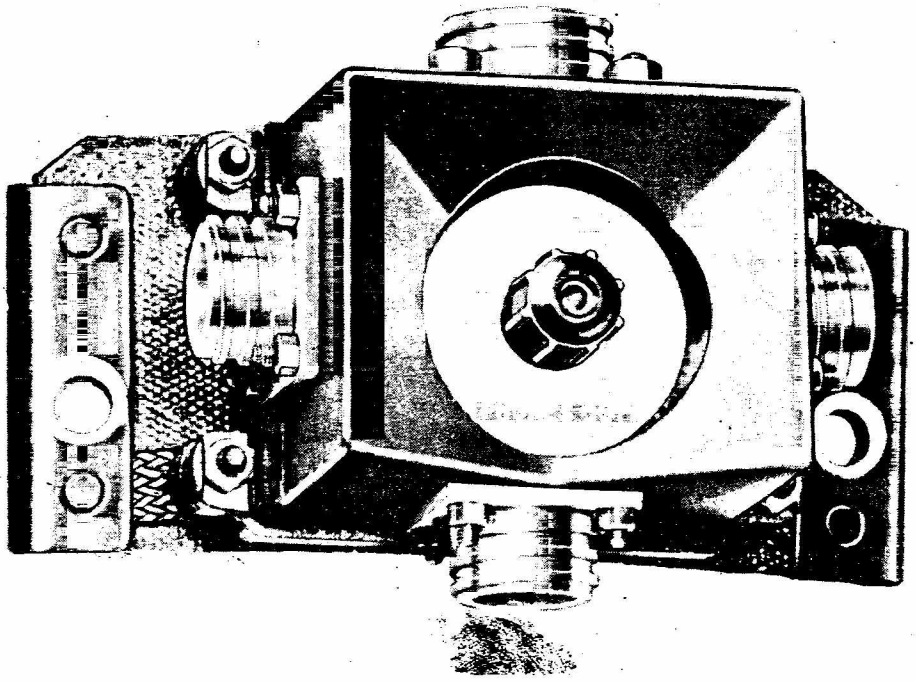


FIG.5 ADAPTOR UNIT A RECEPTION SET

8. Controls

The controls and connector terminations of the various units are described in Tables 2, 3, 4 and 5 and are indicated in Figures 6, 7, 8 and 9.

Table 2 - Reception Set

Figure 6 Ref. No.	Control	Description and Purpose
1	Power Input Plug	12 point panel mounted Mk. 4 plug. Termination for connector from wireless sender, the adaptor unit (DC operation) or the AC PSU (AC operation).
2	IF	Coaxial socket for connection to ancillary equipment requiring IF output.
3	AE 80 ohm	Plug termination for low impedance aerials or feeders.
4	ROD/WIRE AE	Screwed terminal for connection to either rod or wire aerials.
5	Tuning Scale	Seven band scales in parallel on a strip of 70 mm film. The particular band in use is emphasized by the white background strip which moves into position behind the film by operation of the range switch.
6	Cursor control	Controls the position of the movable cursor.
7	BAND switch	7-position switch controlling the seven bands. Operation of this switch also controls the position of the white background strip behind the film scale.
8	Main Tuning Control	Controls variable tuning capacitors geared through a reduction drive to the frequency scale.
9	Tuning Control Lock	Locking device fitted to the tuning control drive. Enables the operator to secure the control in any desired position.
10	VOLUME Control	Ganged potentiometer. This component performs two functions. With the system switch at AM, 100 kc/s and 10 kc/s position, a variable resistor, used as an AF gain control, is in circuit. With the system switch at CW, CWF or MAN. GC, another resistor acts as an RF gain control, the AGC being disconnected.
11	BFO	Controls variable capacitor for adjustment of beat note.
12	FUSE	3 Amp cartridge type fuse for 24 volt DC input.
13	ON-OFF-ON and LIGHTS	3-position switch. The receiver is switched on without dial lighting, at the ON position. At the ON and LIGHTS position, the receiver is on and the dial is illuminated. Other position is OFF.

Table 2 (continued)

Figure 6 Ref. No.	Control	Description and Purpose
14	System switch	6-position switch controlling system of operation, i.e. CW or AM. Position CWF switches in audio filter. Position 10 or 100 kc/s switches the calibrator in circuit with check points as indicated. The MAN. GC position is mainly used for frequency shift operation.
15	NOISE LIMITER	2-way ON-OFF switch; enables noise limiter to be switched into circuit when static interference, etc. is troublesome.
16 (Not Shown)	HUMIDITY INDICATOR and DESICCATOR	This is installed in the rear of the case. Contains a quicklime drying agent. Also gives visual indication of presence of moisture in interior of set.

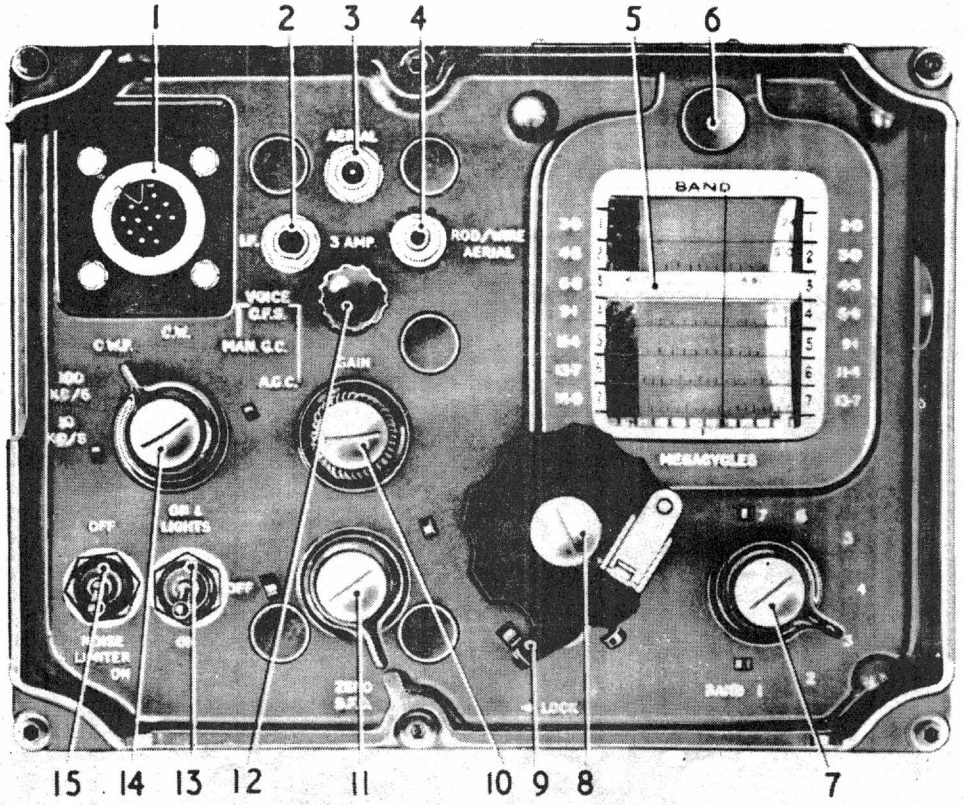


FIG.6 RECEPTION SET FRONT PANEL

Table 3 - AC Power Supply Unit

Figure 7 Ref. No.	Control	Description and Purpose
1	AC Voltage Selector	Enables the correct tapping on the mains transformer to be selected to suit local AC mains.
2	Fuse positions	Three fuseholders suitably engraved with the correct rating.
3	POWER OUTPUT	12 pt. Mk. 4 socket providing means of connecting the power output to the set and also returning audio output from the set to the 6 pt. phone socket on front panel of PSU.
4	PHONES OUT	Screwed terminal to enable phones output of set to be connected, via D10 cable, to the remote ATU.
5	Indicator lamps AC and DC	Two coloured lamp holders containing small 6 volt lamps. The RED is illuminated when AC is on and the GREEN is illuminated when DC is on.
6	AC-DC ON/OFF switch	Rotary switch controlling supplies.
7	PHONES	Two 6 pt. Mk. 4 sockets providing means of connecting phones to audio output of set.
8	24V DC INPUT	2 pt. Mk. 4 plug for connecting DC battery supply to PSU.
9	AC INPUT	3 pt. Mk. 4 plug for connecting AC mains to PSU.

