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Army Code No.71147
D/DAT/13/28/94

Infantry Training
Volume VIII
Infantry Signal Training

RESTRICTED

1982

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AMENDMENTS

Amendment No.	Date of insertion

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Infantry Training Volume VIII
Infantry Signal Training
Pamphlet No 41 Part 4
Equipment and its Operation (Clansman)

Prepared under the direction of the Chief of the General Staff

Ministry of Defence

1982

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FOREWORD

Any person wishing to propose amendments to this pamphlet is invited to write to the Chief Instructor of Signal Wing, School of Infantry, Warminster, Wiltshire. Any such proposals will be given consideration and if there is a requirement for them the appropriate amendments will be prepared by the School of Infantry for submission to Headquarters, Director of Infantry.

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ANNEXES

ILLUSTRATIONS

Figure No.

LIST OF ABBREVIATIONS

A	Ampere
AAFL	Amplifier AF Loudspeaker
AC	Alternating Current
ACCU	AC Charging Unit
ACTIC	A and C radios together with IC
AEL	Audio Extension Lead
AF	Audio Frequency
AHC	Ampere Hour Capacity
AM	Amplitude Modulated

ARFAT	Adaptor RF Antenna Tuning
ATR	Adaptor Telegraph Radio
CBF	Commanders Box Fixed
CB2	Crew Box 2 set
CB3	Crew Box 3 set
CSSH	Clansman Secure Speech Harness
CPU	Commanders Personal Unit
CWI	Central Warning Indicator
DB	Drivers Box
DC	Direct Current
DCCU	DC Charging Unit
DMU	Digital Master Unit
DSB	Double Side Band
DBS	Drivers Box Set *(selector)*
ECM	Electronic Countermeasure
ETI	Elapsed Time Indicator
FM	Frequency Modulated
GS	General Service
GSA	Ground Spike Antenna
IC	Inter-communication
IB2	Inter-connecting Box 2 Radio
IB3	Inter-connecting Box 3 Radio
IBHA	Inter-connecting Box Harness Adaptor
IBRA	Inter-connecting Box Radio Adaptor
PDB	Power Distribution Box
PSU	Power Supply Unit
RCLU	Remote Control Local Unit
RATT	Radio Teletype
RCU	Remote Combining Unit
RF	Radio Frequency
ROS	Remote Operators Switch
RPU	Remote Personal Unit
RTT	Radio Telegraph/Telephony
RUT	Radio Under Test
RX	Receive
SCB	Set Combining Box
SSB	Single Side Band
SSW	Set System Switch
SURF	Selector Unit RF
TKC	Test Kit Condition
T/R	Transmit/Receive
TUAAM	Tuner Unit Automatic Antenna Matching
TURF	Tuner Unit RF
TX	Transmit
WR	Working Radio

ASSOCIATED PUBLICATIONS

TITLE	Army Code No.
Infantry Training Volume VIII, Infantry Signal Training Pamphlet No. 40 (Pts 1 and 2)—to be promulgated	71146
Infantry Training Volume VIII, Infantry Signal Training Pamphlet No 42, Primary and Continuation Morse	71041 (revised 1982)

User Handbooks:

UK/PRC 316	14961
Reference Handbook for CLANSMAN Radio and Ancillary Equipment	61004
UK/PRC 320	61123
UK/PRC 350	61124
UK/PRC 351/352	61128
CLANSMAN Radio Control Harness	61172
UK/VRC 321	61253
UK/PRC 344	61351
Antenna CLANSMAN VHF	61388
UK/VRC 353	61393
UK/PRC 349	61646
Test Set Condition	61655
Audio Accessories	61656
Test Set Harness Connector	61657
CLANSMAN Radio Installations in Trucks ½ tonne and ¾ tonne FFR and GS	61590 (Pts 1 and 7)
Secure Speech Harness, Clansman	61834

INFANTRY TRAINING

Volume VIII – INFANTRY SIGNAL TRAINING

Pamphlet No. 41 Part 4

EQUIPMENT AND ITS OPERATION (CLANSMAN)

INTRODUCTION

Aim

1. The aim of this pamphlet is to provide those concerned with the training of infantry signallers and instructors with a convenient form of instructional material.

Authority

2. The majority of material contained in this pamphlet is taken from existing coded publications; whereas every effort has been made to ensure its accuracy, where variations exist between this pamphlet and the publications listed as references, then the references are to be taken as authority.

3. Many of the references used as a source of material are on occasions difficult to obtain. However, for the most part this pamphlet can be taken as providing an adequate form of instructional material for instructing to the various levels of infantry signalling.

Layout

4. Each chapter of this pamphlet deals with a particular aspect of signalling equipments. Generally the layout of each chapter is as follows:

a. Introduction.

b. Aim.

c. References.

d. Teaching technique *(where appropriate).*

e. Material *(remainder of chapter).*

5.–10. Reserved.

Chapter 1

AUDIO EQUIPMENT AND ASSOCIATED ANCILLARIES

SECTION 1 – AUDIO EQUIPMENT

Introduction

0101. Certain items of equipment used with the CLANSMAN range of radios are designed to be used with all the sets in the range. This helps to cut costs and simplifies the instruction on CLANSMAN radios.

Headgear Assemblies

0102. The three types of headgear provided for use with CLANSMAN radio and/or harness are shown in *Fig 1.* They plug direct into the radio, or into the harness control box sockets marked 'AUDIO' or 'HEADGEAR', via the pressel box.

0103. The headgear shown use rocking-armature receivers in noise-excluding ear pads, and a boom mounted microphone. There is a noise exclusion adjustment on the 'A' vehicle crewmans/staff users headgear.

Infantry and B Vehicle Headgear *(Fig 1)*

0104. This headgear has two earphones, the right hand earpiece is detachable to allow the operator to receive commander's briefings, etc., and maintain listening watch in comfort. *(To remove earpiece; undo press stud and push spring clip downwards.)* If the headgear is connected to a control box with monitor facility, then this facility will be lost if the earpiece is detached.

0105. The three pin socket situated above the boom microphone is for use with the respirator microphone. In cold conditions, should the microphone become iced up from constant use, the operator can by blowing hard, clear the ice and the excess water can then be shaken off. The handset is connected to the pressel box by means of a snatch connector.

'A' Vehicle Crewman's Headgear *(Fig 1)*

0106. The crewman's helmet is used by crew members of armoured vehicles and consists of a helmet fitted with noise excluding earshells and boom microphone. The earshells are fitted with acoustic valves, so that the user can adjust the level of external noise that he hears. The respirator socket is below the boom microphone mount.

'A' Vehicle Staff User's Headgear *(Fig 1)*

0107. This headgear is designed to be worn under the new Infantry Helmet and is to be used by staff officers, or 'A' vehicle commanders. It is fitted with the same components as the 'A' vehicle crewman's helmet.

Cable Assembly Switch Electrical *(Pressel Box) (Fig 1)*

0108. The purpose of the pressel box is to provide a pressel switch for headset users. To operate the pressel box the pressel bar must be firmly depressed in the centre. There is on the bottom side of the box a microphone live on/off switch *(Fig 2).* In order to use the pressel box for live intercom in harness the fixing screw should be slackened and the switch moved to the live position. The microphone is then live for intercom at all times, but to operate the working set the pressel bars must still be depressed. The box is fitted with a swivel mounted clothing clip and is connected between the headset cable and the appropriate harness/set audio connection.

Single Transducer Headset *(Fig 3)*

0109. This headset is a lightweight alternative to the handset enabling operators to keep both hands unencumbered. The single transducer is used both as a microphone and a receiver. A pressel switch is incorporated in the earpiece and the headgear can be plugged directly into the AUDIO or HEADGEAR sockets of radios or harness control boxes.

Note: There is no need to remove headset from the ear to talk as the voice is transmitted by vibrations of the jawbone.

Respirator Microphone *(Fig 4)*

0110. This microphone is used with an S6 Respirator and one of the 'A' or 'B' vehicle headsets. The three pin connector is plugged into the socket provided in the moulded housing of the headgear. The housing of the microphone clips on to the adaptor which mounts over the valve assembly of the respirator. Signallers' and commanders' respirators should be permanently fitted with the adaptor. The use of this microphone gives good speech reproduction when wearing the respirator.

Handset General Purpose *(Fig 5)*

0111. This handset is used with any CLANSMAN radio, directly or through a CLANSMAN harness control box and connects into 'AUDIO' or 'HEADGEAR' sockets. A pressel plate operates the radio transmit or intercom. A spring clip is provided for attaching the handset to clothing/webbing.

Handset Remote *(Fig 6)*

0112. This handset is used to remote any CLANSMAN radio by connecting either direct to the 'REMOTE' terminals on the radio, or through CLANSMAN control harness by connecting to the terminals on the *Interconnecting Box 2 Radio.* To remote the UK PRC 320 a *CRSL/R box* must be used.

0113. The handset is fitted with insulation piercing cable contacts and can be connected and used at distances up to 3km with D10 cable. *(See Fig 7.)*

0114. The handset contains a transistor amplifier to increase the signal power to the line and to provide a locally generated side tone. The amplifier obtains its DC supply along the cable from the radio or harness.

0115. A pressel switch operates the radio transmit or intercom and a call button operates the call tone, which is generated in the connected radio or IC channel. More than one handset remote may be used from the same radio.

Handset Pouch *(Fig 7)*

0116. A handset pouch is issued with the PRC 350 which enables a handset to be stowed out of the way but easily accessible for commanders' use.

Audio Extension Lead (AEL) *(Fig 8)*

0117. This lead is 10 metres long and permits short range remote use of CLANSMAN radios or harness control boxes using the standard range of audio gear. The monitoring facility remains available. The lead may also be used with the Loudspeaker Free Standing in the 'talk-back' role as shown in *Fig 10.*

Loudspeaker Free Standing

0118. This is a portable loudspeaker fitted with a volume control and supplied with a 0.5m jumper lead, necessary when using the Audio Extension Lead or working direct from a set.

0119. *The Loudspeaker* is used as follows:

a. ***For monitoring (see Fig 9).***

in or near vehicle	– Connect by 6 way cable assembly to AUDIO socket on radio or harness control box; or to LS socket on Vehicle Mounted Loudspeaker.
up to 50m remote	– Connect twin cable between terminals on loudspeaker and Amplifier AF Loudspeaker or to remote terminals on the radio set.

b. ***For radio and 'talk-back' (see Fig 10)*** – Connect by jumper lead and Audio Extension Lead to AUDIO socket on radio or harness control box. In this role, the monitoring of an alternative signal is not possible.

Note: When connected directly from the set the signal is not amplified.

Remote Combining Unit

0120. *The Remote Combining Unit* (RCU) *(Fig 11)* permits one of two remote CLANSMAN radios to be selected and used on voice or morse as appropriate; and a second radio to be monitored, at distances of up to 3km over D10 cable.

0121. The RCU contains a transistor amplifier to increase the signal power to the line and to provide a locally generated side tone. The amplifier obtains its DC supply along the line from the radio or harness.

0122. When switched to 'CALL', a tone is generated within the connected working radio, which is heard by the local operator, and if the radio is in harness, by any crew member who has selected that radio as the Working or Monitor Set.

0123. *The Remote Combining Unit* provides the following facilities:

Switch Position	***Facilities***
'A' *'MORSE'/'VOICE'	Work A set; signal in both ears.
'A B' 'MORSE'/'VOICE'	Work A set; signal in left ear; monitor B set; signal in right ear.
'B A' 'MORSE'/'VOICE'	Work B set; signal in left ear; monitor A set; signal in right ear.
'B' 'MORSE'/'VOICE'	Work B set; signal in both ears.
ANY 'CALL' (SPRING LOADED)	'CALL' tone heard by local operator by selected working set, who will switch to 'IC' to reply. Remote operator then switches to 'VOICE' for subsequent communications. *MORSE. HF radio only. Press key to send; release key to receive. VOICE. Press pressel to send; release to receive.

0124. *The RCU* is used as follows:

a. *To a 2 radio Installation.* The line is connected to the *Inter-connecting Box 2 Radio* (IB2). Morse or voice as appropriate, are available on either installed radio, together with IC and CALL within the harness, as determined by the IB2 switch positions.

b. *To any CLANSMAN Radio (Except PRC 320) – No Harness.* The line is connected direct to terminals on the radio. Morse or voice as appropriate are available on radio: and 'IC' and 'CALL' with the local operator.

c. *To PRC 320, No Harness.* The line is connected to the radio through the CRSL/R box. The CRSL/R is part of the PRC 320 system. Morse or voice are available on radio, and 'IC' and 'CALL' with the local operator.

Set Combining Box

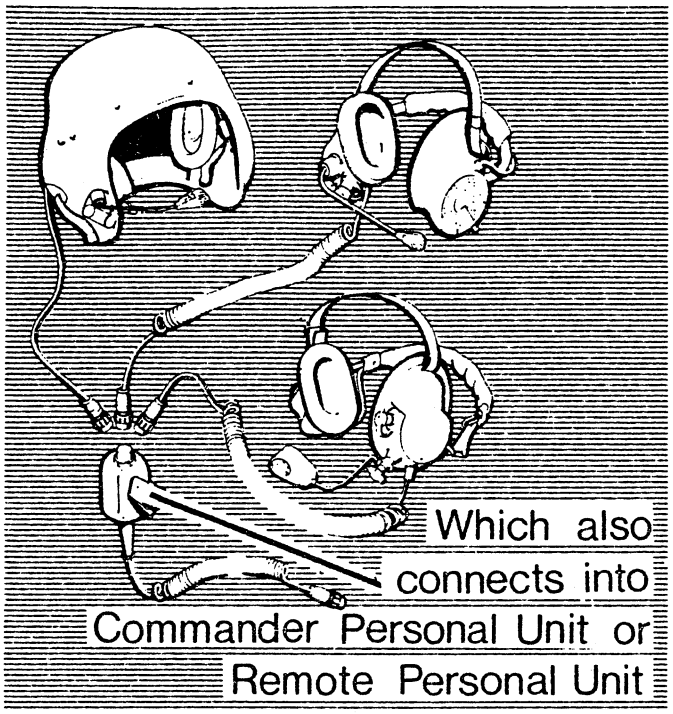
0125. *The Set Combining Box* (SCB) *(Fig 12)* is used when CLANSMAN radios are not in harness and IC is not needed. It enables an operator to use 2 radios, monitoring the receiver output of the radio not being worked. A third radio may be held in readiness for selection, its cable being plugged into a dummy socket on the box. Connection to the radios are made using cables from the standard CLANSMAN range, connected to the audio output of the radio. This cable length should not exceed 1m when connected to the PRC 350 or PRC 351/352.

0126. Any of the standard range of audio gear may be connected to the box. The radio volume controls are used to set the receive level. A nominal 18 Volt supply of limited current capability is available at the Audio Sockets of the *Set Combining Box* (SCB), which is derived from the radio connected to the left hand set connector marked '*'.

0127. *The SCB* provides the following facilities:

Switch Position	***Facility***
'OFF'	Work selected set; press to talk; signal in both ears.
'ON'	Work selected set; press to talk; signal in left ear. Monitor other set; signal in right ear.

~~**Note:** At present only one SCB is issued to a battalion.~~



'A' Vehicle Staff User's Headgear

Adjust Position of Microphone

'A' Vehicle Crewman's Headgear

Adjust Earpiece Position

Adjust Noise Exclusion

Socket for Respirator Microphone

Adjust Position of Microphone

Adjust Earpiece Pressure

Snatch Connector

Pressel Box

Microphone Live On/Off Switch

Infantry & 'B' Vehicle Headgear

Receiver Housing Removable for External Listening

Adjust Position of Microphone

Free Plug

Fig 1.—CLANSMAN Headsets

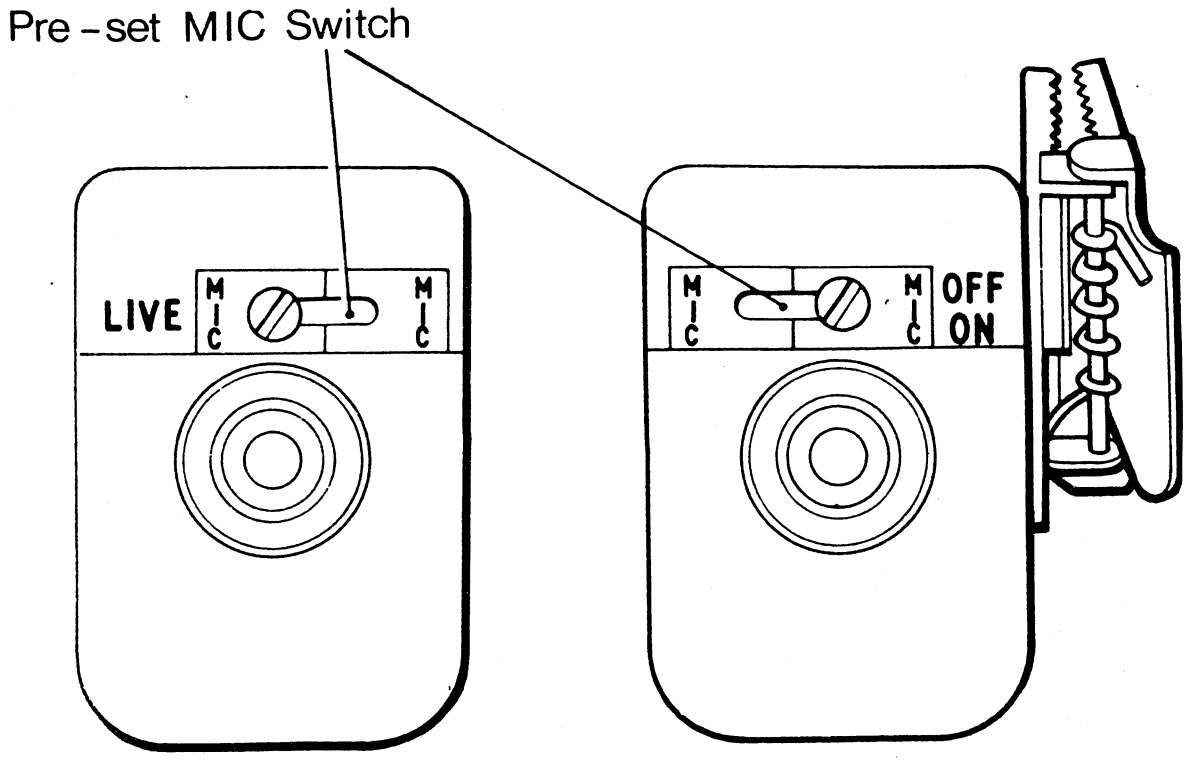


Fig 2.—Live Mic Switch on Pressel Box

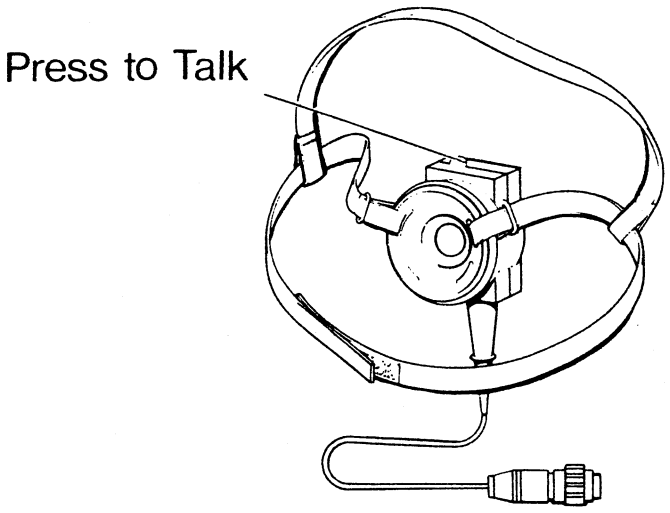


Fig 3.—Single Transducer Headset

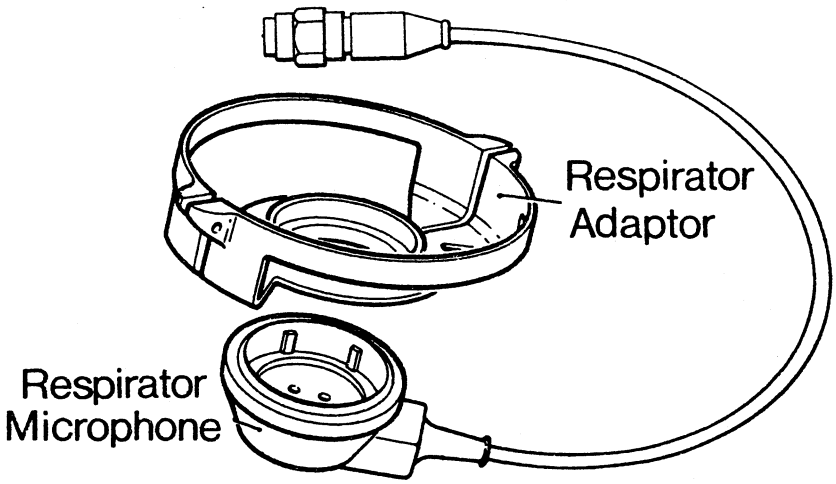


Fig 4.—Respirator Headset

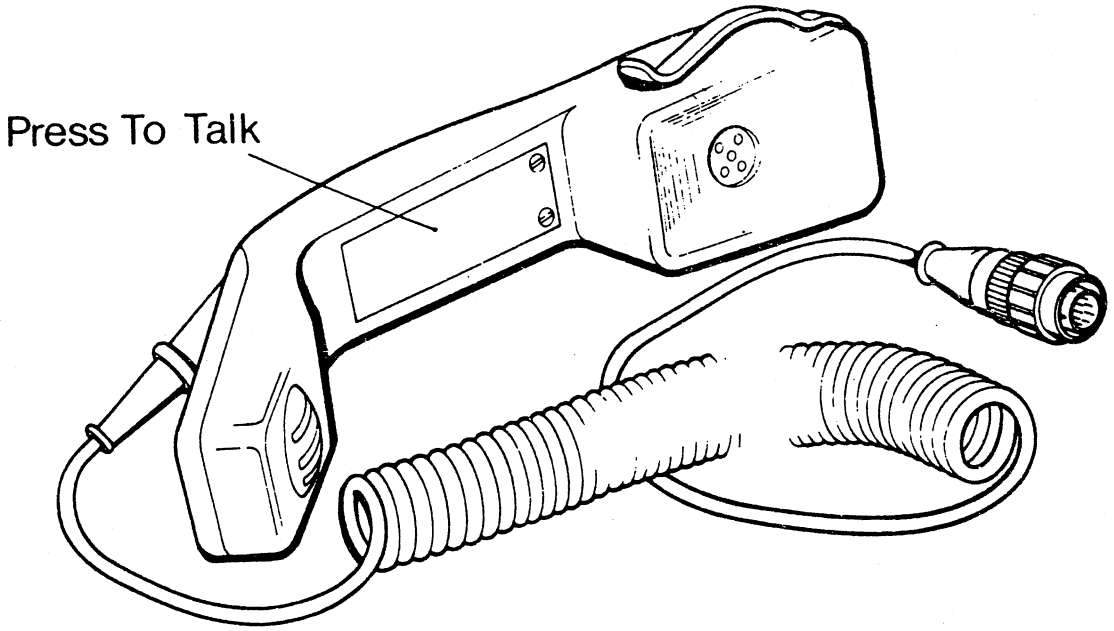


Fig 5.—Handset General Purpose

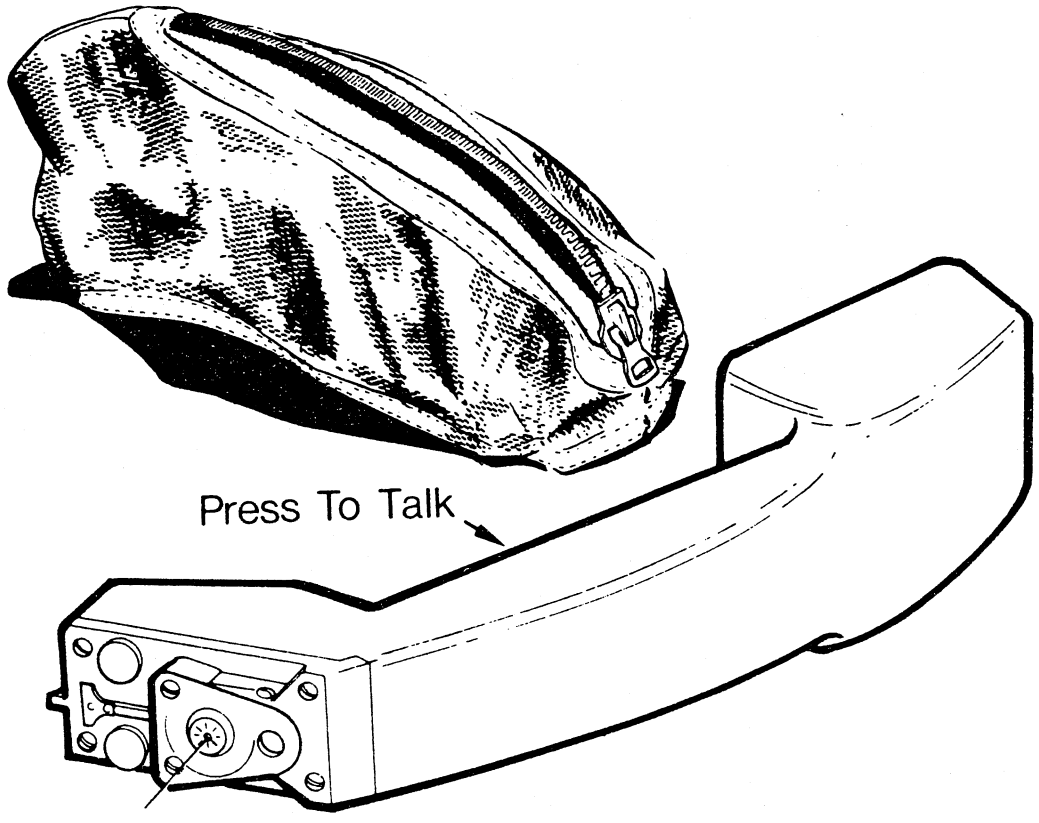


Fig 6.—Handset Remote and Pouch

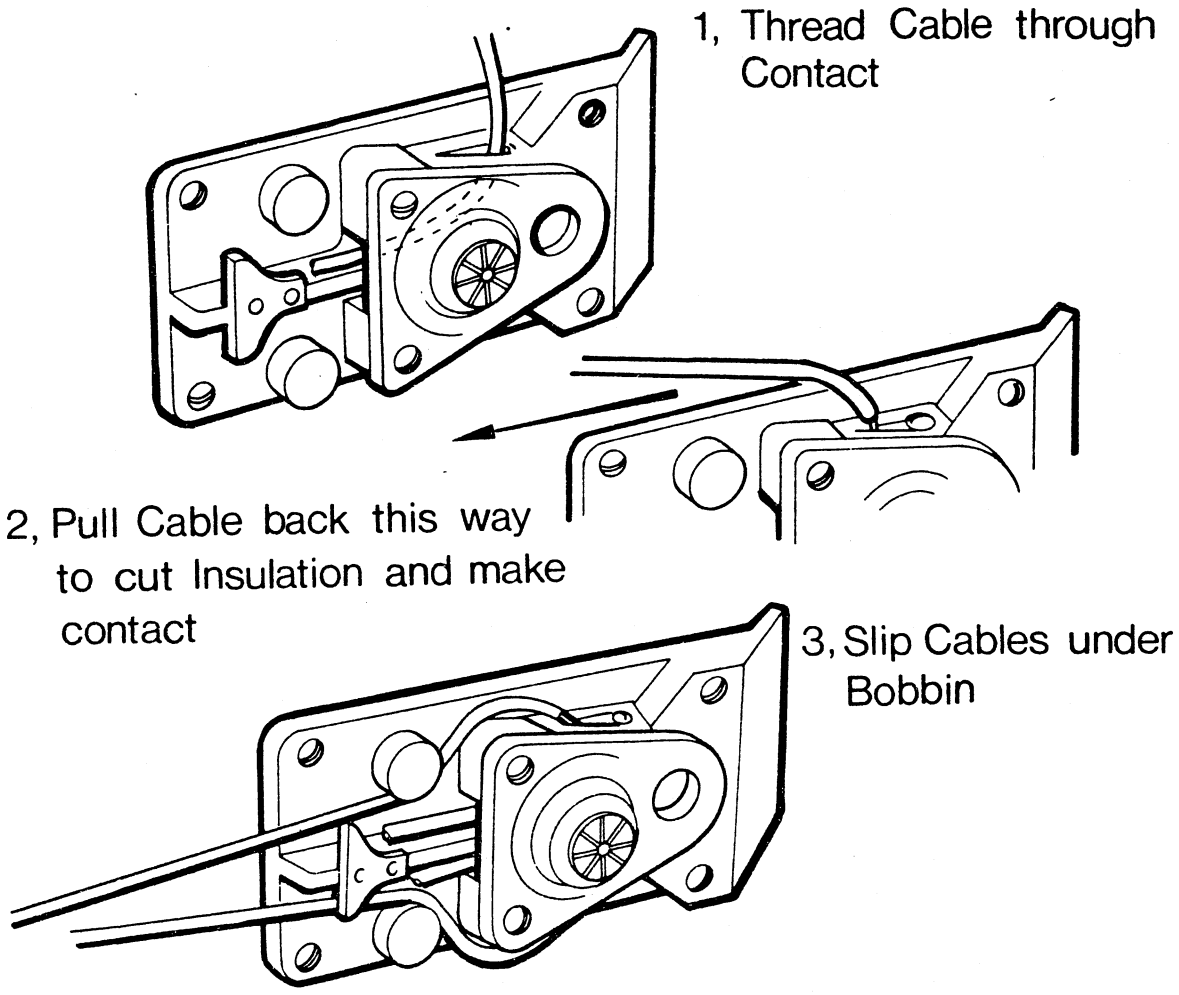


Fig 7.—Remote Handset insulation piercing cable contacts

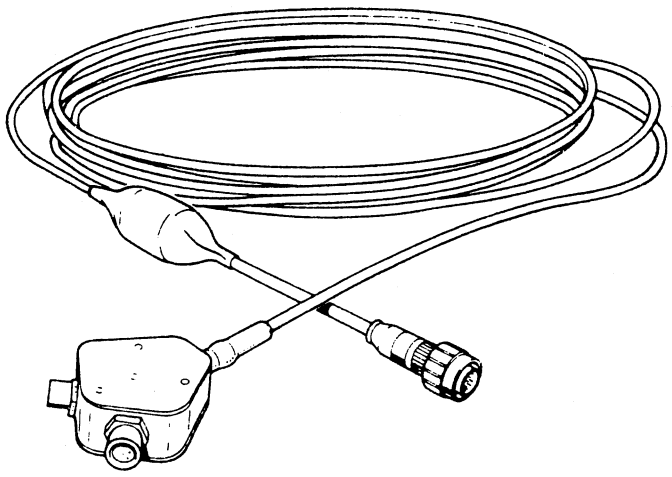


Fig 8.—Audio Extension Lead

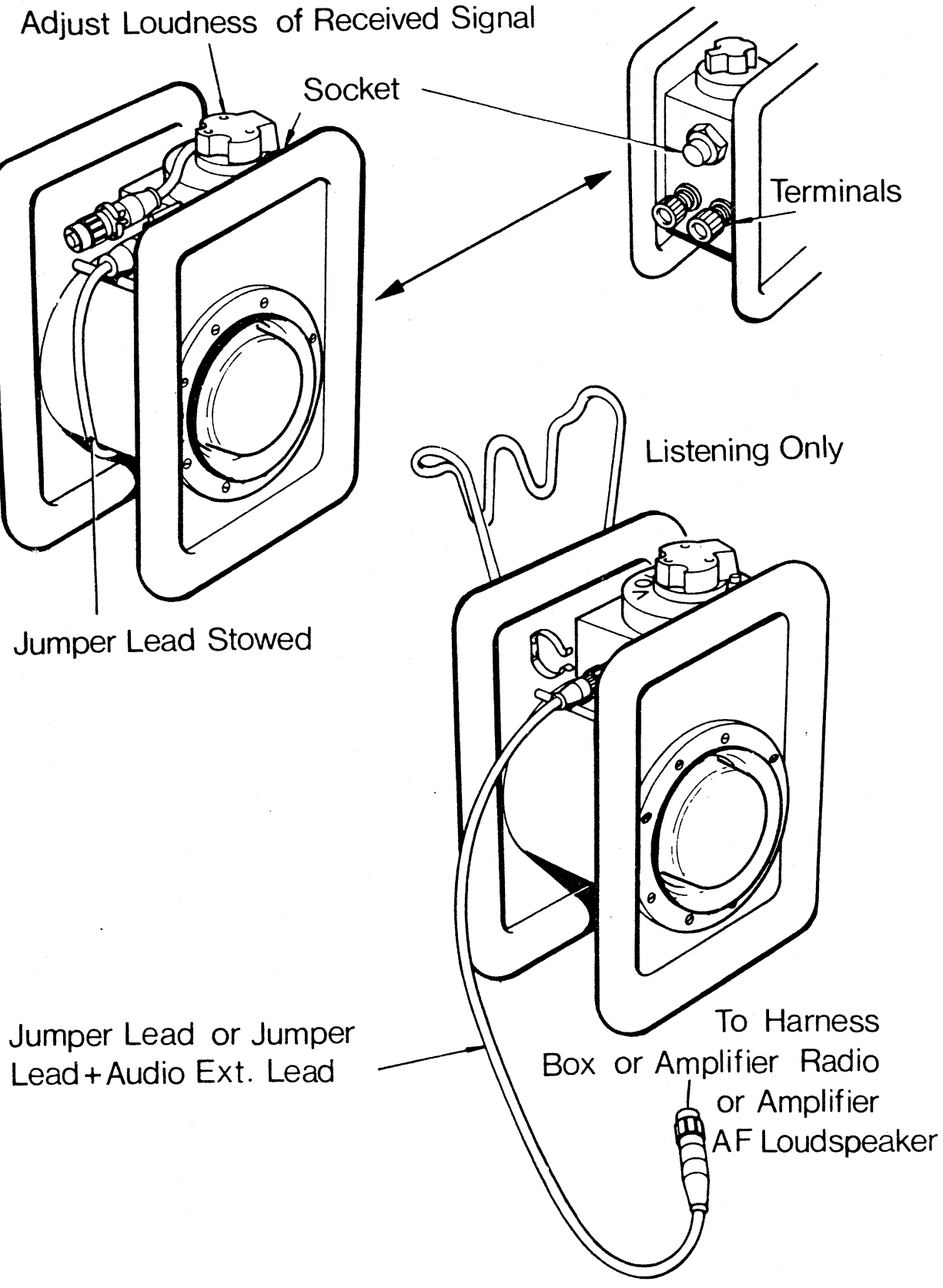


Fig 9.—Loudspeaker Free Standing for Monitoring

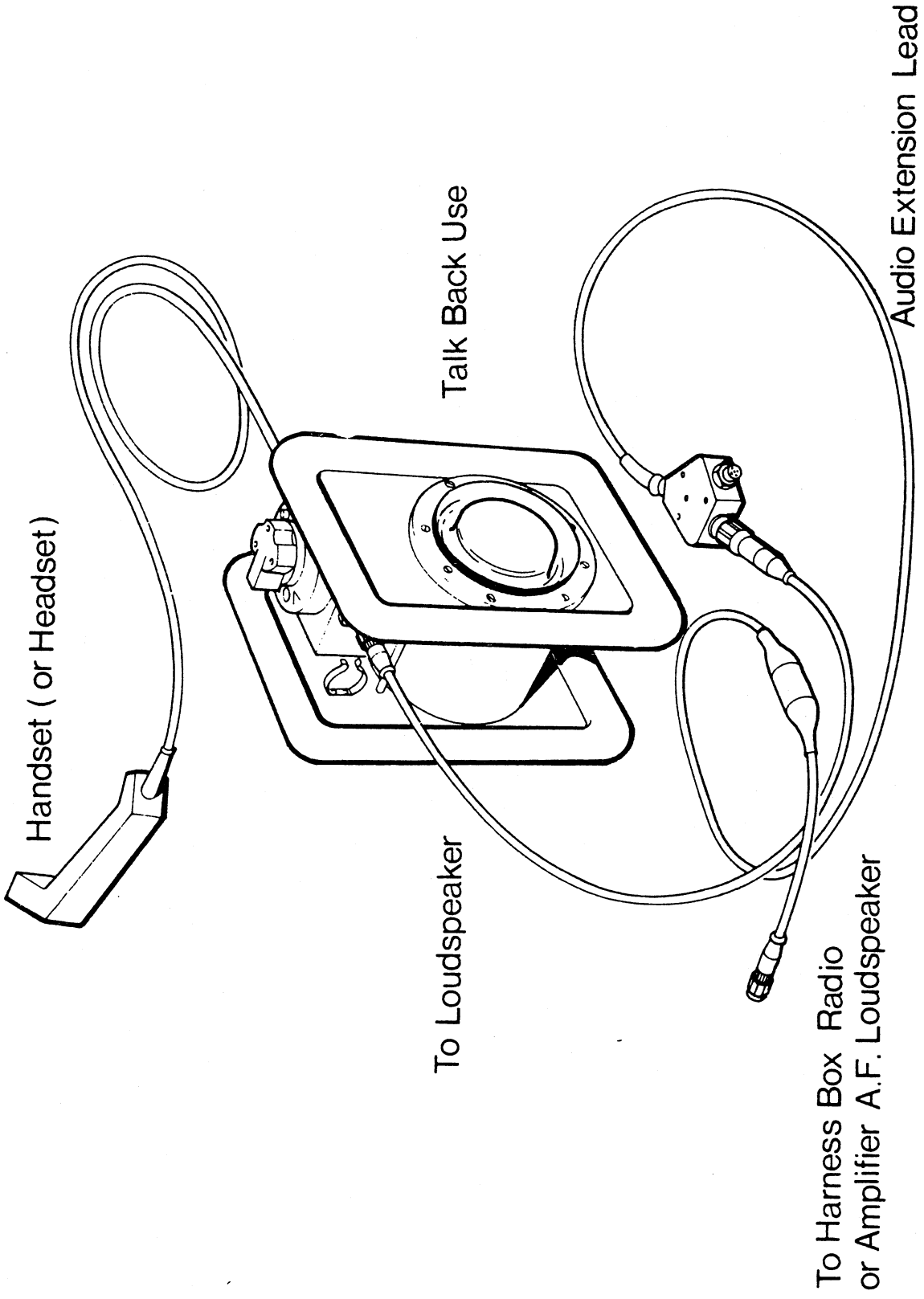


Fig 10.—Loudspeaker Free Standing for Radio

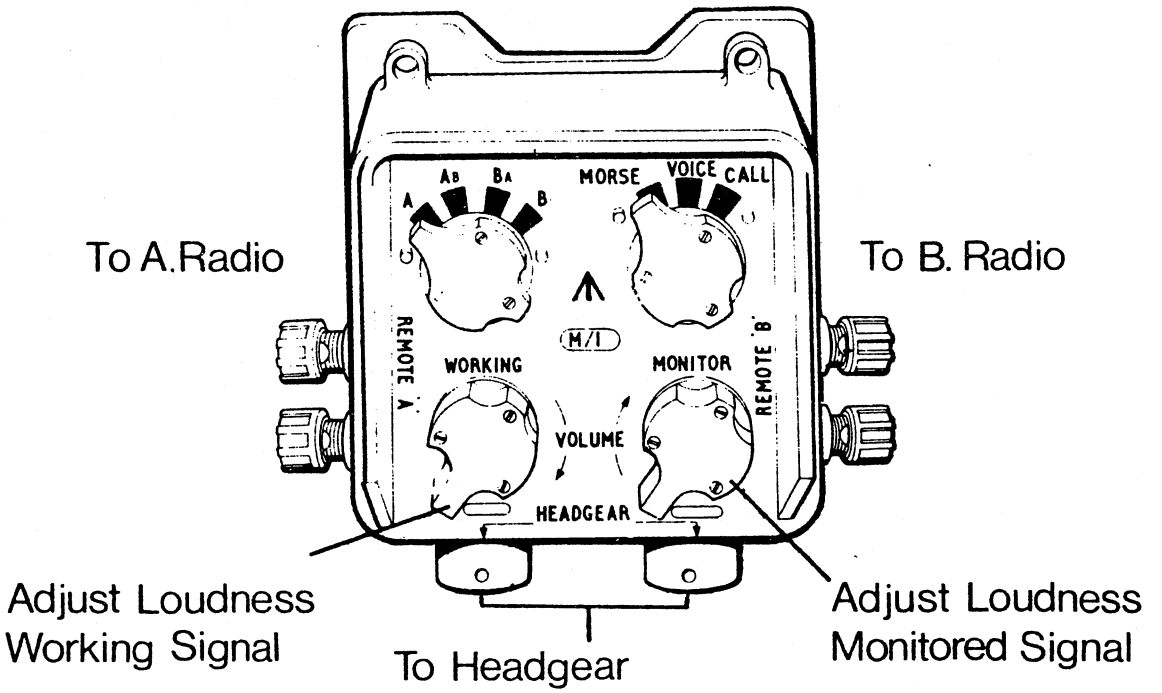


Fig 11.—Remote Combining Unit

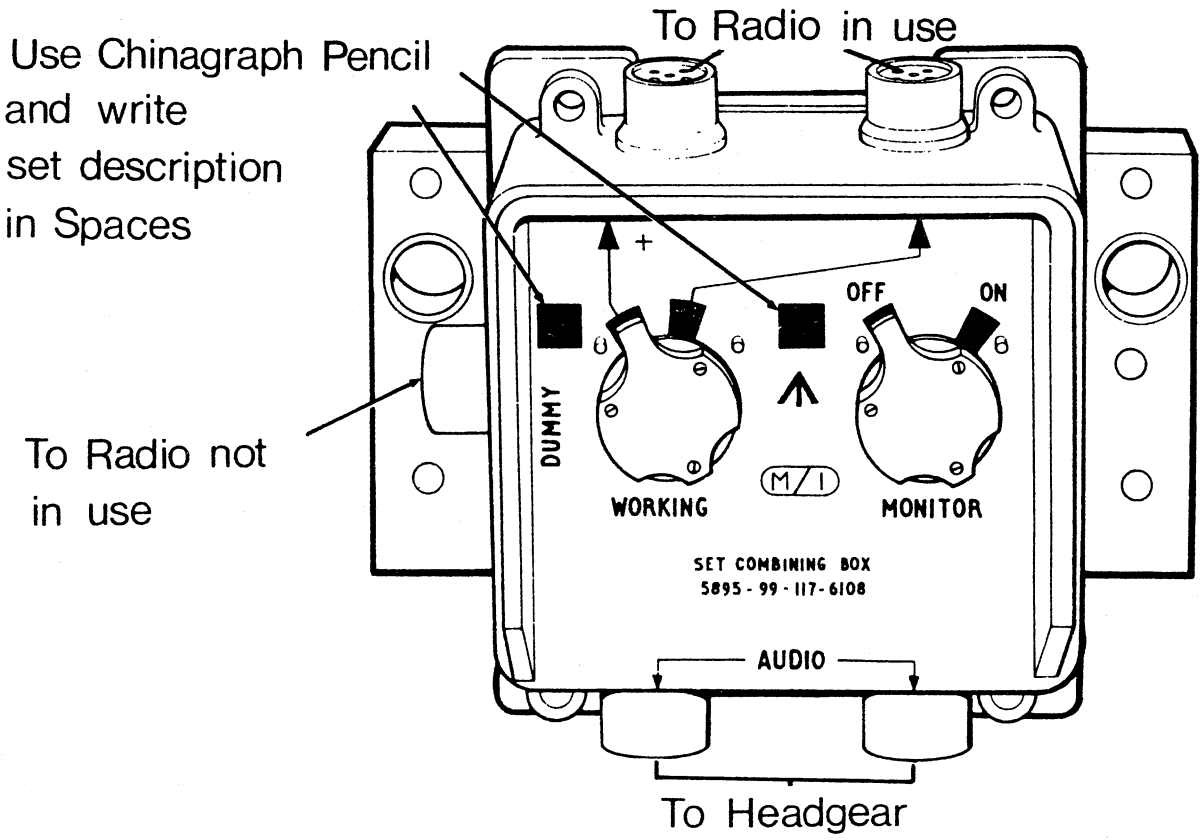


Fig 12.—Set Combining Box

SECTION 2 – ASSOCIATED ANCILLARIES

Introduction

0128. This section is concerned with associated ancillaries which are constantly used with the radios, but not necessarily common to all radios.