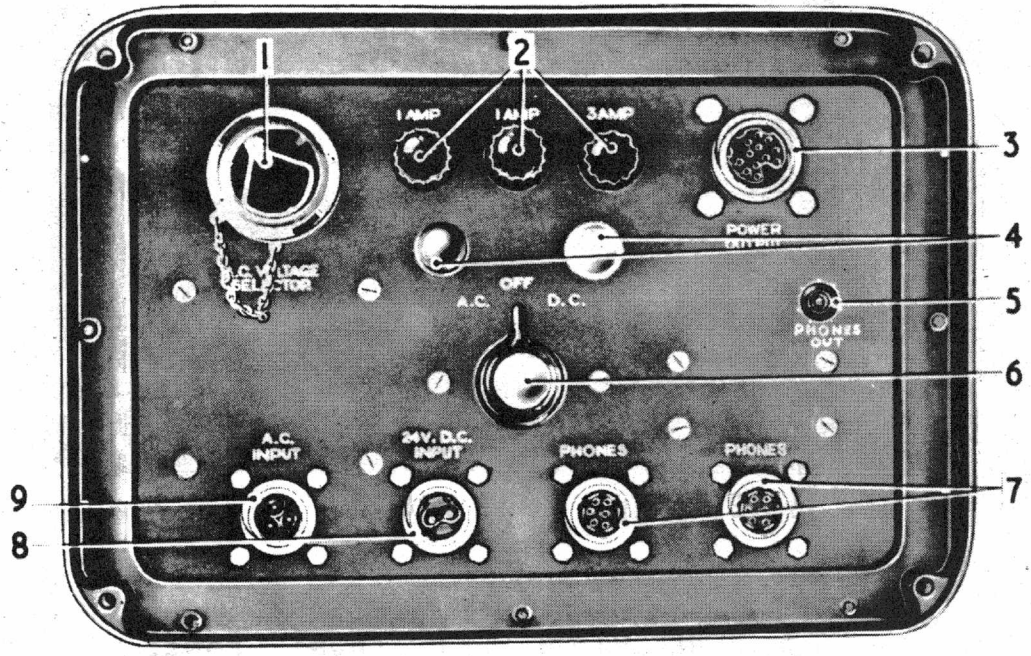


FIG.7 A.C. POWER SUPPLY UNIT FRONT PANEL

Table 4 - Aerial Tuning Unit

Figure 8 Ref. No.	Control	Description and Purpose
1	PHONES IN	Insulated screw terminal connected internally to the 6 pt. Mk.4 phone socket. The terminal provides a means of connecting cable from the PHONES OUT terminal of the Adaptor Unit'A'.
2	6 pt. Mk. 4 SOCKET	For connecting phones to the unit.
3	AE Terminal	Insulated screw terminal for connection to the aerial
4	AE on R210	Coaxial socket termination. Provides the means of connecting a coaxial feeder (up to 100 yards in length) between the ATU and the reception set.
5	EARTH Terminal	This terminal (not shown in photograph) is fitted on the rear right hand flange of the unit. It provides a means of attaching an earth connection to the unit.
6	Range Switch	A 6 pt. rotary switch which selects either of two positions on any one of the three range coils.
7	Tuning	Small capacitor to adjust the tuning of the selected coil

FIG. 8 AERIAL TUNING UNIT FOR RECEPTION SET R210

Table 5 - Adaptor Unit 'A' Reception Set

Figure 9 Ref. No.	Termination	Description and Purpose
1	'PHONES socket'	6 pt. Mk. 4 socket for attaching phones to the adaptor unit. This socket is in parallel with item 4.
2	To SET	12 pt. Mk. 4 socket for connection to reception set. This connection carries power supplies and audio output between the adaptor and the set.
3	'PHONES' OUT terminal	A screwed terminal connected internally to the pin of the 12 pt. socket carrying audio output. The terminal is used on remote operation to connect the audio output to the remote ATU via D10 cable.
4	'PHONES' socket	Similar to item 1 and connected to it in parallel.
5	'DC INPUT' plug	2 pt. Mk. 4 plug for connection of a 24 volt DC supply.

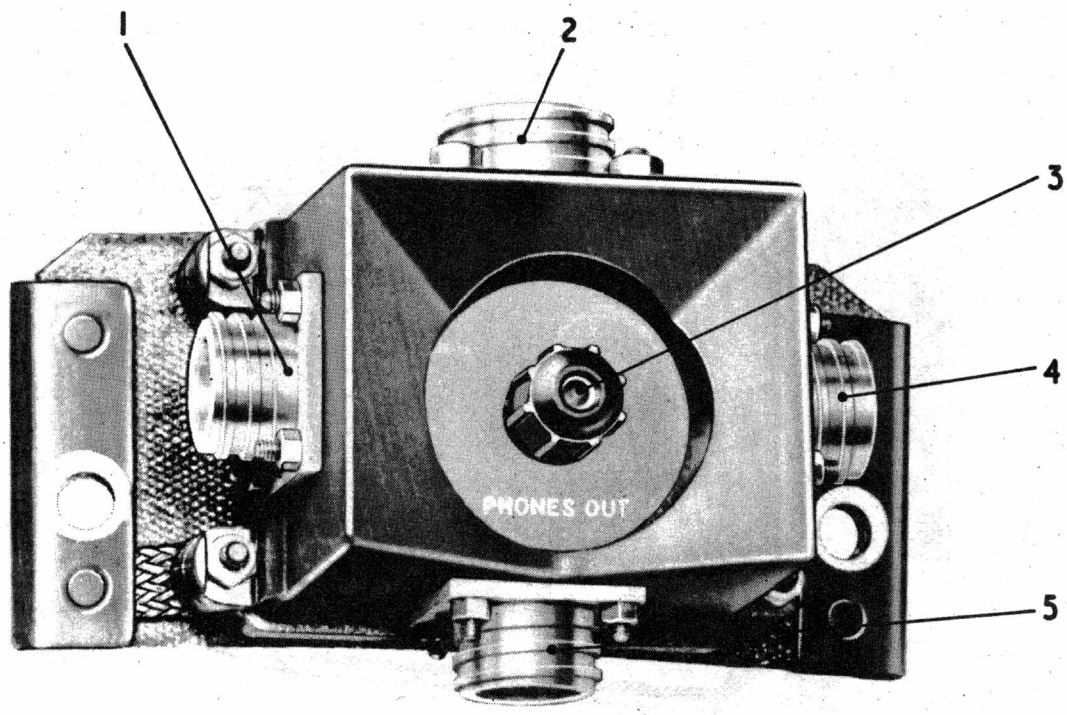


FIG. 9 ADAPTOR UNIT 'A' RECEPTION SET

9. Connectors

When the reception set is used with Wireless Sender C11, a coaxial connector is used to connect the 80 ohm aerial termination of the reception set to the sender, and a 12 point cable, with Mk. 4 plug and socket terminations, is used between the receiver and sender to carry power input to the reception set via the sender and to pass audio output from the reception set, via the sender, to the control harness. This cable also connects the voltage sensitive relay of the sender to the slave relay of the reception set. When the reception set is used alone, the aerial termination is connected direct to the aerial and a 12 point lead connects the reception set to an Adaptor Unit 'A' which is provided in place of the wireless sender terminations for power input and audio output distribution. The adaptor unit is not required when the AC PSU is being used.

10. Construction

(1) Reception Set

The Reception Set R210 is designed on the sub-unit principle, the main chassis assembly being divided into four sub-assemblies comprising the RF unit, the IF unit (including the BFO, detector and noise limiter), the audio unit and crystal oscillator, and the DC power supply unit, each sub-unit being inter-connected by cable-forms. The complete assembly is contained in a die-cast aluminium case which hermetically seals the unit when securely closed.

When the set is removed from its case, the chassis assembly can be hinged back to give reasonable access to the undersides of the units, and still remain operative. This simplifies servicing and maintenance for workshop personnel. Fig. 10 shows set hinged back.

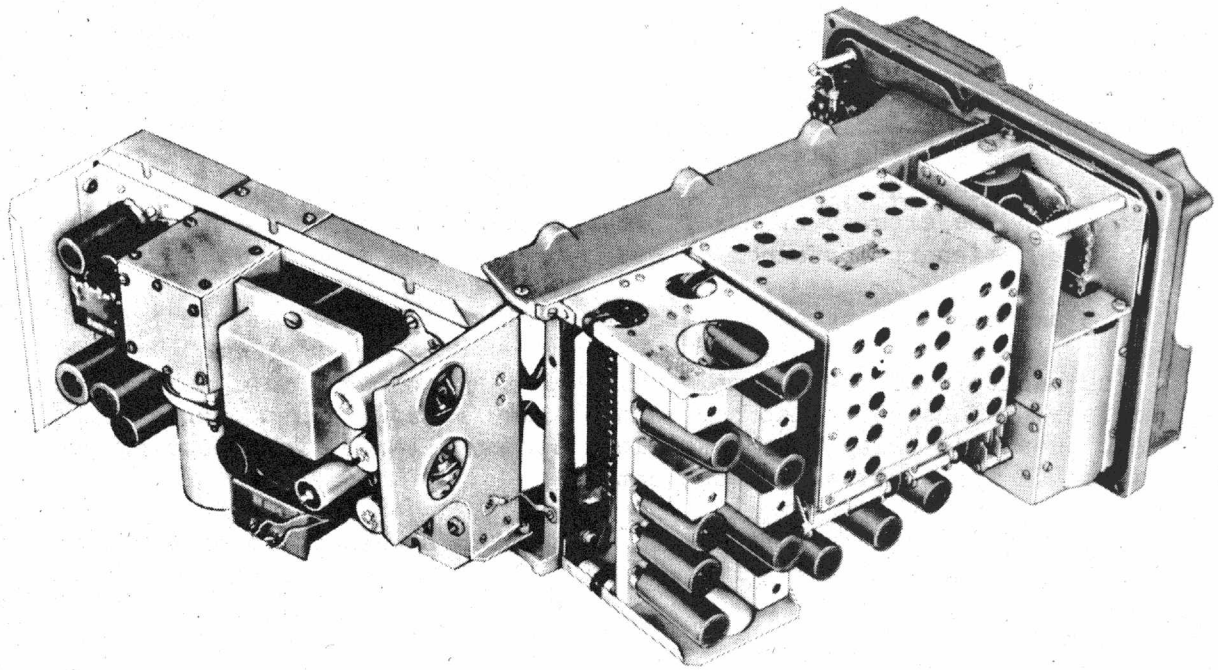


FIG. 10 CHASSIS ASSEMBLY HINGED BACK SHOWING TOP SIDE OF UNITS

Valve test points are provided adjacent to each valve position.