Plate Adaptor Carrier *(Fig 13)*

0129. *The Plate Adaptor* is used to adapt the following sets to be carried on the GS carrier: PRC 351/352, PRC 320 and PRC 344. The plate is screwed to the set by means of 4 captive screws and the plate then hooks into the carrier by means of screw clamps.

GS Carrier *(Fig 13)*

0130. *The GS Carrier* is a lightweight carrier which can be used to carry the PRC 351/352, PRC 320 and PRC 344. The carrier should be worn like a rucksack fairly high up on the shoulders and can be adjusted to an individual by means of the harness straps.

Frame Electrical *(Fig 14)*

0131. *The Frame Electrical* is used to clamp a manpack set on a GS carrier into a vehicle and thus enable it to be converted into a vehicle set. The GS carrier is fixed onto the frame electrical by means of 3 screw clamps.

Nickel Cadmium 4 AHC and 1.1 AHC Batteries *(Fig 15)*

0132. The present CLANSMAN secondary batteries are of nickel-cadmium construction and are for use with the manpack radios.

0133. *24V 4 AHC and 1.1 AHC.* These batteries are sealed and require very little maintenance on the part of the user. The internal construction is similar to that of the lead acetate batteries in as much as the positive and negative plates are immersed in an electrolyte solution. The plates are Nickel *(positive)* and Cadmium *(negative)* whilst the electrolyte is ***Potassium Hydroxide.***

Characteristics

0134. The nickel-cadmium battery has the following characteristics:

- **a.** Can be installed in any position.
- **b.** Does not require topping up.
- **c.** Does not discharge a gas or corrosive liquid.
- **d.** Provides maintenance free operation.
- **e.** Constancy of discharge voltage.
- **f.** High rate charge capability.
- **g.** High rate discharge capability.

j. Moderate self discharge life.

k. Excellent life cycle.

Safety

0135. The electrolyte of the nickel-cadmium battery is a caustic solution and should not come in contact with any part of the body, especially the eyes. If any part of the body is splashed with the solution wash the affected part immediately with cold water. Medical aid should be sought immediately as serious and deep burns can be caused.

Fitting *(Fig 16)*

0136. The battery is fitted to the radio sets by means of two spring loaded clips on the radio set. The battery can only be fitted one way to the radio because of mounting lugs.

Charging Units

0137. ***Hand Generator*** *(Fig 17).* The hand generator is designed to be used with a 1.1 AHC CLANSMAN battery to operate a transmitter/receiver unit i.e. PRC 320, in emergencies or on long range patrols. The generator delivers an output of 28V at 330 mA which, together with the battery, can provide enough power to operate the main unit indefinitely. It can be used to charge any CLANSMAN manpack secondary battery (24V).

Fitting

0138. *The Hand Generator* clips directly to the bottom of the radio set by means of the securing clamps on the radio. The 1.1 AHC battery is then clamped onto the base of the hand generator.

Operation

0139. A lamp, with a shutter, is provided to indicate the correct winding speed. It is illuminated at low speed and is extinguished when the correct speed is attained.

Emergencies

0140. In emergencies the generator, without battery, can provide sufficient current to operate the receiver only.

Weight

0141. The generator, complete with a 1.1 AHC battery, weighs approximately 3.5kg.

Direct Current Charging Units (DCCU) *(Fig 18)*

0142. *The DCCU 28V* and the *DCCU 14V* have been designed to charge single discharged 3.3 AHC 24V batteries in approximately 4 hours and 1.1 AHC 24V batteries in approximately 1 hour, each unit will operate from any source, e.g. a vehicle battery supply. 12V 75 AHC/100 AHC signal batteries with or without a DC Generator. Protection circuitry guards against mis-connection and input surge protection is also built into the units.

Use and Operation

0143. Having secured the unit in its operational location carry out the following:

a. Ensure both lamps switch and 'INPUT' switch are in the 'OFF' position *(upwards).*

b. Using the DCCU power lead; connect to the appropriate supply *(14V or 28V)* ensuring the correct polarity and then onto the DCCU itself.

c. Using the charging lead connect to the DCCU output and then onto the battery input socket.

d. Set the 'INPUT' switch to 'ON'.

e. Set the lamp switch to 'ON' *(down).* The charge proceeding yellow lamp will light to indicate that the battery is properly connected and is being charged: when the battery is nearing the completion of the charging cycle the yellow lamp will go out and the green *(charge complete)* light will be illuminated indicating that the battery is fully charged.

f. Set the lamp switch to 'OFF', except when connecting the battery or inspecting the charge state. No damage to the battery or the charging unit will occur if a fully charged battery is left connected.

AC Charging Unit (ACCU) *(Fig 18)*

0144. *The ACCU* enables up to 16 CLANSMAN 3 AHC and 1.1 AHC secondary batteries to be charged simultaneously, regardless of their state of discharge. The unit is housed in an aluminium case fitted with a removable cover for transit containing provision for stowage of cables. The unit, including cables, weighs 29.5kg.

0145. The charging procedure is as follows:

a. Remove the cover from the charging unit.

b. Adjust the voltage selector panel to correspond with the voltage being used.

WARNING. ENSURE THAT THE UNIT IS DISCONNECTED FROM THE SUPPLY WHILST MAKING ADJUSTMENTS.

c. Remove the cover from the AC mains fuse and ensure that it is of the correct rating i.e. 20A for a 100–125V supply and 10A for a 200–250V supply.

d. Open the sliding vent at the rear of the charging unit.

e. Using the AC charging unit supply cable connect the input plug to the AC mains supply.

f. Set the lamp switch 'ON' *(down).*

g. Using the battery charging cables, connect the charging connector of each battery to be charged to an outlet connector and set the mains switch 'ON' *(down).* Each outlet has an associated yellow lamp which will light to indicate that the battery is properly connected and being charged, when the battery is fully charged this lamp will extinguish and the associated green lamp will illuminate.

h. Replace charged batteries with discharged one *(there is no need to switch 'OFF' when doing this).* No damage to the battery or the charging unit will occur if a fully charged battery is left connected.

External Batteries

0146. The UK/PRC 320, 351 and 352 can be connected directly to an external 24V battery e.g. 2 × 12V 100 AHC provided that no other device is connected to the battery. (i.e. it must NOT be on float charge). The normal CLANSMAN batteries must be removed from the radio set.

NOTE. The leads for this type of connections are not yet on general issue and units are warned NOT to make up their own.

Battery Extension Cable *(Fig 19)*

0147. This cable is used in extremely cold conditions to remote the battery from the set, so that it can be carried in a warmer place.

Power Distribution Box (PDB) *(Fig 20)*

0148. ***The Power Distribution Box*** (PDB) is used to provide power to all VRCs and to the DCCU 28V when the secondary batteries are being float charged by using the normal vehicle charging system. The PDB is connected to the vehicle power system observing polarity. Power take off from the PDB to radios

and charging units such as the DCCU 28V are made by using the normal CLANSMAN 2 point power lead. Each of the 3 take off points on the PDB offers a fuse protected circuit. Fuse ratings for the various equipments are as follows:

DCCU – 3 amp rating
VRC 321 – 10 amp rating
VRC 353 – 15 amp rating

0149.–0165. *Reserved.*

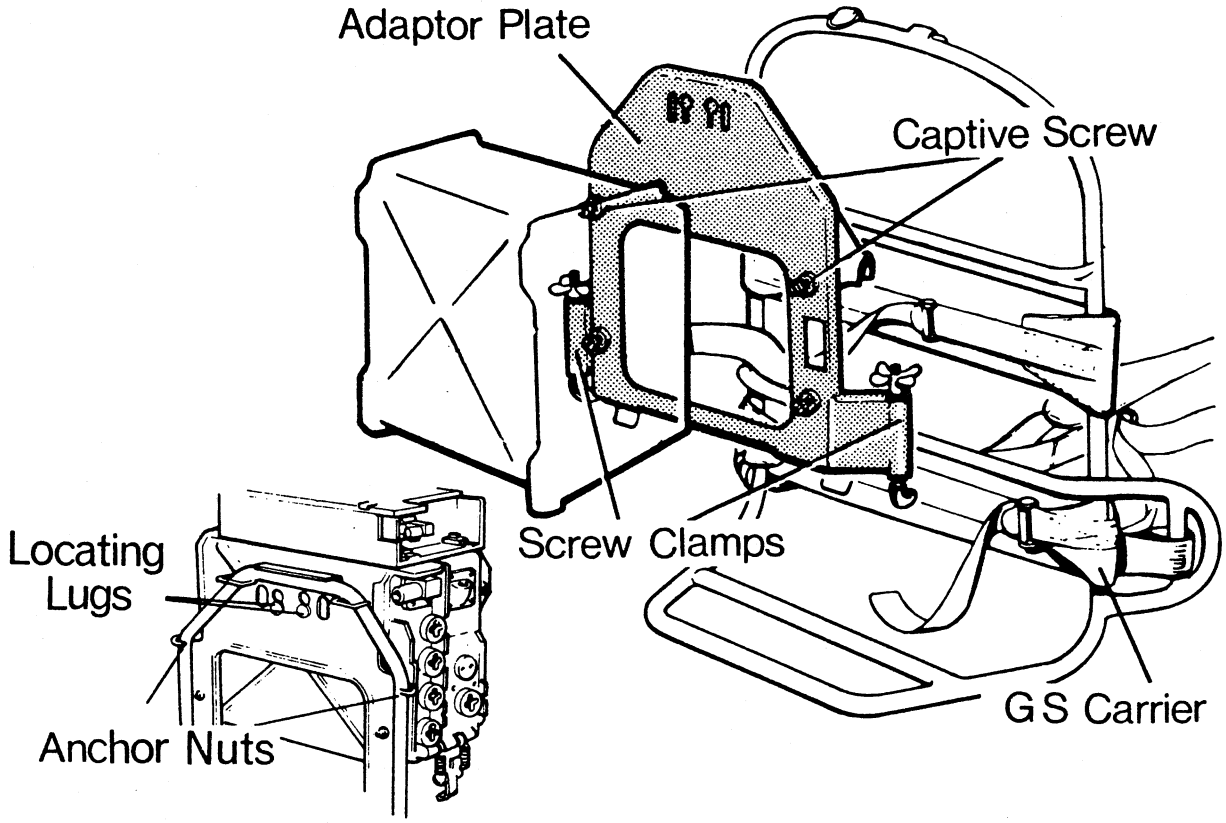


Fig 13.—Plate Adaptor and Carrier G.S.

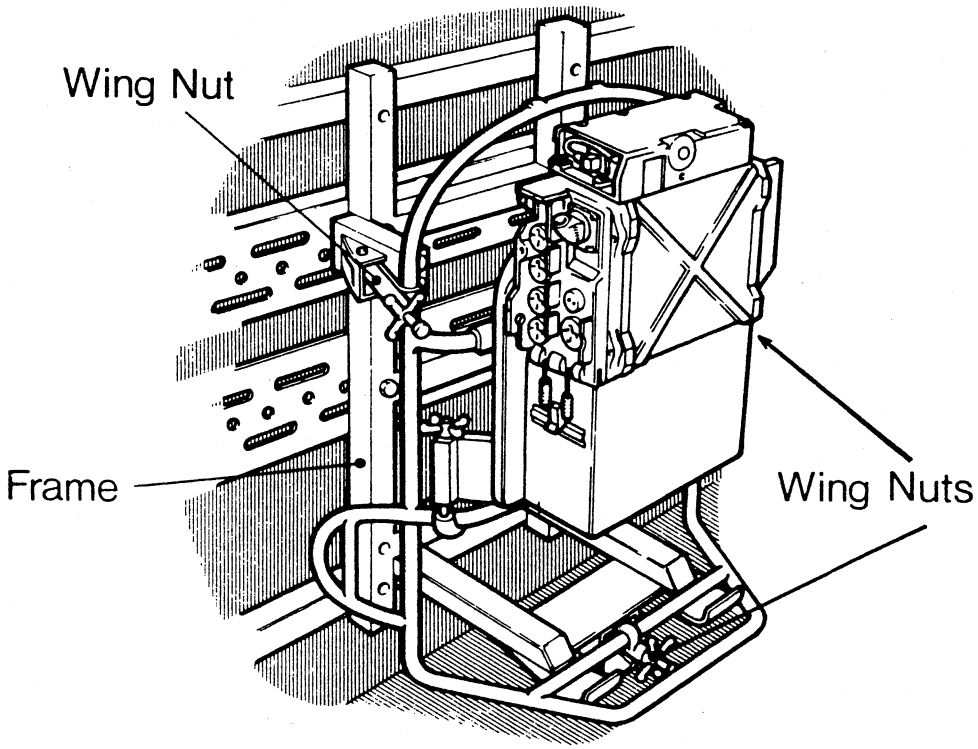


Fig 14.—Frame Electrical

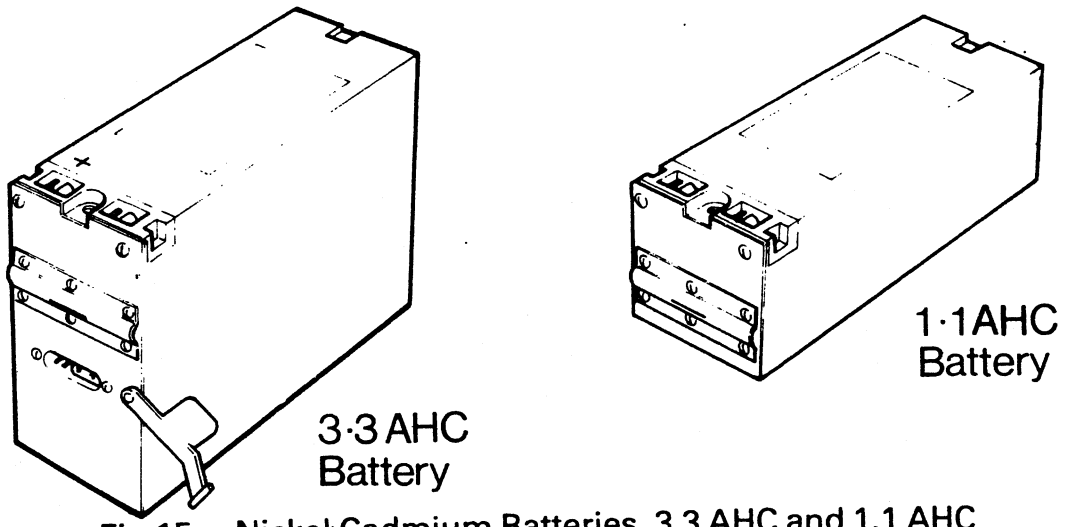


Fig 15.—Nickel Cadmium Batteries, 3.3 AHC and 1.1 AHC

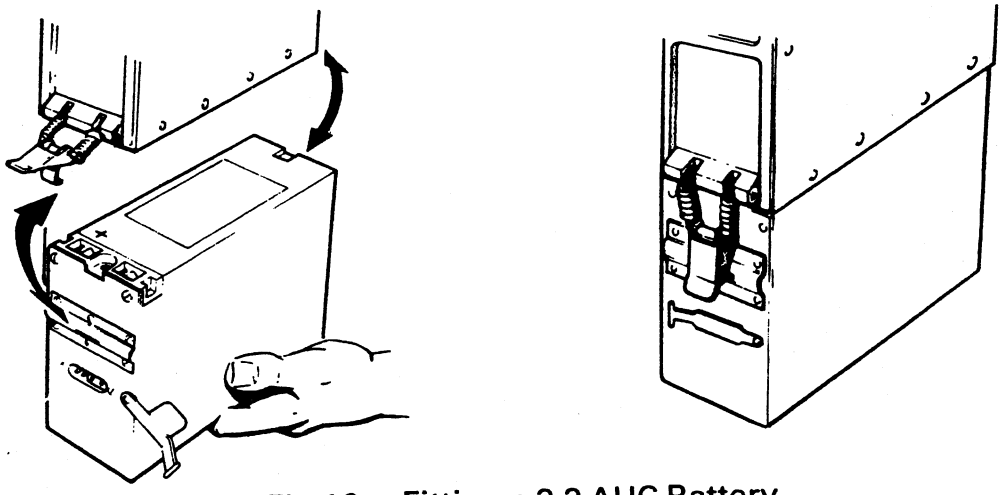


Fig 16.—Fitting a 3.3 AHC Battery

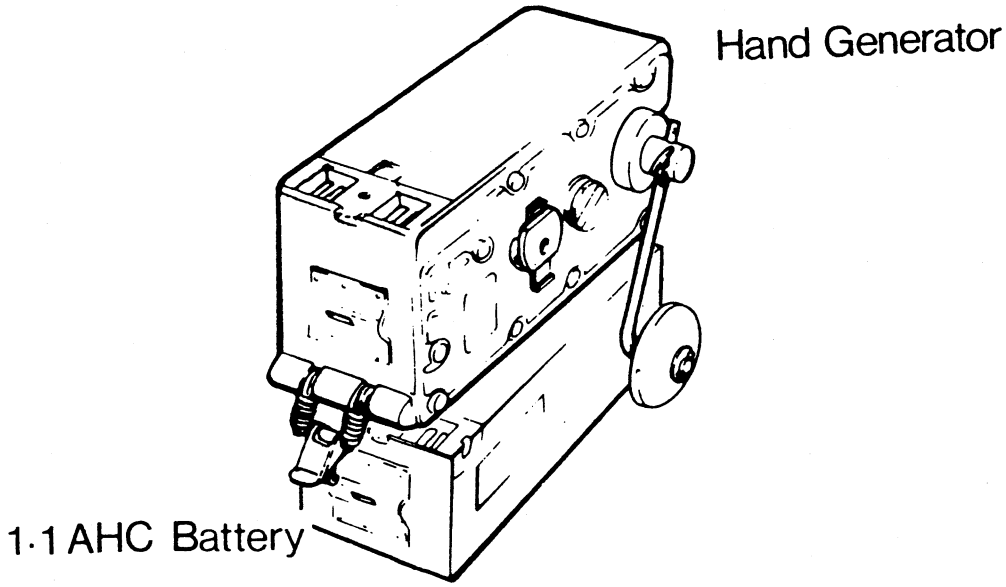


Fig 17.—Hand Generator and 1.1 AHC Battery

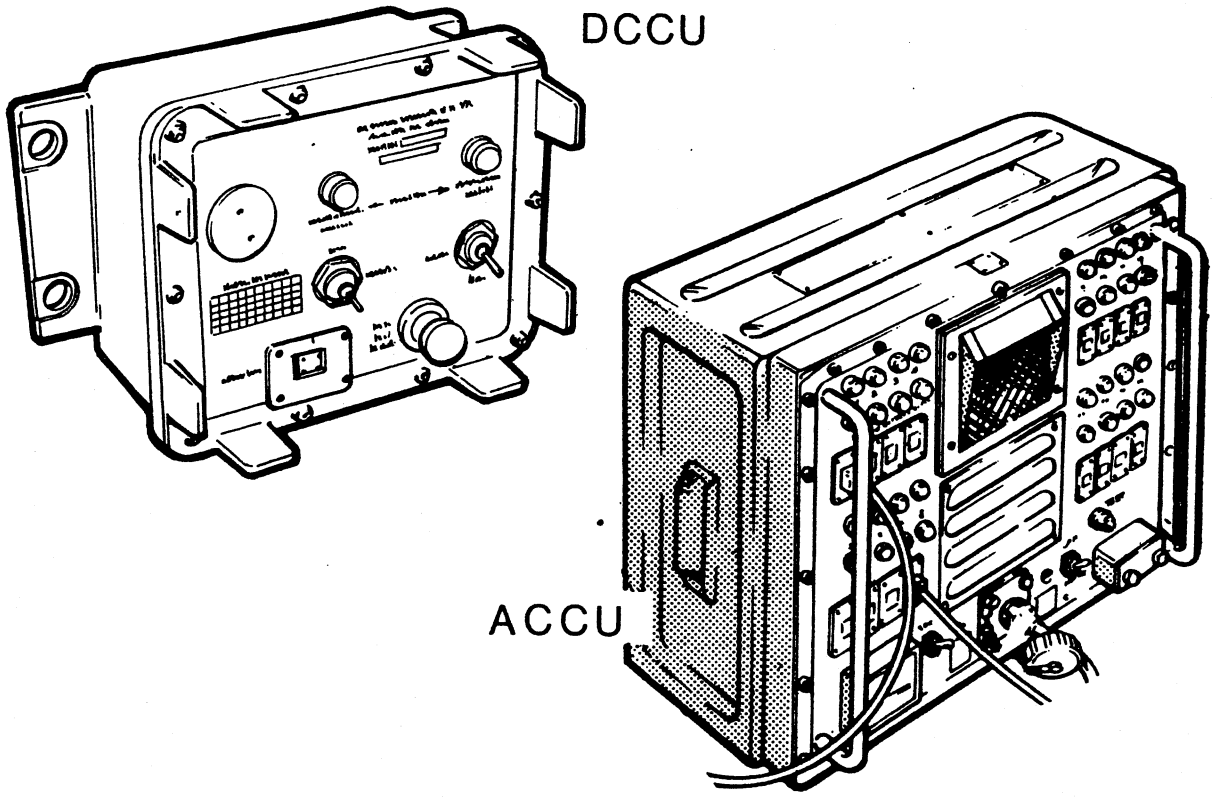


Fig 18.—DCCU and ACCU

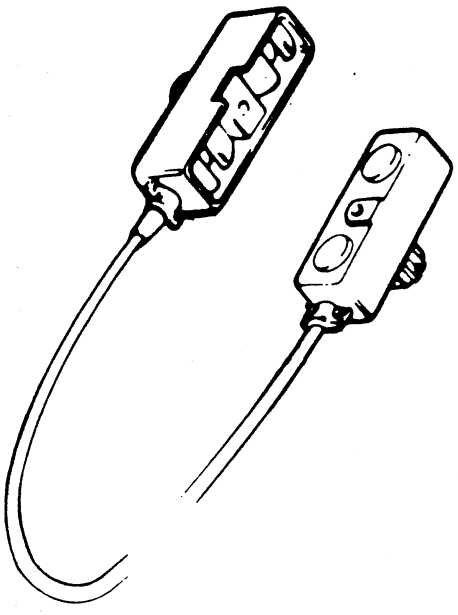


Fig 19.—Battery Extension Cable

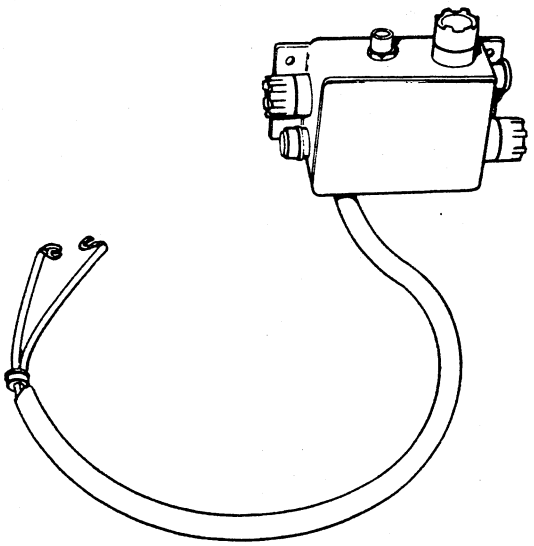


Fig 20.—Power Distribution Box

CHAPTER 2

RADIO

SECTION 3 – INTRODUCTION

General

0201. This chapter is concerned with the radios used in infantry and mechanized battalions. The information contained in the Chapter is taken from User Handbooks and set out in a possible sequence of instruction in the various equipments.

0202. Though primarily of value to the instructor it will also be of use to the student as an aide memoire.

Aim

0203. The aim of this Chapter is to summarize, for infantry instructors, essential elements of the User Handbook for infantry battalion radio.

Reference

0204. The following publications have been used in the compilation of this Chapter.

a. *User Handbooks:*	*Army Code No.*
(1) Radio Station UK/PRC 349	61646
(2) Radio Station UK/PRC 350	61124
(3) Radio Station UK/PRC 351/352	61128
(4) Radio Station UK/VRC 353	61393
(5) Radio Station UK/PRC 320	61123
(6) Radio Station UK/VRC 321	61253
(7) Lightweight HF Radio A16 UK/PRC 316	14961
(8) Radio Station UK/PRC 344	61351
(9) CLANSMAN Radio Control Harness	61172
(10) Secure Speech Harness, Clansman	61834

Teaching Technique

0205. ***Indoor Instruction***

a. An equipment to student ratio of one each to student should be achieved, if at all possible.

b. With this ratio up to 30 students can be instructed at any one time by one instructor. However, one or 2 assistants can be used to check and remedy faults when they occur.

c. Prior to taking part in outdoor instruction instructors must be satisfied that the training objectives can be partially or wholly achieved by each student, particularly in terms of setting up, testing and operating.

0206. ***Outdoor Instruction.***

a. Foot and vehicle borne radio exercises are the best way of confirmation in most of the objectives. It follows that stations should be limited to 2 or 3 men, if all students are to be effectively exercised and assessed.

b. All exercises should be written to include practising individuals in all the critical skills.

c. At the end of each exercise it should be possible to comment on the ability of each student in relation to the training objectives laid down.

Aids

0207. The use of aids is entirely up to the individual instructor. It should be remembered that aids should be used sensibly and never be a substitute for the equipment itself. For basic radio training large scale models are of value.

SECTION 4 – RADIO GENERAL

CLANSMAN

0208. The CLANSMAN range of radios have the following advantages:

a. Lighter.

b. Has a greater frequency range and more channels.

c. Simpler to use and, above all, when tuning, quicker and more accurate.

0209. The range provides communication facilities for all arms of the service and consists of VHF, HF and UHF radios which are covered in this chapter.

0210. There now exists a new NATO standardization nomenclature for radios which consists of 3 parts:

a. *National Identification Letters:*
UK – United Kingdom

b. *A 3 letter group to denote:*
(1) Type of installation:
P – Portable
V – Vehicle
U – Utility
(2) Type of equipment:
R – Radio
T – Telephone

(3) Purpose of equipment:
C – Communications

c. *A 3 figure group to identify the station:*
001–299 = Royal Navy
301–599 = Army
601–999 = Royal Air Force

d. Basically, in the Army, HF radios are in the 320 series, UHF in the 340 series and VHF in the 350 series. Thus the full nomenclature for the 351 is UK/PRC 351.

SECTION 5 – UK/PRC 349

Introduction

0211. The UK/PRC 349 is a light and efficient VHF/FM manpack set for use at section and platoon level.

Data

0212. ***Frequency Range*** 37 to 46·975 MHz
Channels 400 channels at 25 KHz
Power Supply 12V Primary Battery *(Battery life 20 hrs approx)*
Penlight Batteries *(Used in adaptor case)*
12V Rechargeable Battery
Antennas 0·5m and 1·0m Whip
Ranges Basic planning range 1·5km

Terrain	Working Ranges (km)	
	0·5m Whip	1·0 Whip
Rolling Countryside	2·0	2·8
Wooded Countryside	1·2	1·5
Built-up Area	0·3	0·5

Note: Not all sets will have 1·0m Antennas issued.

Weight and dimensions (with battery)

Height	***Width***	***Depth***	***Weight***
246mm	91mm	41mm	1·4kg

Facilities Voice (FM) Narrow-band
Whisper
Loud
Confidence Check
Battery low warning

Description. *(Fig 21 shows PRC 349 in carrying position)*

Setting Up and Operating

0213. ***Setting Up (Fig 22).***

a. Ensure set is switched off *(system switch to 'O').*

b. Connect battery *(scews into casing Fig 23).*

c. Connect antenna *(screws in).*

d. Connect AF gear.

e. Insert into holster.

0214. ***Frequency setting.*** *(See Fig 24.)* Press ball of thumb onto control and twist until required figure appears in aperture. Frequency setting can be carried out in the dark by counting, from the extreme left, the appropriate number of click positions for each control.

Note: The top and centre switches each have 10 positions; the bottom switch has 4 positions.

Operator Checks *(System switch illustrated at Fig 22)*

0215. ***Receive.***

a. Set System Switch to *. Noise on.

b. A loud continuous hiss should be heard in the headset, if not refer to fault location chart at Annex A.

0216. ***Transmit.***

a. Set System Switch to L *(Loud).*

b. Depress the pressel switch and speak into microphone.

c. Sidetone should be heard in headset, if not refer to fault location chart at Annex A.

d. Repeat with System Switch on 'W' *(Whisper).*
Set is now ready to operate.

General Information

0217. ***Whisper and Loud Facilities (W & L).*** With the system switch [redacted] the set at 'W', the operator can produce, with a whisper, full modulation and range.

0218. Received signals are less likely to be overheard, under conditions of high ambient noise, e.g. in a vehicle the system switch should be set to 'L' and the operator speaks normally.

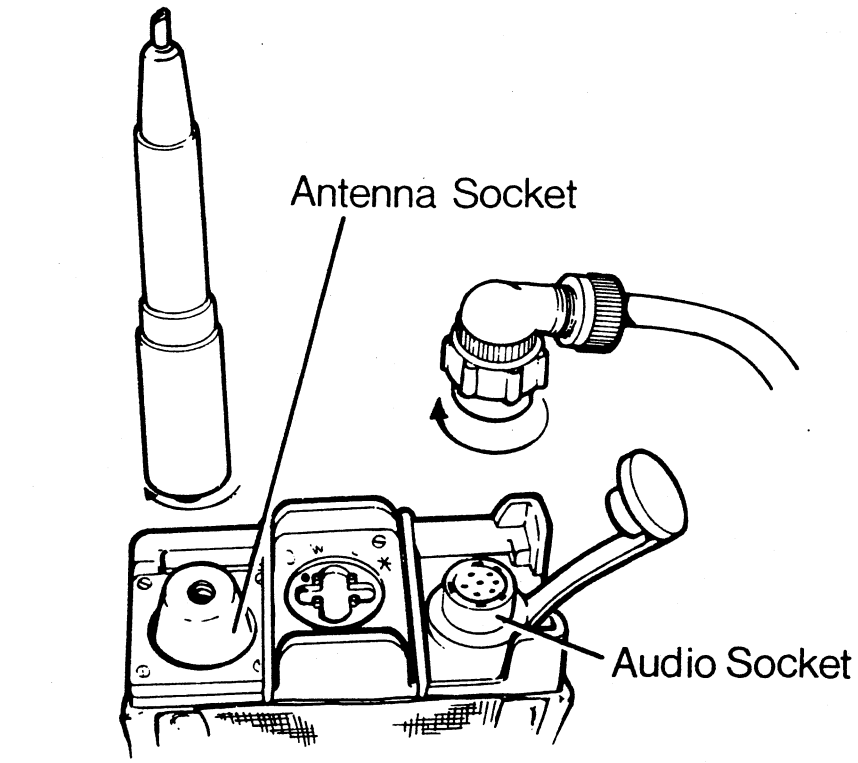
0219. ***'Noise on' (*).*** Used to confirm that the battery and receiver are satisfactory – a loud hiss will be heard in the absence of a signal. This position is also used for inter-operability with older sets such as ~~LARKSPUR~~ Non Synthesised Radios

0220. ***Battery 'Low' Warning.*** As the battery approaches exhaustion, an interrupted hiss is heard in the headset, when the system switch is set at either 'W' or 'L'. A battery change should take place as soon as is possible.

0221. ***Antennas.*** The set must NOT be operated on any frequency, at 2 metres or less from a 50 watt transmitter *(VRC 353)* working in the 30–76 MHz frequency band. At no time must the set be used without an antenna, or with antennas not designed for the set.

0222.–0230. *Reserved.*

Fig 21.—UK/PRC 349 in carrying position



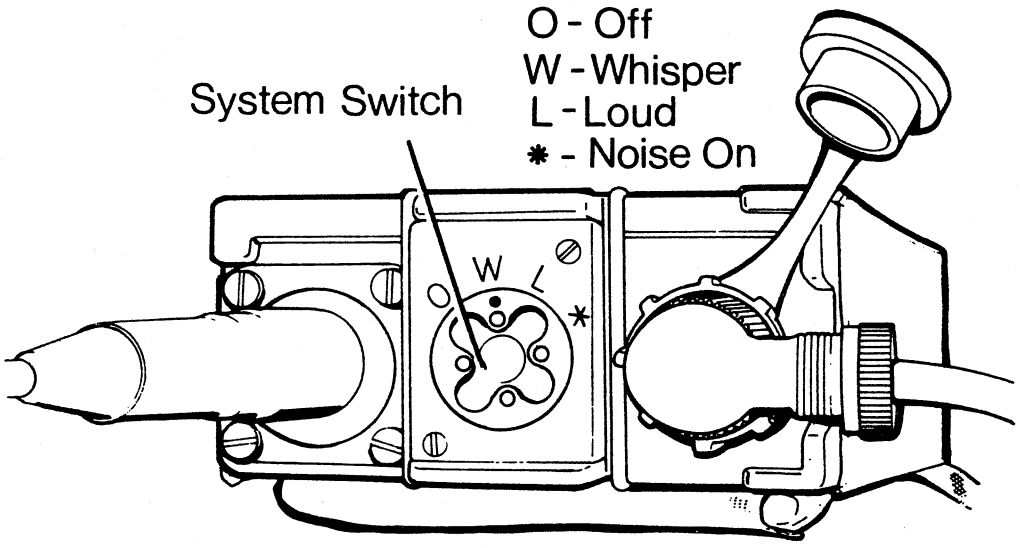


Fig 22.—Setting up UK/PRC 349

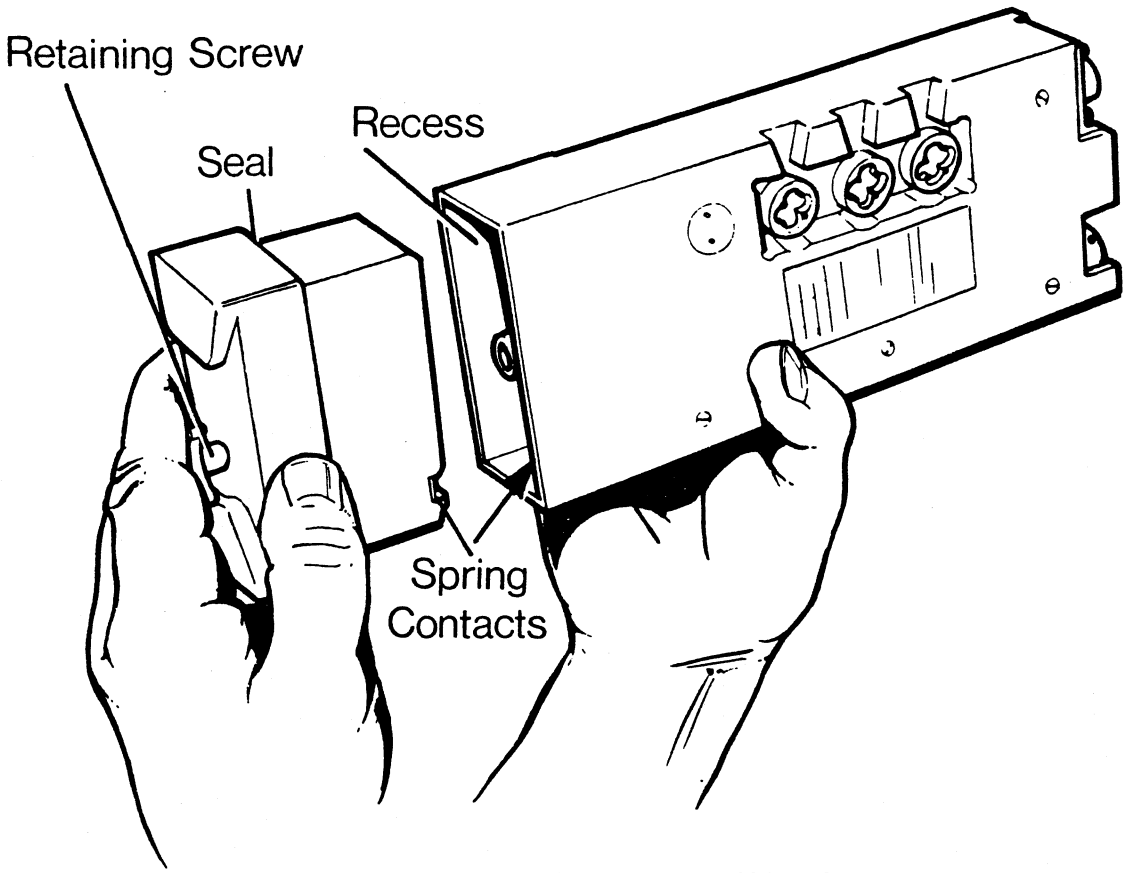


Fig 23.—Connecting Battery to UK/PRC 349

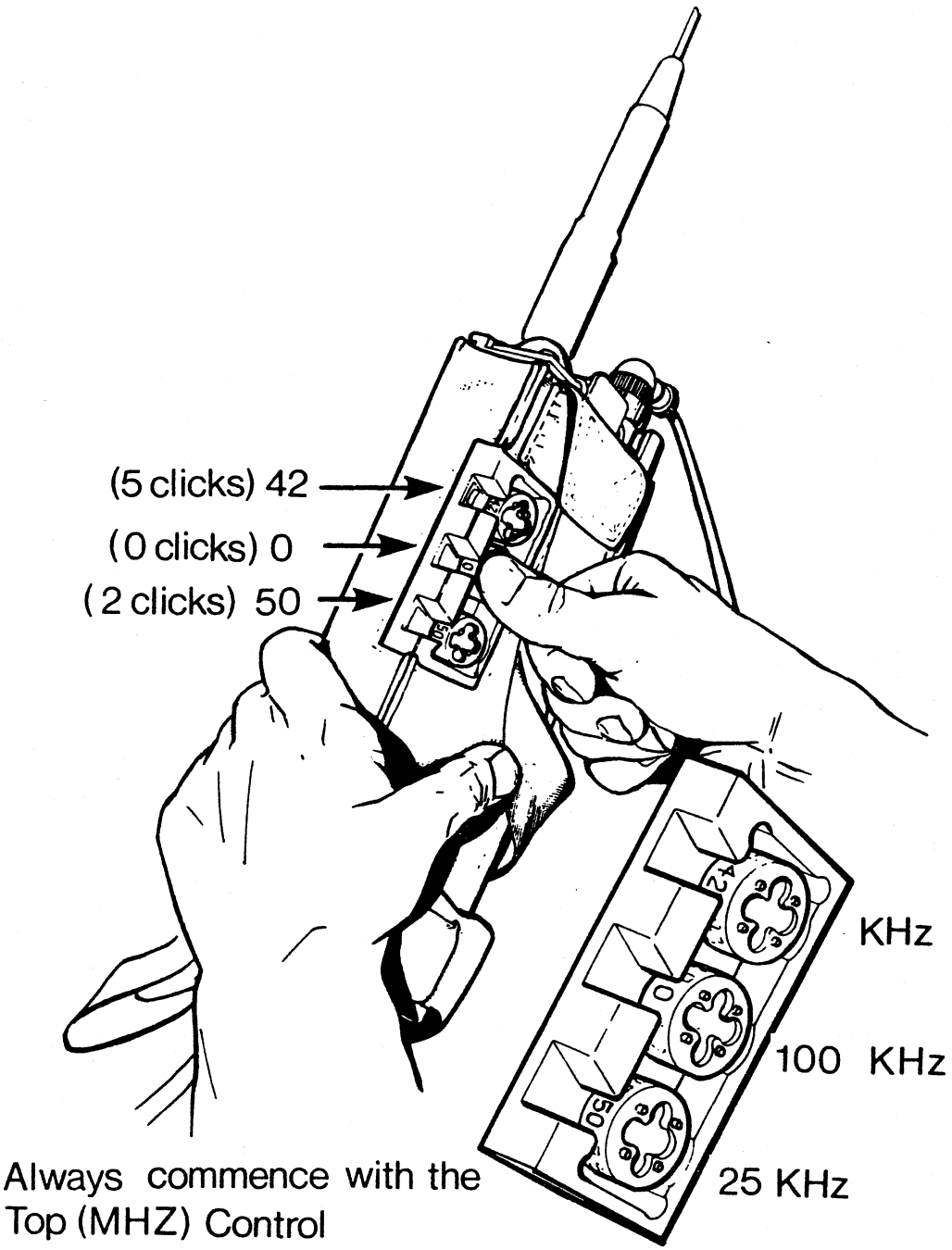


Fig 24.—Frequency Setting UK/PRC 349

SECTION 6 – UK PRC 350

Introduction

0231. The UK/PRC 350 is a VHF/FM manpack radio for use at platoon and section level.

Data

0232. ***Frequency Range*** 36 to 56·975 MHz

Channels 840 at 25 KHz

Power Supply 15V Primary battery
15V Rechargeable battery (Battery life approx 12 hrs)

Antennas 1·2m Whip – Ground Mounted Monopole
1·2m Wire – Inverted 'V'
} With 400mm adaptor from GSA
Ground Spike Antenna

Ranges Basic Planning range 6km max

Terrain	Working Range km	
	1·2m Whip	GSA
Rolling Countryside Wooded Countryside Built-up Area	5-7 ~~5-7~~ 3-5 ~~3-5~~ 1·5–5	5km Plus

Weight and Dimensions (with battery)

Height	***Width***	***Depth***	***Weight***
200mm	120mm	60mm	3·6kg

Facilities
Voice (FM) Narrow-band
Whisper
Loud
Confidence Check
Battery low warning
Can be vehicle mounted
SURF 2W can be used

Description

Setting Up and Operating (Fig 25 & 26)

0233. ***Setting Up.***

a. Ensure set is switched off (systems switch to 'O').

b. Connect battery (clips on to underside of set).

c. Connect antenna *(push in, twist and screw down).*

d. Connect AF gear.

e. Connect straps.

0234. ***Frequency Setting.*** *(See Fig 27.)* Press ball of thumb onto control and twist until required figure appears on window. Frequency setting can be carried out in the dark by counting, from the extreme left, the appropriate number of click positions for each control.

Operator Checks

0235. ***Receive.***

a. Set system switch to * *(noise on).*

b. A loud continuous hiss should be heard in the headset, if not refer to fault location chart at Annex B.

0236. ***Transmit.***

a. Set system switch to 'L' *(Loud).*

b. Depress the pressel switch and speak into the microphone.

c. Sidetone should be heard in headset, if not refer to fault location chart at Annex B.

d. Repeat with system switch on 'W' *(Whisper).*

The set is now ready to operate.

0237. ***Selective Unit Radio Frequency (SURF) 2 Watt.*** When working 2 or more VHF stations in close proximity a SURF 2W can be fitted to the set in order to achieve minimum distance spacing *(cutting down of mutual interference).*

0238. ***Setting Up.***

a. Connect SURF to set *(see Fig 28).*

b. Disconnect the antenna from set and reconnect to the antenna socket of the SURF.

c. Connect the coaxial lead from RF socket on the set to the RF socket on the SURF.

0239. ***Tuning.***

a. Select frequency on set.

b. Press pressel switch.

c. Adjust tuning control on SURF for peak reading in meter.

d. Snap metal cover shut when peak reading is obtained and release pressel.

Vehicle Installation

0240. ***Setting Up.***

a. Fit set to vehicle wing with installation kit provided *(see Fig 29).*

b. Connect passive audio lead to set.

c. Connect AF gear to outlet box on passive audio lead.

General Information

0241. ***Battery 'Low' Warning.*** As the battery approaches exhaustion, an interrupted hiss is heard in the headset when the system switch is set at either 'W' or 'L'. A battery change should take place as soon as possible.

0242. ***Remote Antennas.*** At no time should the 1·2m whip antenna be left connected whilst a remote antenna is in use. Failure to remove the whip antenna will result in both antennas radiating and considerable loss of signal.

0243. ***Carrying positions (see Figs 30 and 31).***

0244.–0250. *Reserved.*

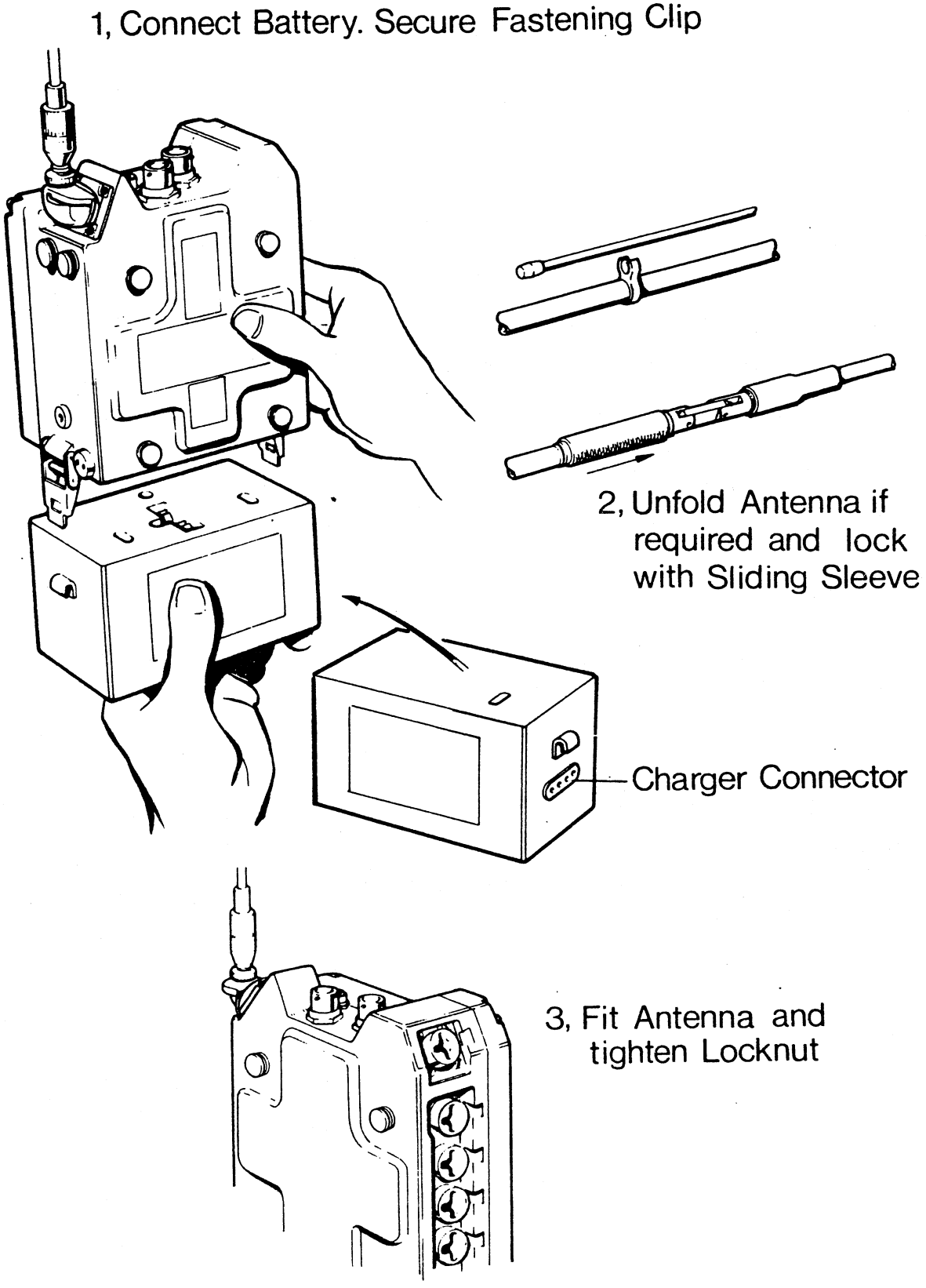
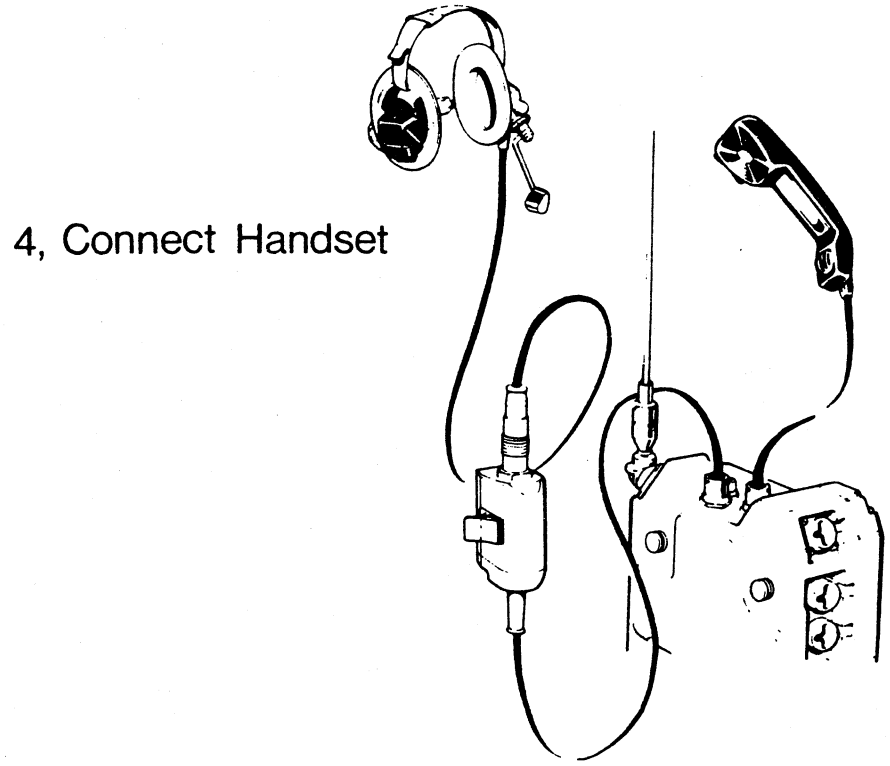


Fig 25.—Setting up UK/PRC 350 (Stage 1)



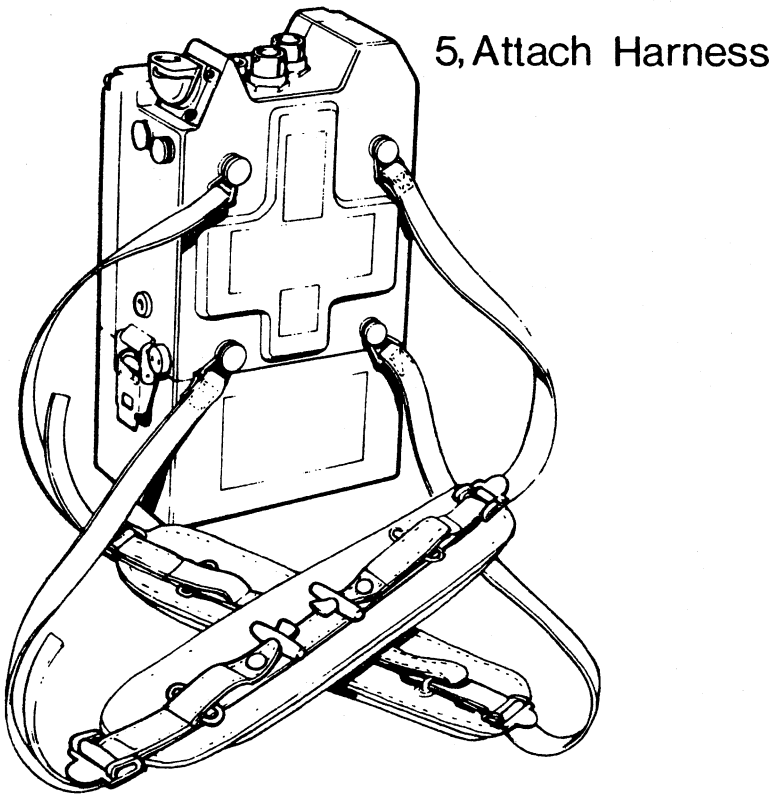


Fig 26.—Setting up UK/PRC 350 (Stage 2)

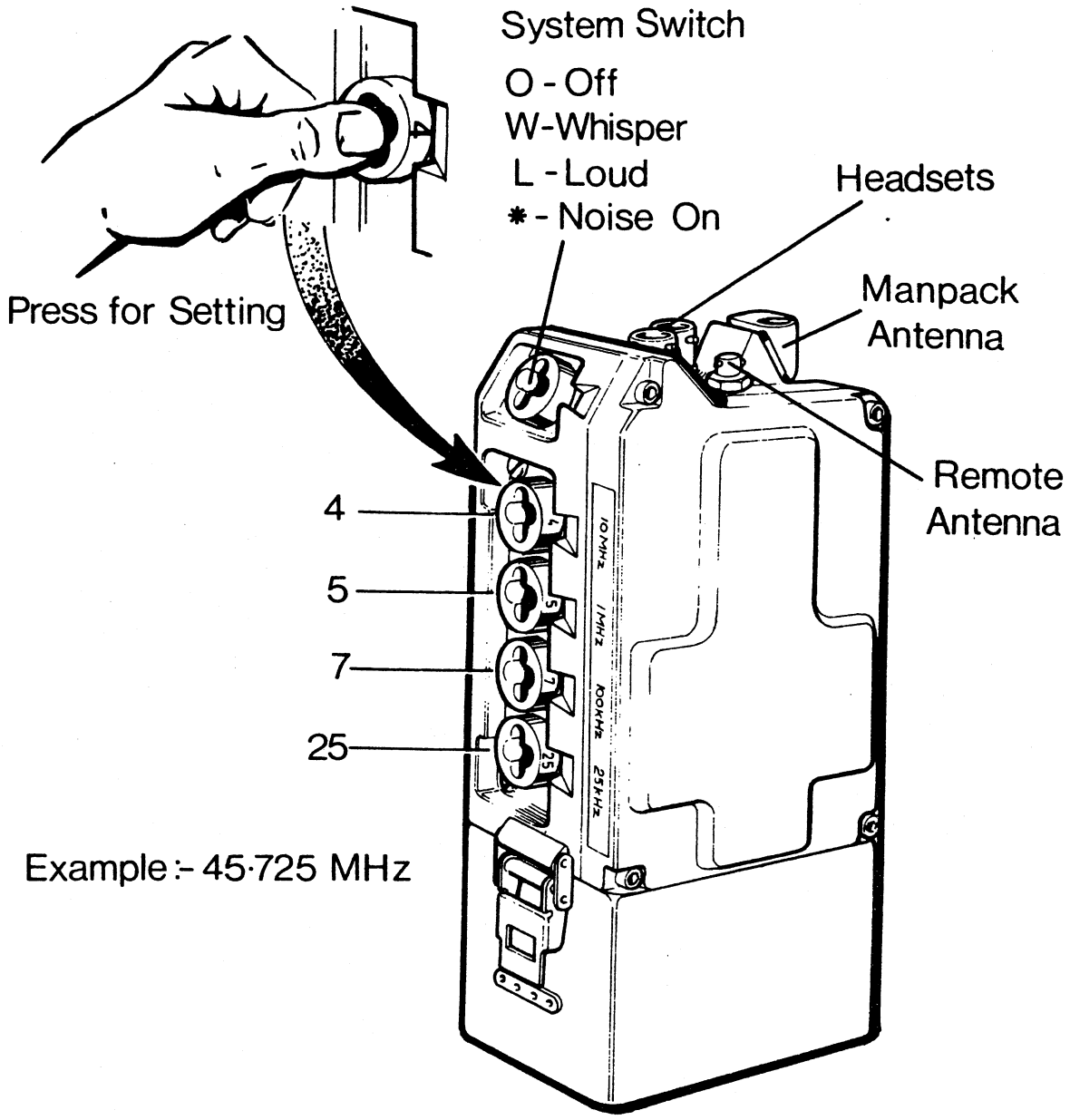


Fig 27.—Frequency Setting UK/PRC 350

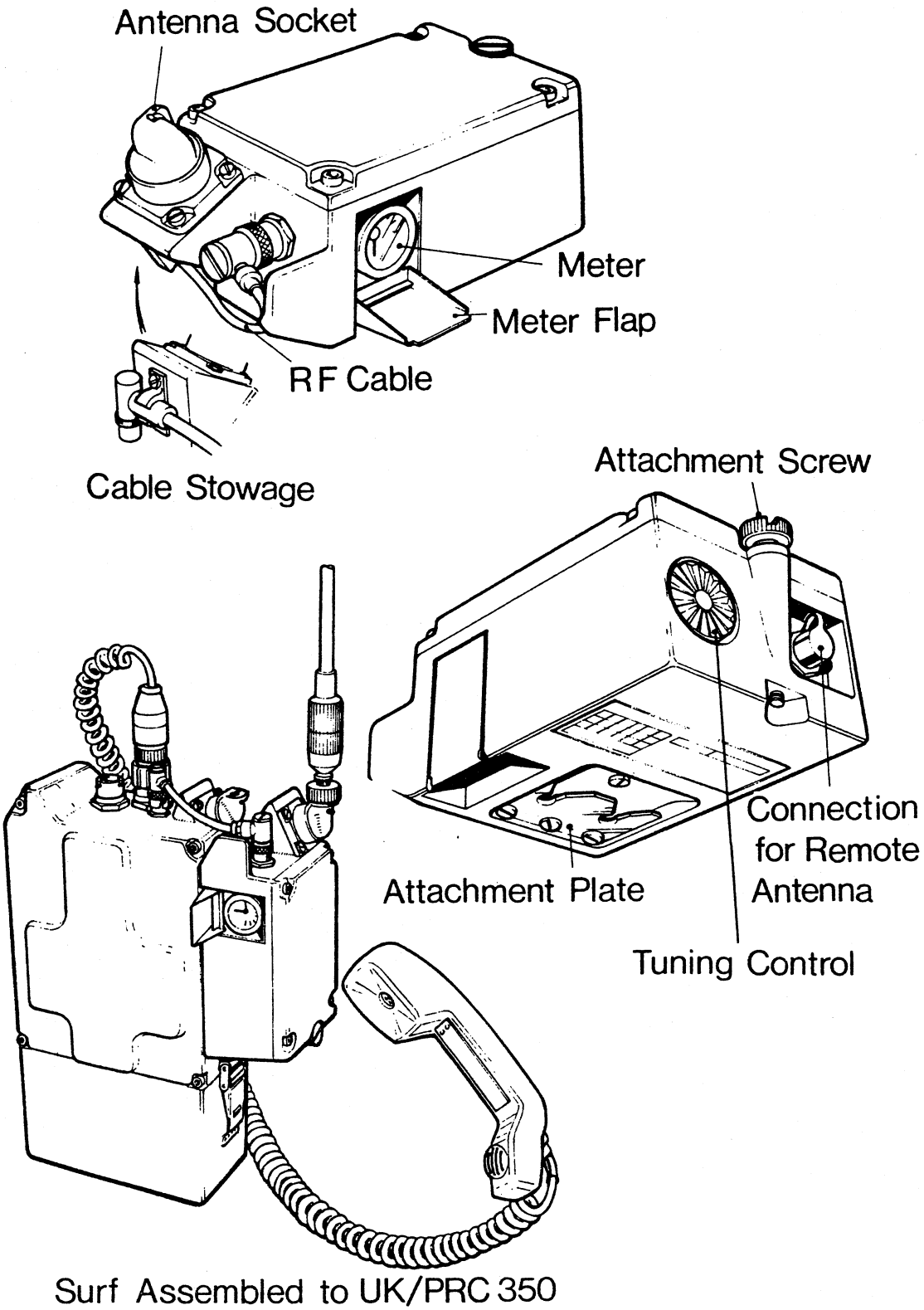


Fig 28.—Connecting a 2 Watt SURF to UK/PRC 350

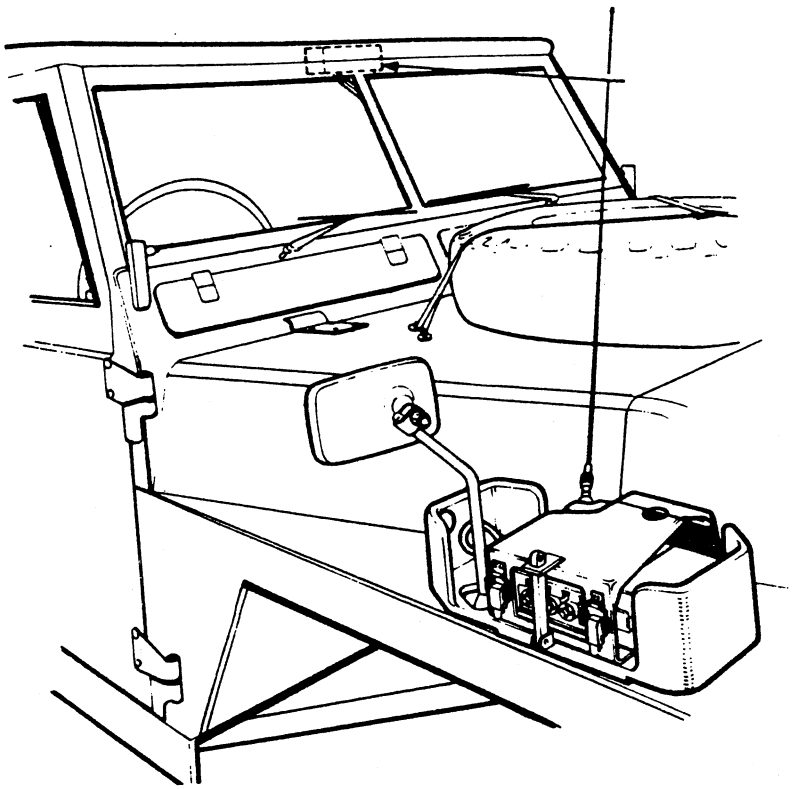


Fig 29.—Vehicle Mounted UK/PRC 350

Fig 30.—UK/PRC 350 Carrying position

Fig 31.—UK/PRC 350 Alternative carrying position

SECTION 7 – UK/PRC 351 AND UK/PRC 352

Introduction

0251. The UK/PRC 351 is a low power VHF/FM transmitter receiver which is the primary manpack set in use at platoon, company and battalion level.

Data

0252. ***Frequency Range*** 30 to 75.975 MHz

Channels 1840 at 25 KHz

Power Supply 24V 1 AHC Secondary Battery (*normally used with hand generator)*
24V 3.3 AHC Secondary Battery (*Life approx 18 hrs)*

Antennas 1.2m Whip Antenna
1.2m Wire
Ground Spike Antenna
Broadband Antenna
Inverted V
TUAAM with 2m Rod
Ground Mounted Monopole

Ranges Basic planning range 8km – manpack
16km – vehicle

Terrain	Working Range km	
	Manpack	Vehicle
Rolling countryside *(Good site)*	8	16
Rolling countryside *(Bad site)*	3–7	12
Built-up Area	4	8

Weight and Dimensions (Basic station)

Height	***Width***	***Depth***	***Weight***
260mm	215mm	80mm	8.2kg

Facilities

Voice (FM) Narrow band
Whisper
Loud
Confidence Check
Battery low warning
Can be vehicle mounted
SURF 4W can be used
Remote
Rebroadcast
Intercom
Call

Description *(Fig 32)*

0253. ***System Switch.*** A 4 position switch which provides:

O – Off Battery supply cut off
W – Whisper
L – Loud
* – Noise on (confidence check)

0254. ***Remote Operating Switch (see Fig 33).*** A 5 position switch which provides:

L – Local
R – Remote
A – Automatic Rebroadcast
I – Intercom
C – Call

Setting Up and Operating

0255. ***Setting Up***

a. Ensure set is switched off *(systems switch to 'O').*

b. Connect battery *(Fig 32).*

c. Connect Antenna *(push in, twist and screw down).*

d. Connect AF gear.

0256. ***Frequency Setting (Fig 32).*** Using thumb, twist frequency selection switches (FSS) until required figures appear in window.

0257. ***Switching On.***

a. Set System Switch *(SSW)* to 'L' *(Loud).*

b. Set Remote Operation Switch *(ROS)* to 'L' *(Local).*

0258. ***Testing.*** Carry out tests using flow charts *(Annex C).* The set is now ready to operate.

0259. ***Remote Operating (Fig 33).***

a. Connect D10 to remote terminals on the set and to remote handset. *(Parallel connections are required, and with the ROS set to 'R' and the cable connected a 2 KHz tone will be heard if the polarity is incorrect.)* The set can be remoted up to 3km.

b. Set ROS to 'R' *(Remote)* and handset user will have full receive and transmit capability.

c. Set ROS to 'I' *(Intercom)* and the handset user has an intercom link with the set user.

d. Set ROS to 'C' *(Call)* and a tone is generated in the remote handset to alert the users.

Note. The handset remote will generate a single tone in the audio gear if the remote switch is on 'I' or 'R'.

0260. ***Rebroadcast.*** Connect the 2 sets together, using D10 cable, connecting the remote terminals in parallel. If the polarity is incorrect a 2 KHz tone will be heard. ~~*(Fig 34 shows a typical layout).*~~ If the antennas of the Rebroadcast station are less than 50 metres apart a SURF 4W should be fitted to each set. Frequency separation for rebroadcast is 10% and the following combinations should be avoided:

F1=2×F2 or F2=2×F1
(e.g. 32 MHz and 64 MHz)
F1±23.05 MHz *(e.g. F1—39.95 then for F2 avoid 63 MHz)*

0261. ***Vehicle Station (Fig 35 & 36).*** The UK/PRC 351 and UK/PRC 352 radio equipments can be clipped into vehicles and operated in that mode using the vehicle antenna and ancillary equipment.

0262. ***Setting Up.***

a. Clamp UK/PRC 351 onto Frame Electrical. Connect cable from DCCU to charging socket on 3.3 AHC battery.

b. Connect vehicle coax to the TUAAM and RF and socket on the set.

c. Connect control cable from the initiate box to socket 2 on the set. *(Note: cable must not be connected to socket 1.)*

d. Connect headsets to socket 1 on the radio and/or to the AUDIO socket on the initiate box.

When using the UK/PRC 352 the coax is connected to the RF out socket on the 20W amplifier.

0263. ***Switching On.***

a. Set system switch to 'L'.

b. Set remote operating switch to 'L'.

c. Initiate automatic tune by pressing button on initiate box.

Note: SURF is not to be used in vehicle installation.

0264. ***Initiate Box & Tuning Unit Automatic Antenna Matching (TUAAM) (Fig 37).*** For normal operation the initiate box is set to 'N'. When switching on or changing frequency the TUNE push button on the initiate box must be depressed and released to tune the TUAAM to the new frequency. During the tuning period *(3 secs approx)* the amber lamp will glow, a fault or use of an unsuitable antenna will result in the lamp staying on for a longer period or not extinguishing.

0265. During periods of RADIO/ELECTRONIC silence the initiate box should be set at 'S' when changing frequency so the TUAAM tunes internally to a dummy load and no outgoing signal is made.

UK PRC 352

0266. ***Carrying positions (Fig 38).***

0267. The UK/PRC 352 is a high power VHF/FM transmitter receiver comprising the UK/PRC 351 plus a 20W amplifier *(Fig 39).*

Data

0268. As per the PRC 351 with the following exceptions:

Power Supply 24V 3.3 AHC Secondary Battery
(Life approx 9 hrs)

Ranges Basic Planning range 16km Ground Station
28km Vehicle Station

Terrain	Range in km	
	GSA	TUUAM
Rolling countryside *(good site)*	16–20 ~~16.20~~	>28km
Rolling countryside *(bad site)*	8–16 ~~8.16~~	

Weight and Dimensions (Basic station & GSA)

Height	***Width***	***Depth***	***Weight***
355mm	215mm	80mm	11.4kg

Description *Fig 40* shows the PRC 352 set up.

0269. ***Control switch (see Fig 39)***

A 5 position switch providing the following functions:

O	—Off	Reverts to PRC 351
T	—Test	
30–40	MHz	Frequency Band
40–55	MHz	Frequency Band
55–76	MHz	Frequency Band

Setting Up and Operating

0270. ***Setting Up.***

a. Ensure set and amplifier are switched off.

b. Connect 20W amplifier to PRC 351.

c. Connect battery to 20W amplifier.

d. Connect coax from set to amplifier.

e. Connect ground spike antenna to amplifier.

f. Connect AF gear.

g. Select frequency.

0271. ***Switching On.***

a. Set system switch to 'L'.

b. Set remote operating switch to 'L'.

c. Select appropriate frequency band on amplifier.

0272. ***Testing.*** Carry out tests using flow charts (**Annex D**). To test the receive facility a second set is needed. The set is now ready to operate.

Note: The set must not be used with a whip antenna when using the 20W amplifier.

0273. ***Vehicle Operation. See PRC 351.***

General Information

0274. ***Battery Low Warning.*** As the battery approaches exhaustion an interrupted hiss is heard in the headset when the system switch is set to either 'W' or 'L'. A battery change should take place as soon as possible.

0275. ***Remote Antennas.*** At no time should the 1.2m antenna be left connected whilst a remote antenna is in use.

0276. ***SURF 4W.*** The SURF 4W is not to be used in vehicle installations.

0277. ***Rebroadcast.*** The setting up of the PRC 352 for rebroadcast is the same as for the PRC 351. A typical layout is shown at *Fig 34.*