The main tuning scale consists of a 50 inch length of 70 mm film having the seven bands marked in parallel to each other along its length.

The drive mechanism of the scale is linked to the main tuning control by a system of bevel gears and worm drive, the reduction ratio of the control knob to the tuning capacitors being 40 : 1. A small handle is added to the control knob to facilitate rapid rotation, and a locking device is fitted to enable the operator to lock the control in any required position.

The scale window is illuminated by a small lamp fitted inside the case. The lamp is controlled by a switch on the front panel.

To emphasize the black graduations of the film scale a white reflecting strip, controlled by the band switch, moves into position behind the scale of the particular band selected by the operation of the switch.

In front of the tuning scale is an adjustable cursor controlled by the knob situated immediately above the scale window. The cursor is used in conjunction with the crystal calibrator.

The crystal calibrator is built on the sub-unit chassis of the IF Unit. A 100 kc/s crystal, followed by a frequency divider circuit, gives check points at 100 kc/s and 10 kc/s, either being selected by operating the system switch to the indicated position.

Power input to the receiver, and audio outputs from the receiver, are passed via a 12-way Mk. 4 fixed plug on the front panel of the set.

A desiccator of the quick-lime type is fitted into the rear of the case. The purpose of the desiccator is to absorb residual moisture from the interior of the set and to give visual indication of excessive dampness. The quick-lime type is used in preference to the silica-gel type because the heat generated in the close confines of the sealed case adversely affects silica-gel. The desiccant container of quick-lime is colour coded red.

A 3 amp cartidge type fuse and fuse-holder is fitted in the front panel.

The built-in DC power supply unit has a synchronous vibrator and neon stabiliser. This unit also houses the slave relay which operates from the voltage sensitive relay in the Wireless Sender C11 used for reducing the variation of input voltage to the set.

A separate AC power supply unit is available when it is essential to use AC mains supply.

11. Basic Principles of Operation

The receiver is a single superheterodyne. Referring to block diagram Fig. 11, RF signals are fed to the appropriate aerial circuit, via the band switch, and on to the RF valve (V1). Output from V1 is passed to the mixer stage (V2) which is fed with the output from the local oscillator (V3). The resultant IF is passed through three stages of IF amplification (V4, V5 and V6), and on to one diode of the double-diode valve (V7) which acts as the detector. The other diode of V7 is used for AGC purposes. A noise limiter (V8) may be switched in circuit when required. The BFO (V9) is connected at the detector stage and is switched in circuit when system switch is at the CW, CWF, 100 kc/s or 10 kc/s position. Output from the detector stage passes to the 1st audio amplifier (V10) and so on to the output stage (V11). This output is passed, via the 12 point connector of the set, to the Wireless Sender C11 harness, or, when the reception set is used alone, to the phones distribution box (Adaptor Unit 'A'). A 1000 c/s audio filter is incorporated in the reception set and can be switched in circuit by setting the system switch to CWF position. A cathode follower (V14), fed with IF from the detector anode, is used to supply a low impedance IF output of the order of 0.1 volt. A crystal calibrator (V12 and V13), giving check signals at 100 kc/s

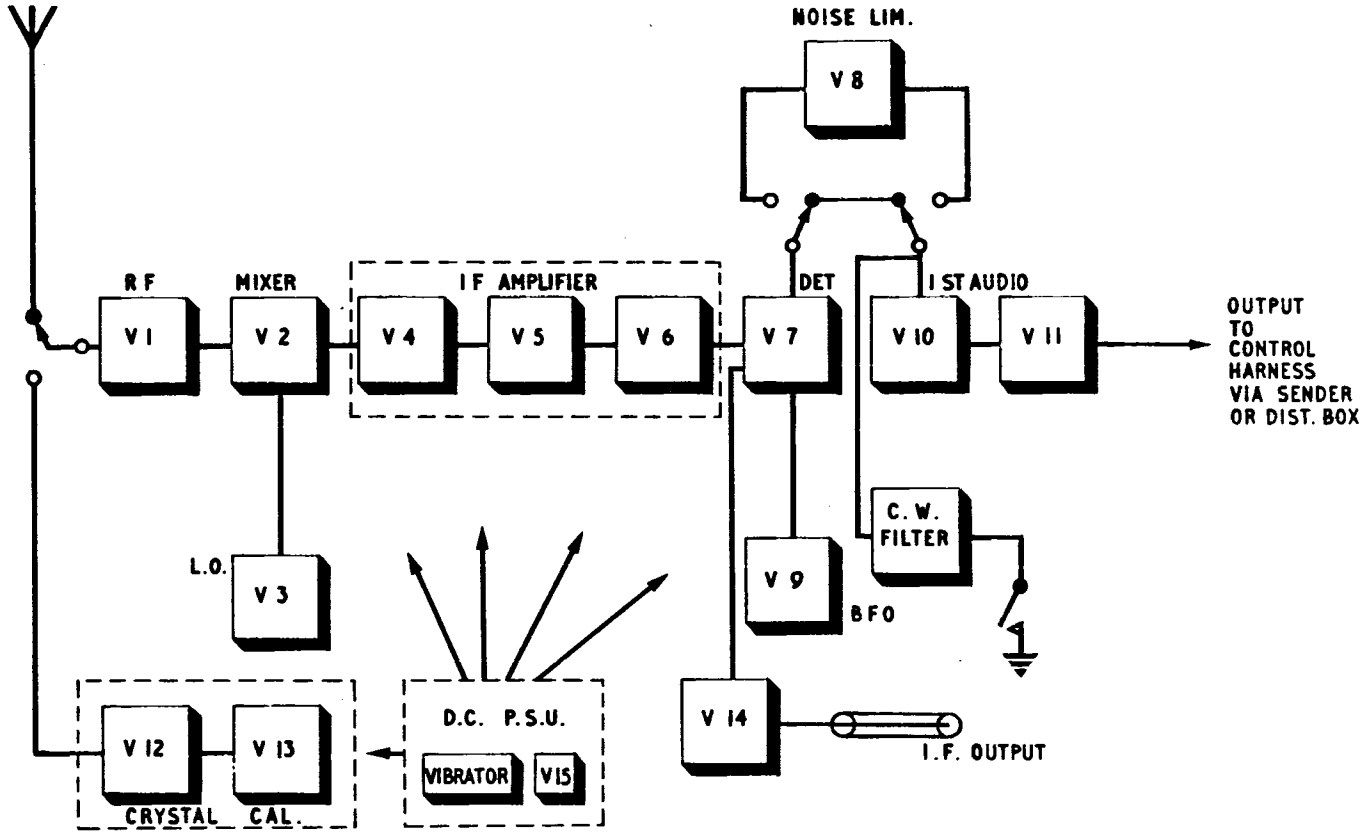


FIG.11. BLOCK DIAGRAM.

and 10 kc/s, may be switched in circuit by operating the system switch to the appropriate position. This operation connects the crystal calibrator to the RF stage and disconnects the aerial circuit.

A DC power supply unit, designed to operate from a 24 volt DC source, is built into the receiver, the main components being a synchronous vibrator, a vibrator transformer, a neon stabiliser, and a slave relay. Input voltage from a 24 volt battery on float charge is liable to fluctuate greatly to the detriment of the receiver, so to control the input voltage within reasonable limits an automatic switching system has been designed. A voltage sensitive relay situated in the Wireless Sender C11 acts as a changeover switch. The input side of the vibrator transformer is tapped at two positions, (1) for HIGH input, and (2) for LOW. When the input voltage is low, the voltage sensitive relay contacts are in a position which operates the slave relay of the DC power supply unit causing the slave relay contacts to hold to the LOW tapping circuit. If the voltage rises excessively, the voltage sensitive relay contacts changeover to the other position, causing the slave relay to become inoperative, thus releasing its contacts and changing over to the HIGH tapping position. A neon stabiliser (V15) controls the HT supply to the mixer and the local oscillator, and also controls the delay bias to the AGC line.

When the receiver is being operated in conjunction with Wireless Sender C11 from AC supply, the AC power supply unit of the latter provides the power for the receiver. When it is required to operate the receiver alone from an AC supply source, a separate AC power supply unit is available, the built-in DC power unit being by-passed.

When the receiver is being used alone on DC, the Adaptor Unit 'A' must be connected to the receiver in place of the sender, to enable power supplies to reach the receiver, and to provide a means of attaching the phones. (See Fig. 13, page 18.)