0278–0280. *Reserved.*

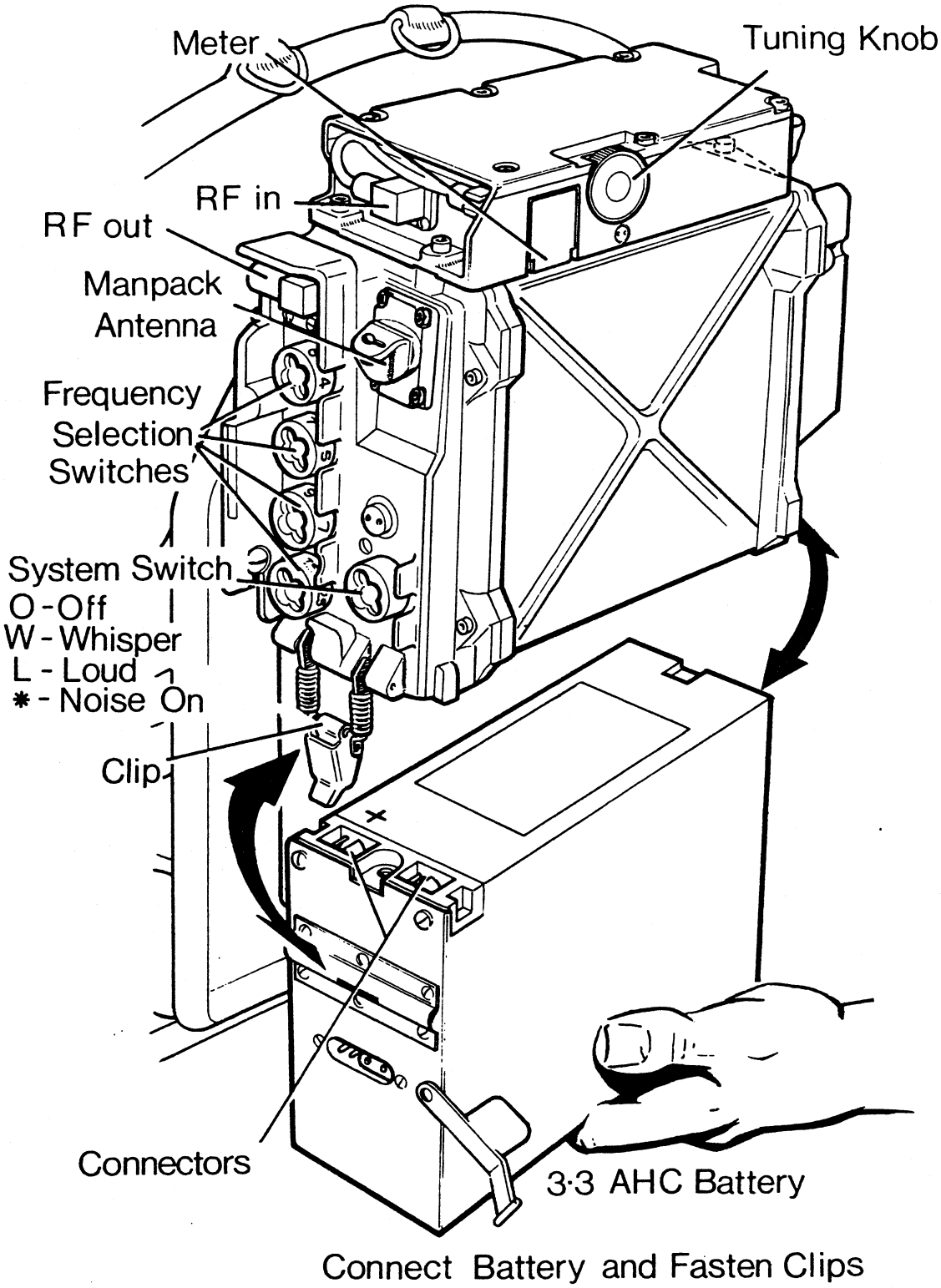


Fig 32.—UK/PRC 351

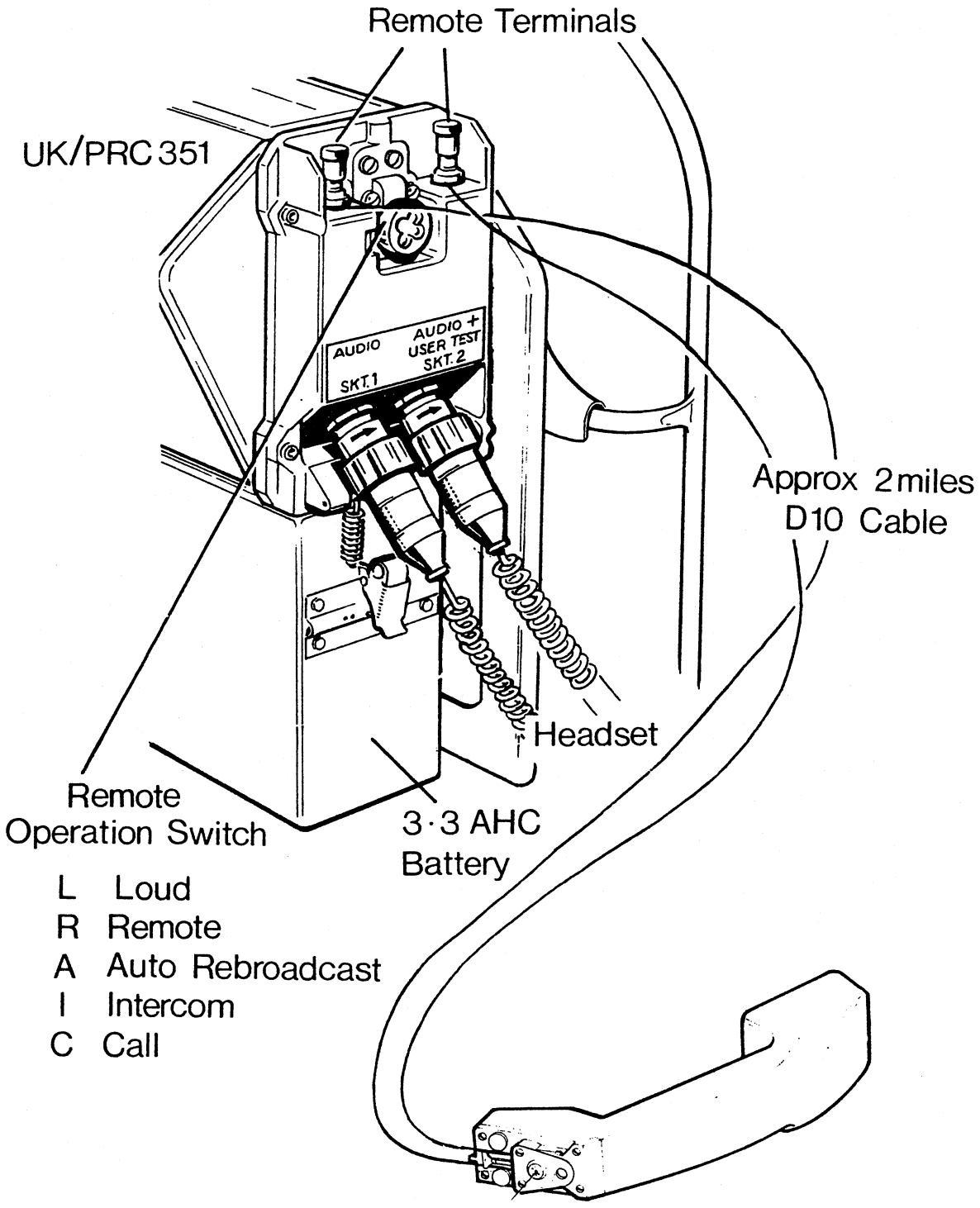


Fig 33.—Remote operating UK/PRC 351

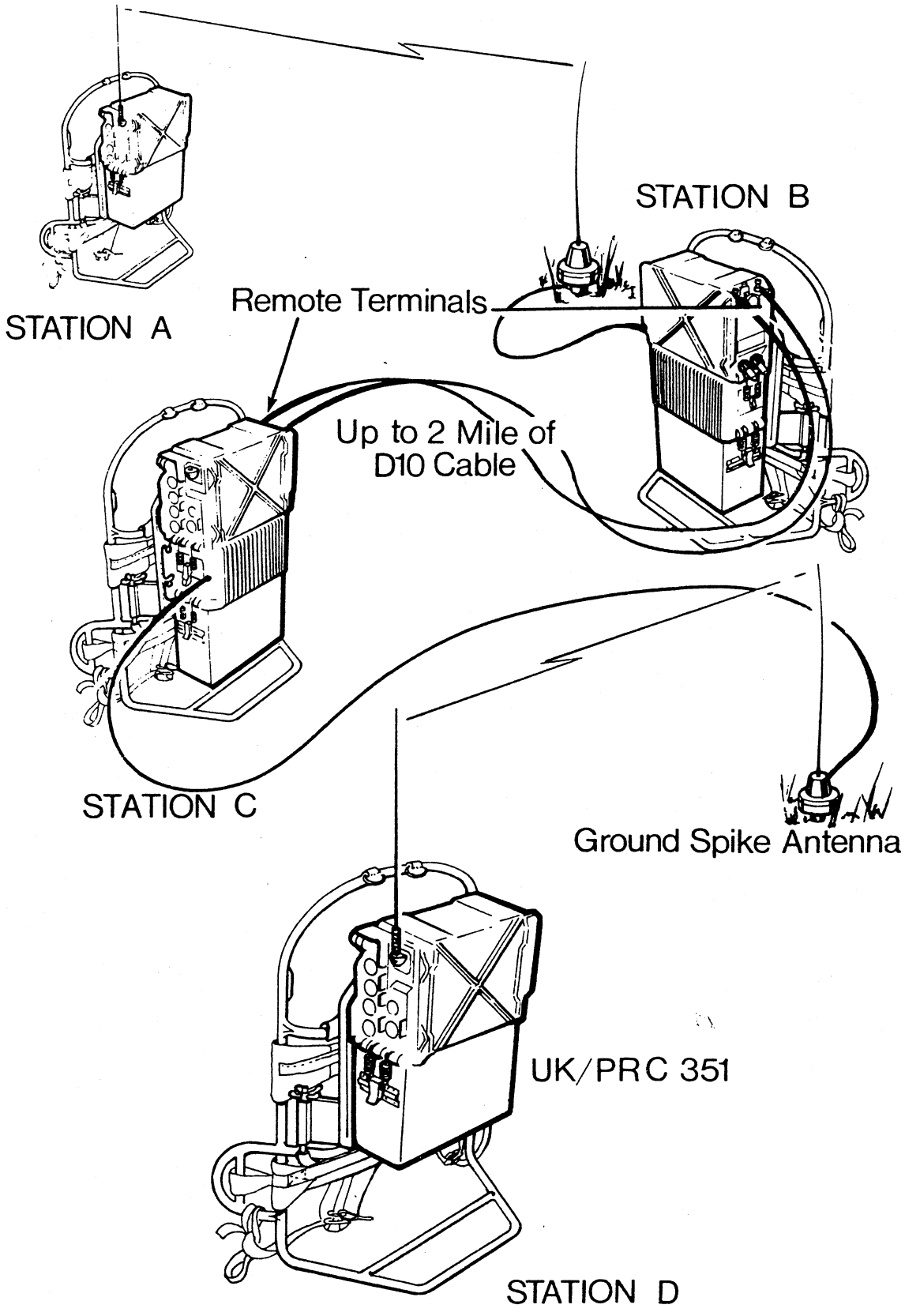


Fig 34.—Rebroadcast using 2×UK/PRC 352

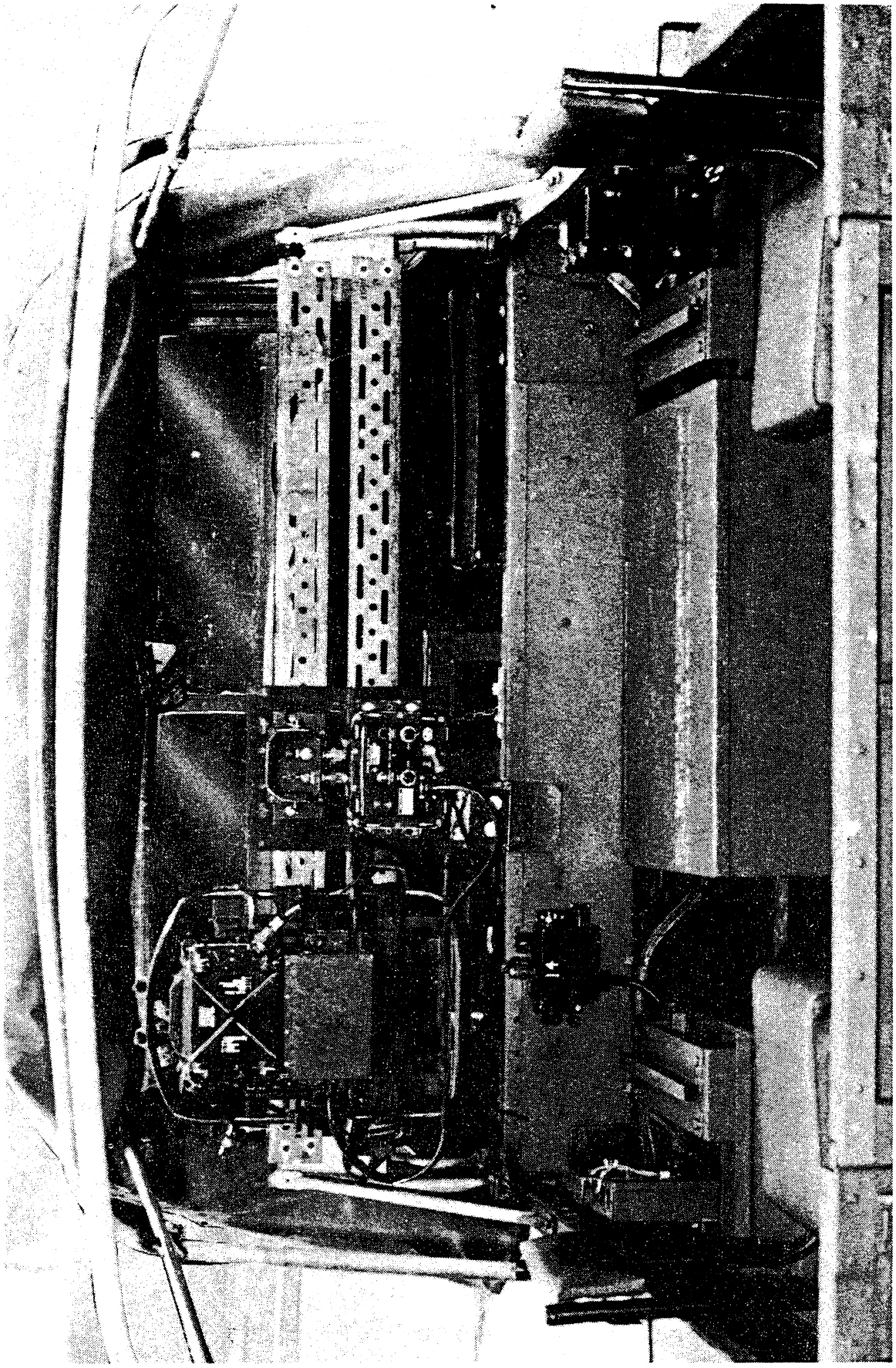


Fig 35.—Vehicle Mounted UK/PRC 351

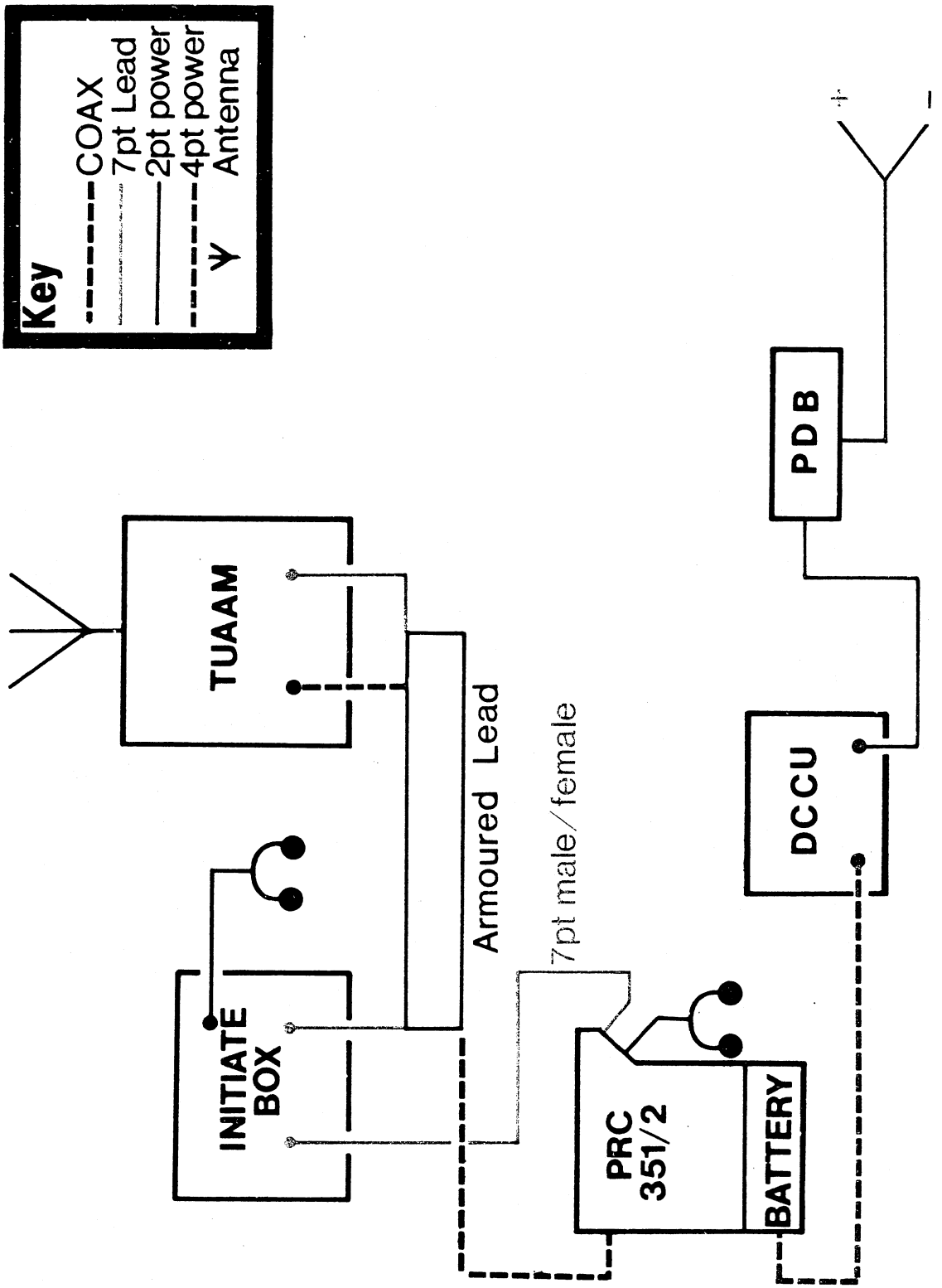


Fig 36.—Vehicle Interconnections UK/PRC 351

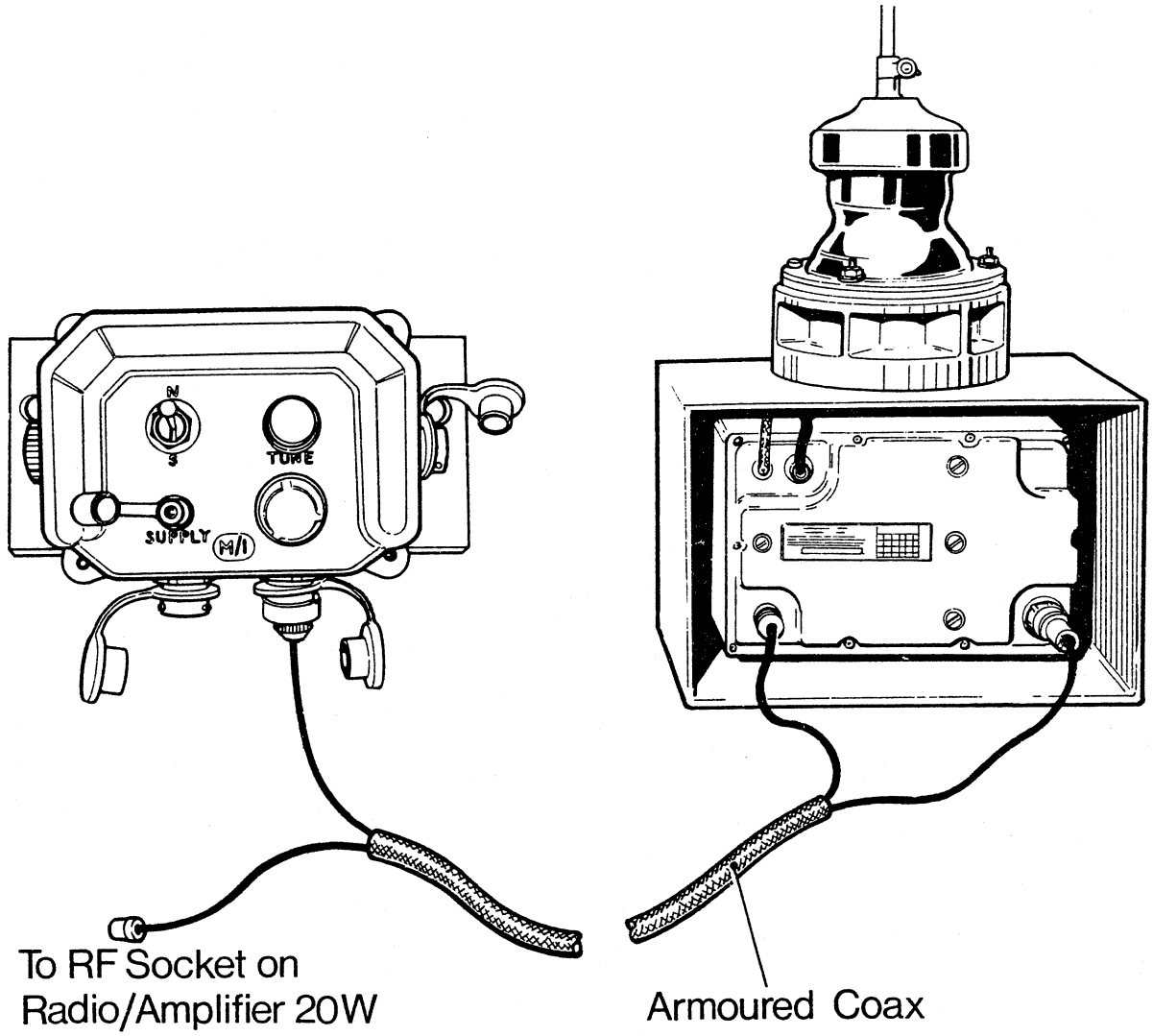


Fig 37.—TUAAM and Initiate Box

Fig 38.—UK/PRC 351 Carrying position

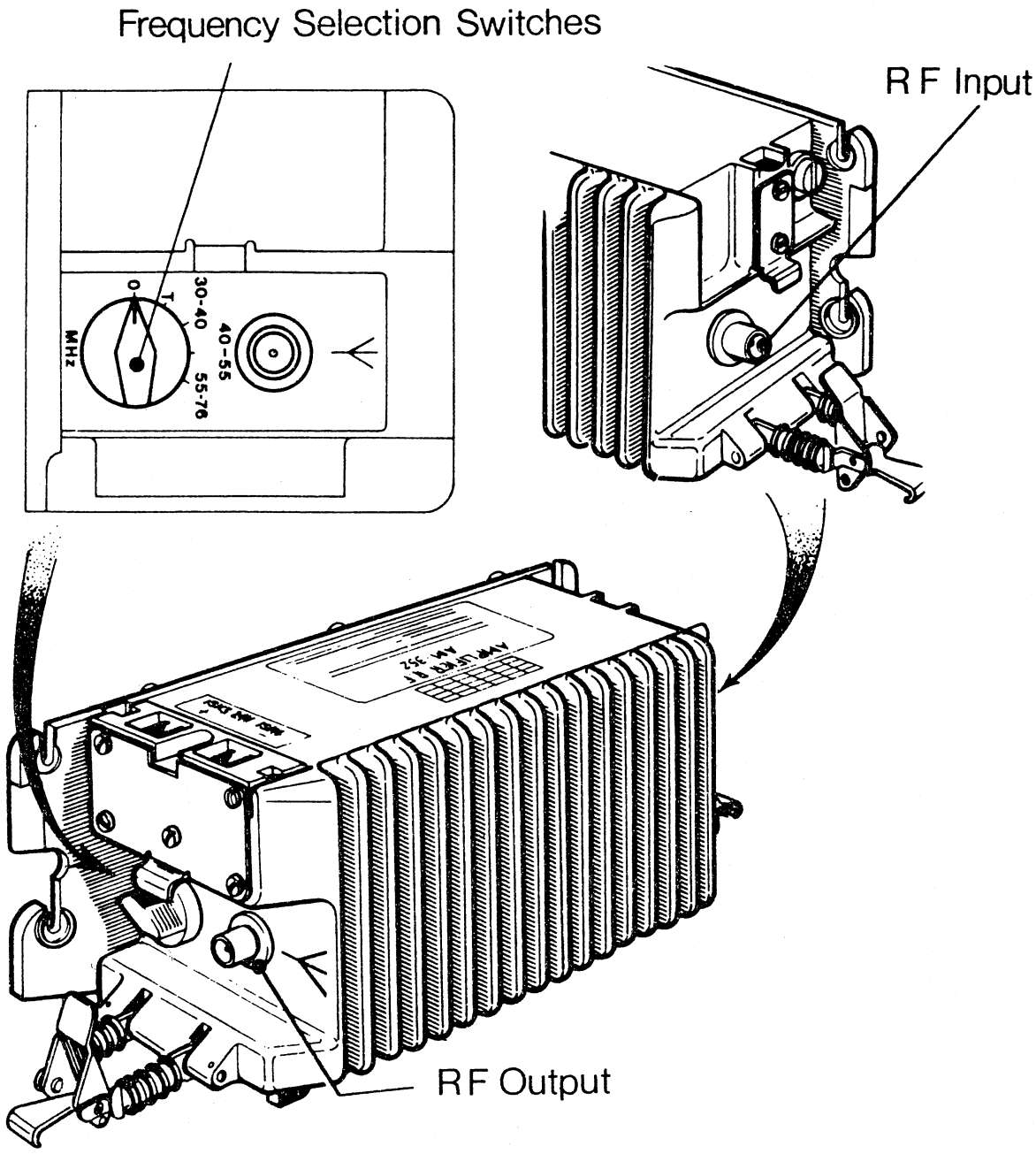


Fig 39.—20 Watt Amplifier

Fig 40.—Setting up UK/PRC 352

SECTION 8 – UK/VRC 353

Introduction

0281. The UK/VRC 353 is a VHF/FM transmitter/receiver designed for vehicle and ground station use throughout all arms of the Army.

Data

0282.

Frequency Range	30–75.975 MHz
Channels	1840 at 25 KHz 920 at 50 KHz
Systems	Narrow – Normal CLANSMAN working Wide Tone – For working to wide tone systems *(i.e. NATO Forces Radio)* Wide – ~~LARKSPUR working~~ NON SYNTHESISED RADIOS Narrow Data – For R SIGNALS use only. Wide Data – Clansman Secure Speech
Power Supply	2×12V Batteries AC PSU from mains *(VRC 353 will accept 20–30 volts)*
Antennas	TUAAM with 2m Rod | Ground Mounted Monopole Broadband Antenna | GSA (*15W and below*) Inverted V
Ranges	Basic Planning Ranges 50W 32km 15W 18km

Weight and Dimensions

	Height	***Width***	***Depth***	***Weight***
VRC 353	215mm	240mm	360mm	22.2kg
TUAAM & Antenna Base	400mm	250mm	190mm	8.7kg
ARFAT	70mm	160mm	120mm	0.9kg

Facilities

Automatic Rebroadcast
Remote Operation
Intercom
Call
Break in

Description *(Fig 41 shows the VRC 353 installed in a vehicle)*

0283. ***Vehicle Interconnections (Fig 42).***

0284. ***VRC 353 Controls and Connections.***

Fig 43 Ref	Controls and Connections	
1	**MODE SWITCH**	
	NARROW	The normal CLANSMAN operating position when working analogue, channels are confined to 25 KHz.
	WIDE TONE	50 KHz channel spacing using the 150 Hz tone squelch system. For use with equipments using 50 KHz channel spacing and 150 Hz tone squelch.
	WIDE	Used when working to non-tone squelch equipments ~~e.g. LARKSPUR.~~ •
	NARROW DATA	For future applications.
	WIDE DATA	For data working.
	Notes: When the MODE switch is set to DATA the radio can only be operated from special equipment connected to the HARNESS connector.	
2	**TX LAMP** The lamp lights when the radio is transmitting.	
3	**METER** The meter is calibrated from 16 to 32 divisions and is used in conjunction with the TEST switch.	
4	**ELAPSED TIME INDICATOR** A digital read-out of the total running hours of the radio set.	
5	**POWER**	
	OFF	Power off but meter reading available for 28V test.
	MIN	On with 100 milliwatts output.
	1W	On with 1 Watt output.
	15W	On with 15 Watts output.
	50W	On with 50 Watts output.
	Ø	This position is for RADIO & ELECTRONIC SILENCE. During Radio and Electronic Silence with the power switch in the Ø position, the radio can receive signals but cannot be caused to transmit.
	TUNE	This is a spring biased position used to initiate tuning of the TUAAM and is only used with the TUAAM/ARFAT antenna system.

Fig 43 Ref	Controls and Connections	
6	**TEST** A 10-position rotary switch labelled as follows:	
	LAMPS OFF	In this position all illumination on the radio is switched off. Received signal strength is indicated on the meter. Note also that the transmission indicator lamp does not light up during transmission when the switch is in this position. Do not attempt to tune the radio with the switch in this position as it is essential that the lamp comes on whilst the set is tuning.
	FANS OFF	In this position the cooling fans will not switch on and transmission is inhibited except for automatic tuning. Other conditions will be as for LAMPS OFF. This position is for use ONLY when *(Audio)* SILENCE is essential. Note: Excessive use of this position will increase likelihood of failure of the radio and may cause the safety trip to operate which will initially prevent the radio from transmitting and finally switch the radio off until it is cool.
	28V SPLY	In this position the meter indicates the applied voltage. If reading is less than 22v recharging of the batteries is essential.
	RX SIG	In this position the meter indicates the received signal strength.
	TX O/P	In this position the meter indicates the RF output from the radio. The meter indication should be in the green area irrespective of the setting of the POWER switch whilst the radio is transmitting.
	AFC TX	In this position if the set is transmitting and the meter does not read within 3 divisions of centre scale, the transmitter is out of alignment and the set may not transmit at a later occasion.

Fig 43 Ref	Controls and Connections	
	SYNTH	If the frequency window illumination flashes and the meter reads in the red or left hand half of scale in this switch position the synthesiser is out of lock possibly due to a frequency outside the range 30 to 75.975 MHz having been selected. Otherwise the set needs to be repaired.
	TEMP	If the frequency window illumination flashes and the meter reads in the red or left hand half of the scale in this switch position the set is overheating. Check that the air flow through the set is not restricted. Under this condition the set will not go to transmit. In emergency ONLY the set may be made to transmit for a short period by turning the TEST switch to OVERRIDE and operating the pressel but the set may be damaged by doing this.
	ARFAT	If the frequency window illumination flashes and the meter reads in the red or left hand half of scale in this switch position there is a fault in the antenna system. This is detected because the ARFAT will have overheated indicating a fault in the antenna system beyond the VRC 353. This fault position is redundant when using a remote antenna,.
	OVERRIDE	In this position standard functions are overridden: **a.** All illumination is switched off. **b.** The fans operate. **c.** Audio muting is removed even in the absence of an incoming signal to give confidence that the receiver is operating by listening to its own noise. **d.** The transmit inhibit caused by overheating or ARFAT faults is removed. **e.** A reading is obtained on the meter. If in the red or left hand half of the scale when the pressel is operated the transmitter is out of lock. It will not transmit.

Fig 43 Ref	Controls and Connections	
7	**GAIN**	Varies the gain to the 2 output sockets.
8	**REMOTE** LOCAL REM AUTO BK IN IC CALL	A 6-position switch the last position of which is spring loaded. No harness, no remote, the set is operated directly from the audio sockets. Local, Harness or Remote except AUTO rebro. Automatic rebroadcast, Local or Remote. For setting up Automatic Rebroadcast. For intercommunication over remote line without transmitting over the air. Spring loaded switch for calling the remote operator when intercommunication is required.
9	**D10 CABLE STRIPPER**	For stripping insulation from ends of remote cable.
10	**REMOTE**	Pair of spring terminals for remote line connections. Up to 3 Kms with D10 cable.
11	**EARTH TERMINAL**	Terminal for earth connection.
12	**ANT/ARFAT**	A coaxial connector for ARFAT or remote antenna.
13	**ARFAT**	A 12-way connector used to supply power and control information between the set and the ARFAT.
14	**AIR INTAKE GRILL**	Fans provide protection from overheating. The air intake grill on the front panel and 2 fan outlet housings at the rear of the set provide physical protection to the heat exchanger.
15	**AUDIO**	Pair of sockets for connection of audio gear.
16	**HARNESS**	A 7-pin plug for connecting radio into Harness.
17	**28V**	A 2-pin plug for 28V supply connection.

Fig 43 Ref	Controls and Connections	
18	**FREQUENCY SELECTOR**	Inner and Outer control knobs for frequency selection.
19	**FREQUENCY DISPLAY WINDOWS**	Two windows where the frequency to which the radio is tuned is displayed.
Note: If the set detects a fault the frequency window illumination will be made to flash and the audio output will be alternately muted and not muted in time with the light.		

Connecting up the Radio Station

0285. In vehicles fitted with Harness follow the instructions in the order shown in the table below:

ORDER	OPERATION	ILLUSTRATION REFERENCE FIGURES	
		43	44
1	Connect Earth Braid.	11	
2	Set POWER switch to OFF.	5	
3	Connect DC supply lead to 28V socket.	17	
4	Connect Harness cable to the 7-pin Harness socket.	16	
5	Connect the 12-way interconnecting cable from the ARFAT socket on the VRC 353 to the 12-way socket marked VRC 353 on the ARFAT.	13	20
6	Connect coaxial cable from ANT/ARFAT socket on the VRC 353 to the coaxial cable socket marked VRC 353 on the ARFAT.	12	21
7	Connect the 7-way interconnecting cable from the 7-way socket marked TUAAM on the ARFAT to the 7-way socket (ISK1) on the TUAAM.		22 24

ORDER	OPERATION	ILLUSTRATION REFERENCE FIGURES	
		43	44
8	Connect coaxial cable from the coaxial socket marked TUAAM on the ARFAT to the coaxial socket (ISK2) on the TUAAM.		23 25
9	Connect the coaxial cable from the antenna base No. 31 to the coaxial socket (ISK3) on the TUAAM.		26
10	Screw the whip antenna sections together and mount on the antenna base.		27

0286. In vehicles without Harness, connect as normal except that at operation (4), connect Headgear to the socket marked AUDIO.

Note: Alternative antenna systems can be used; information on these will be found in Chapter 5.

Setting Up and Antenna Tuning

0287. ***General Instruction.*** Follow the instructions in the order shown in the table below:

ORDER	OPERATION	ILLUSTRATION REFERENCE FIG 43
1	Set the REMOTE switch to REM if Harness is in use. Set the REMOTE switch to LOCAL if local audio gear is in use.	8
2	Set the TEST switch to RX SIG *(when panel illumination prohibited set to LAMPS OFF).*	6
3	Set MODE switch to the appropriate mode of operation, e.g., NARROW.	1
4	Set up Frequency.	18, 19
5	Set POWER switch to minimum RF output level needed. The OFF position disconnects power supply.	5
6	Wait 40 seconds before using the VRC 353.	
7	If a TUAAM, ARFAT and 2m end-fed whip antenna are in use, initiate automatic antenna tuning.	5
8	Adjust GAIN control *(NOT applicable if AUDIO gear is connected via Harness).*	7

0288. ***Setting Up Frequency.*** Use the following sequence:

ORDER	OPERATION
1	Set the inner control knob fully anti-clockwise.
2	Rotate the outer control knob until the required 'Tens of MHz' appears in the left hand window.
3	Set the inner control knob one step clockwise.
4	Rotate the outer control knob until required 'MHz' appears in same window.
5	Similarly rotate knobs until the required 'Hundreds of kHz' and '25 kHz' appear in the right hand window.

0289. ***Antenna Tuning using the TUAAM and ARFAT.*** The TUAAM can tune to the matching transformer and internal pigtail between the transformer and antenna socket, in the antenna Base No. 31. It is important to check that there is an antenna fitted in the antenna base.

0290. ***Power Tuning.*** Rotate the POWER switch to the TUNE position and return it immediately to the minimum RF output power required. This will cause the TUAAM to tune to the antenna. The TX indicator lamp will light while the TUAAM is tuning. This should be completed in approximately 3 seconds. Wait until the TX indicator lamp has gone out before using the VRC 353.

0291. ***Silent Tuning.*** During Radio Silence conditions rotate the POWER switch to the TUNE position and return it immediately to the 0 position. This will cause the TUAAM to tune in to a dummy load which will allow the radio only to receive signals. The TX indicator lamp will light while the TUAAM is tuning. This should be completed in approximately 3 seconds. At the end of Radio Silence use the Power Tuning procedure shown above to cause the TUAAM to tune to its antenna.

0292. It is important that the following rules are observed.

a. Do not change frequency while the TUAAM is tuning.

b. The TUAAM will be caused to tune if:

(1) The power supply to the VRC 353 is interrupted.

(2) The control cable connections between the VRC 353 and the TUAAM are interrupted.

c. If the TX lamp stays alight for 10–12 seconds this indicates that the TUAAM was unable to match to its antenna and has carried out a silent tune into its dummy load. The antenna system should be checked for completeness or damage at the earliest opportunity.

d. If the TX lamp stays on for longer than 12 seconds a fault is indicated in the TUAAM, ARFAT, Cables or VRC 353.

e. When not using the vehicle mounted whip, it is always necessary to disconnect the ARFAT/TUAAM control lead; if this is not done the set will be an ECM hazard. With the lead connected, if the set is caused to go into its antenna tuning cycle it will be unable to find a tuning point as the ARFAT is not in circuit *(coax removed)*. The 50W RF is passed directly to the antenna being used so that the station will become a continuously transmitting beacon. The VRC 353 will continue to transmit until the control lead is disconnected or the ARFAT/TUAAM coax reconnected. The output is 50W on any power setting, including '0'. All operators should be aware of this hazard and each set be wired with the 12 point control lead and the vehicle coax taped together so that the removal of one without the other is difficult.

0293. ***Fault Locating (See Annex E).***

Rebroadcast

0294. ***Automatic Rebroadcast.*** Automatic rebroadcast means that when one set receives, it passes the received signals together with the DC switching current along the cable, which automatically switches the remote set to Transmit. For automatic rebroadcast the cable must be terminated by another VRC 353, a PRC 351, or an Interconnecting Box 2-radio (IB2) connected to another VHF radio. Set the REMOTE switch to the AUTO position. Automatic rebroadcast with an HF radio is not possible.

0295. ***Remote Rebroadcast.*** Connect the cable to the terminals marked REMOTE on the VRC 353. The second of the 2 radios to be connected to the remote cable should be used to check the polarity of the cable. This is done by connecting the audio gear to one of the audio sockets on the set and with the REMOTE switch at REM or AUTO listening for a call tone. If this is heard the polarity of the wires is NOT correct and they should be removed from the terminals and each inserted into the opposite terminal to which it was connected before. If a local monitor is required connect the audio equipment to the AUDIO sockets on the VRC 353.

0296. ***Manual Rebroadcast.*** For manual rebroadcast the cable will normally be terminated by an IB2 connected to an HF radio. An operator will control the IB2 Transmit switch. Set the REMOTE switch to the REM position. Manual rebroadcast, although possible with a VHF remote radio, is not normally desirable, but could be used if the automatic circuitry was not functioning correctly.

0297. ***Telegraph Operation.*** When the VRC 353 equipment is required to be used for passing telegraph information, an Adaptor Telegraph Radio (ATR) Unit will be required. Information on the use of this Unit will be found in the user handbook supplied with it.

0298. ***Ground Station Operation.*** The equipment can be removed from a vehicle for operation as a ground station, e.g., for use in a building, or in the open as a rebroadcast station.

0299. ***Connecting Up.*** Place the VRC 353 radio in a suitable operating position and carry out the following:

ORDER	OPERATION
1	Set the POWER switch to the OFF position.
2	Connect the batteries using the special battery lead to the 28V socket on the front panel.
3	Connect the coaxial cable from the Antenna to the ANT/ARFAT socket.
4	Connect the audio gear to the AUDIO sockets on the VRC 353. *(An audio extension lead is available which can be inserted between the audio gear and the audio sockets where required).*

02100. ***Setting Up.***

ORDER	OPERATION
1	Set switch to LOCAL except where Remote operation is required.
2	Set the TEST switch to RX SIG.
3	Set MODE switch to NARROW unless alternative position is required.
4	Set up frequency.
5	Set POWER switch to minimum RF output level needed.
6	Adjust GAIN control to required audio level.
7	Wait 40 seconds.

02101. ***Operation.*** The set is now ready for operation. Press the pressel switch to transmit; the TX lamp should glow. A ground station may be operated from a remote position or as a rebroadcast station.

02102. ***Remote Control.*** Connect the cable to the terminals marked REMOTE on the VRC 353. If the remote unit is already connected to the cable a check must be made to ensure the wires have been connected to the correct terminals. This is done by connecting audio gear to one of the radio sockets on the set and with the REMOTE switch at REM or AUTO listening for a call tone. If this is heard the polarity of the wires is NOT correct and they should be removed from the

terminals and each inserted into the opposite terminal to which it was connected before.

02103. If a local monitor is required connect the audio equipment to the AUDIO sockets on the VRC 353. Set the REMOTE switch to the REM position when the termination of the cable at the remote position is by one of the following:

a. *Remote Control Harness, Remote Personal Unit,*

b. *Remote Combining Unit,* or *Adaptor Radio Telegraph.*

02104. The Remote operator must press his pressel switch to transmit over the radio link. For speech to a local operator without transmitting over the link the remote operator must press his CALL button. The local operator must then switch to IC for intercommunication.

02105. The operator at the radio may call the remote operator without transmitting over the air by switching the REMOTE Switch to IC and depressing it to the CALL position. The switch will return to the IC position. The operator is required to operate his pressel switch in the normal manner.

02106. ***Intercommunication from a Remote Position.*** For intercommunication between the Local Monitor and the Remote Operator, hold the REMOTE switch in the CALL position, then release the switch so that it returns to the IC position. When the remote operator wishes to reply he will switch to IC before doing so. Each operator must press his pressel whilst speaking.