12. Weights and Dimensions

The weights and dimensions of the Reception Set R210 and the associated units are given in Table 5.

Table 5

Item	Height (in)	Width (in)	Depth (in)	Weight (lb)
Reception Set	$7\frac{1}{2}$	10	14	approx. 35
AC PSU	$8\frac{1}{4}$	$11\frac{3}{4}$	$7\frac{1}{2}$	approx. 15
AERIAL COUPLING UNIT	5	$7\frac{1}{4}$	6	approx. $5\frac{1}{4}$
ADAPTOR UNIT 'A'	4	$4\frac{1}{2}$	2	1

CHAPTER 2- OPERATION

13. Preliminary Setting Up

WARNING

When this equipment is operated on an AC supply the voltage employed is sufficiently high to endanger human life. Every reasonable precaution has been observed in design to safeguard operating personnel. Do not tamper with supply leads and switch the power supply off before removing connectors. In case of electric shock refer to the inside front cover of this handbook.

(1) General

Check that the equipment is in a sound mechanical condition and all controls operate freely. Check that the window of each desiccator shows blue. Should the colour show pink, the interior of the unit is damp and should be dried out by a qualified technician. (See Section 22, page 31).

(2) Connections

(a) DC Operation

When the reception set is being used with Wireless Sender C11, power supplies are fed from a 24 volt battery via the wireless sender PSU and 12 point connector. Fig. 12 shows connections.

When the reception set is used alone from a 24V DC source of supply, power is passed from the 24 volt battery via an Adaptor Unit 'A' and a 12 point connector. (Fig. 13 shows connections).

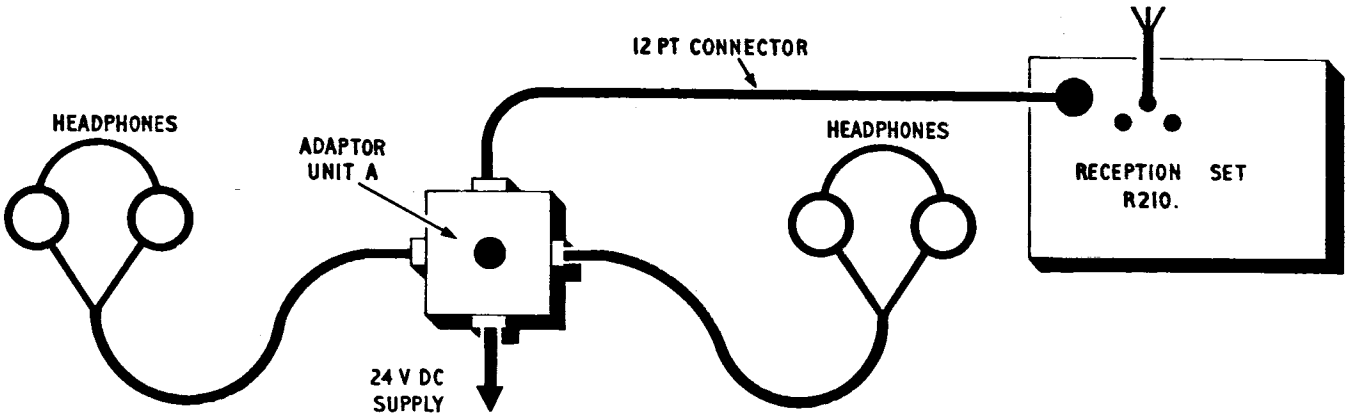


FIG.13. CONNECTIONS WHEN USED ALONE ON D.C.

DC supplies may also be connected to the reception set via the AC power supply unit. In this instance the 24 volt DC supply is connected to the DC INPUT plug of the AC PSU, the AC circuit of the PSU is by-passed and the supply is fed, via the 12 pt. connector, to the built-in DC power unit of the reception set. Fig. 14 shows the connections. The adaptor unit is not required when the AC PSU is used.

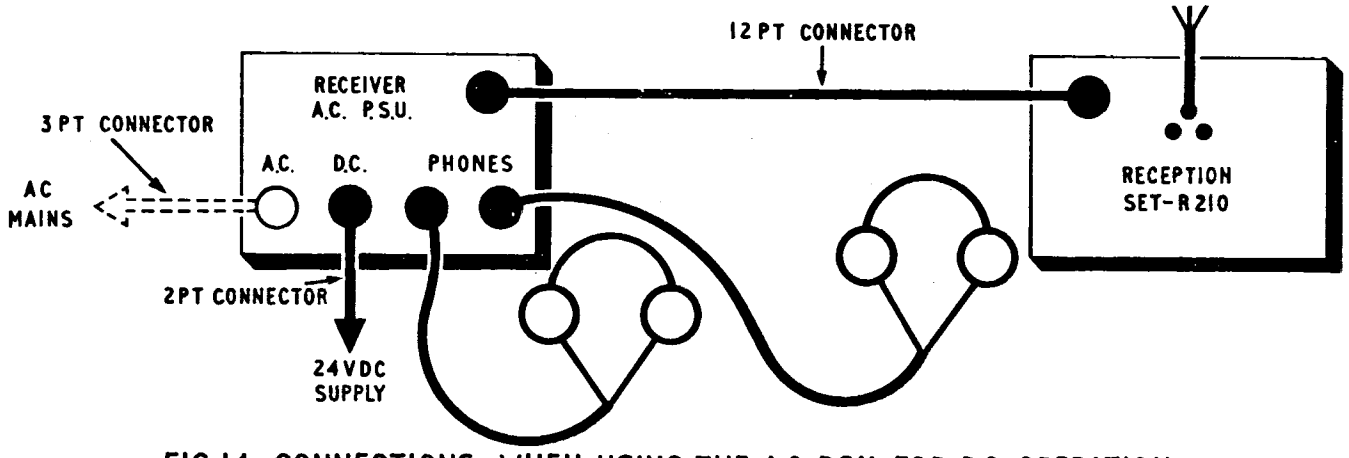


FIG.14. CONNECTIONS WHEN USING THE A.C. PSU FOR D.C. OPERATION

(b) AC Operation

When it is required to operate the reception set on its own using AC mains supply the AC Power Supply Unit is connector to the receiver in a similar manner to that shown at Fig. 14 except that the 2 pt. DC connector is omitted and a 3 pt. connector is connected to the AC INPUT for connection to the mains supply.

When the reception set is to be used with its associated sender (Wireless Sender C11) on AC operation the HT and LT supplies for the receiver are provided by the AC Power Supply Unit of the sender. These are controlled by a separate switch on the front panel of the power unit. Connections for this condition are shown at Fig. 15.

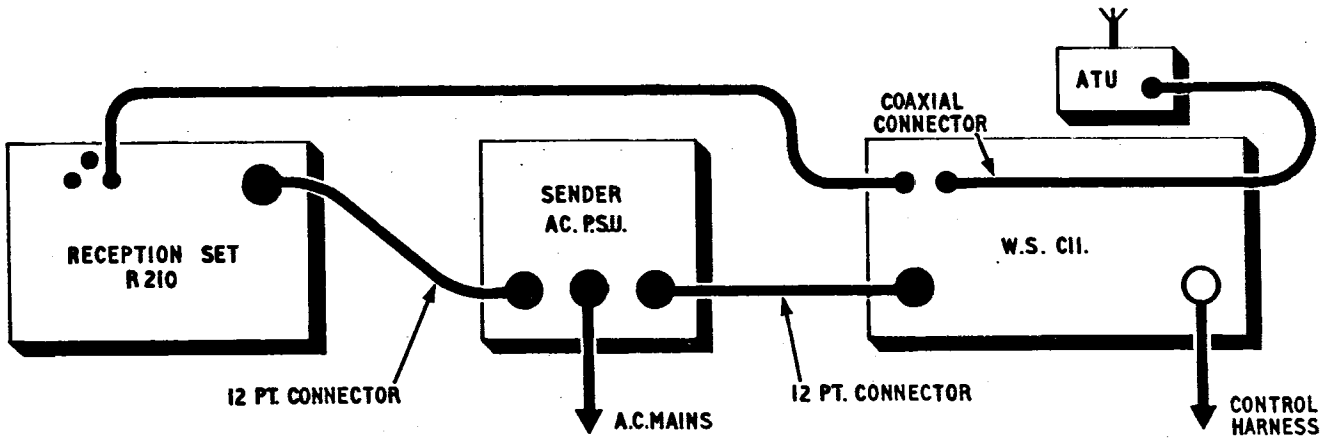


FIG. 15. CONNECTIONS WHEN USING THE RECEIVER WITH SENDER ON A.C.

(c) Remote Aerial Connection

When the reception set is to be used alone and remote from the aerial the set must be connected to the Remote Aerial Tuning Unit, situated at the base of the aerial, by an 80 ohms coaxial feeder not exceeding 100 yards in length. The PHONES IN termination of the ATU must be connected by a length of D10 or similar cable to the PHONES OUT termination on the front of the Adaptor Unit 'A' and the 12 pt. Mk. 4 socket of the adaptor unit must be connected to the 12 pt. Mk. 4 input plug on the front of the reception set. The phones must be connected to the 6 pt. Mk. 4 socket on the front of the ATU for tuning purposes. (See Section 19 - Remote Operation).

(3) Adjusting the AC Voltage Selector of the AC PSU

When using the AC PSU and before connecting the AC mains to the unit it is important that the selector on the front panel of the unit is correctly adjusted to suit local voltages.

This adjustment is made in the following manner:-

(a) Remove the knurled cover plate.

(b) Lift the handle of the pin and remove the pin A as shown in Fig. 16.

(c) Rotate the plate C Fig. 16 until the required voltage figure is shown at B, Fig. 16.

(d) Re-insert the pin and replace the cover plate.

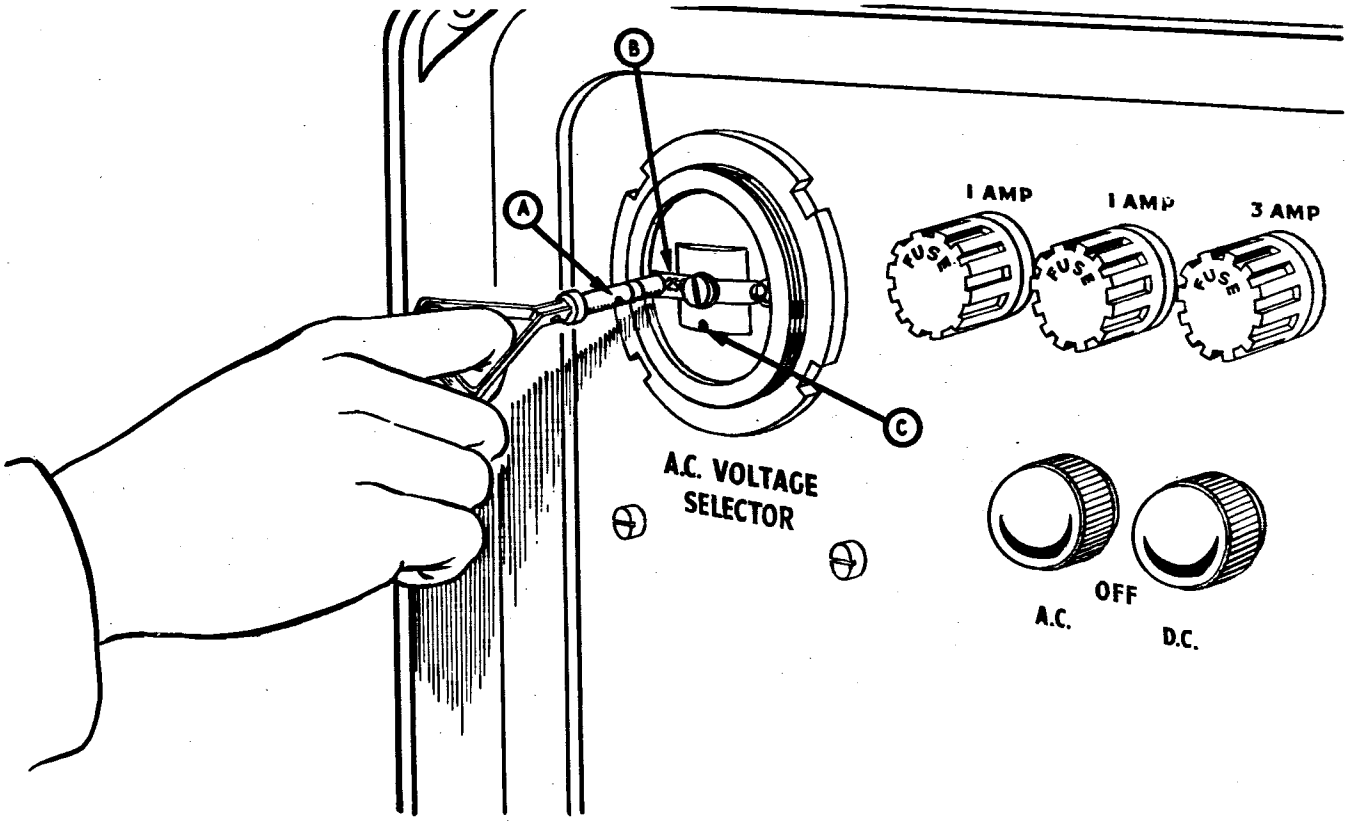


FIG. 16. ADJUSTMENT OF A.C. VOLTAGE SELECTOR.

(4) Connecting the AC PSU to the Reception Set

Set the main switch to the OFF position.

Connect the 12 point Mk. 4 connector between the 12 point socket in the right hand top corner of the PSU to the 12 point socket in the top left hand corner of the Reception Set R210.

Connect a Microphone and Receiver Headgear assembly. (This comprises a Microphone Hand SI No. 1 or 1A, neckband snatch pattern No. 1 or 1A and Receivers Headgear SI double No.1A), to the 6 pt. Mk. 4 socket engraved PHONES.

Connect the 3 point socket of the mains lead to the 3 point plug termination engraved AC INPUT.

Alternatively when DC operation is required, the 24 volt DC supply is connected to the 2 point socket engraved 24V DC INPUT.

14. Operating on VOICE (Fig. 17)

Having ascertained that all connections are correctly made, and power is reaching the receiver input:

(1) Operate ON-OFF switch to ON and allow set to warm up. (If required, the scale window may be illuminated by operating the ON-OFF switch to ON and LIGHTS).

(2) Set system switch to the AGC position.

(3) Set VOLUME control fully clockwise.

(4) Set NOISE LIM. switch to OFF.

(5) Set cursor line to its central position by operation of the cursor control.

(6) Set the RANGE switch to range in which wanted frequency lies. (Operation of this switch will cause the white background strip, behind the film strip, to move into position behind the calibrated scale for the required range, thus emphasizing that particular scale).

(7) Rotate the TUNING control handle until the required frequency reading appears in the scale window, approximately in line with the cursor.

(8) Make final tuning adjustment by rotating TUNING control slowly in either direction to obtain strongest signal.

(9) Lock the tuning control by operating locking device in direction of the arrow engraved on panel.

(10) Adjust the VOLUME control to a comfortable audio level.

(11) If signal is being interfered with by pulses of interference, e.g. atmospherics, ignition noise, etc., switch the NOISE LIM. switch to ON and readjust VOLUME control if necessary.

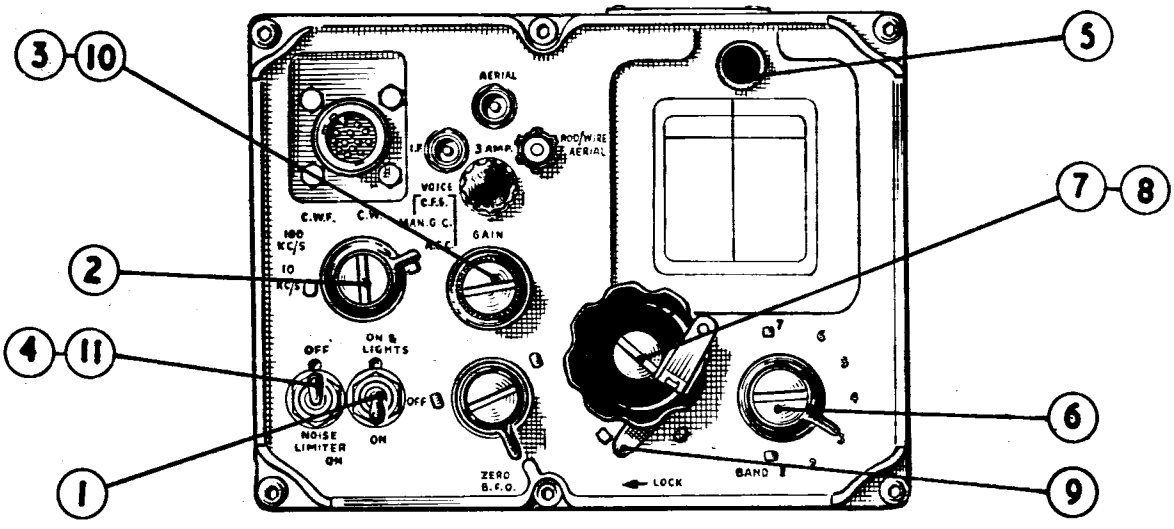


FIG.17 SEQUENCE OF OPERATIONS ON VOICE

15. Operating on CW (Fig. 18)

(1) Operate ON/OFF switch to ON and allow set to warm up. (If illumination of the scale window is required, operate the ON/OFF switch to ON and LIGHTS).

(2) Set the system switch to the CW position.

(3) Set the NOISE LIM. switch to OFF.

(4) Turn the VOLUME control fully clockwise.

(5) Set the BFO pitch control to the ZERO position.

(6) Set the RANGE switch to the range in which the required frequency lies.

(7) Set the cursor to its central position by operating the CURSOR control.

(8) Rotate the main TUNING control until the required frequency reading appears against the cursor line in the scale window.

(9) When the signal has been located adjust the TUNING control until the beat frequency falls to zero (in the case of strong signals it will be necessary to re-adjust the VOLUME control in an anti-clockwise direction).