02107.–02110. *Reserved.*

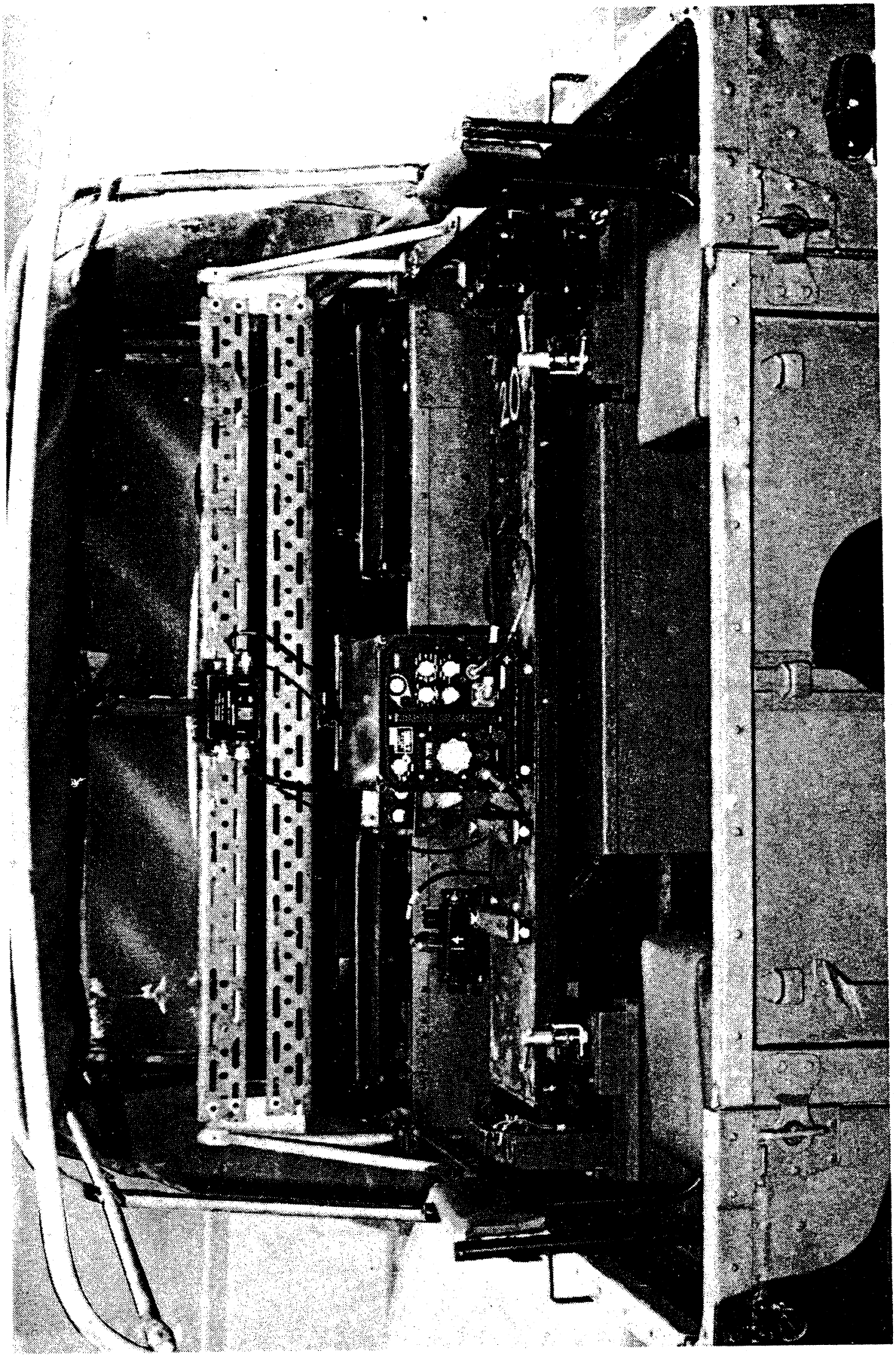


Fig 41.—UK/VRC 353 in Vehicle

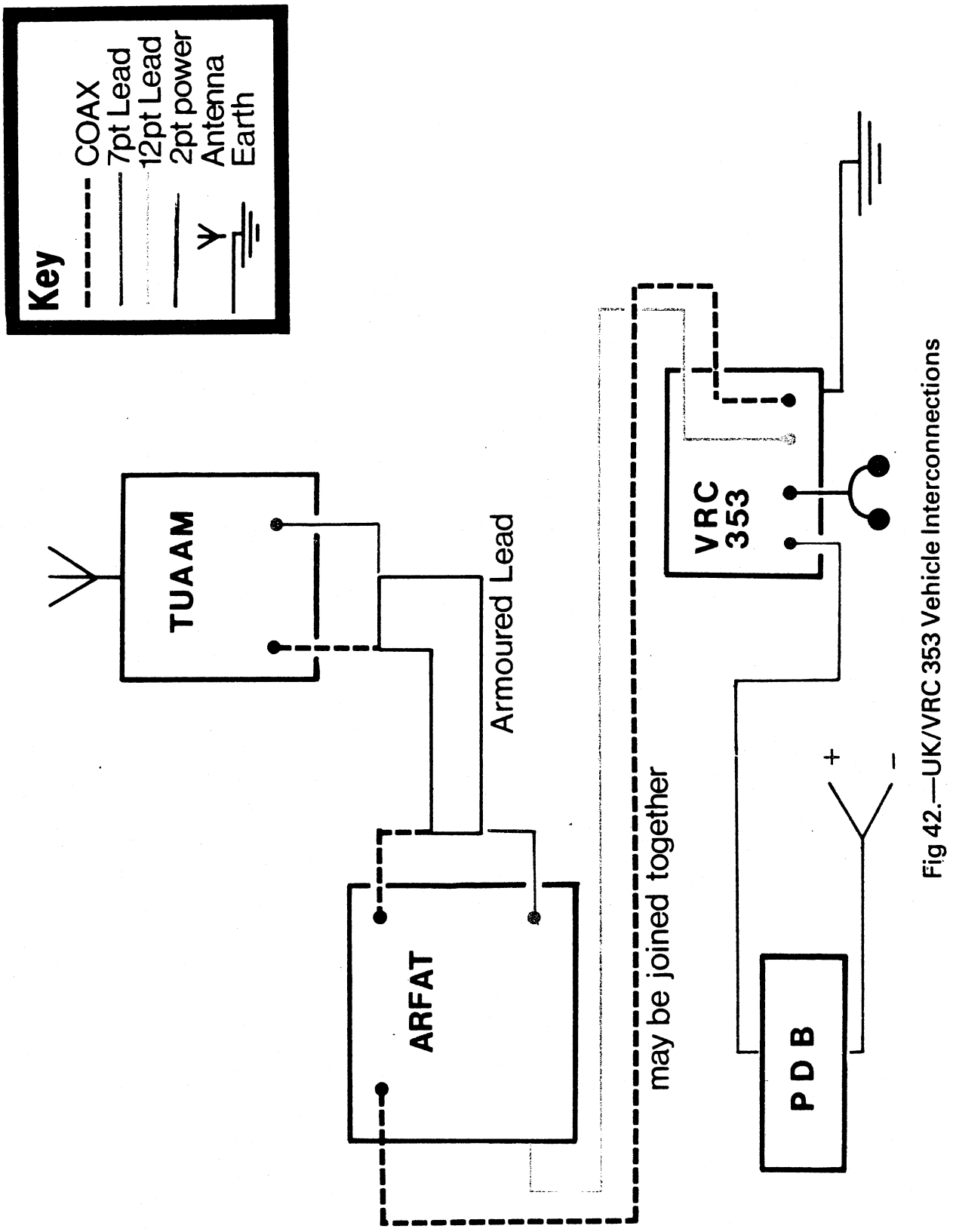


Fig 42.—UK/VRC 353 Vehicle Interconnections

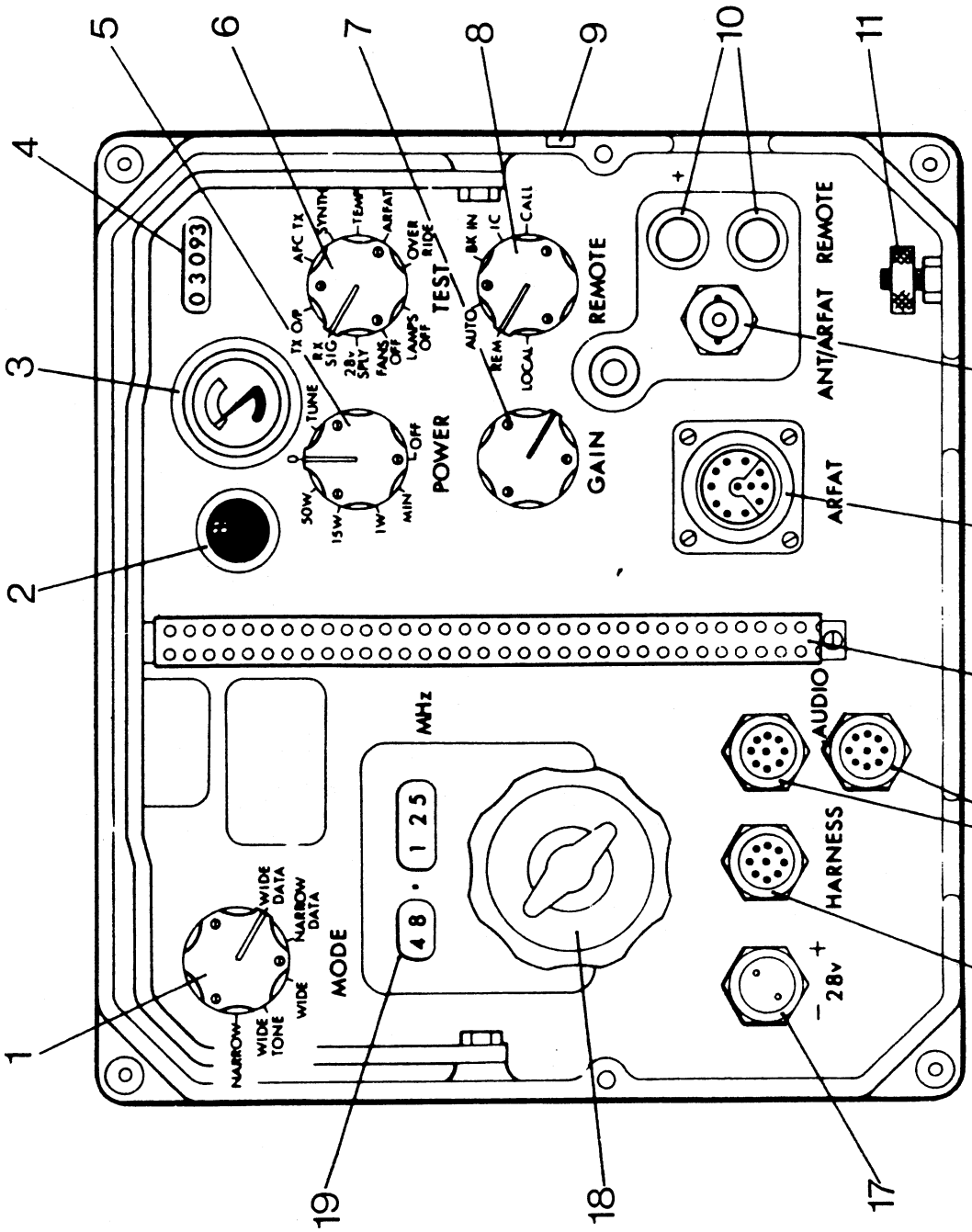


Fig 43.—UK/VRC 353 Controls and Connections

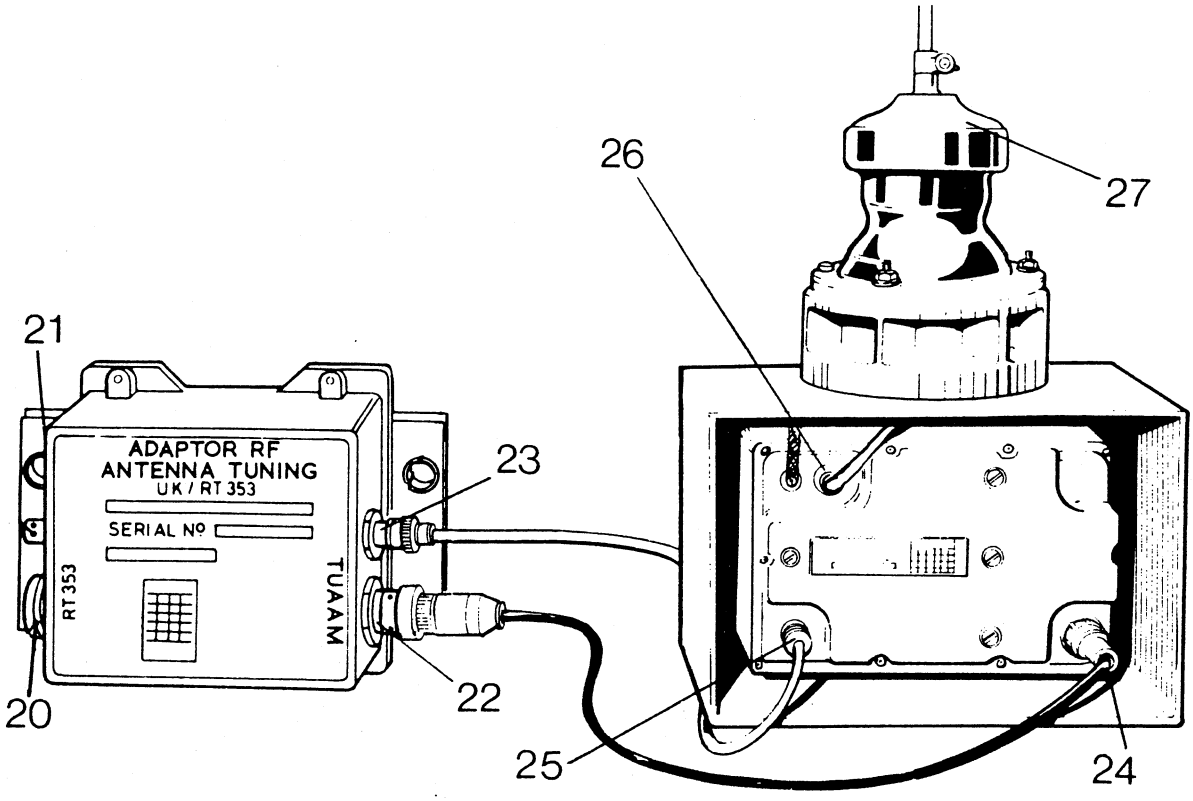


Fig 44.—ARFAT and TUAAM Connections

SECTION 9 – UK/PRC 320

Introduction

02111. The UK/PRC 320 is a lightweight HF manpack radio which can be used as a ground or vehicle station.

Data

02112. ***Frequency Range*** 2 to 29.999 MHz
Channel 280,000 at 100 Hz
Power Supply 3.3 AHC Secondary Battery *(Battery life approx 12 hrs)* 1·1 AHC
~~1 AHC~~ Secondary Battery *(with hand generator)*
2 × 12V 75 AHC secondary batteries *(using external supply cable)*
Antennas 2.4m Whip
7.9m Vertical
Endfed Antennas
Dipole Antenna
2m Rod vehicle antenna

Ranges

Antenna	Range in km
2.4m Whip	Up to 20km
7.9m Vertical	30km
Endfed Antennas	Dependant on Type
Dipole	300km+
2m Rod Vehicle Rod	Up to 30km

Weight and Dimensions

	Height	***Width***	***Depth***	***Weight***
PRC 320	390mm	250mm	120mm	5.0kg
3.3 AHC Bty	130mm	180mm	70mm	3.4kg
Frame and Plate	450mm	440mm	40mm	2.4kg

Facilities Voice – AM, SSB
CW – Narrow, Wide
Battery Check
Can be vehicle mounted
Frequency check
HP and LP

Description *(Fig 45 shows PRC 320 in carrying position and morse operating).*

02113. ***PRC 320 controls and Antenna Connections.***

Ref Fig 46	Controls
A	**METER** **a.** When set on 'BATT CHK' meter indicates battery state. **b.** Tune antenna to maximum reading.
E	**FREQUENCY RANGE SWITCH** For selecting required frequency band.
J	**FREQUENCY SWITCHES** Six decade switches for selecting frequency.
H	**POWER SWITCH** A 5 position switch: OFF – all power disconnected AWT – antenna tuning position LP – low power HP – high power Batt Chk – in this position reading in meter will give battery state. A fully charged battery will register over second mark on scale with pressel switch depressed.
G	**GAIN** Normal volume control
F	**SYSTEM SWITCH** *(Mode select)* A 5 position switch AM – for use with older equipment CW(W) – for use with older equipment SSB – normal CLANSMAN working CW(N) – normal CLANSMAN working FREQ CHK
C	**ANTENNA TUNE**
D	**ATU RANGE SWITCH** Used in conjunction with loading chart on set
B	**ATU LOAD SWITCH** Used in conjunction with loading chart on set

Ref Fig 46	Antenna Connections
K	**EARTH POINT**
L	**ANTENNA COUPLING CLUSTER**
M	**COAXIAL LINK** *(Rear of set)* For connecting transmitter/receiver to ATU

Setting Up and Operating.

02114. ***Setting up.***

a. Ensure set is off.

b. Connect battery.

c. Connect antenna.

d. Connect AF gear.

Note: If an endfed or whip antenna is used the Coaxial LINK must be fitted. *(See Fig 46)*

If a dipole antenna is used disconnect Coaxial LINK and connect coax to T/R socket.

02115. ***Frequency Setting.***

a. Select frequency band on Frequency Range Switch.

b. Turn Frequency Selection Switches (FSS).

c. Until required frequency is lined up.

02116. ***Switching On.***

a. Select required mode (AM, CW(W), SSB, CW(N)) (6).

b. Set power switch (4) to BATT CHK, press pressel and check battery reading (second mark on sale or above).

c. Set power switch to ANT.

d. Select range and loading combination on ATU.

e. Press pressel switch/morse key and tune for maximum deflection in meter (select lowest number if two settings give the same reading).

f. Set power switch to LP or HP.

02117. ***Testing.***

a. ~~Select the frequency of a known station and receive a signal *(6.090 MHz in the European area gives Radio Luxembourg)*~~

5·975 (WORLD SERVICE

b. Using Flow Charts (**Annex F**) carry out tests as required.

c. The set is now ready for use.

02118. ***Vehicle Station.*** *(See Fig 47 and 49.)* The UK/PRC 320 can be clipped into vehicles and operated on the move using the HF Antenna pod on the vehicle and ancillary equipment.

a. Clamp UK/PRC 320 onto Frame Electrical Equipment.

b. Connect cable from DCCU to charging socket on 3.3 AHC battery.

c. Erect 2m rod antenna and fit into vehicle antenna pod.

d. Connect antenna to set *(ensuring the P11 cable length is 18 inches maximum, and that the cable is properly insulated using insulating bushes).*

e. The set is now ready for use.

02119. ***Remote Operating.*** *(See Fig 49.)* Remote operation can be set up using the CRSL/R and RCU.

a. Set up radio as normal.

b. Connect CRSL/R to audio socket on set using 7 point provided.

c. Connect RCU to the CRSL/R using D10 cable *(up to 3km).*

d. Connect AF gear and morse key to RCU.

02120. The facilities provided by the CRSL/R in each position are as follows:

a. ***'LOCAL'*** – The radio is controlled by the local operator's pressel switch. Both operators hear the receive signal and transmitter sidetone.

b. ***'REM'*** – The radio is controlled by the remote operator's pressel switch. Local operator can override remote operator by operating his pressel. Both operators hear receive signal and transmitting sidetone.

c. ***'I/C'*** – Intercommunication between both operators on operation of their respective pressels. Both operators hear receive signal superimposed on their intercommunication.

d. ***'CALL'*** – Local operator calls remote by tone. Switch spring loaded return to I/C position. Remote operator can call local operator in any position of CRSL/R function switch by depressing call button on handset.

02121. The facilities provided by the RCU being used in conjunction with the CRSL/R are as follows:

a. If the D10 cable has been connected to the 'LINE A' terminals, set the selector switch to 'A'. If the cable has been connected to the 'LINE B' terminals, set the switch to 'B'.

b. Set the function switch to 'MORSE'. The equipment is now ready for operation in the CW mode and can be controlled from either the local or

the remote position by means of the CRSL/R function switch, as previously prescribed. When working the equipment set the WORKING control to obtain the required volume in the remote handset or headset. To call the operator on local, turn the function switch to the spring loaded 'CALL' position.

c. If required, the RCU can be operated in the speech mode by setting the function switch to 'VOICE' and the UK/PRC 320 to 'SSB' or 'AM'.

General Information

02122. ***Frequency Check.*** If frequency instability is suspected, the operator can check frequency accuracy by using the frequency check facility.

a. Set the frequency to that of a check station transmitting CW only so that pure tone is heard in the headset.

b. Set mode selector to FREQ CHK, and listen to the 2 tones now present.

c. If the tones fluctuate slowly the frequency accuracy is satisfactory.

d. If a rapid warble is heard the frequency is off tune and equipment requires workshop attention. *(Worldwide frequencies are 5.00, 10.00 and 15.00 MHz.)*

02123. ***Earthing.*** The set should be earthed at all times to obtain maximum performance. A solar shield is provided to protect the radio from direct radiation by the sun. No harm is done if the shield is left fitted to the radio when it is not needed.

02124.–02125. *Reserved.*

Morse Operating

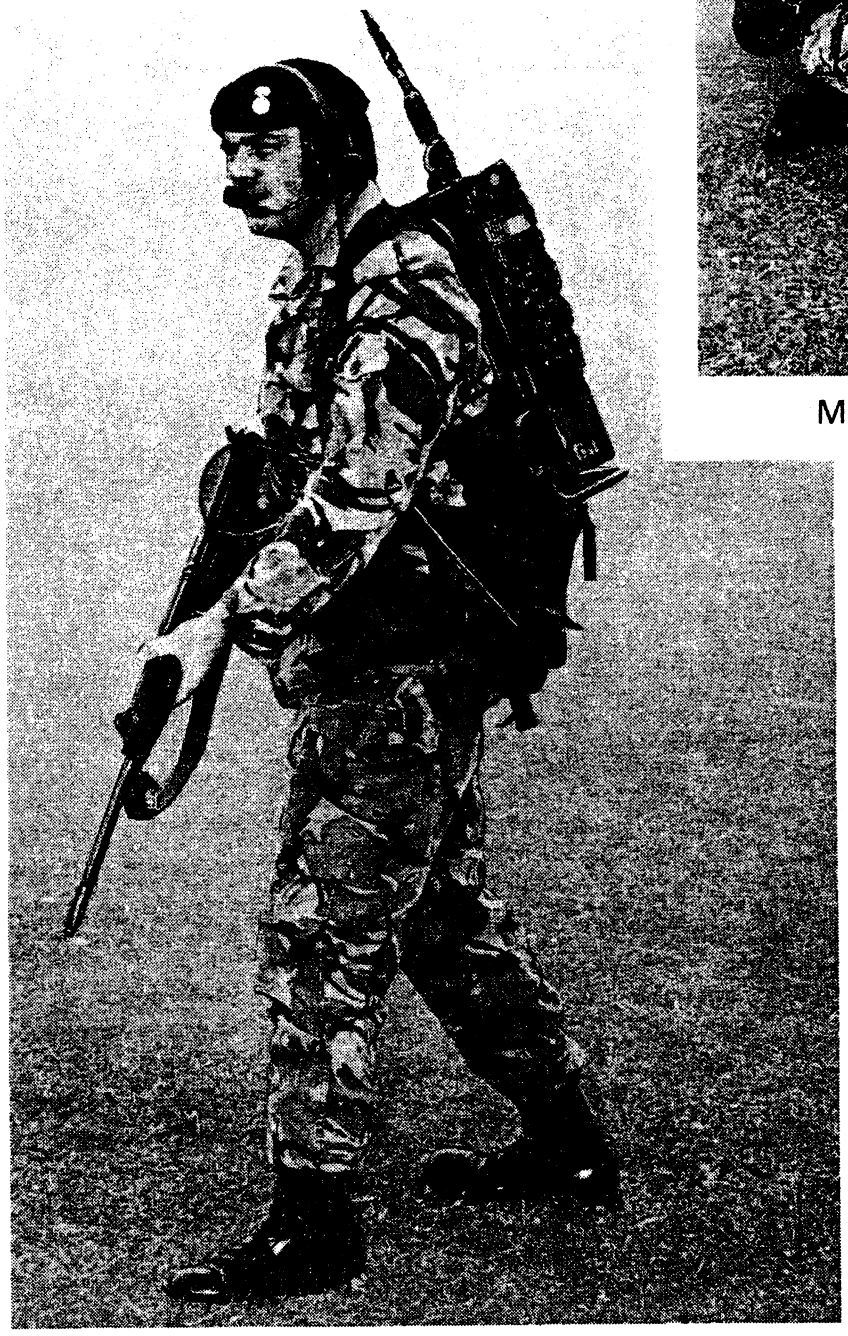
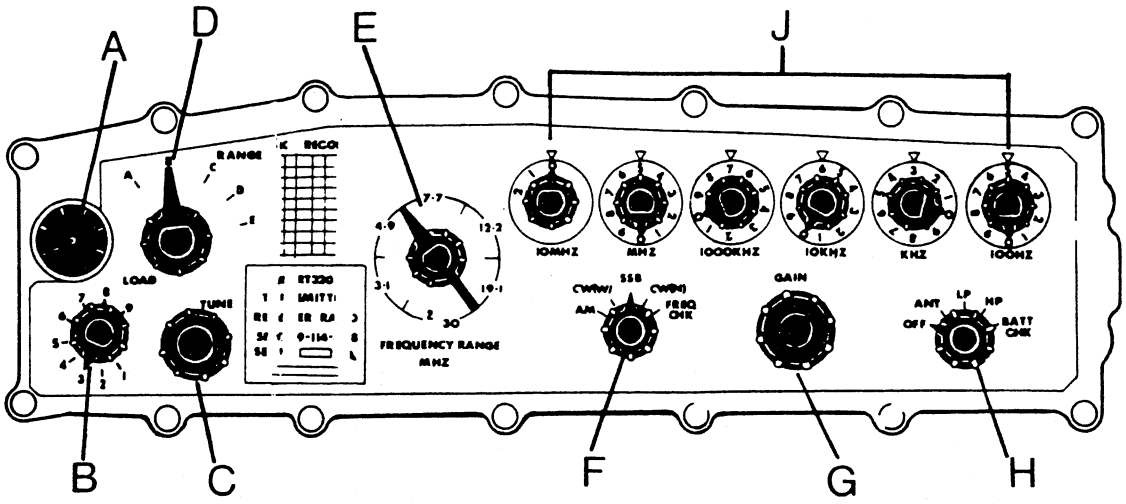


Fig 45.—UK/PRC 320 Carrying position



Key

A	Meter	E	Frequency Range Switch
B	Load Switch	F	Mode Switch
C	Tune Control	G	Gain Control
D	Range Switch	H	Power Switch
		J	Decade Switches

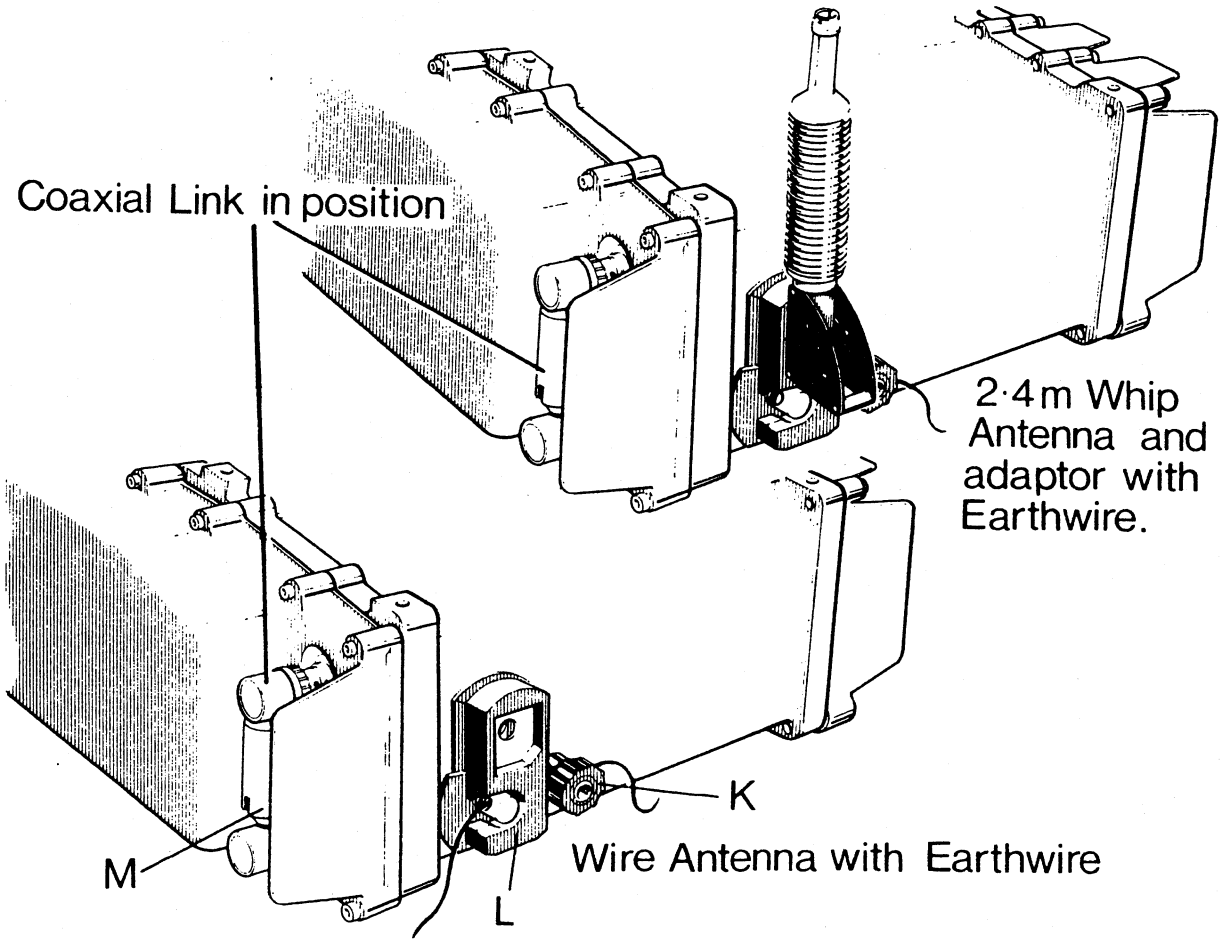


Fig 46.—UK/PRC 320 Controls and Connections

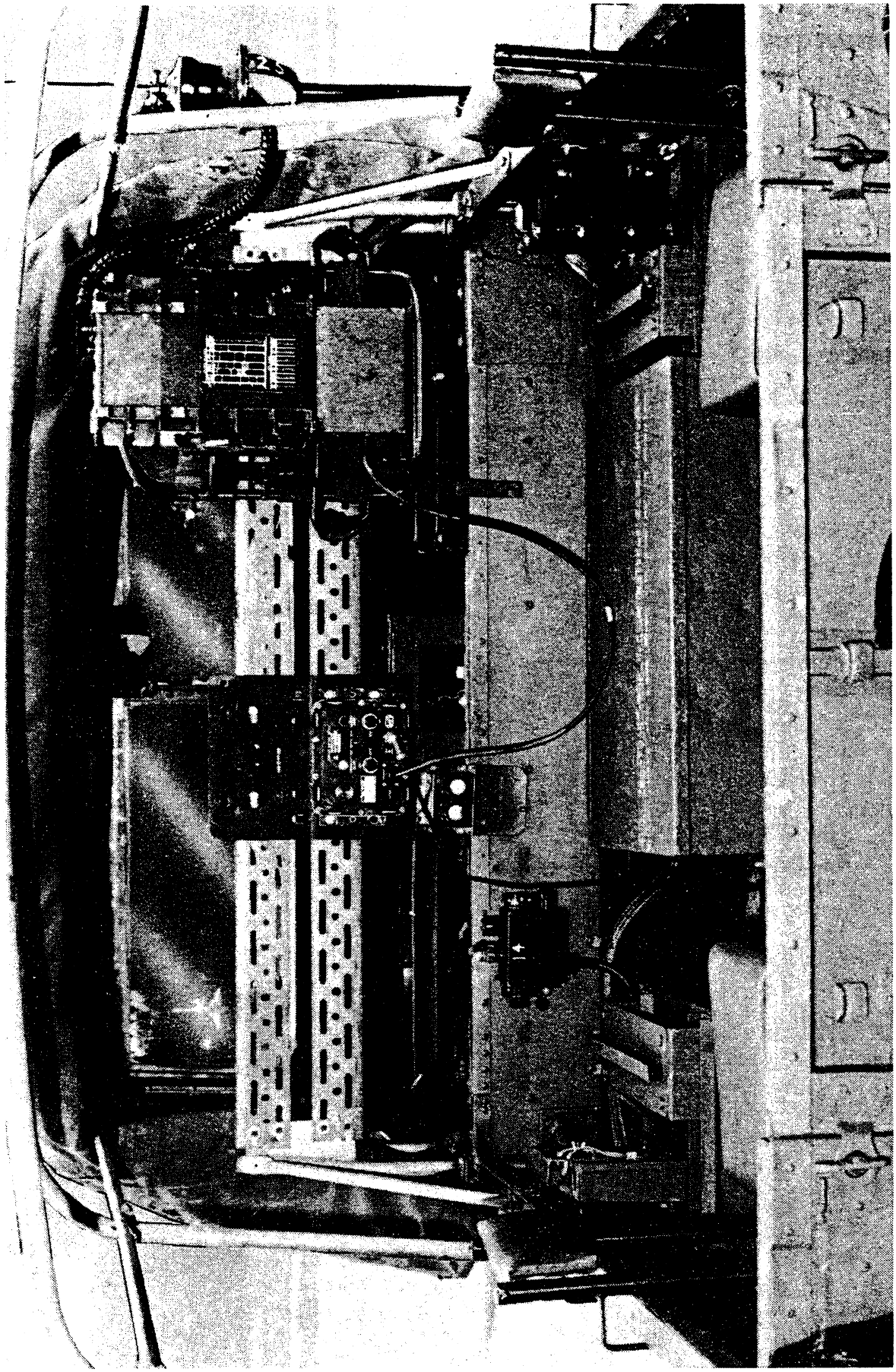


Fig 47.—UK/PRC 320 Vehicle Station

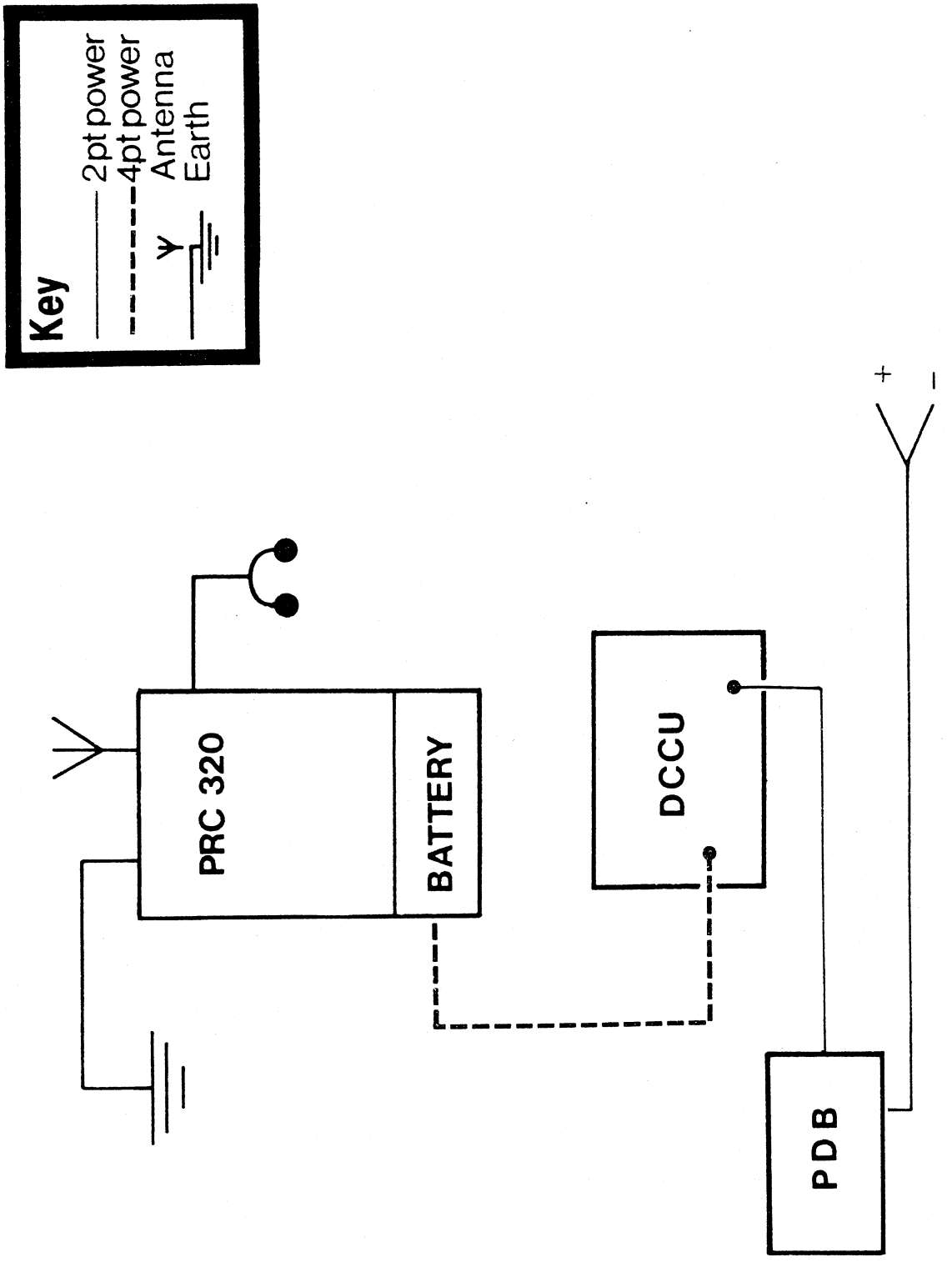


Fig 48.—UK/PRC 320 Vehicle Interconnections

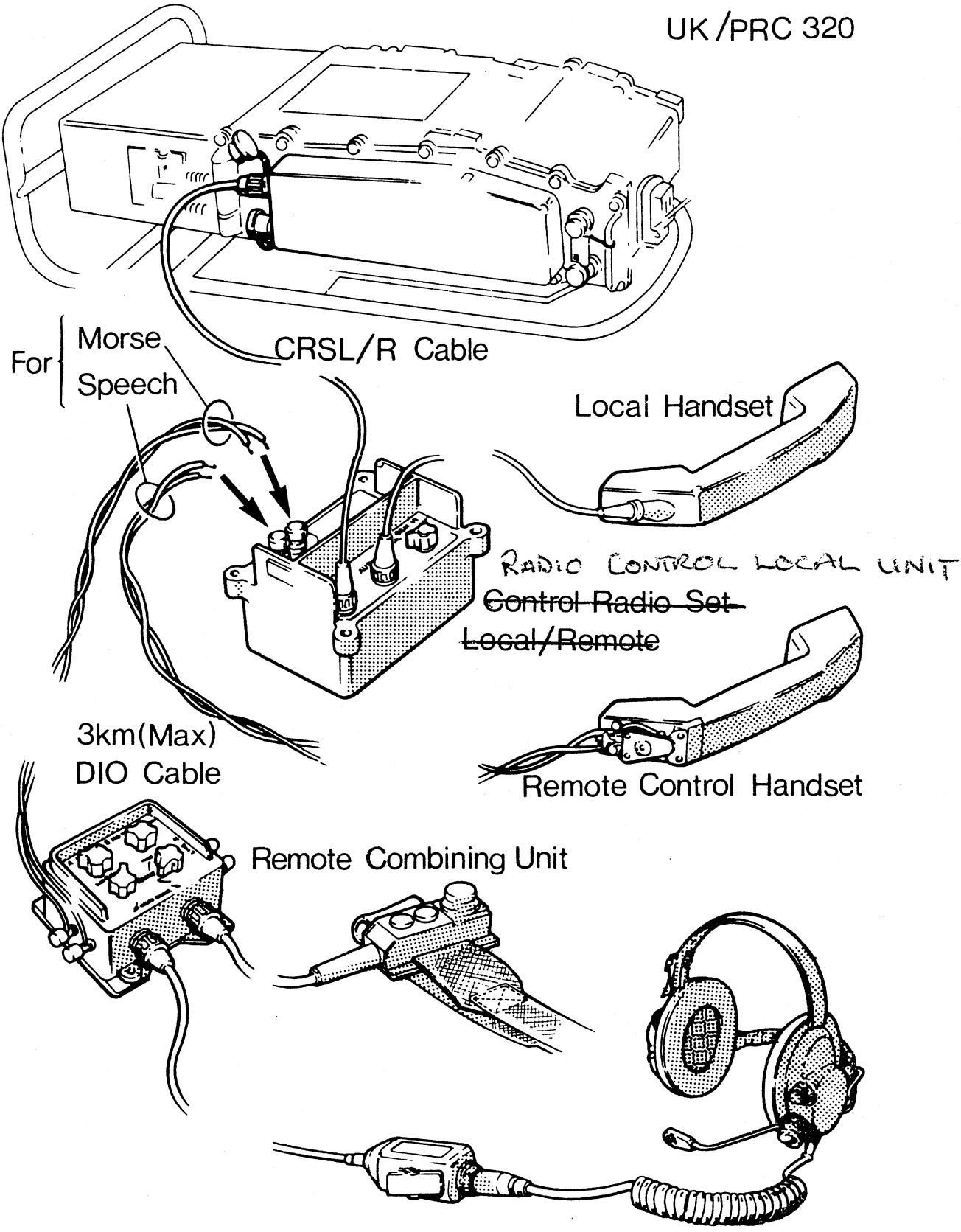


Fig 49.—UK/PRC 320 Remote Operating

SECTION 10 – UK/VRC 321

Introduction

02126. The UK/VRC 321 is a vehicle borne HF transmitter/receiver for use by all arms of the Army.

Data

02127.

Frequency Range	1.5 to 29.9999 MHz
Channels	285,000 at 100 Hz
Power Supply	2 × 12V 100 AHC Batteries AC Power Supply Unit *(The set will accept voltages between 20–30 Volt)*
Antennas	3 or 4m Rod Antenna Endfed Antenna Dipole Antenna
Ranges	Ground Wave 50km Sky Wave >1000km

Weight and Dimensions

	Height	***Width***	***Depth***	***Weight***
VRC 321	215	230	355	23kg
SURF 25W	215	150	355	10kg
TURF 25W	215	140	280	9kg
AC PSU	215	305	355	35kg

Facilities

Voice – AM, SSB, DSB
CW – Narrow, Wide
RATT using ATR
Intercom and call
Remote operation
HP and LP

Description

02128. ***Controls and Connections.***

<table>
<tr><th>Fig 50
Ref</th><th>Controls and Connections</th></tr>
<tr><td>1</td><td>10A FUSE and spare</td></tr>
<tr><td>2</td><td>28V CHECK pushbutton
When depressed, Meter (4) reads supply volts, (overriding any position of OFF-LP-HP-TUNE Switch).</td></tr>
<tr><td>3</td><td>OFF-LP-HP-TUNE Switch
OFF Equipment switched off
LP Low power transmit – or receive with pressel
HP High power transmit – released
TUNE LP CW transmit, with pressel operated, to enable tuning of SURF 25-W and TURF 25-W. Interrupted audio tone in headset</td></tr>
<tr><td>4</td><td>METER
<table>
<tr><th></th><th colspan="2">METER INDICATION</th></tr>
<tr><th>OFF-LP-HF-TUNE Switch position</th><th>Pressel Operated (Transmit)</th><th>Pressel Released (Receive)</th></tr>
<tr><td>LP</td><td>Forward minus</td><td></td></tr>
<tr><td>HP</td><td>Reflected power</td><td>Signal Strength</td></tr>
<tr><td>*TUNE</td><td>Reflected power</td><td></td></tr>
</table></td></tr>
<tr><td>5</td><td>Frequency Setting Switches – MHz, 100 kHz, 10 kHz, 1 kHz, 100 Hz</td></tr>
<tr><td>6</td><td>GAIN control
Adjusts loudness of received signal and sidetone at LOCAL headset</td></tr>
<tr><td>7</td><td>REMOTE Terminals
Remote connection of Remote Handset, Remote Combining Unit, Remote Personal Unit, IB-2, VRC 321, ATR or PRC 320 and CRSL/R using up to 3Km of D10 cable.</td></tr>
</table>

Fig 50 Ref	Controls and Connections
8	**REMOTE Switch** LOCAL — Radio can be used only from headset or handset plugged into AUDIO sockets on front panel. RX ONLY — Used when the radio is the RECEIVE station in a duplex arrangement and the TRANSMITTER Is connected via the remote terminals. Operating the local pressel puts the remote transmitter to transmit, speaking into the local microphone modulates the remote transmitter. REMOTE — Radio used through remote terminals or through CLANSMAN Harness. IC — Intercommunication with remote operator, no transmission over the radio. Received signal heard by local operator. CALL — Spring loaded position. Calls remote operator.
9	**RF** Coaxial connector for cable to either SURF 25-W or TURF 25-W.
10	**HARNESS** Cable Assembly to Control Harness when used.
11	**CONTROL** Cable Assembly to AMP RF 250-W when used.
12	**Mode Switch** AM — Voice – amplitude modulation CW(W) — Wideband CW SSB — Voice – single sideband (USB) or RATT CW(N) — Narrowband CW
13	**28V** Two pin plug for 28 volt DC supply connection.
14	**Earth Terminal**
15	**AUDIO** Pair of sockets for Headset, Handset, Morse Key or ATR connection.
16	**D10 cable stripper** For stripping insulation from D10 field cable before connecting to remote terminals

Fig 50 Ref	Controls and Connections
17	**ETI** *(Elapsed Time Indicator)* An electrochemical device showing total operating time of VRC 321. It is important that the positive terminal of the ETI is connected to the red cap., **DO NOT REMOVE.**

Note.** ***TUNE. With the meter switch in this position, the meter scale is reversed. Therefore a high reading indicates a low reflected power.

02129. ***TURF 25-W***

Fig 51 Ref	Controls and Connections
1	**Tuning Data Disc** A rotatable disc giving tuning data for the 4 × 1 metre whip. Rotate to show the frequency nearest to the frequency of operation. Read across for TUNE, MATCH and SELECT settings.
2	**RF Coaxial (BNC) socket** For cable to VRC 321 or SURF 25-W where used.
3	**MATCH** A 2 turn continuously variable control set in accordance with tuning data and operating instructions. Reads from 10 to 29.
4	**LOCK** Locks TUNE and MATCH controls to prevent accidental movement when set up for operation.
5	**TUNE** A multi-turn control with a retractable quick wind handle. Position indicated by figures 00 to 99 behind a panel window. Set in accordance with tuning data and operating instructions.
6	**Meter** Indicator for tuning when VRC 321 is on TUNE, and for RF output power when VRC 321 is on LP or HP transmit.

Fig 51 Ref	Controls and Connections
7	**ANTENNA COAX-FED** Coaxial connector for cable to a dipole or other coaxially fed antenna.
8	**SELECT** A 6 position switch set in accordance with tuning data. Positions A-E for antenna connected to the rear terminal. Position F for coaxial fed antennas connected to ANTENNA COAX FED socket.

02130. ***SURF 25W***

Fig 51 Ref	Controls and Connections
1	**RANGE MHz** Selects range covering frequency in use. The DIR position connects the VRC 321 directly to the TURF 25-W.
2	**TURF/ARF** Coaxial (BNC) socket for connection to TURF 25-W.
3	**OPERATE AND LOCK – TUNE Switch** TUNE — Allows movement of TUNE Control (4) OPERATE AND LOCK — TUNE control locked.
4	**TUNE** Tune to operating frequency using VRC 321 meter.
5	~~**VRC 321**~~ R.T. Coaxial (BNC) socket for connection to VRC 321.
6	**Earth Terminal.**

02131. ***Notes on SURF 25-W***

a. Due to the sharp electrical characteristics of the SURF 25-W it is important that care be taken when tuning.

b. Frequency separation between HF/HF should not be less than 10%–15%.

c. Two VRC 321 co-located on different frequencies and in separate vehicles should ideally be not less than 15 metres apart and have a 10% frequency separation.

d. All HF/HF installations must have a SURF 25-W with each set.

Setting Up and Operating

02132. ***Setting Up.***

a. Earth set and check it is switched off.

b. Connect power cable to set.

c. Select required mode.

d. Select Local or Remote Switch.

e. Connect AF gear.

f. Connect TURF to set using Coax lead.

g. Connect antenna or antenna base to TURF.

02133. ***Frequency Setting.***

a. Depress 28V check push button and using meter ensure correct voltage is applied to set.

b. Switch power switch to LP.

c. Select required frequency on the frequency setting switches. The set is tuned when the unready tone ceases.

d. Set power switch to TUNE, this enables the SURF 25W/TURF 25W to be tuned.

02134. ***Tuning TURF 25W (See Fig 51).***

a. For 4 × 1m rod antenna rotate the tuning data disc to read the frequency nearest the one in use. Read across for tune and match numbers, select letter and set controls accordingly *(for other antennas use Data Chart on TURF).*

b. Press pressel switch and adjust TUNE control first and the MATCH control for maximum readings. Continue to adjust both controls alternatively until meter reading has reached its highest point.

c. The set is now ready to operate.

02135. ***SURF 25W (See Fig 51).*** If the SURF 25W is in use it is fitted between the TURF and the set.

02136. ***Tuning SURF 25W.***

a. Set range switch to frequency.

b. Switch locking switch to tune.

c. Press pressel switch and set TUNE control for maximum reading on the SET meter.

d. Release pressel and switch locking switch to operate.

Operation with CLANSMAN Radio Control Harness

02137. Tune the VRC 321, SURF 25-W and TURF 25-W as previously instructed with the following differences:

a. Connect headset to the appropriate harness box.

b. Switch the remote switch to REMOTE.

c. The loudness of received signal and sidetone are now adjusted by means of the gain control on the harness box.

Remote Operation

02138. Facilities are provided for transmission or reception of Voice, CW or RTT traffic from a point up to 3Km from the VRC 321 using D10 field cable.

02139. Operation of the remote transmitter in a duplex station is also possible over the same distance.

02140. Local and remote operators have CALL and intercommunication (IC) facilities as well as the ability to transmit and receive.

02141. ***Tuning and Matching during Radio Silence.***

a. Switch to RX only and SSB.

b. Set up set as normal but do not tune antenna.

c. Rotate tuning data disc on TURF to nearest frequency, then read and set controls accordingly.

d. Adjust appropriate gain control so that received signals can be heard on low volume.

e. Adjust TURF 25W TUNE control for maximum volume of received signals.

f. Lock controls and select required mode.

g. The set is now ready to Receive.

General Information

02142. ***Antenna Counterpoise.*** An antenna counterpoise can be used to provide an artificial earth for surface wave antennas on ground of poor conductivity. *(If in doubt use the counterpoise; its use will never reduce the performance of the radio.)*

02143. ***Remote Antennas.***

a. The TURF-25W and antennas may be used up to 100m from the VRC-321. The coaxial cable is made up from standard 20m lengths each of which is terminated with Type C plugs and sockets. A 3m length of coaxial cable is connected at each end to adapt to the BNC connections on the VRC-321 and TURF 25-W.

b. The tuning of the remote TURF is the same as for the standard station except that the VRC-321 is switched to REMOTE and is controlled from the TURF 25-W position by a Remote Handset, Remote Personal Unit or Remote Combining Unit with headset connected via D10 cable to the REMOTE terminals on the VRC-321.

c. When the TURF has been tuned, switch the VRC-321 to LP or HP as required and to LOCAL if necessary.

02144. ***Vehicle Installation.*** When installing the UK/VRC-321, TURF 25-W and SURF 25-W the following notes should be observed:

a. The installation must be earthed to the vehicle. This connection is taken from the rear of the TURF 25-W to a point as close as possible to the antenna base.

b. Care should be taken to ensure that the earth lead from rear of TURF 25-W is clear of the antenna terminal and lead. Use alternative earth terminal if necessary.

c. Insulating bushes should be fitted to the antenna lead.

d. Other Unit Earths are normally taken to the terminal at the centre front of the radio table.

02145. ***Testing. (See Annex G).***

02146.–02149. *Reserved.*

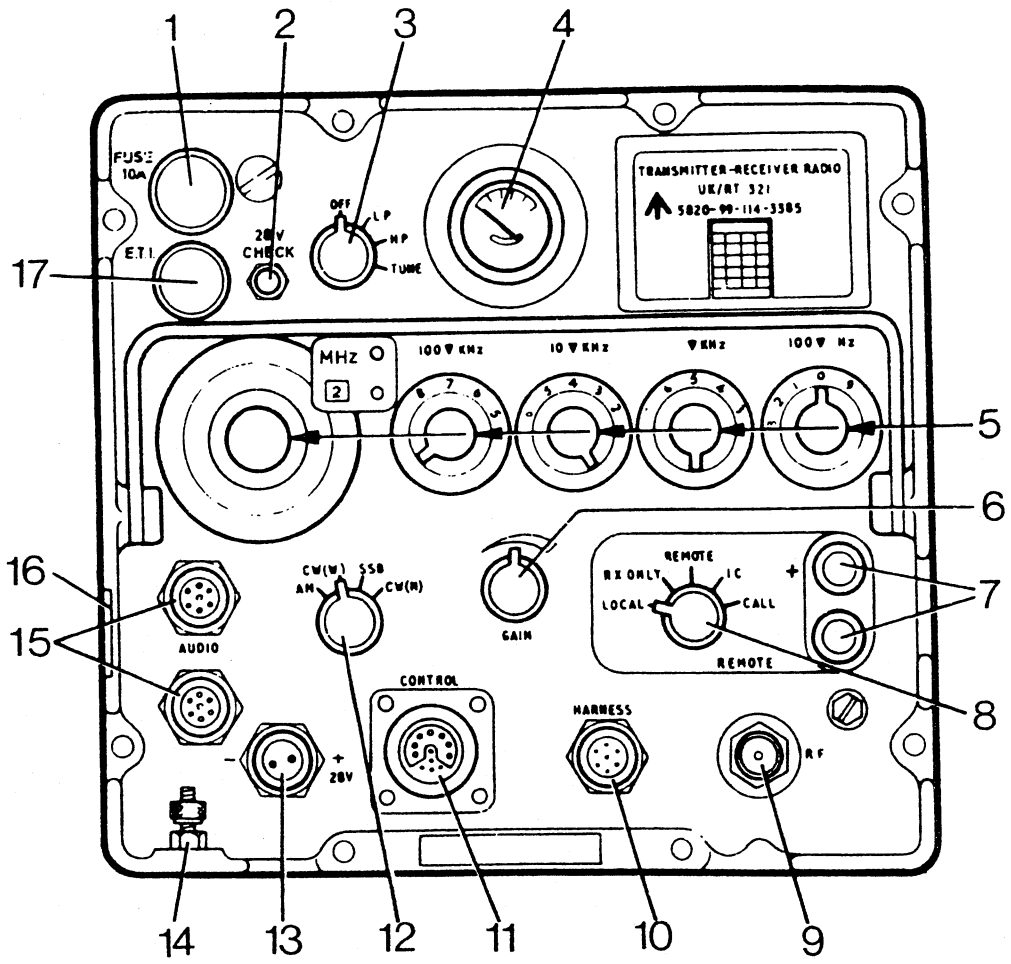


Fig 50.—UK/VRC 321 Controls and Connections

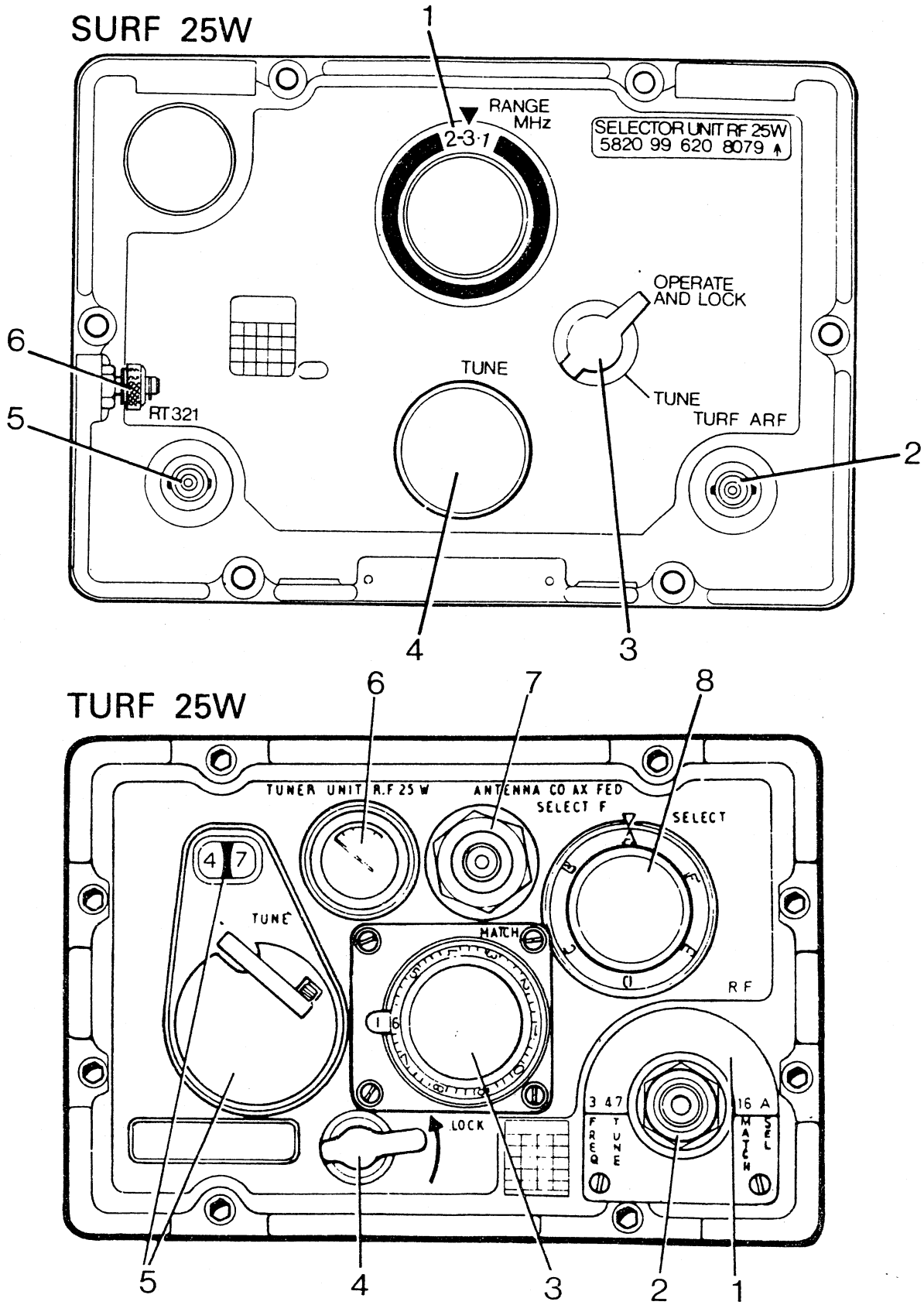


Fig 51.—SURF 25 Watt and TURF 25 Watt

SECTION 11 – UK/PRC 316

Introduction

02150. The PRC 316 (formerly designated the SR A16) is a lightweight HF patrol radio. *(See Fig 52.)*

a. It is a small, compact transmitter/receiver, designed primarily for use when halted within parachute battalions in the air assault role or on long range patrols particularly within jungle conditions.

b. It is not intended for use in very cold conditions, at temperatures of lower than minus 10°C. It was originally part of the LARKSPUR range of sets (SR A16) but has been given a CLANSMAN number *(PRC 316)* although not a part of the CLANSMAN range.

02151. This radio has been designed to meet the need for a simple transmitter/receiver capable of providing 'CW' communications between distant stations, and voice communication over shorter distances.

Data

02152. ***Weights***

a.	Radio	2.2kg
b.	Battery (Mallory)	2.2kg
c.	Antenna	1.0kg
d.	Headgear Type (A)	0.2kg
e.	Headgear Type (B)	0.5kg

02153. ***Facilities.*** Although primarily a 'CW' set, it will also give short range, double side-band 'AM' voice communications.

02154. ***Frequencies. (Fig 53.)***

a. There are 9, switched, crystal-controlled basic frequencies in the 2–7 MHz band.

b. Each of these frequencies may be varied using the offset frequency switch. This switch will give us 2 frequencies above, and 2 frequencies below, the basic frequency, thus providing a total of 9 times 5 equalling 45 channels.

02155. ***Power Supply.*** There are 4 main sources of power:

a. The Mallory primary battery which plugs into the set.

b. The Lechlanche primary battery which plugs into the set.

~~**c.** The SR A13 battery using the SR A13 connector special purpose~~

c. Any convenient 12 volt DC supply through an adaptor plug and external lead.

02156. ***Ranges.*** On 'CW' a range of hundreds of kilometres may be achieved by day and night. This applies to voice also, but voice is primarily for short range communication, as for example to support aircraft.

02157. ***Power Output.*** Four watts peak on both key and voice.

02158. ***Ancillaries.***

a. *Antenna (See Fig 54).* A dipole antenna is provided which is adjustable in length to suit the frequency in use. The halves of the dipole, both of which have a throwing cord and are wound on a reel, are secured direct to the terminals of the radio. The use of insulated wire allows the antenna to function when draped over wet vegetation.

b. *SR A13 Antenna Items.* The radio is also provided with a 50 Ohm co-axial socket to allow its use with the SR A13 antenna items. Therefore it can be used as mobile groundwave station with the SR A13 TRFA and rod antenna.

c. *Headgear.* Two types of headgear are provided:

(1) A single unit microphone/receiver with a pressel switch, which may be worn as a receiver for key operations or slung round the neck for voice operation.

(2) A conventional double receiver/boom microphone assembly.

Description (See Fig 55)

02159. ***The radio consists of 3 units:***

a. A moulded plastic case which houses the controls, receiver circuits and those circuits that are common to both the receiver and transmitter.

b. A cast alloy case housing the transmitter and antenna connections.

c. An alloy battery housing to which **a.** and **b.** are secured.

02160. The radio is sealed and can be used in the temperature range −10°C to +55°C.

02161. It can be transported in unpressurized aircraft at altitudes of up to 3050m.

02162. ***Setting Up***

a. Connect battery.

b. Remove antenna reels, set to correct length, erect and connect. *(See Figs 56 and 57.)*

c. Plug in headgear.

02163. ***Receive.***

a. Switch to either key, battery or voice.

b. Loud signals or receiver hiss should be heard in the headgear.

c. If not:

(1) Check battery.

(2) Check antenna connections.

(3) Check 'GAIN' control.

(4) Check 'TUNE' control.

(5) Replace headgear.

(6) Replace set.

NOTE: The key position will give narrow bandwidth reception. The battery will give wideband reception.

02164. ***AF Gear.***

a. *Depress key.* Meter *(see Fig 55)* shows antenna current, sidetone heard in headgear.

b. *If not:*

(1) Check battery.

(2) Check antenna connection.

(3) Check 'TUNE' control.

(4) Check antenna is correct length and raised above the ground.

(5) Replace headgear.

(6) Replace set.

02165. ***Tuning.***

a. Switch to required system, i.e. key, battery or voice.

b. Set the basic channel switch to the required frequency.

c. If required, set the Offset switch to the required position.

d. Adjust 'PEAK NOISE' switch for the maximum noise in the headgear. The 'GAIN' control should be set so that the noise is just audible.

e. Adjust the 'GAIN' control for loudness and clarity of signal.

f. Operate as normal.

02166.–02170. *Reserved.*

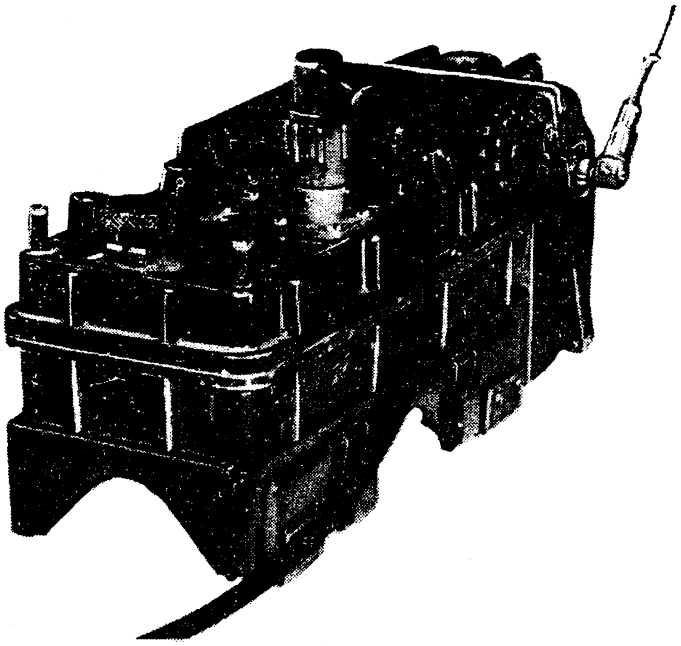


Fig 52.—UK/PRC 316

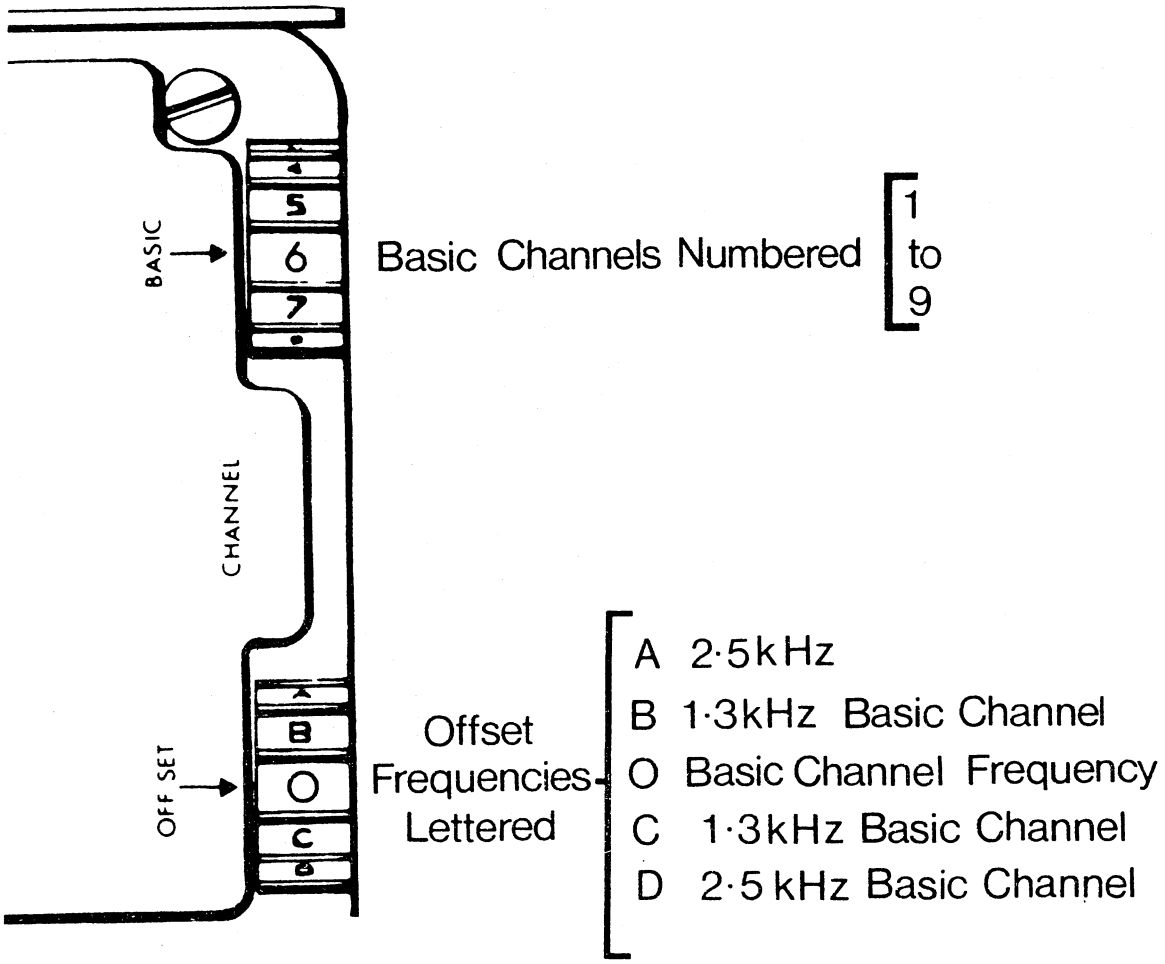


Fig 53.—UK/PRC 316 Frequency Selection

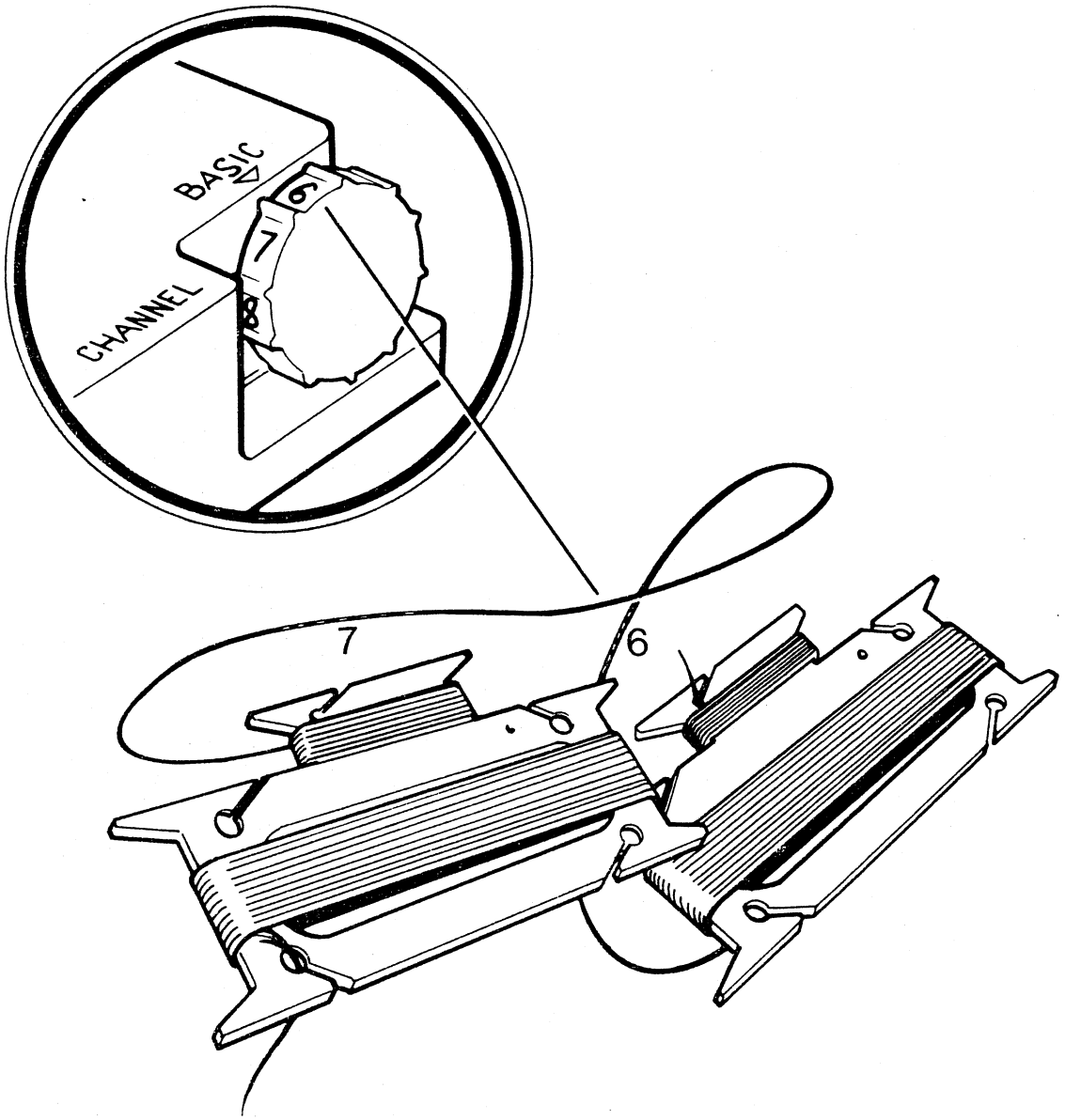
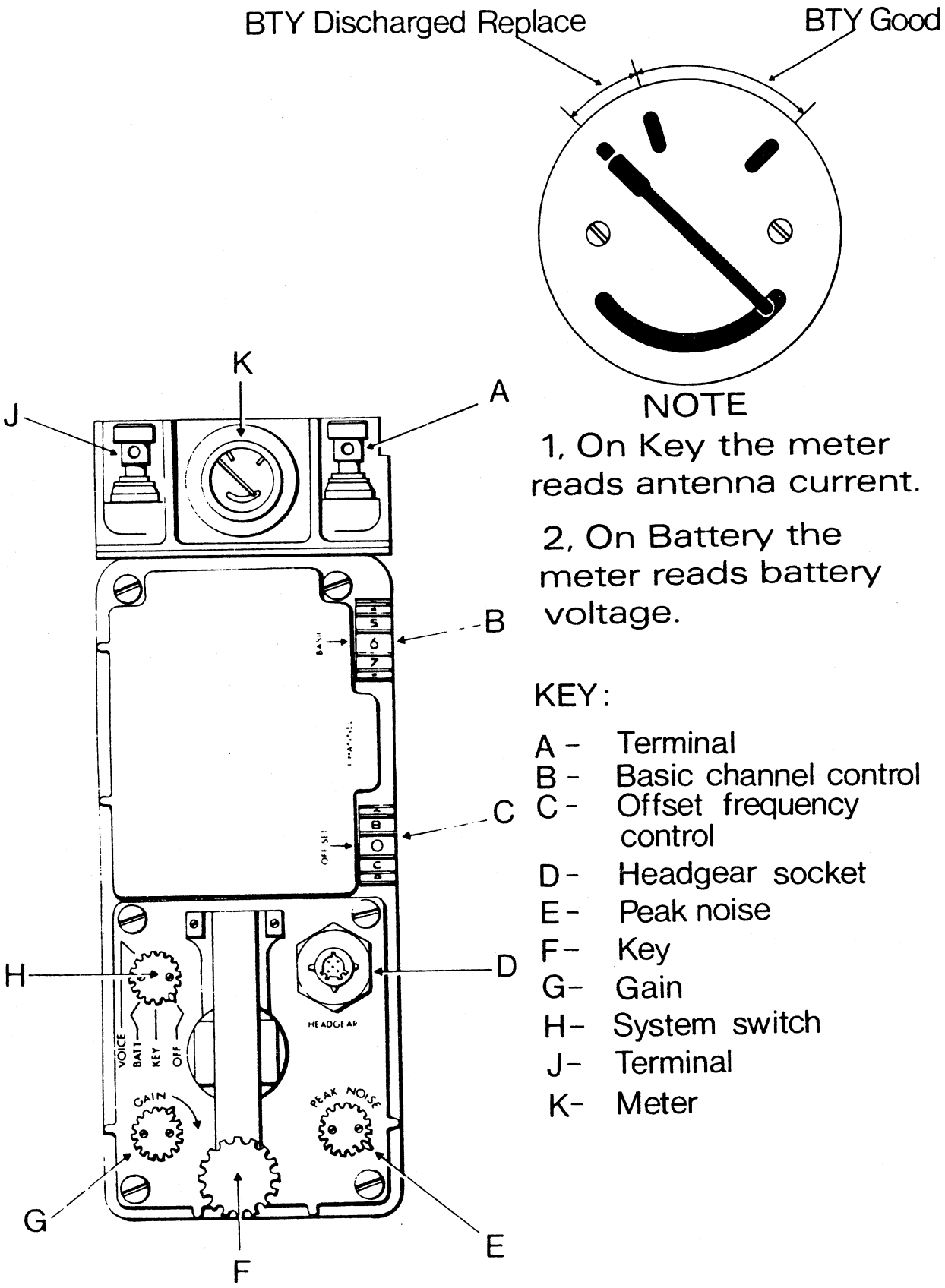


Fig 54.—UK/PRC 316 Antenna



NOTE

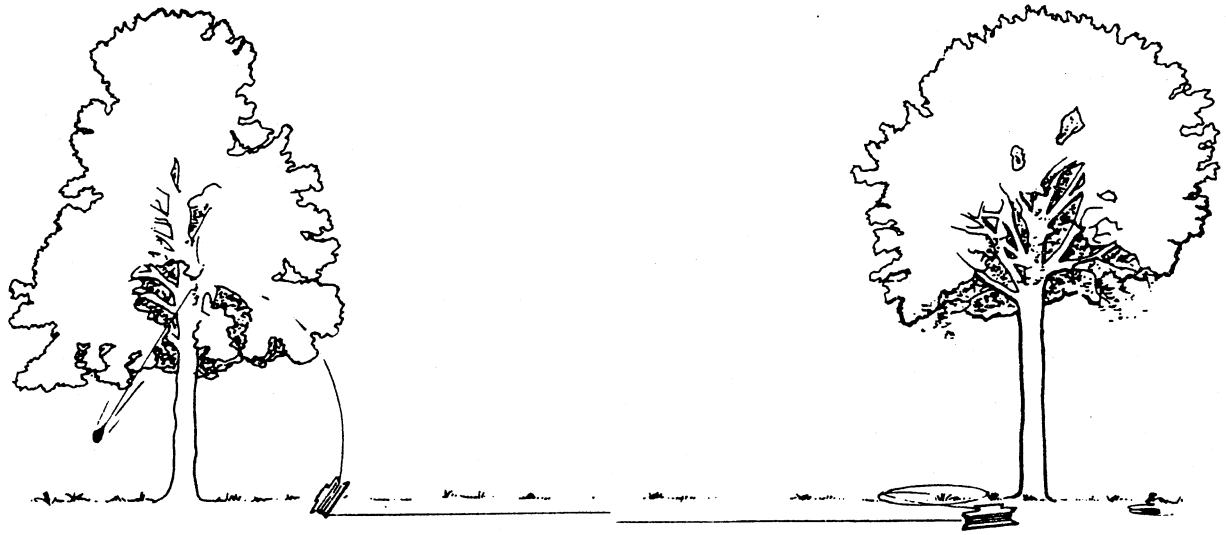
1, On Key the meter reads antenna current.

2, On Battery the meter reads battery voltage.

KEY:

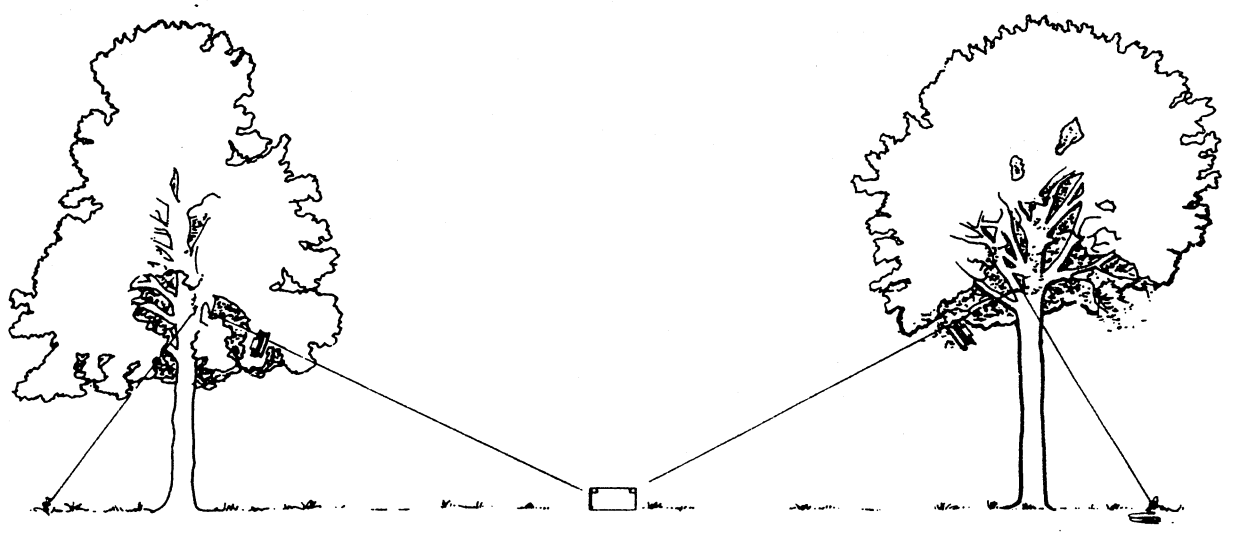
A - Terminal
B - Basic channel control
C - Offset frequency control
D - Headgear socket
E - Peak noise
F - Key
G - Gain
H - System switch
J - Terminal
K - Meter

Fig 55.—UK/PRC 316 Controls and Connections



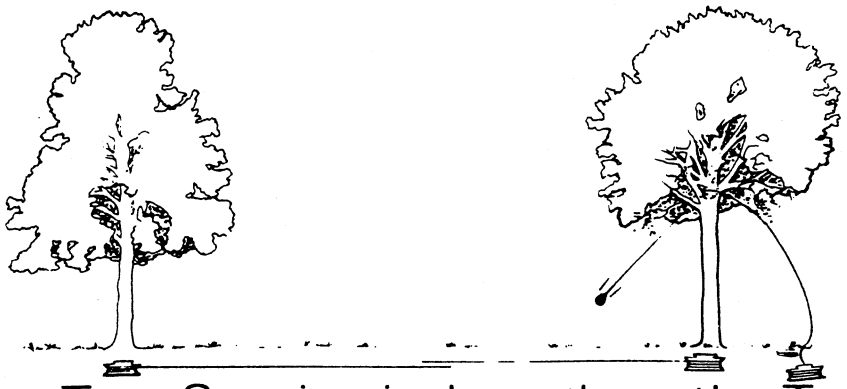
1: Roughly Check the Total Antenna Length Against the Tree Spacing

2: If the Tree Spacing is Greater, Unwind the Throwing Cords, and with a Suitable Weight at the Free End, Throw the Cord over a Branch about 10 m (30ft) above the Ground and.....

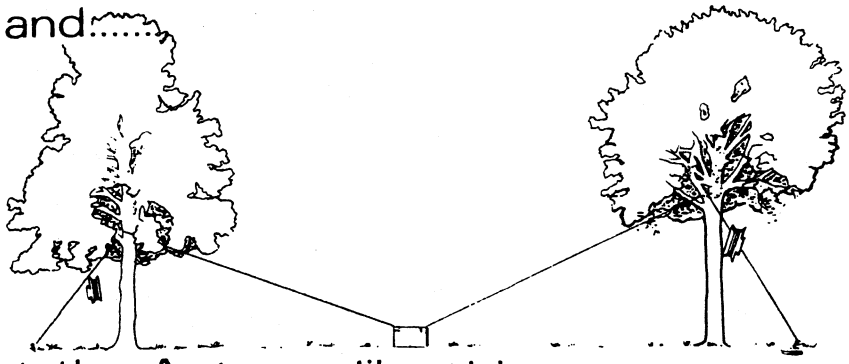


3: Erect the Antenna like this

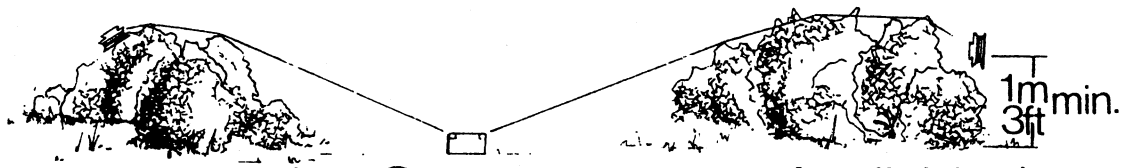
Fig 56.—UK/PRC 316 Antenna Erection



4: If the Tree Spacing is less than the Total Length of the Antenna, Tie the Weight to the Tree End of the Antenna and Throw the Wire over a suitable Branch and.....



5: Erect the Antenna like this



6: If Trees or other Supports are not Available the Antenna Wires may be Draped over Bushes, Keeping Wires and Reels as High as Possible

7: Or it may be Necessary to Use a Combination of 3, 5, &6.

Fig 57.—UK/PRC 316 Antenna Erection *(continued)*

SECTION 12 – UK/PRC 344

Introduction

02171. The UK/PRC 344 is a lightweight UHF AM manpack radio designed to provide ground to air communications.

Data

02172. ***Frequency Range*** 255 – 399.95 MHz

Channels 3500 at 50 kHZ

Power supply 24V 3.3 AHC Battery *(Battery life normal working 11½ hrs, continuous beacon 3 hrs)*

Antennas (Fig 62) Battle Antenna
Omnidirectional Antenna

Ranges

	Distance (km)	Height (ft)
Ground to Air	20 40 80 160	100 500 5,000 20,000
Ground to Ground (Line of sight)	8	N/A

Facilities Voice (AM DSB)
Beacon
Rebroadcast
Remote operation
Break-in
IC
Call

Description *(See Figs 58 and 59)*

02173. ***Controls and Connections.***

Ref	Control	Function
1	**VOLUME switch**	Rotary switch with 6 positions labelled: (1) OFF: Equipment switched off. (2) 1 to 5: Equipment switched on with, at position 1, minimum volume of received signals and sidetone in all positions of the mode selector switch *(REF 2)* except BEACON *(sidetone only)*, increasing in steps to maximum volume at position 5.
2	**Mode selector switch**	Rotary switch with 6 positions labelled: (1) *LOCAL:* **(a)** Equipment controlled only via a headset or handset connected to one of the HEADSETS sockets. **(b)** Operation of the pressel *(REF 6)* switches the equipment from receive to transmit. **(c)** Local operator hears received signals and hears sidetone when transmitting. **(d)** Remote operator cannot hear received signals. **(e)** Remote operator cannot activate call tone. (2) *MUTE O/R:* As LOCAL, but mute inoperative for reception of weak signals. (3) *REM:* **(a)** Equipment normally controlled by remote operator's remote control handset. **(b)** Local operator can break in on remote operator's transmission: (i) Remote operator can hear local operator's and his own sidetone but cannot transmit. (ii) Remote operator can activate call tone, which can be heard by local operator but does not break into local operator's transmission.

Ref	Control	Function
		(c) Remote operator can call local operator when equipment is receiving or transmitting. **(d)** Between 17V and 18V is supplied to power the remote control handset via the PRC 344 REMOTE terminals. If the line connections are crossed, a 2 kHz tone is heard by both local and remote operators. (4) *AUTO:* WARNING When set up for automatic rebroadcasting, if one equipment is switched to LOCAL or MUTE O/R, the other will switch to transmit. **(a)** Split automatic rebroadcast facilities are available by using another PRC 344 connected by the REMOTE terminals of each equipment. **(b)** The facilities referred to in **(a)** are also available to a connected UK/PRC-351, providing always that the received signal to the PRC 344 is a CLANSMAN signal, i.e., one that contains a 150 Hz pilot tone, receipt of which, via the PRC 344, causes the PRC 351 to switch to transmit. **(c)** The remotely connected equipment can also be in a CLANSMAN harness installation connected via a harness adaptor box. **(d)** Operators at either station can break in and transmit over both the primary and rebroadcast frequencies. **(e)** Either operator may call the other during the setting-up procedure. *(When rebroadcasting is taking place, intercommunication is normally made via a field telephone).* **(f)** Between 17V and 18V d.c. is applied to the REMOTE terminals. If the line connections are crossed, a 2 kHz tone is heard by both local and remote station operators.

Ref	Control	Function
		(5) *IC:* Provides intercommunication and call facility between remote and local operators. Receiver operative but transmitter not. (6) *BEACON:* Transmits continuous 1 kHz tone.
3	**LAMP/CALL switch**	Toggle switch with 3 positions, spring loaded to return-to-centre Off position. Two operating positions are: (1) *LAMP:* Illuminations frequency display windows for night operation. (2) *CALL:* When the mode selector switch is set to REM, AUTO or IC, a kHz tone is generated to call the remote operator, as described under REF 2.
4	**FREQ selector switches**	Three thumb wheel switches, each with an associated display window in the front panel. The switch on the left has 18 positions, numbered 22 to 39, and selects frequencies from 220 MHz to 390 MHz in 10 MHz steps. That in the centre has 10 positions, numbered 0 to 9, and selects frequencies from 0 MHz to 9 MHz in 1 MHz steps. That on the right has 20 positions, numbered 00 to 95, and selects frequencies from 0.00 MHz to 0.95 MHz in 0.05 MHz steps. Thus if the 3 windows display 31, 9. and 05 respectively, the frequency selected is 319.05 MHz.
5	**Antenna Socket**	Socket for connecting: (1) Battle Antenna. (2) Omnidirectional Antenna.
6	**Handset/headset**	When a handset or headset is plugged into one of the HEADSETS sockets, operation of the pressel switches the PRC 344 from receive to transmit. It can be used in all positions of the mode selector switch *(REF 2)* except BEACON. When operating in the latter mode, the handset or headset should be disconnected to avoid inadvertent transmission of extraneous signals.

Setting Up and Operating

02174. ***Setting Up.***

a. Ensure set is switched off.

b. Connect battery.

c. Connect antenna.

d. Connect AF gear.

02175. ***Frequency Setting.***

a. Rotate frequency selection switches until required frequency is lined up in windows.

b. Frequency setting can be carried out in the dark by switching on the lamp to illuminate frequency display.

02176. ***Switching On.***

a. Set volume switch to ON and adjust GAIN.

b. Select LOCAL on mode switch.

02177. ***Testing.*** Carry out tests using flow charts *(ANNEX H).* The set is now ready to operate.

02178. ***Remote Operating.***

a. Set mode selector switch to REM.

b. Connect D10 to remote terminals on set and to remote handset.

02179. ***Rebroadcast.*** Normal automatic rebroadcast can be obtained by using the PRC 344 with another PRC 344 or PRC 351/2 *(provided the signal received by the PRC 344 contains a 150 kHz pilot tone).*

02180. ***Vehicle Station.*** A normal CLANSMAN clip in manpack installation using the DCCU and an omnidirectional antenna on the vehicle.