(10) Lock the tuning control by operating the locking device in the direction of the arrowhead engraved on the panel of the set.

(11) Adjust the BFO control until the note rises to a suitable pitch.

(12) Adjust the VOLUME control to a comfortable audio level.

(13) If interference is being experienced from atmospherics, ignition noise, etc., operate the NOISE LIM. switch to ON and re-adjust the VOLUME control if necessary.

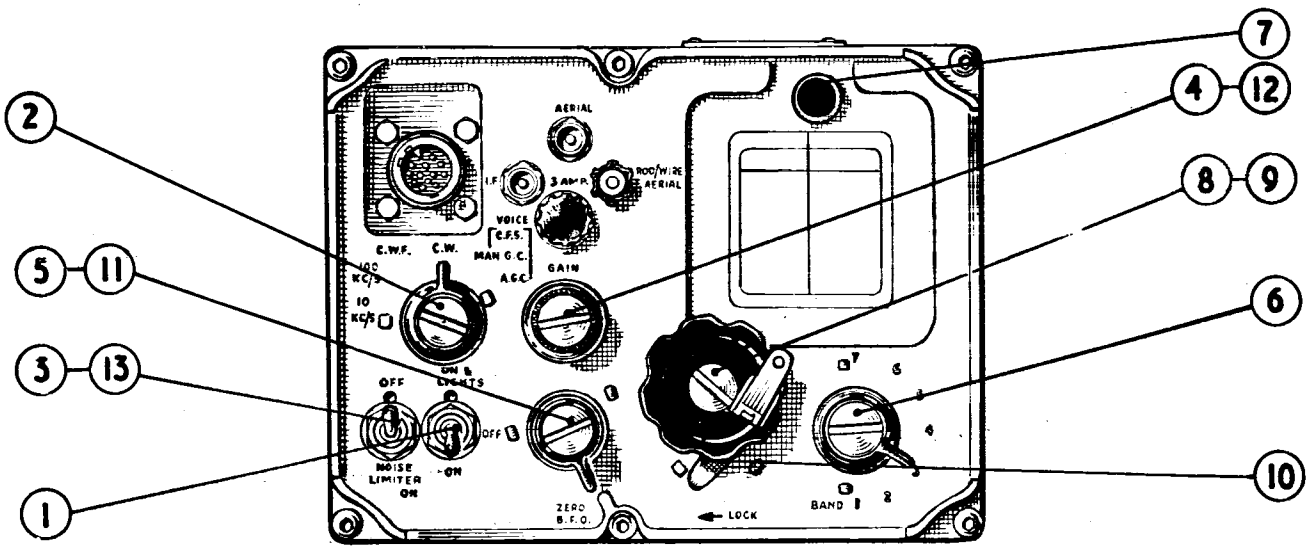


FIG.18 SEQUENCE OF OPERATIONS ON C.W.

16. Use of the Crystal Calibrator

(1) To Check the Exact Frequency of a Received Signal (Fig. 19)

(a) Operate the movable cursor to the centre position on dial.

(b) Note the scale reading of the received signal against the cursor line.

(c) Set the system switch to the 100 kc/s position.

(d) Adjust TUNING control to obtain zero beat in the neighbourhood of the nearest 100 kc/s point to the cursor line.

(e) Set the movable cursor to the new position of the 100 kc/s point.

The difference between the centre line of the dial window and the cursor line position, is the correction to be made to the noted scale reading of the incoming signal. It must be remembered that if the new position of the cursor reads above (to the right of) the centre line, the difference must be deducted from the noted scale reading of the incoming signal, and if the new position is below (to the left of) the centre line, the difference must be added.

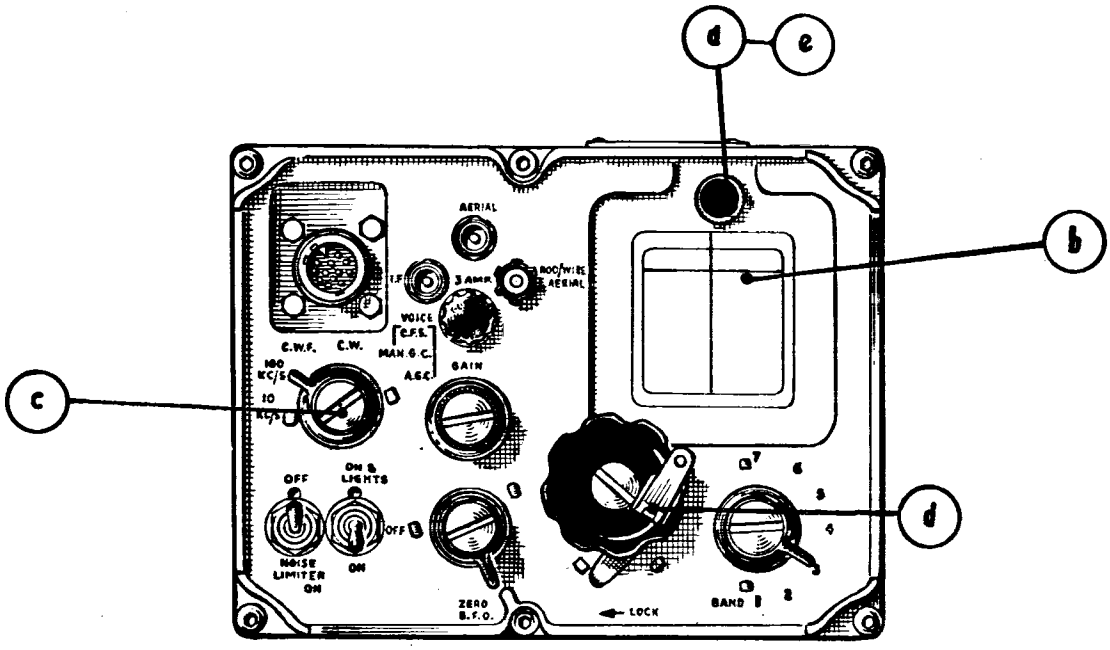


FIG. 19 SEQUENCE OF OPERATIONS TO CHECK THE EXACT FREQUENCY OF A RECEIVED SIGNAL

(2) To Tune Receiver Accurately to a Given Frequency (Fig. 20)

The built-in crystal calibrator, giving check points at 100 kc/s and 10 kc/s, is used in conjunction with the movable cursor, and enables the operator to tune the receiver accurately to any given frequency.

The following paragraphs describe, as an example, the method of setting the receiver accurately to a frequency of 2.57 Mc/s.

(a) Ensure that all connections to receiver are correctly made, and that power supplies are reaching receiver input, switch ON-OFF switch to ON, or to ON and LIGHTS, as required.

(b) Set NOISE LIM. switch to OFF.

(c) Set BFO control to zero position (projection of knob in line with projection on panel).

(d) Set cursor line to its central position by operation of cursor control.

(e) Set system switch to 100 kc/s position.

(f) Turn TUNING control so that the nearest 100 kc/s point on the scale, to the required frequency, lines up with the cursor, i.e. 2.6 Mc/s against cursor line.

(g) Adjust tuning on either side of the scale reading 2.6 Mc/s, until the signal nearest the reading is heard, then readjust for zero beat.

(h) Adjust the cursor to line up with new position of the 2.6 Mc/s reading on scale.

(j) Adjust TUNING control so that position 2.57 Mc/s on scale lines up with cursor.

(k) Set system switch to 10 kc/s position.

(l) Readjust TUNING control for zero beat.

(m) Set system switch to the required system of operation, i.e. CW or AM.

(n) Operate locking device of main tuning control in direction of arrow.

The receiver is now set up for the required frequency of 2.57 Mc/s.

NOTE: When the receiver is being used in hot climates, (where excessive ambient temperature changes occur), it may be found necessary to check the setting at intervals. To do this, it is only necessary to switch the system control to the 10 kc/s position and re-tune for zero beat, afterwards returning system control to the system of operation, i.e. CW or AM.