02181.–02185. *Reserved.*

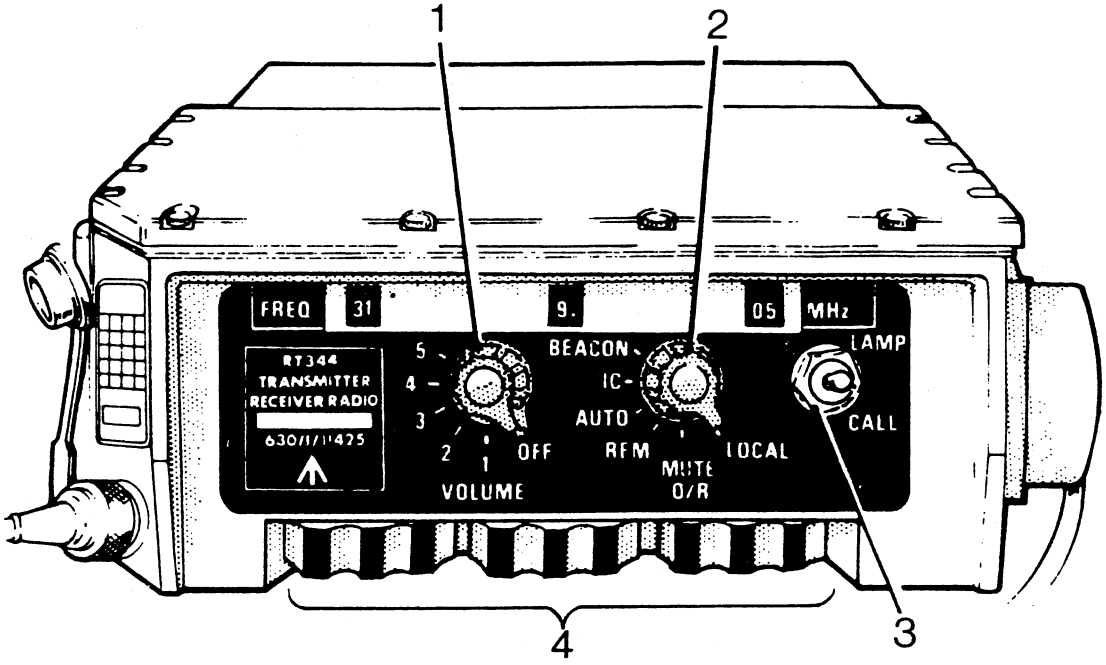


Fig 58.—UK/PRC 344 Controls

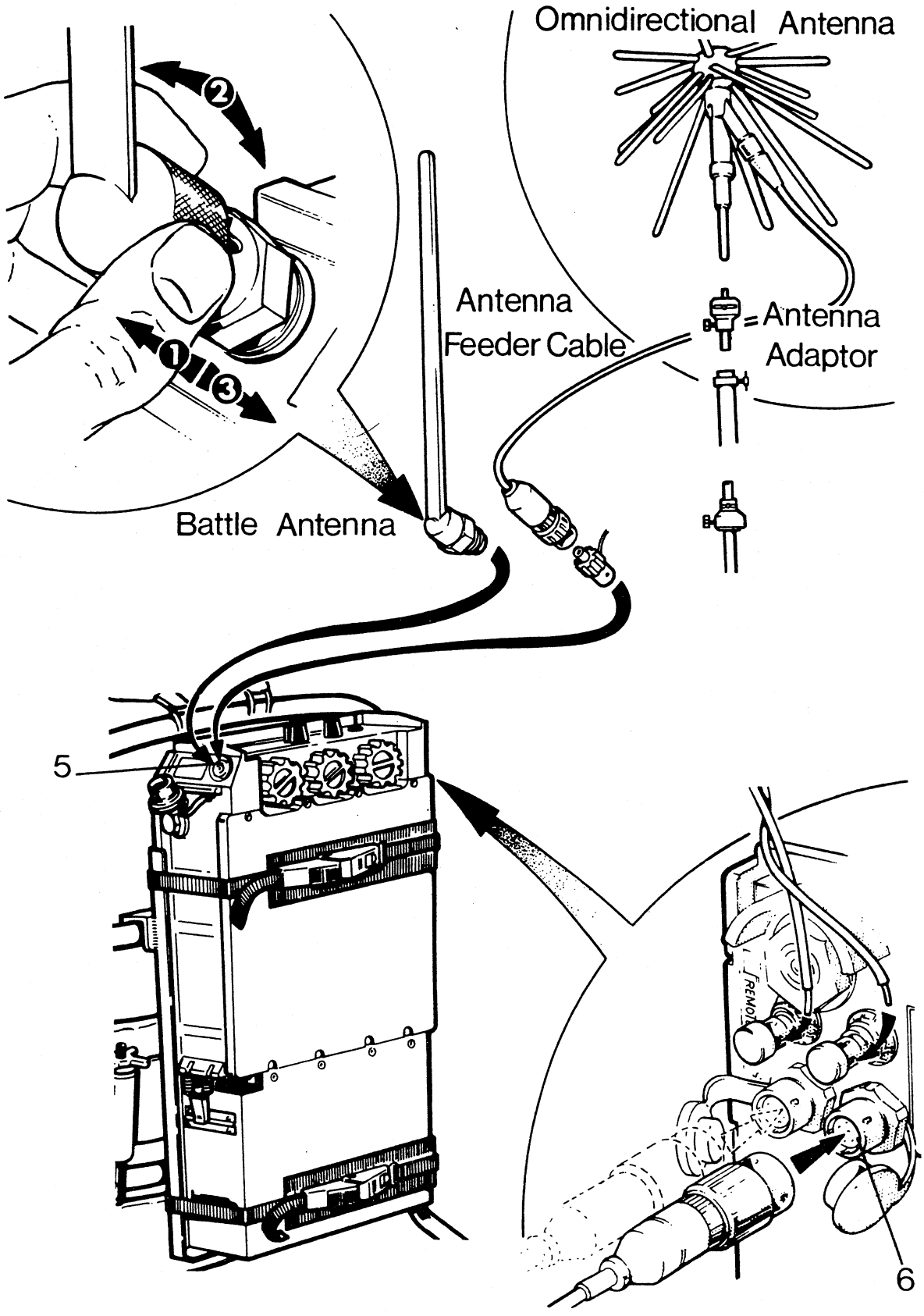


Fig 59.—UK/PRC 344 Antennas and Connections

SECTION 13 – CLANSMAN SECURE SPEECH HARNESS

Introduction

02186. The Clansman Secure Speech Harness (CSSH) is a range of units and cables that, together with the VRC 353 and the BID/250/1 Main Cypher Unit, form a secure speech system.

02187. This section describes the use and operation of CSSH as a basic terminal.

References

02188. The following references have been used in compiling this section:

User Handbook for Secure Speech Harness, Clansman BID/250/1,BID/250/31 — Army Code 61834 (BID.250/1(1))

Principles of Secure Communications

02189. Before describing the individual units of the basic terminal CSSH it is necessary to understand the principles of secure communications and the terms used in this section.

02190. Communications in clear voice are used extensively over radio networks in the field. To an alert enemy these communications provide valuable information. To deny this information to the enemy it is necessary to process the signals in such a way that the enemy will not understand the messages. To achieve this, the information signal is mixed with a signal which is generated in a continuously changing, apparently random, manner. When the mixed signal is received the random signal is removed leaving the clear signal.

02191. The process of adding the random signal and removing the random signal are called encryption and decryption respectively. The equipment which performs both these functions is a CRYPTO UNIT. The mixed signal is an encrypted signal and is usually referred to as a secure signal.

02192. The random signal is derived from an electronic key known as an ELECTRONIC KEY VARIABLE (EKV) which is stored in the CRYPTO UNIT. When the receiving unit and the transmitting unit are using the same EKV a secure speech link may be established.

CAUTION

The unauthorised release of information concerning national crypto systems or installations is a serious offence. It is forbidden to make copies or extracts of crypto-graphic documents. Photographing of crypto-material or the inside of vehicles containing cryptographic installations is strictly forbidden.

The Basic Terminal

02193. The basic terminal consists of the following units:

a. The Digital Master Unit (DMU).

b. BID/250/1.

c. BID/250/31 EKV.

d. VRC 353.

e. Remote Units (*Reserved*).

The Digital Master Unit

02194. The DMU is the control unit which houses, powers and controls the BID/250/1.

02195. The controls, switches, plugs and sockets are all mounted on the front panel of the DMU and are clearly labelled. Each label is engraved on the panel adjacent to the item to which it refers (*see Fig 59A*).

02196. The DMU controls are grouped in four areas according to their function (*see Fig 59A*):

a. Power controls and fuse.

b. BID/250/1 controls.

c. Operator controls.

d. Interface selection.

The Main Cypher Unit

02197. The BID/250/1 is the main cypher unit and is housed inside the DMU. It is held in position by a DMU Clamp (*see Fig 59B*).

02198. The EKV is contained within the main cypher unit for secure speech operations. It can store up to six key variables.

VRC 353

02199. A standard VRC 353 is used in the CSSH on a dedicated circuit.

Remote Units

02200–02210. *Reserved.*

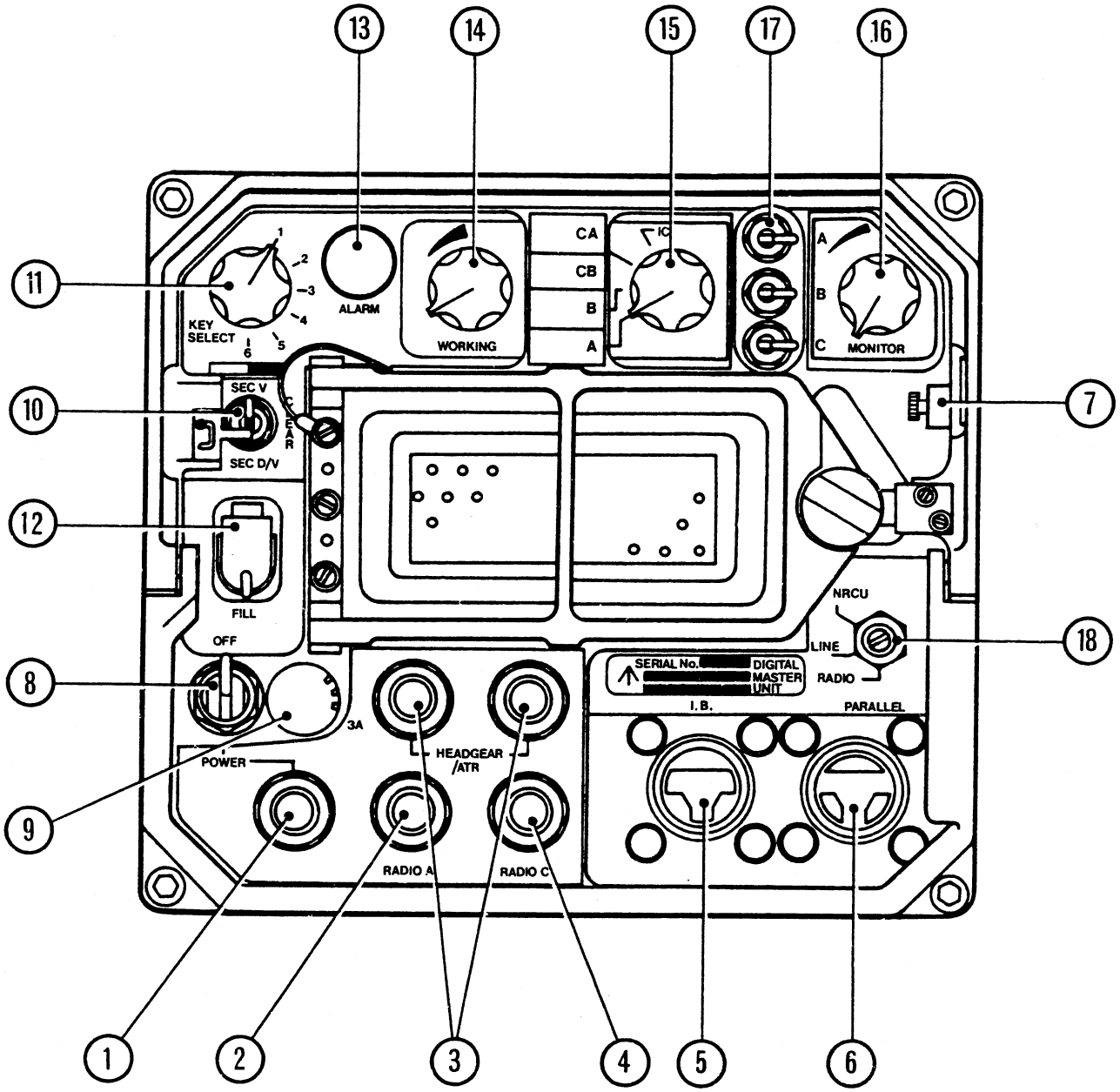


Fig 59A.—DMU Controls and Connections

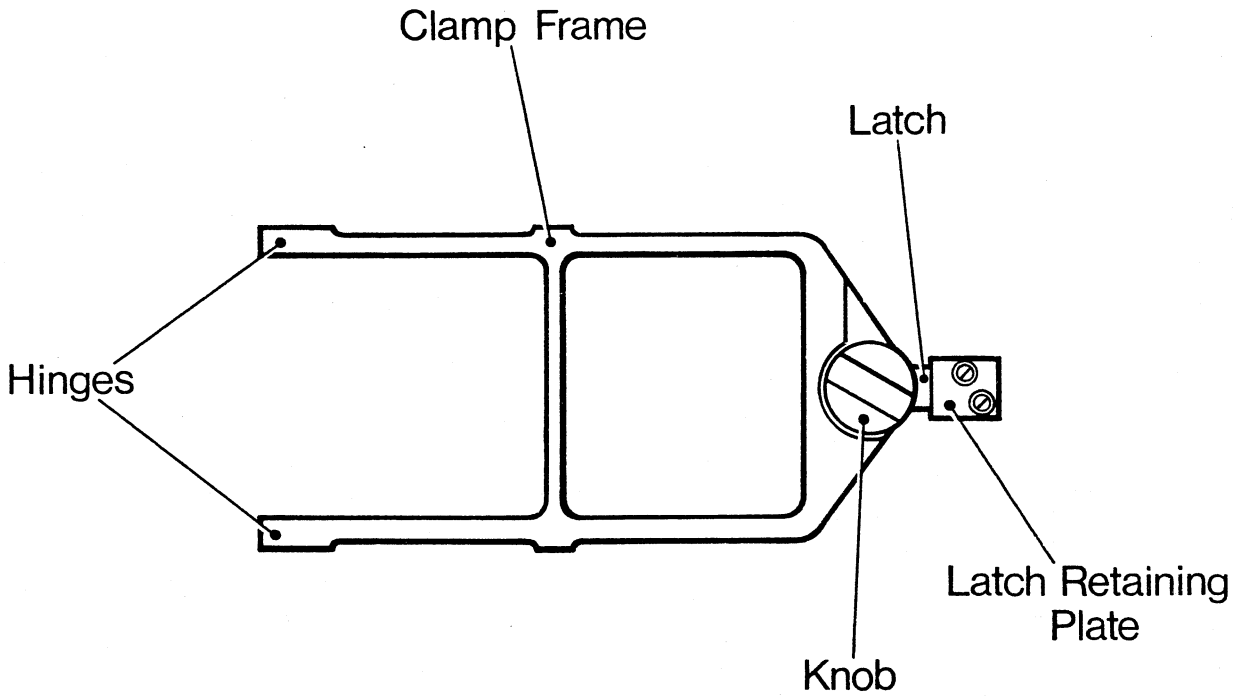


Fig 59B.—DMU Clamp for BID 250/1

The DMU Controls and Connections

02211. The controls and connections for the DMU are as follows and should be read in conjunction with *Fig 59A.*

Ref Fig 59A	Designation	Remarks
1	**POWER**	A 2-pin plug for 28v supply connection.
2	**RADIO A**	A 7-pin plug to connect to the Harness Connector of the VRC 353 or DMU1 or DMU2 connector of an IBRU, via a cable up to 10 metres long.
3	**HEADGEAR**	Two 7-pin sockets connect the DMU audio circuits to one or two local users' headsets for working, monitoring and intercom.
4	**RADIO C**	A 7-pin socket connects the DMU to an insecure Clansman system. This may be via the CRCH audio connection or a direct to an insecure Clansman radio (*see footnote*).
5	**IB**	A 26-pin socket connects a DM BOX (*Clansman*) to the DMU, via a cable up to 10 metres long, to provide access to remote users.
6	**PARALLEL**	A 26-pin plug to permit connection to a second DMU via a cable up to 2 metres long. This allows the DMU operator to gain access to a second VRC 353 secure installation.
7	**EARTH**	Earth braid connects from the DMU terminal to the radio table. Ensure the connection is secured to meet the TEMPEST requirement.

Note: The RADIO C connector should be connected to an audio socket, if it is connected to a headset socket the full range of facilities will not be available. On the PRC 351 only the socket marked AUDIO + TEST (SKT 2) will provide transmit and receive, or the AUDIO socket on the Initiate box.

Ref Fig 59A	Designation	Area	Remarks
(a)	(b)	(c)	(d)
8	**ON/OFF Switch**	a	Switches the dc supply to the DMU.
9	**3A FUSE**	a	Fuse rating of 3 amperes in the power supply circuit.
10	**CLEAR/SECURE Switch**	b	A three position switch to select SECURE VOICE, CLEAR or SECURE DATA/VOICE modes.
	Reversible Guard Plate		DMUs are often dedicated to one or other secure modes. To prevent accidental selection of the wrong secure mode, a reversible guard plate is fitted to restrict the movement of the switch.
11	**KEY SELECT Switch**	b	A six position rotary switch to select the required BID/250/1 key store.
12	**SINGLE ERASE/ FILL Switch**	b	A three position centre biassed toggle switch with a mechanical stop to prevent accidental operation of the SINGLE ERASE. The positions are as follows: **OPERATE** – (*Center position*) For normal BID/250/1 operation **FILL** – (*Downward position*) With a BID/250/31 connected to BID/250/1 FILL connector, operation of the switch allows the selected key store to be filled with new key (*see note 4*). **SINGLE ERASE** – (*Upward position*) This position erases the key in the store selected by the KEY SELECT switch.

Ref Fig 59A	Designation	Area	Remarks
(a)	(b)	(c)	(d)
	TOTAL ERASE		A toggle switch mounted on the BID/250/1 and therefore not shown. Operation of this switch erases all BID/250/1 key stores.
13	**ALARM Lamp**	b	This AMBER lamp lights to indicate an alarm state in the BID/250/1. A rotating bezel control allows the lamp to be dimmed.
14	**WORKING VOLUME**	c	A nine position switch to select any one of nine fixed audio levels for the selected working circuit.
15	**WORKING SELECT**	c	A four position switch to select: **A** – to work a directly connected VRC 353. **B** – to work a VRC 353 connected to a parallel DMU. **C** – to work an insecure radio connected to the Clansman socket either directly or via the CRCH, and to provide intercom with users of the CRCH via the connected CRCH unit. **IC** – Intercom with remote users.
	ADJACENT WRITING SURFACE	c	Allows the operator to mark on the label the identification of the radios.
16	**MONITOR VOLUME**	c	A control to adjust the audio level in the right earphone of the headset.
17	**MONITOR SELECT Switch** *(see notes 1, 2 and 3)*	c	Connects the monitor earphone to the circuits described above for WORKING SELECT positions A, B and C.

Ref Fig 59A	Designation	Area	Remarks
(a)	(b)	(c)	(d)
18	**INTERFACE Switch**	d	Selects the appropriate interface circuits for RADIO, LINE or NRCU. **RADIO** – The DMU may be connected directly to a radio or IBRU. **LINE/NRCU** – *Reserved.*

Notes: 1. In order to prevent the transmission of secure traffic by insecure means, it has been made impossible to monitor a secure signal when causing an insecure radio to transmit via the DMU.
2. With the three MONITOR SELECT switches set at the OFF position the working channel is present in both earphones.
3. It is possible to work one channel while monitoring two others simultaneously.
4. Instructions in the use of BID equipments can be found in the user handbook.

CAUTION

When an operator of an insecure radio and an operator of a secure radio are working within hearing distance of each other, the operator of the insecure radio must not operate his pressel while the secure radio operator is sending a secure message. This is a precaution against the inadvertant transmission of classified traffic by insecure means. Security can be degraded if non-approved or unspecified cables and/or connectors are used or if cable lengths are extended.

Setting up Drills

02212. ***Connections.*** The following connections are made on the VRC 353 and the DMU:

a. Connect the 28v supply to the VRC 353 and DMU.

b. Connect the harness lead from the VRC 353 to the radio A socket on the DMU.

c. Connect a suitable antenna system to the VRC 353.

d. Connect the EARTH leads on the VRC 353, carrying frame and DMU.

e. Connect the headset to the headgear socket on the DMU.

02213. ***Switch Settings.*** The switch settings on the DMU and the VRC 353 are as follows:

a. *DMU.*

(1) Key Select switch to the required key.

(2) Mode switch to the required mode.

(3) Working Path switch to position A.

(4) Working Volume to about halfway.

(5) Monitor switches all set to OFF.

(6) Monitor Volume to about halfway.

(7) Radio Interface screw set to RADIO.

b. *VRC 353.*

(1) Select WIDE DATA (*for secure working*)

(2) TEST switch to RX SIG.

(3) Select required frequency.

(4) GAIN control to about halfway.

(5) Remote switch set to LOCAL.

(6) Power switch to the required power output (ϕ *during radio silence*).

02214. ***Fit BID/250/1.*** Insert the BID/250/1 with the FILL connector nearest the gate hinge and close the clamp until it is secure. Switch on the DMU.

02215. Insert the KV if necessary and carry out the following drills:

a. Cancel or identify alarms—*see* TABLE 1.

b. Carry out SIDETONE TEST—*see* TABLE 2.

c. Reconnect the antenna.

02216. Once the above drills have been carried out the secure tone (*a bleep every 5 seconds*) is heard and the alarm lamp is extinguished the terminal is ready for use. Select current KV and follow local orders.

TABLE 1
WARNING AND INDICATOR TONES

Serial	Tone/Indication	Title	Remarks
(a)	(b)	(c)	(d)
1	A bleep every 5 seconds	Secure Indication	Indicates that the DMU is switched to the SECURE mode.
2	ALARM lamp lit and continuous tone	Alarm	Indicates either a possible BID/250/1 fault or that you are being jammed. To clear the alarm the operator may either switch the KEY SELECT switch to an adjacent position and back again, or press and release the pressel (*see Note 1*). If the alarm persists, disconnect the antenna from the VRC 353. If the alarm still persists after 4 seconds have elapsed the fault is probably in the BID/250/1. If the alarm is cancelled but returns when the antenna is reconnected to the radio it is probable that the BID/250/1 is being jammed. Check the received signal strength of the VRC 353. If the wanted signal is stronger than the jamming signal, it will recapture the BID/250/1. Observe SOPs.
3	ALARM lamp/tone accompanied by rapid 'hand slapping'	Empty Store Alarm	Indicates that there is no key fill in the selected BID/250/1 store.
4	Fast bleeps (*similar to telephone box pay tone*)	Opposite Mode (*see Note 2*)	Indicates that the VRC 353 is receiving a signal in the opposite mode to that selected on the DMU CLEAR/SECURE switch. To remedy this, set the CLEAR/SECURE switch to the appropriate mode (*if local orders allow*).

Serial	Tone/Indication	Title	Remarks
(a)	(b)	(c)	(d)
5	No Tone	Clear	Clear working is selected.
6	A high pitched tone	Call (*Remote to DMU Op*)	Heard by local DMU operator and is present for the period that the remote user pushes his CALL button for one second, whichever is the shorter period. If convenient and if local orders allow: a. Set WORKING SELECT switch to IC. b. Set CLEAR/SECURE switch to CLEAR.
7	A high pitched tone for one second	Call (DMU Op to Remote)	Heard by remote user when local DMU operator selects IC. Intercom can proceed when remote user answers.
8	Alternating tones (BEE-BAR)	Wrong Interface	Indicates that the wrong interface circuits have been selected on the DMU.
9	Fast bleeps (*similar to opposite mode alarm, No 4*)	Wrong Mode	Indicates that the VRC 353 is set to one of the Analogue modes and not WIDE or NARROW Data (*see Note 3*). When the DMU is set to CLEAR the alarm changes to a continuous high pitched tone.
10	High pitched continuous tone	Clear Headset Warning	If, in an installation, a headset is connected to the audio socket of a VRC 353 that is part of a secure installation it is not normally possible to transmit with the headset, from that VRC 353. If, however the VRC 353 is switched to an Analogue mode the alarm will sound while the radio is connected to the DMU.

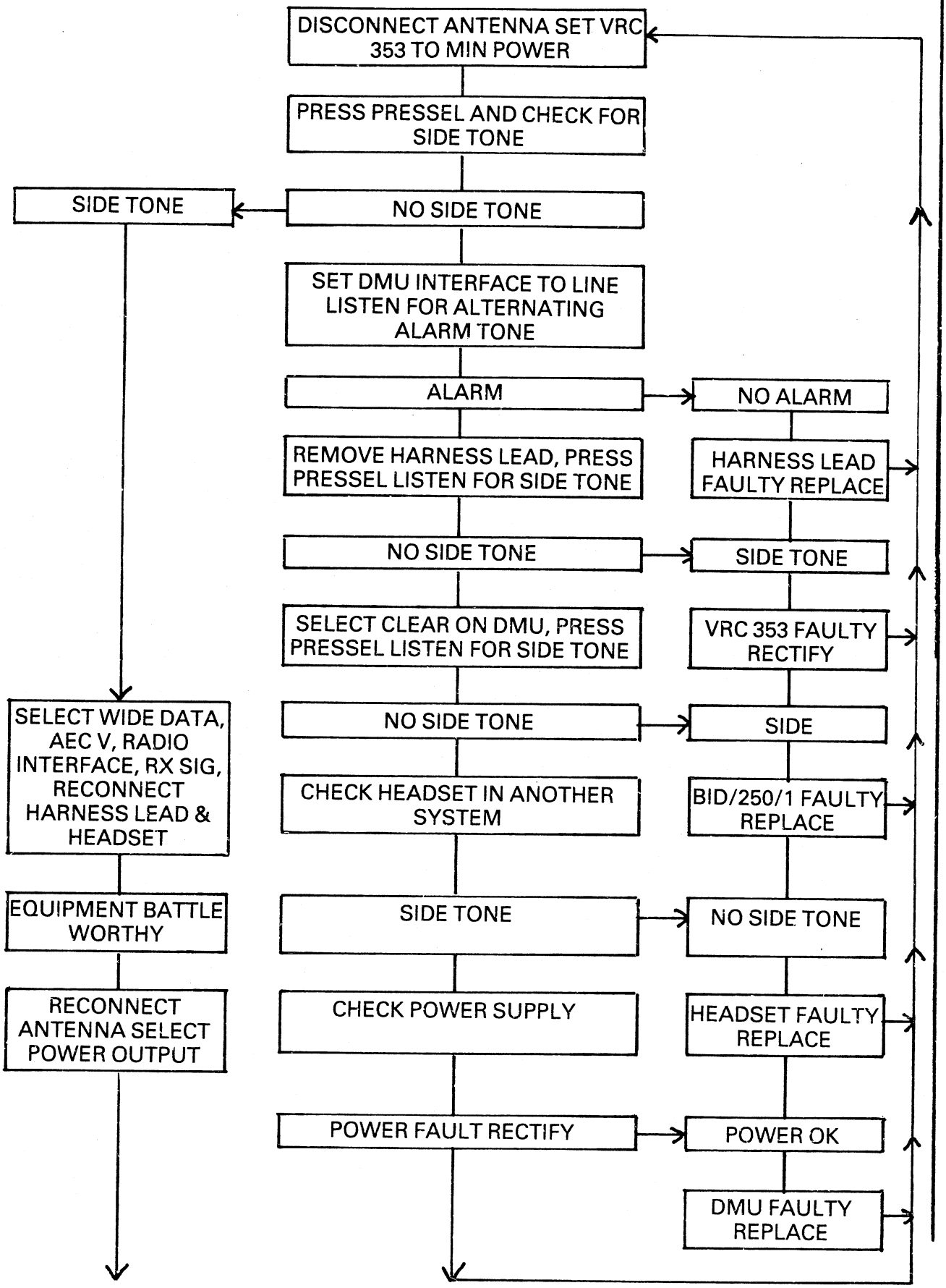
Notes: 1. When radio silence has been imposed, the pressel should not be operated unless the antenna has been disconnected from the VRC 353 and its output set to the minimum.

2. If a clear signal captures the VRC 353 while a secure signal is being received, the Opposite Mode Alarm will not sound. For a period of 4 seconds from the capture of the receiver, pulse noise will be heard in the headset followed by the Opposite Mode Alarm. (*A SEC DV signal will retain synchronisation until the Opposite Mode Alarm sounds*).

3. Only WIDE DATA is to be used for CSSH systems.

TABLE 2

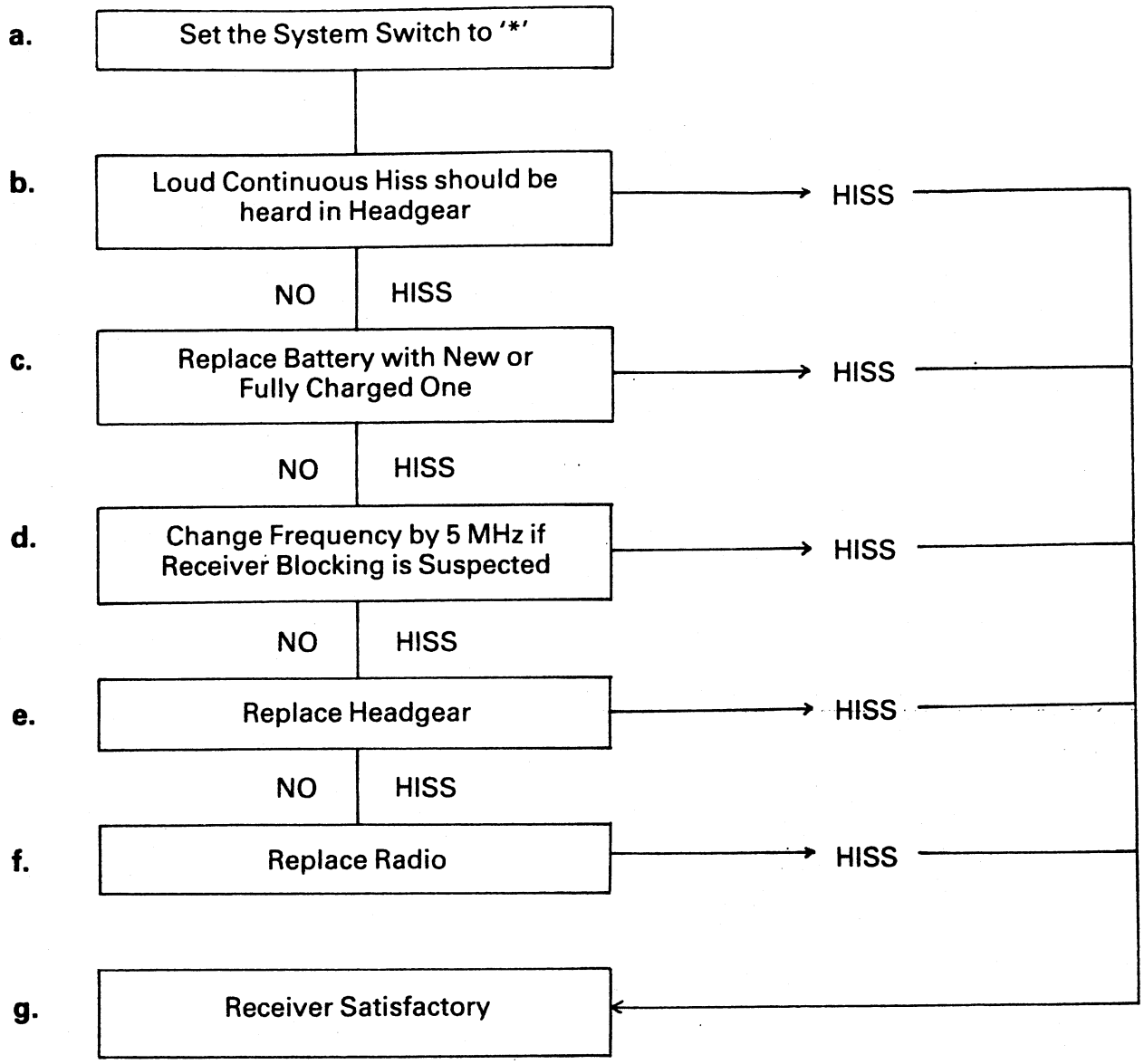
SIDE TONE TEST



FUNCTIONAL CHECKS – UK/PRC 349

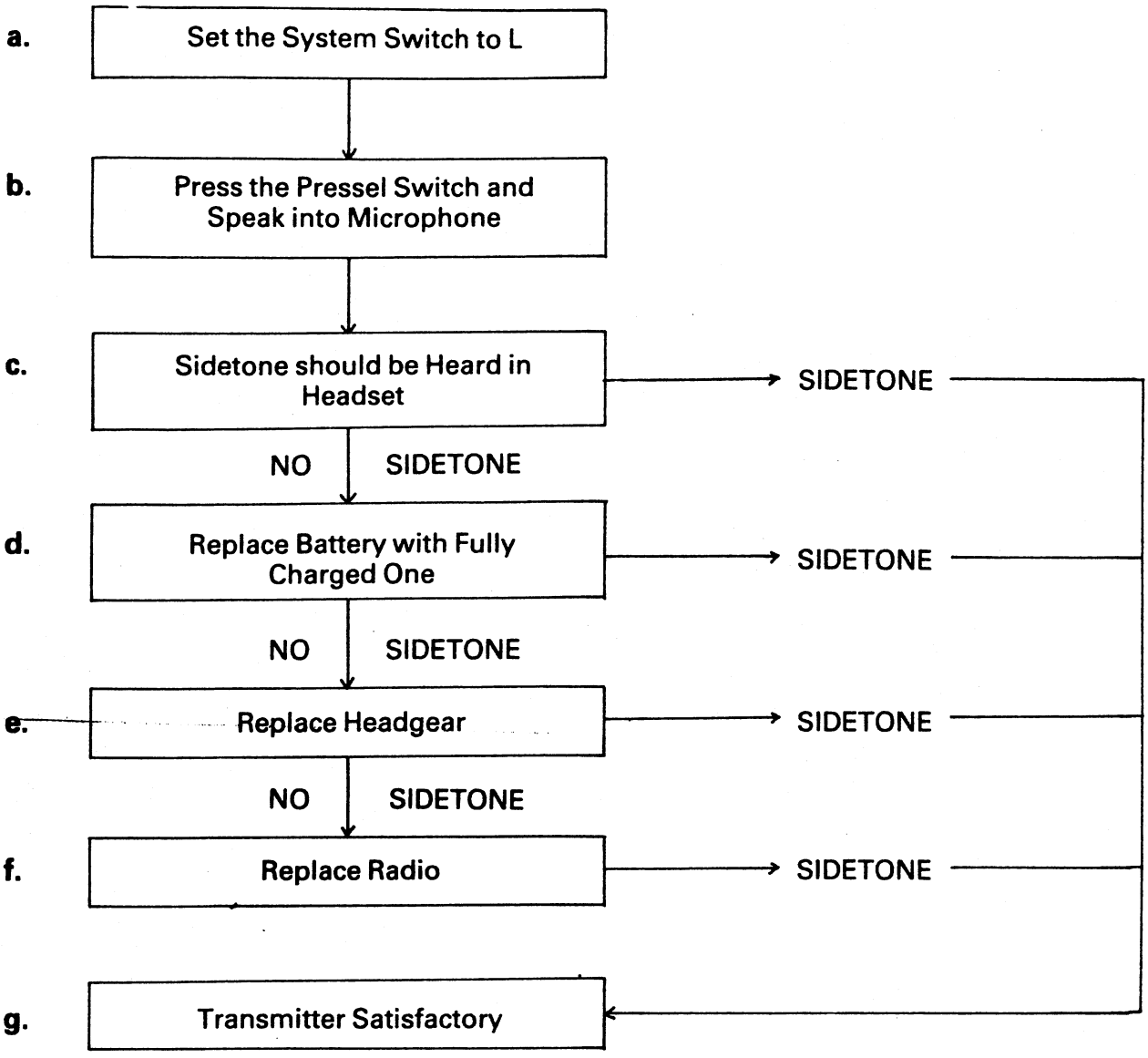
RECEIVER FAULT LOCATION

1. The following procedure should be carried out if a receiver fault is suspected.
2. Connect the Battery and Headset to the Radio.



TRANSMITTER FAULT LOCATION

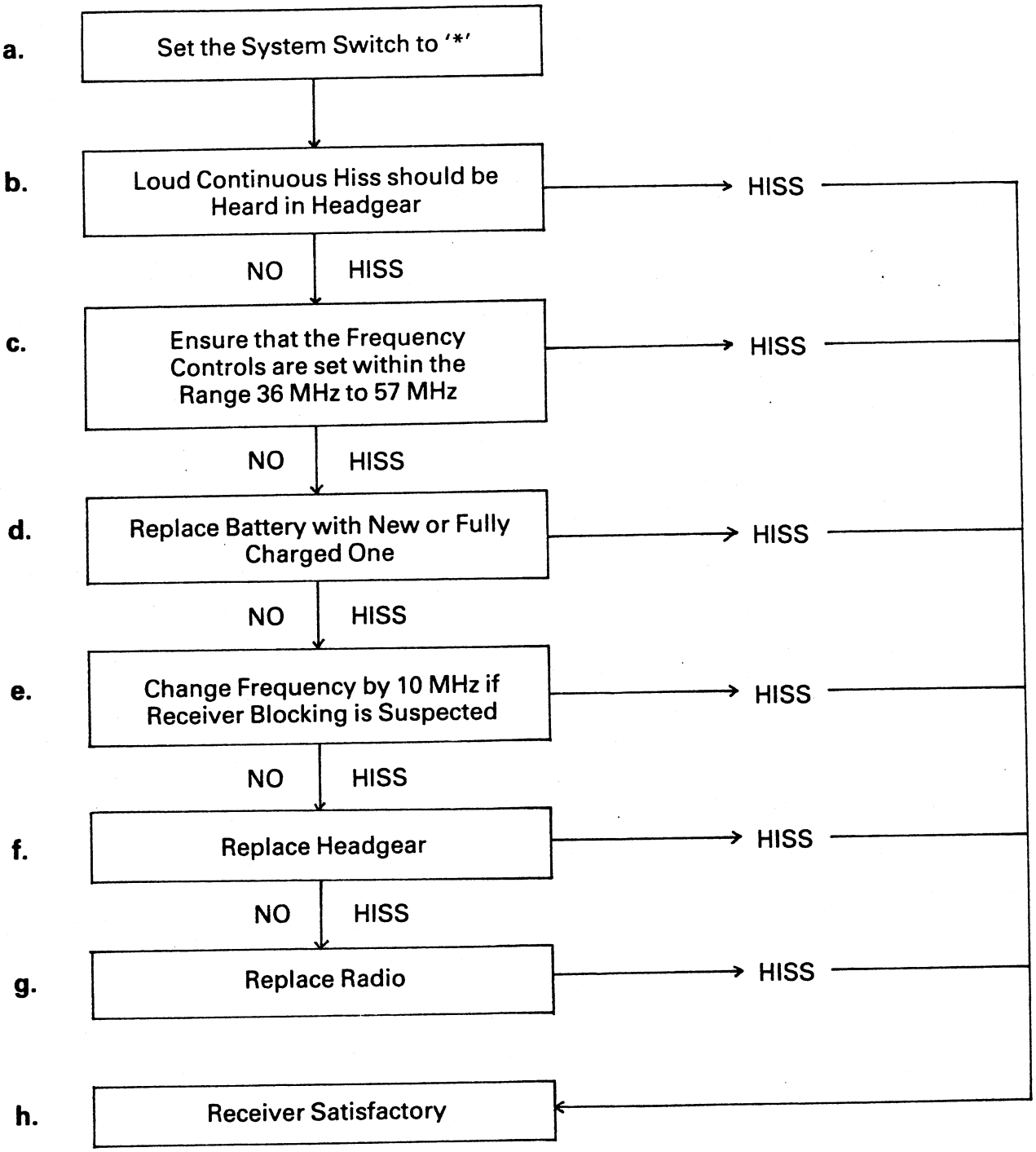
1. The following procedure should be carried out if a transmitter fault is suspected.
2. Connect the Battery and Headset to Radio.