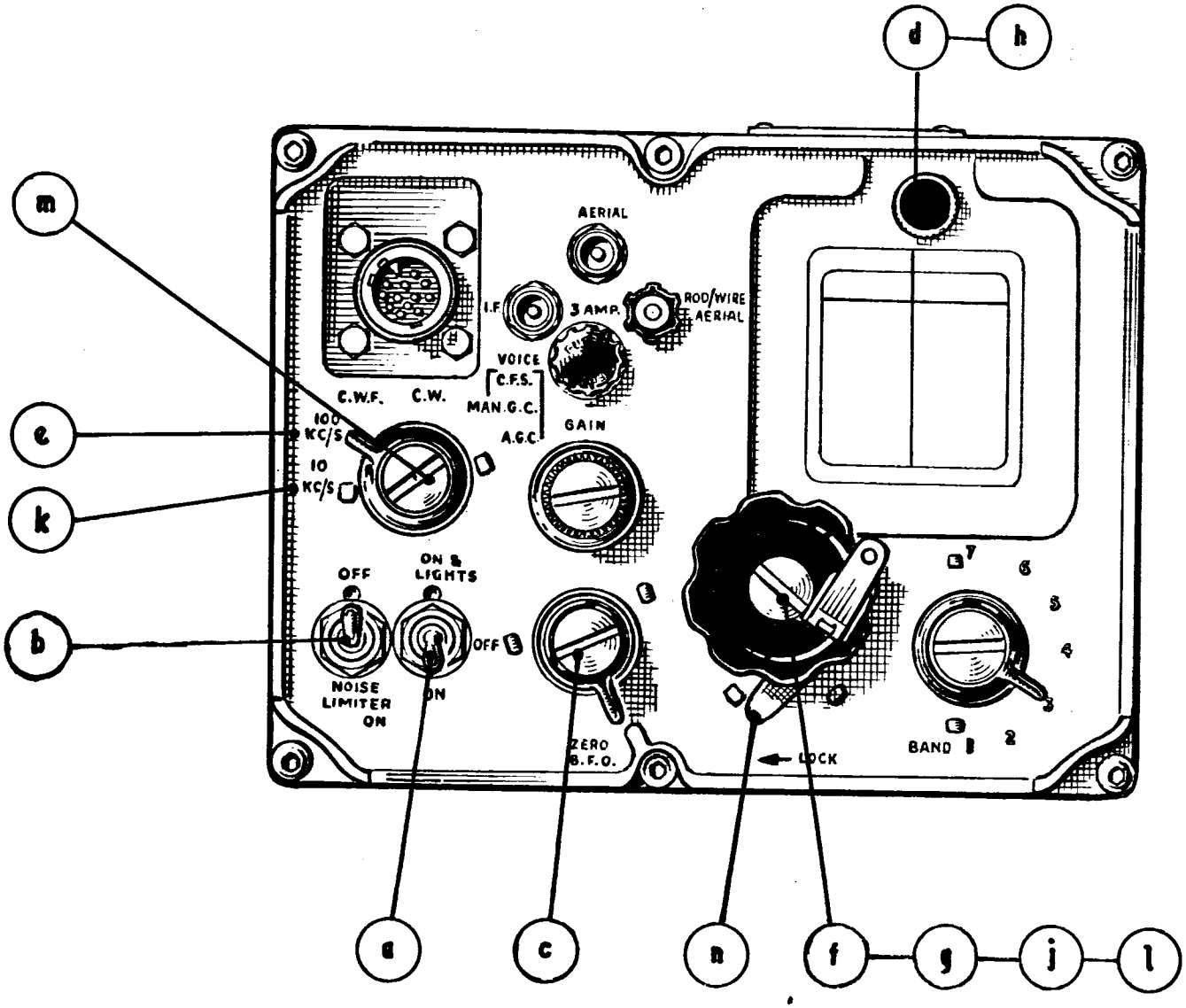


FIG. 20 SEQUENCE OF OPERATIONS TO TUNE ACCURATELY TO A GIVEN SIGNAL

17. Use of CWF Position

If, when operating on CW, the signal suffers from adjacent station interference, the system switch should be set to the CWF position. This switches in the audio filter. The BFO control should be slightly readjusted to give maximum output.

18. Use of MAN. GC Position

When the receiver is required for use with ancillary equipment for frequency shift working, the system switch should be operated to the MAN. GC position.

In this position, the AGC is cut out and manual RF gain control is brought into circuit.

19. Remote Operation

As previously stated the reception set may be operated with a remote aerial up to a distance of 100 yards from the set and the aerial tuning equipment described at Section 7 has been primarily designed for this purpose.

(1) Connections

(a) DC Operation

For remote operation, using DC supply, the connection between the reception set and the aerial tuning equipment is as shown at Fig. 21.

(b) AC Operation

When remote operation is required whilst using AC supplies, the AC PSU replaces the adaptor unit 'A' and the D10 cable connection is made between the PHONES IN terminal of the ATU and the PHONES OUT terminal on the front panel of the PSU.

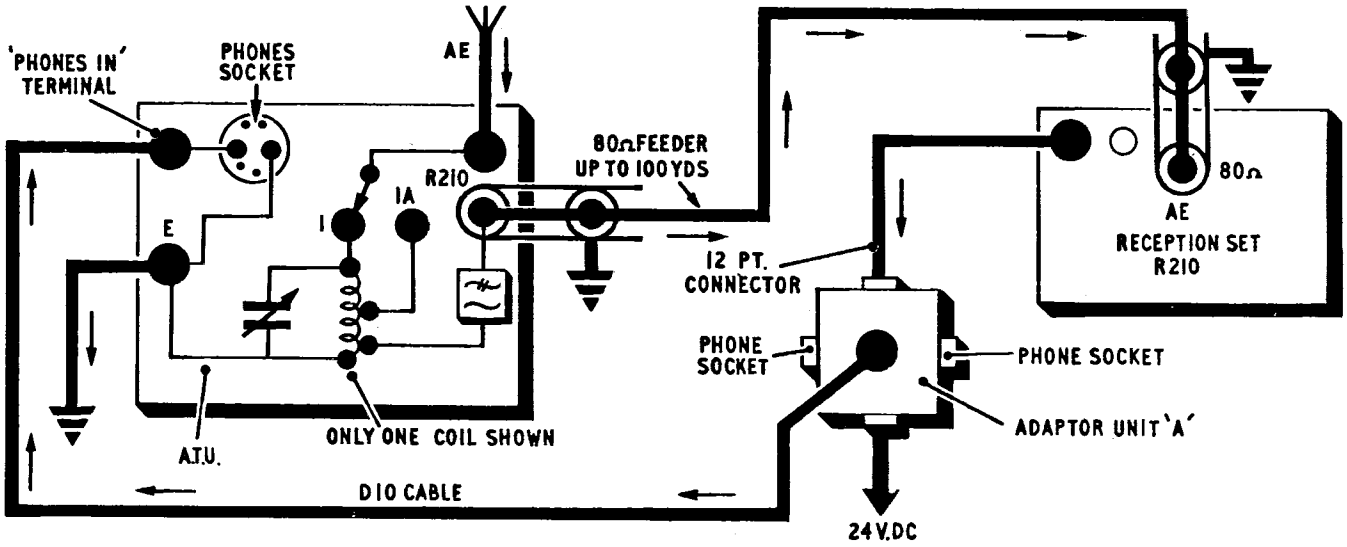


FIG. 21. CONNECTIONS FOR REMOTE OPERATION

(2) Principle of Operation

With the reception set tuned as described at (2) page 24 and with the equipment connected as shown in Fig. 21 it can be seen that an incoming signal to the aerial tuning unit passes via the switch position and selected coil out via the VHF rejector and the 80 ohm feeder to the aerial input of the reception set. Tuning is affected by the variable capacitor across the coil. The audio output of the set is passed to the 6 pt. Mk. 4 phone sockets of the adaptor unit and the insulated terminal on the front of the adaptor unit is connected internally to this output.

External connection between this terminal and a similar terminal engraved PHONES IN on the ATU, is made by a suitable length of D10 cable. Internal connection is made between the PHONES IN terminal and one point of the 6 pt. Mk. 4 phone socket and a second point of the 6 pt. socket is earthed, these are the only two points used in the 6 pt. socket. Thus with phones connected to the phone socket the operator at the ATU can listen to the output of the reception set and adjust the tuning accordingly.

It should be noted that the phones earth return is via the outer conductor of the coaxial feeder. Therefore the coaxial terminations at 'set' and 'remote' ends must be making a good earth contact to ensure a phones output at the remote end.

(3) Tuning the Equipment for Remote Operation

When using the Aerial Tuning Unit, the range switch must be set to a position to suit the particular type of aerial in use and the frequency required.

Table 6 shows the switch positions for various aerials and frequency coverage.

Two tuning methods are possible and both methods are detailed below:-

(a) First Method

(i) Set the receiver to the required frequency. (See Section 16 (2)).

(ii) Set the system switch of receiver to 'MAN GC'

(iii) Adjust VOL control of receiver so that a slight amount of set noise can be heard in phones.

(iv) At the ATU, ascertain the switch setting for the required frequency from the table below and set ATU range switch accordingly.

(v) On receipt of the incoming signal, adjust the tuning control of the ATU to give maximum signal output in the phones.

(b) Second Method

(i) Carry out the instruction at (a) (i) above.

(ii) Set the system switch of receiver to AGC.

(iii) Carry out the instruction at (a) (ii) to (iv) above.

(iv) On receipt of the incoming signal, adjust the tuning control of the ATU to give maximum signal to noise ratio.

The second method is preferable as overloading of the receiver cannot occur even with a powerful signal.

Table 6 - Switch Settings of ATU

Type of Aerial	Frequency Range	Range Switch Position
8 ft. Rod	2- 4 Mc/s 4- 8 " 8-16 "	1 2 3
12 ft. Rod	2- 4 Mc/s 4- 8 " 8-12 "	1 2 3
16 ft. Rod	2- 4 Mc/s 4- 8 " 8-12 "	1 2A 3A
Wire Aerials exceeding the above lengths	2- 4 Mc/s 4- 8 " 8-16 "	1A 2A 3A

When using wire aerials, care should be taken to ensure that the aerial length is <u>under</u> $\frac{1}{4}$ wave or <u>just below</u> $\frac{3}{4}$ wave.

<u>NOTE</u>: Where dipoles, cut to length, are used the Aerial Tuning Unit is not necessary.

CHAPTER 3- USER SERVICING

20. General

No equipment can be expected to work properly unless it is kept in first class condition by regular servicing, conscientiously carried out. This servicing is the responsibility of the NCO or man who is in direct charge of the equipment and is responsible for its operation, NOT of workshop or repair staffs, though workshop personnel may be called on to carry out certain servicing tasks.

21. Unit Servicing Log

To guide the NCO or man responsible for servicing and to ensure that it is done, it has been laid down that Signal Equipment will be serviced on the task system and that the completion of each task will be recorded on Army Form B2661 - Unit Servicing Log.

A facsimile of the form is shown on the opposite page. Completion of servicing tasks will be recorded by initialling in the space provided on the front of the form; all repairs and replacements will be recorded on the reverse of the form. The form lasts 24 weeks and replacements should be obtained on indent in the normal way.

22. Opening Sealed Units

The reception set is hermetically sealed, and operators must not loosen any fixing screws, or in any way attempt to remove the unit from its case. Furthermore, none of the control knobs must be tampered with, as this may cause damage to the spindle sealing glands.

Royal Signals radio technicians may open a unit for servicing, so far as their technical ability and the equipment and spares in their possession allows, subject to the following conditions:

(a) On the initiative of the technician, when absolutely necessary to restore essential communications, or

(b) On the authority of the Officer Commanding.

These are the only occasions when Royal Signals radio technicians may break the seals.

Seals should so far as possible only be broken in conditions when the risk of dust or damp getting into the equipment is as small as possible. The equipment must be sent to workshops for testing of the seals, and drying out if necessary, as soon as possible after an emergency opening.

23. Servicing Tasks

The following servicing tasks may be carried out by the operator. The frequency with which these duties will be carried out will be detailed by the Unit Commander who may add to them at his discretion. It is advised, however, that all of these tasks are carried out.

(1) Keep the equipment in a clean and dry condition.

(2) Examine all connectors for fraying, paying special attention to the points where they enter plugs and sockets.

(3) Check that all connectors are pushed fully home and are firmly secured in position by their locking rings.

(4) Check that all switches and controls work smoothly and firmly through their range of movement.

(5) Inspect the humidity indicator. If the colour of indicator remains blue, the interior of the equipment is in a dry condition, but if the colour has changed to pink then the interior of the unit is damp, and the set should be returned to REME workshops for drying out and replacement of desiccator.

24. Fuses

A 3 amp cartridge type fuse, in the 24 volt DC input line, is installed in the fuseholder on the front panel of the set. The fuseholder is of the sealed type and removal of the fuse does not break the sealing of the set, therefore, if the fuse blows, the operator can replace by a new cartridge of the same rating and type.

Fuses for the AC power supply unit are housed in three fuseholders on the front panel of the unit, the 1 amp fuses being for the AV power input and the 3 amp fuse being for the DC input.

It is important, when replacing fuses, to use replacements of the correct rating and value.

25. Fault Location

The following fault location table is intended as an operator's guide to the simpler faults which might occur. These instructions may be carried out without the use of special apparatus and will enable simple faults to be localized.

It should be remembered that simple external faults are much more common than internal faults; if the equipment fails, look for faults in the following order:

(a) Faults in the setting of switches or controls.

(b) Faults due to external connections, etc.

(c) Internal faults.

It must be emphasized that the sealing of the set should not be broken except by authorized technicians at workshops, and internal faults must be reported in order that they may be repaired by workshop personnel equipped with suitable apparatus.

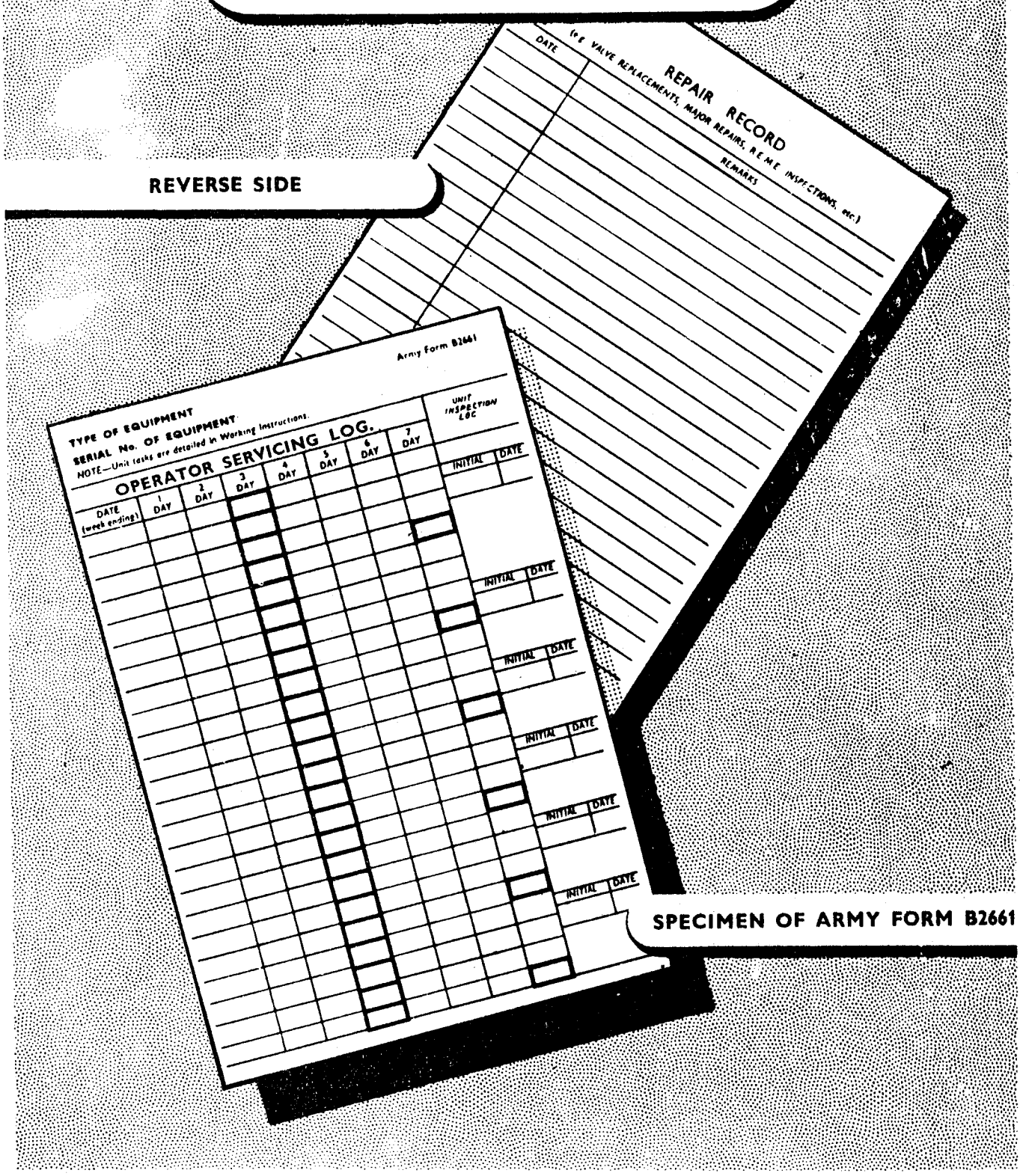
Fault Location Table

Sympton	Possible Fault	Action
(1) Humidity Indicator appears pink.	Moisture in interior of reception set.	Report for drying out and desiccator replacement.
(2) With set connected for operation and switch at ON position, set appears dead.	(a) Volume control fully anti-clockwise	(a) Turn volume control to maximum (clockwise).
	(b) Blown fuse on front panel of set. (DC operation).	(b) Replace with new 3 amp fuse of similar type.
	(c) Blown mains fuse at power source (AC operation).	(c) Check and replace
	(d) Fault in external connections between set and power source.	(d) Check all connectors and ensure that good contact is being made at connector terminations.
	(e) Faulty battery (DC operation).	(e) Replace with efficient battery.
	(f) Internal	(f) Report to workshops.
(3) As at (2) above but with switch at ON and LIGHTS, no illumination of scale window	(a) Defective scale lamp.	(a) Report
	(b) As at either (2)(b), (c), (d), (e) or (f) above.	))) As above

All internal faults should be reported immediately and the equipment sent to workshops for overhaul.

OPERATOR SERVICING LOG.

REVERSE SIDE



SPECIMEN OF ARMY FORM B2661

IMPROVEMENT OF SIGNAL EQUIPMENT

Do you think YOU can improve ANY Signals Equipment?

Can you suggest:

(a) An improvement in design or shape?
(b) A better method of installation, operating or servicing including the tools you use?
(c) Other equipments which might do the job better?

The War Office is interested in your ideas. Apply to your Troop Commander for details of the method whereby suggestions may be passed by YOU to the War Office.

War Office Memorandum to C.S.Os., reference 42540 (Signals 3 (c)) dated 30th March 1948 refers.

Suggestions from Other Arms of the Service will be welcomed but should be passed to the nearest Chief Signal Officer.