FUNCTIONAL CHECKS – UK/PRC 350

RECEIVER FAULT LOCATION

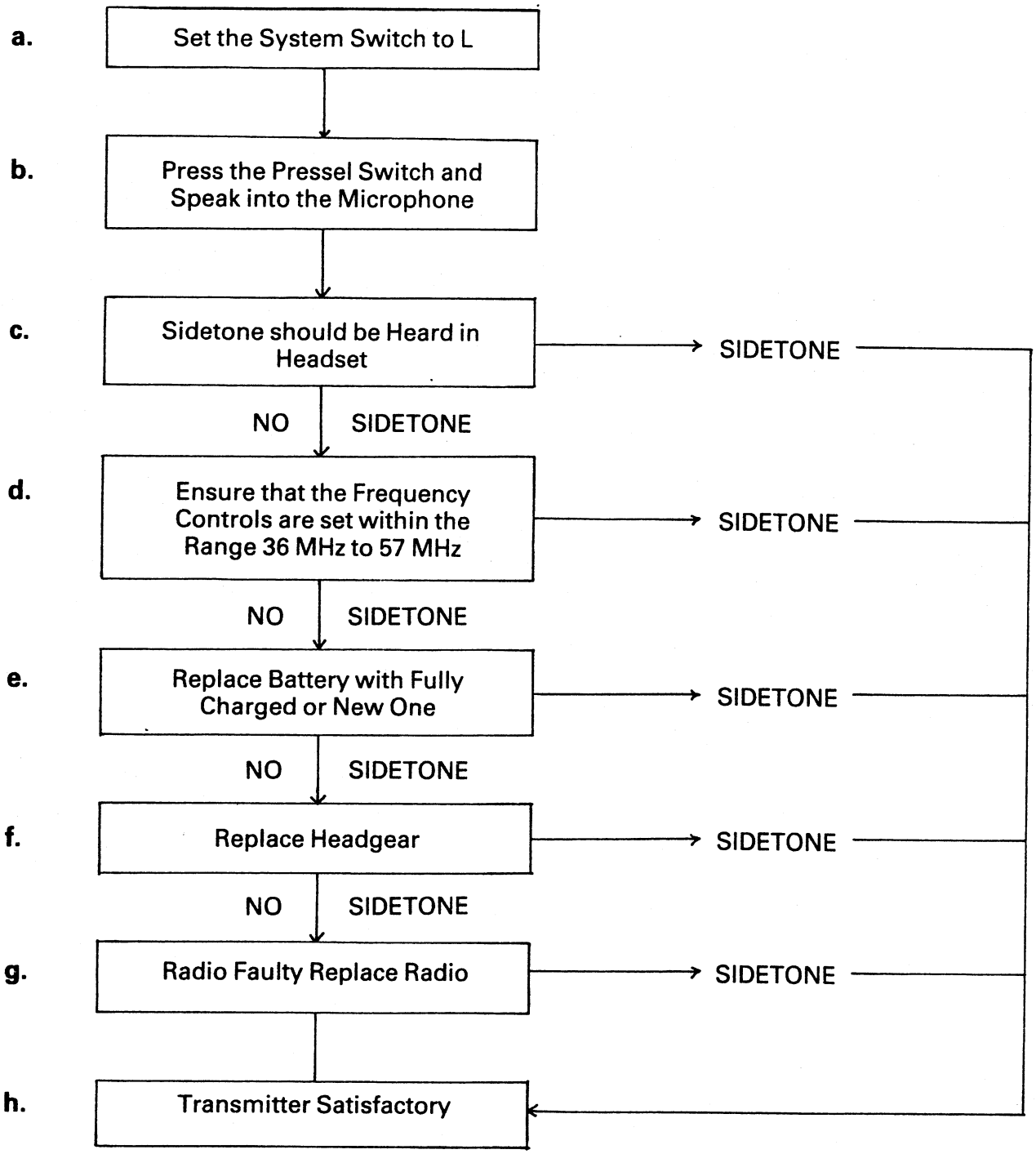
1. The following procedure should be carried out if a receiver fault is suspected.
2. Connect the Battery and Headset to the Radio.



TRANSMITTER FAULT LOCATION

1. The following procedure should be carried out if a transmitter fault is suspected.

2. Connect the Battery and Headset to the Radio.

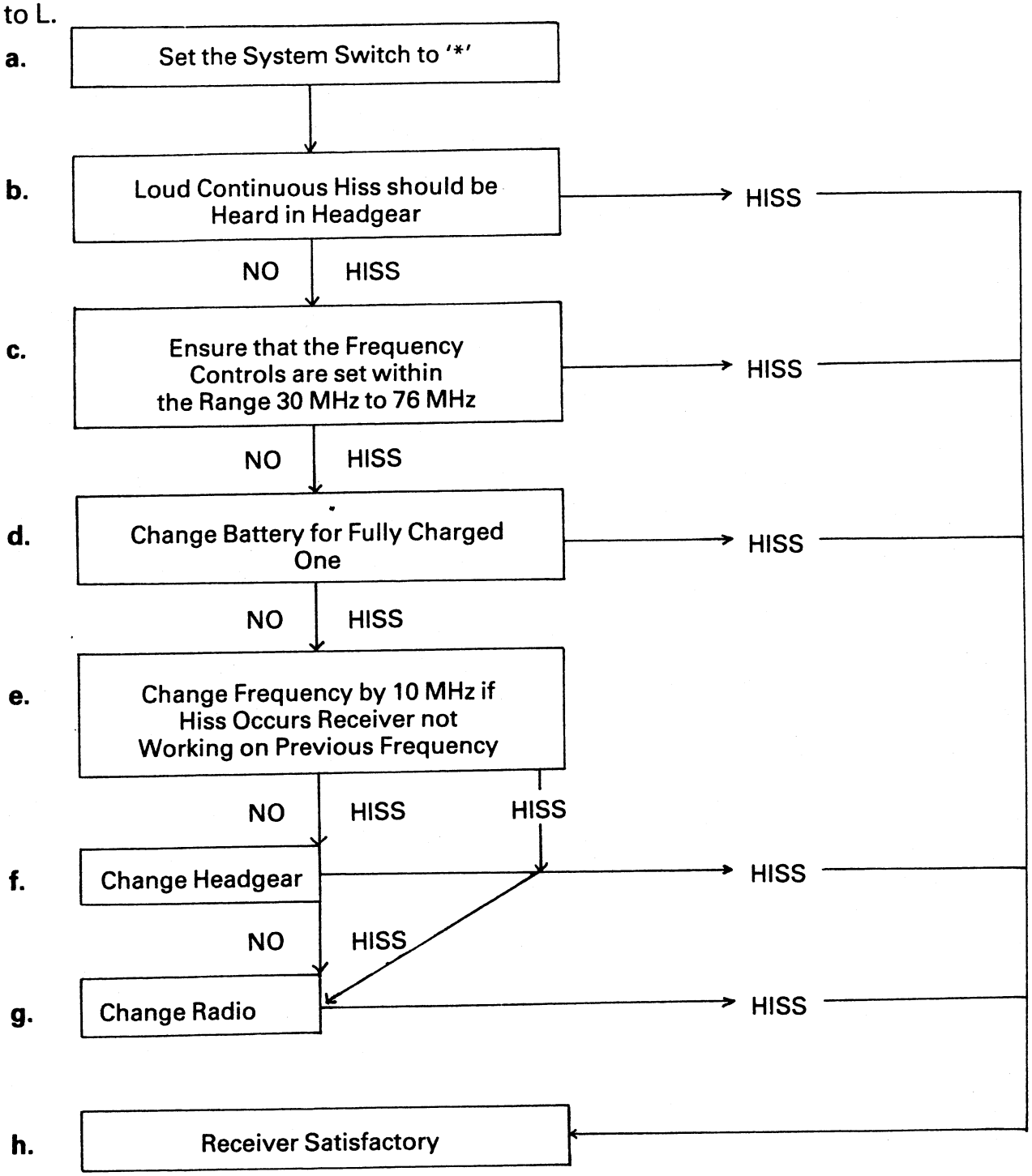


3. Repeat with SYSTEM switch at 'W'.

FUNCTIONAL CHECKS – UK/PRC 351

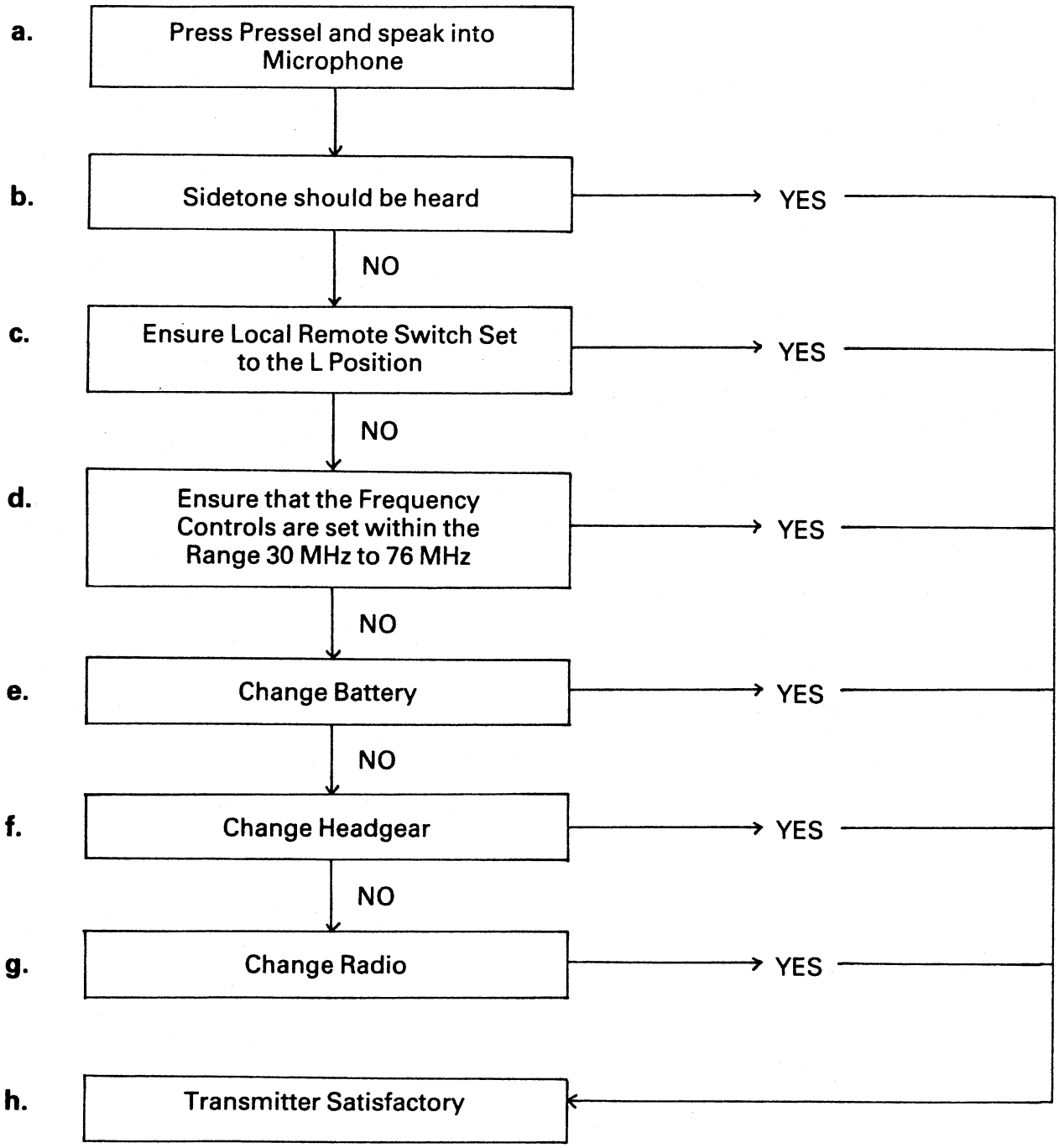
UK/PRC 351 Receiver Test, Local Operation – 1

1. This procedure should be carried out at 4 frequencies approximately 31, 47, 49 and 75 MHz. Connect the battery and headset to the PRC 351. Set the ROS to L.



UK/PRC 351 Transmitter Test Local Operation – 2

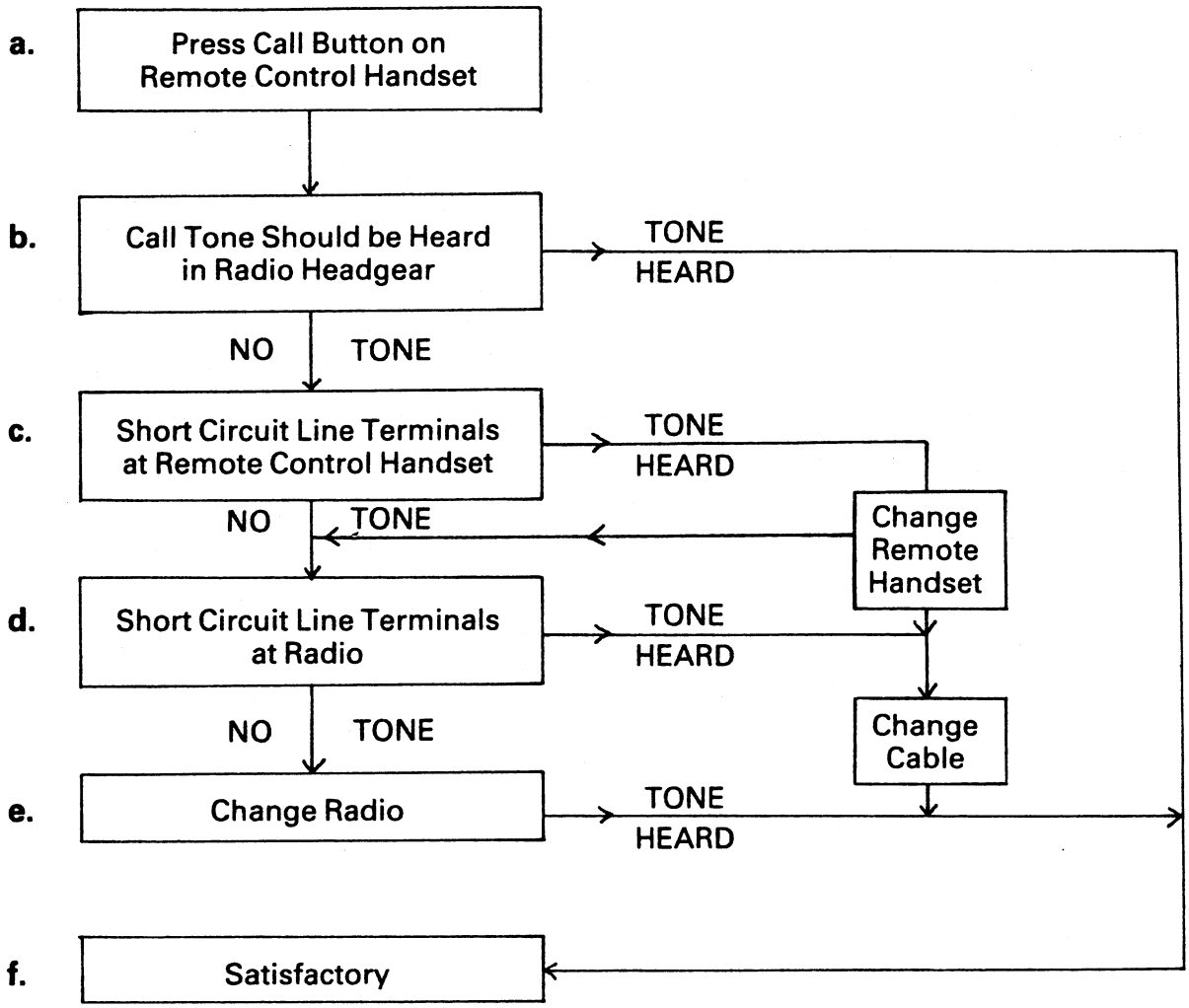
1. This procedure should be carried out at 4 frequencies, approximately 31, 47, 49 and 75 MHz. Fit whip antenna into antenna socket (*ISK1*). Set the ROS to L (*LOCAL*). Set the SSW to L (*LOUD*).



Remote Control Tests – Call From Remote – 3

1. Test radio for Local Operation as detailed in tests 1 and 2. Leave Headset/Handset attached to radio. Connect Remote Control Handset using short length of cable.

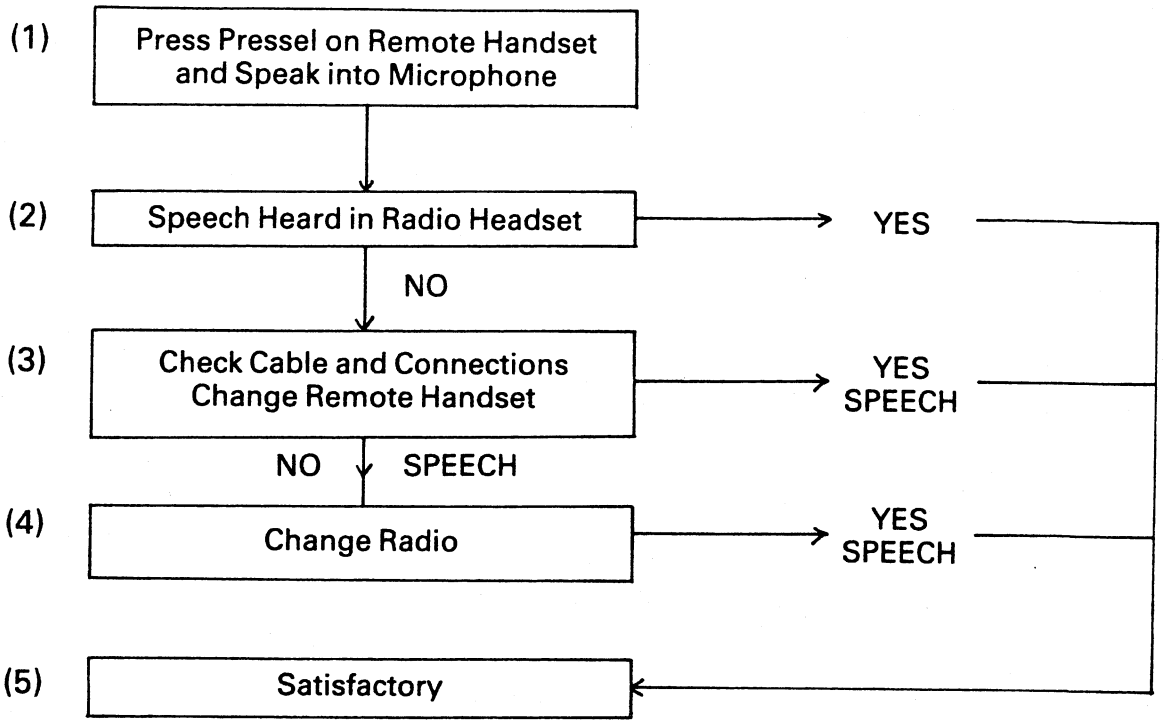
2. Set the ROS to R.A. and 1 in turn.



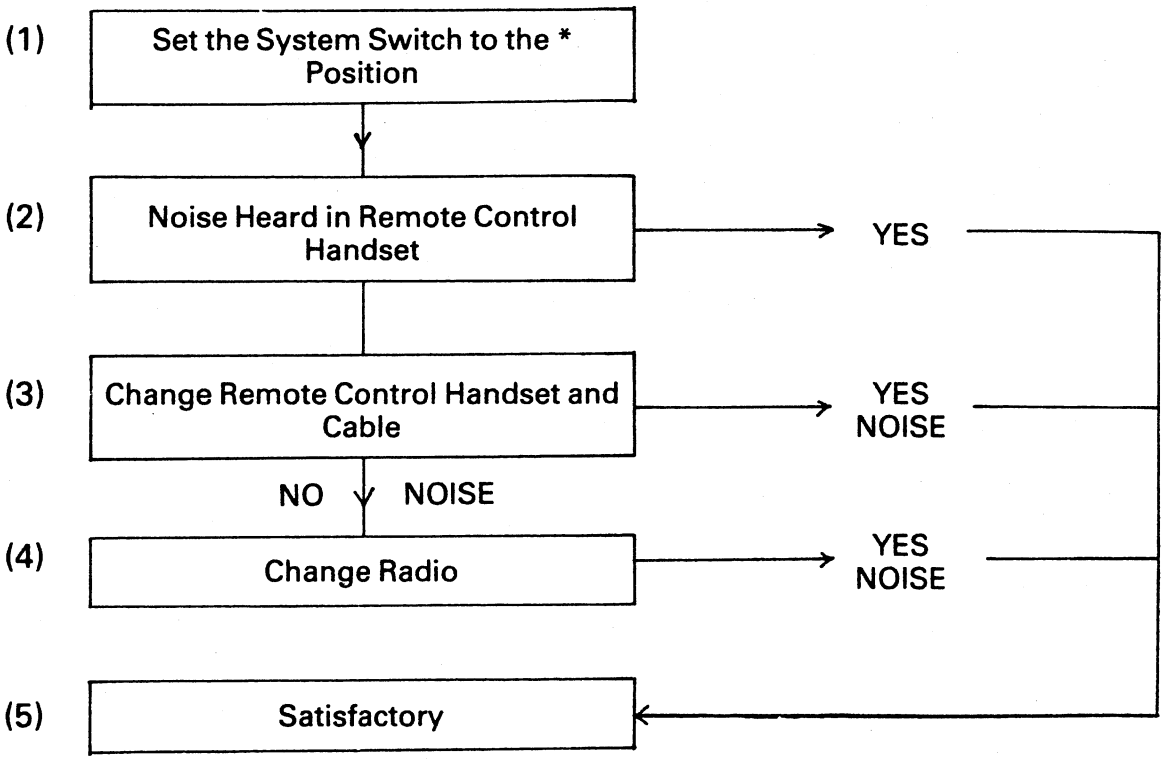
Remote Control Tests – Transmit and Receive – 4

1. Set the ROS to 'R' (*REMOTE*).

a. *Transmit.*

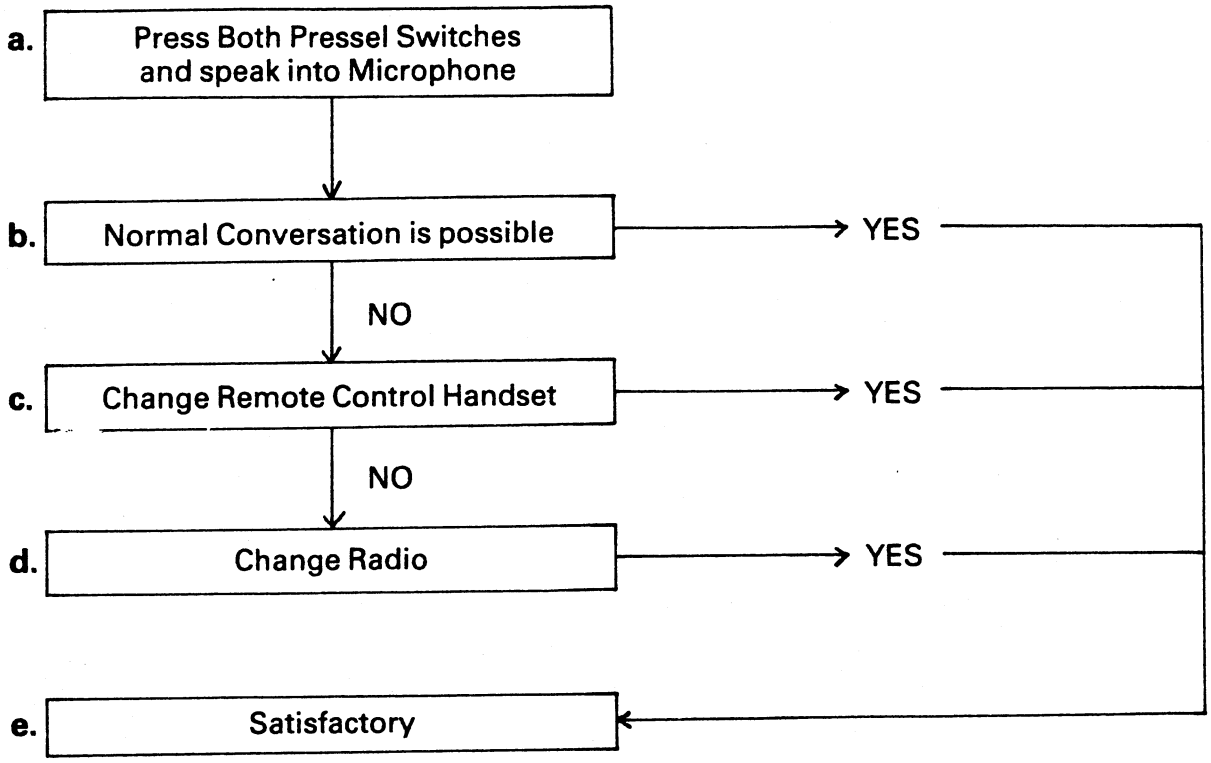


b. *Receive.*



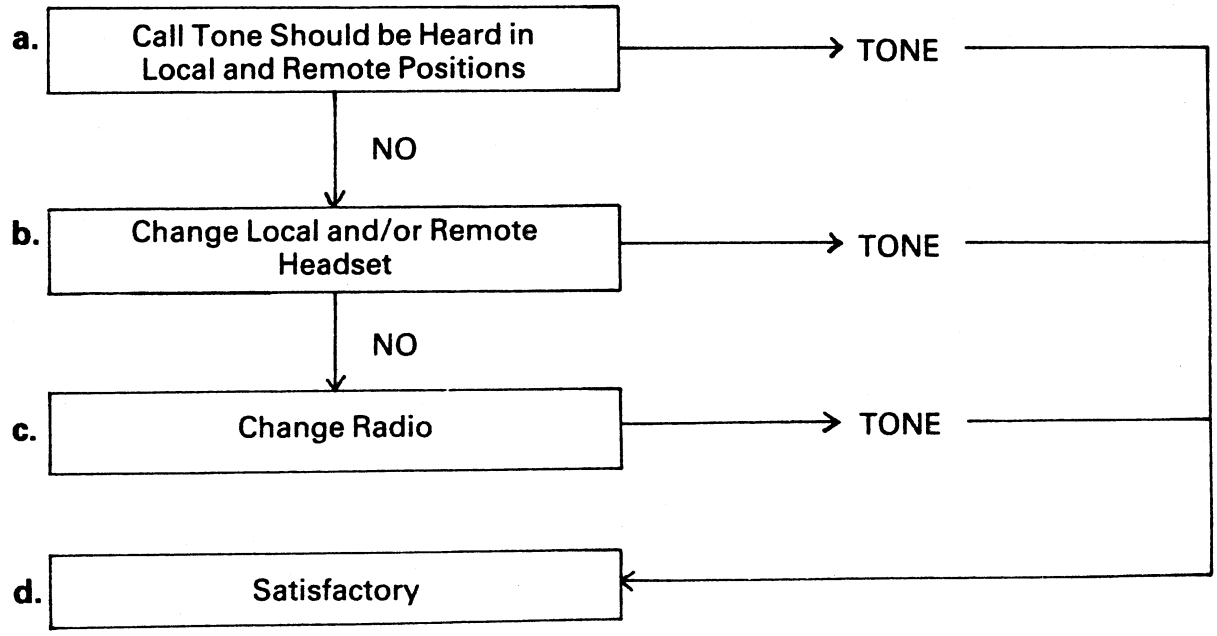
Remote Control Tests – Speech Test on Intercom – 5

1. Set the Local/Remote switch to the '1' position.



Remote Control Test – Call From Radio – 6

2. Set the Local/Remote switch to the C position.



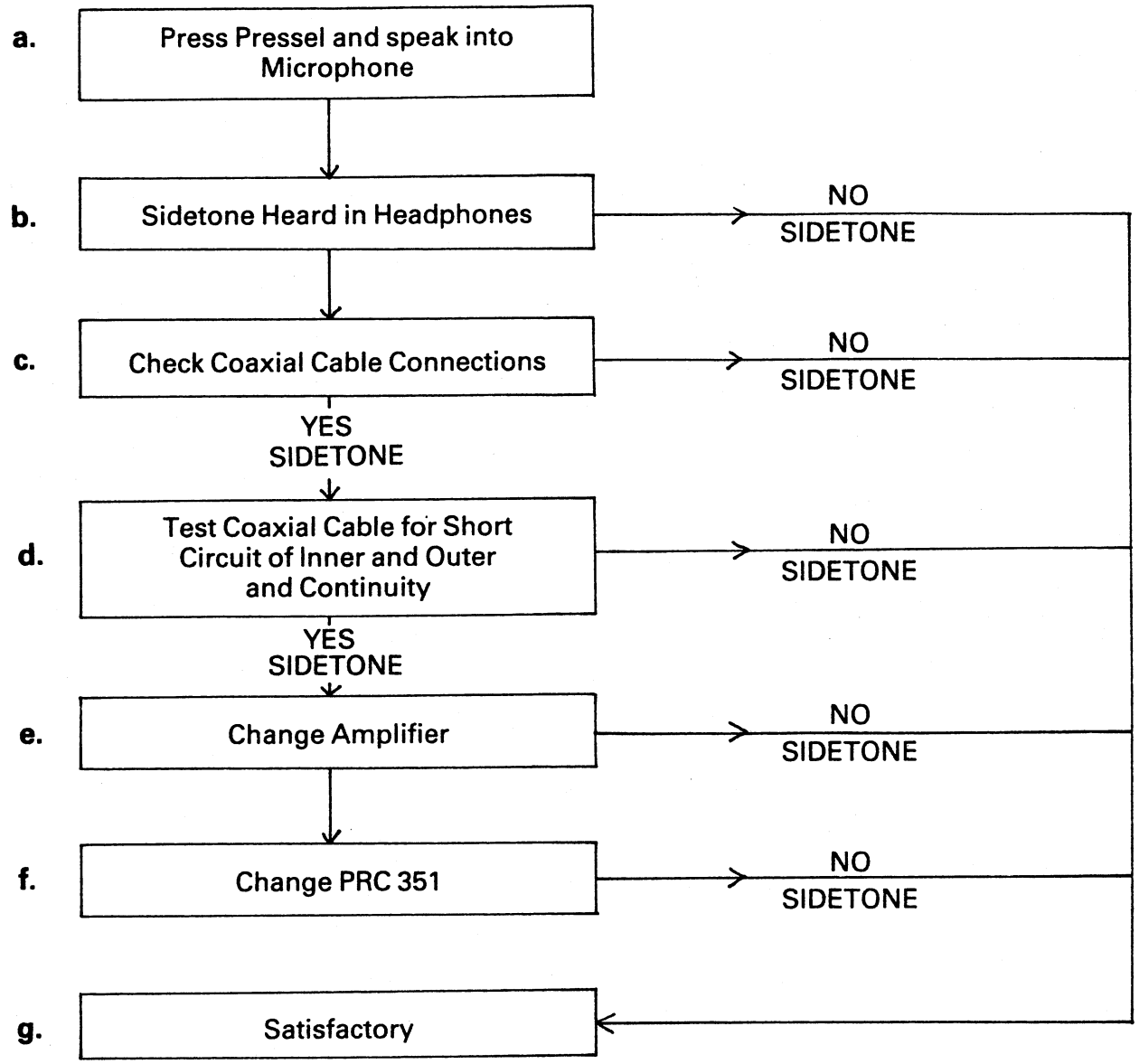
FUNCTIONAL CHECKS – UK/PRC 352

UK/PRC 352 Transmitter Test 1

1. Disconnect the coaxial cable to the amplifier, by removing the plug from the coaxial antenna socket on the PRC 351.

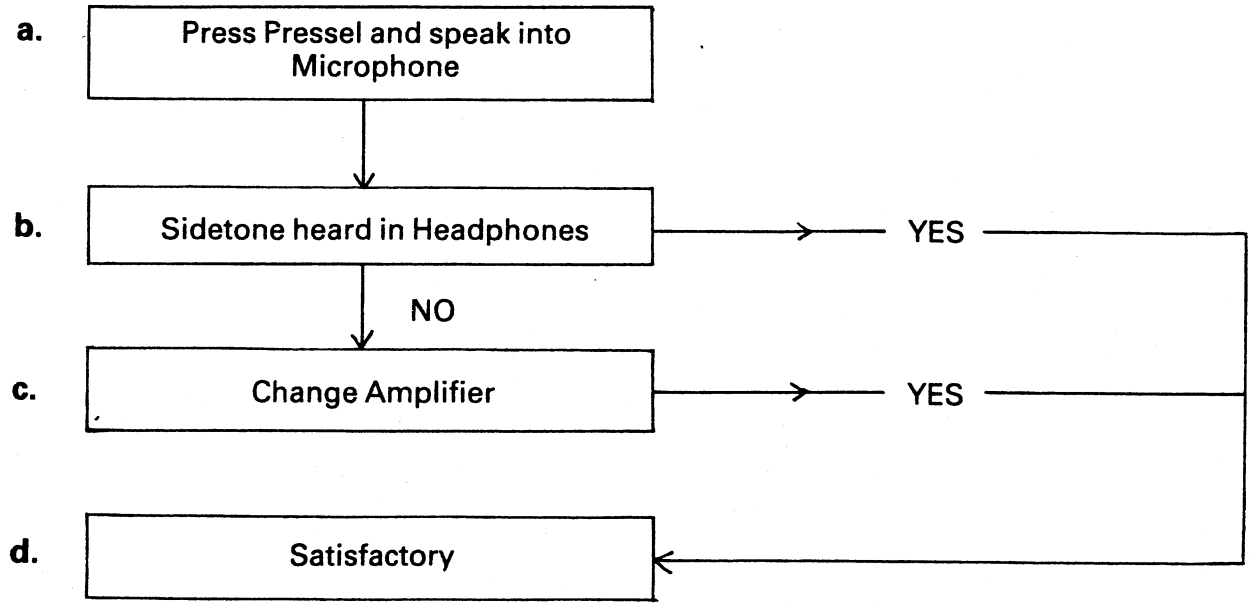
2. Carry out the fault location procedure detailed for the UK/PRC 351, if satisfactory, reconnect coaxial cable and proceed as follows:

3. The ground spike antenna need not be connected. Set the ROS to 'L'. Set the SSW to 'L'. Set the Band switch on the Amplifier to the TEST position.



UK/PRC 352 Transmitter Test 2

1. ***Connect Ground Spike Antenna.*** Set the frequency controls on the radio to 35 MHz 47 MHz and 65 MHz in turn. Set the Band switch to each of the 3 frequency bands in turn. Carry out the following procedure on each of the selected frequencies.



UK/PRC 352 Receiver Test

2. The PRC 352 receiver cannot be fully tested unless a signal is received at the Ground Spike Antenna i.e., a second radio set available.

UK/PRC 351/352 Auto rebroadcast Test

3. The automatic rebroadcast position of the ROS can only be fully tested using a complete rebroadcast system.

4. If a fault occurs; each station check all connections to cables etc., and carry out Fault Location procedure on their equipment. If fault persists change radio at station B and C in turn.

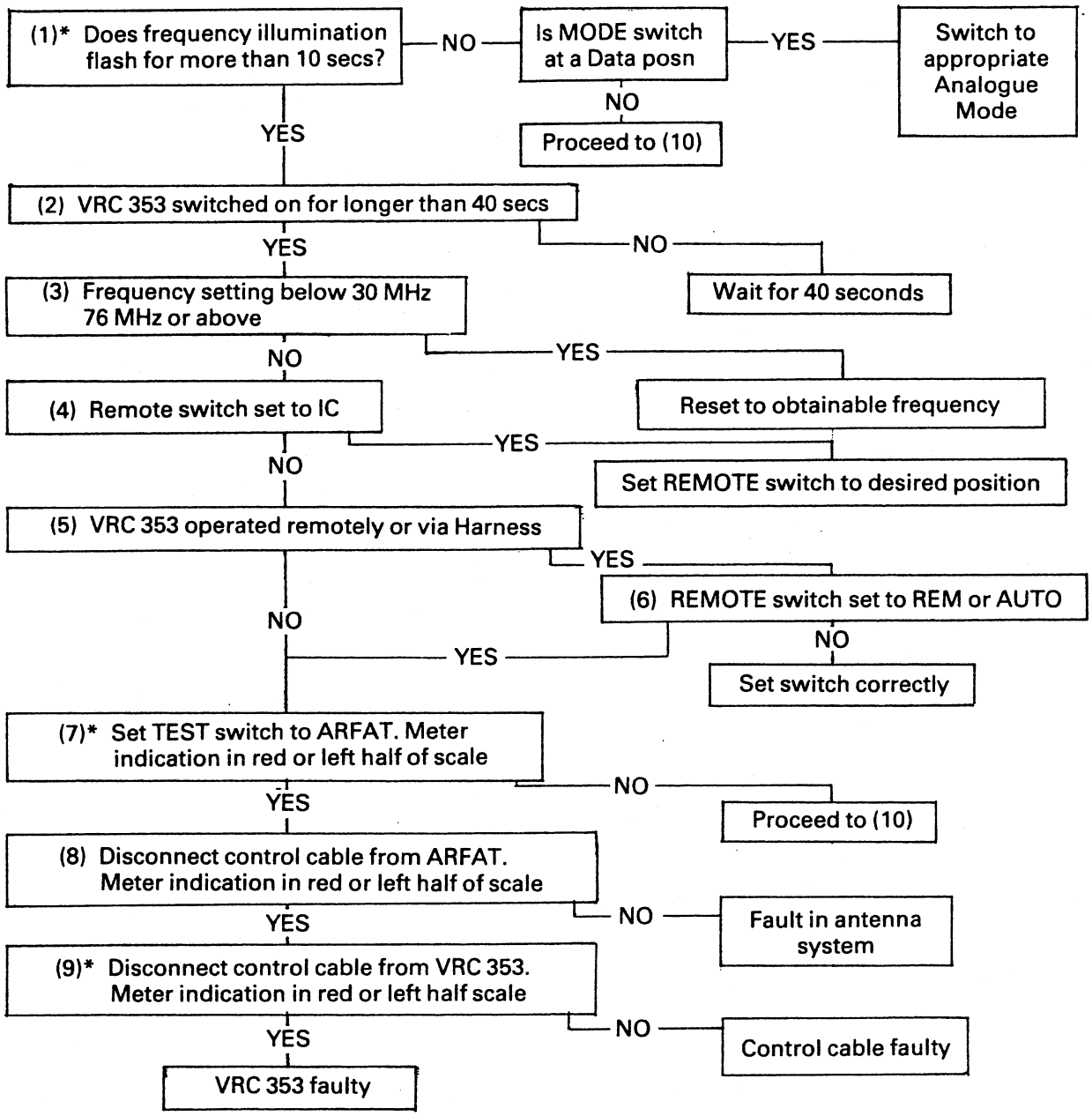
FUNCTIONAL CHECKS – UK/VRC 353

1. It is assumed that the VRC 353 has been connected up as detailed in the Handbook and that one or other of the following fault symptoms are apparent:

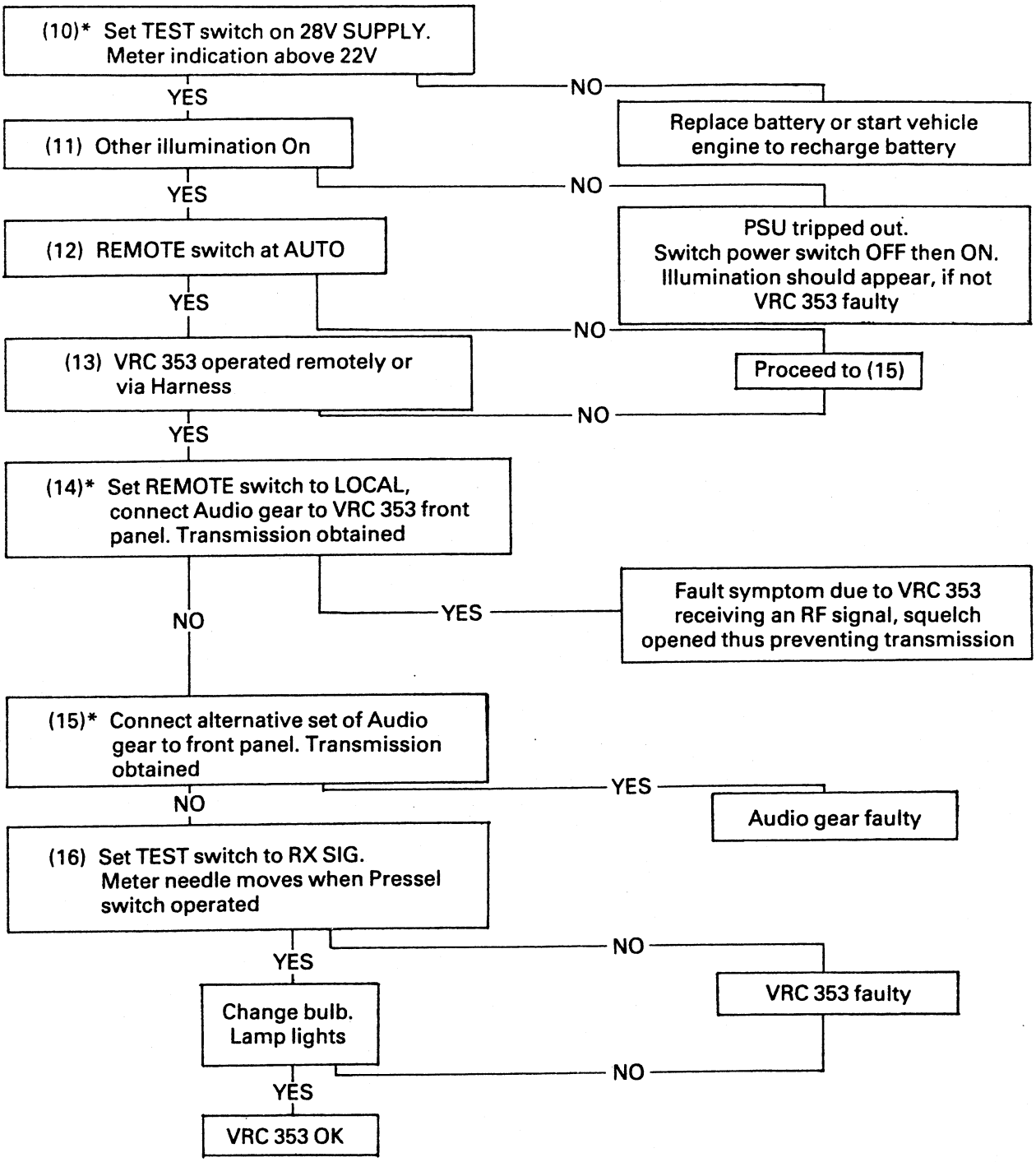
2. ***Fault 1, No Transmission.***

Symptom: TX lamp does NOT light *when pressel switch is pressed* and the TEST switch is set to a position other than *LAMPS OFF or OVERRIDE.*

Note: Press pressel when asterisk * shown.

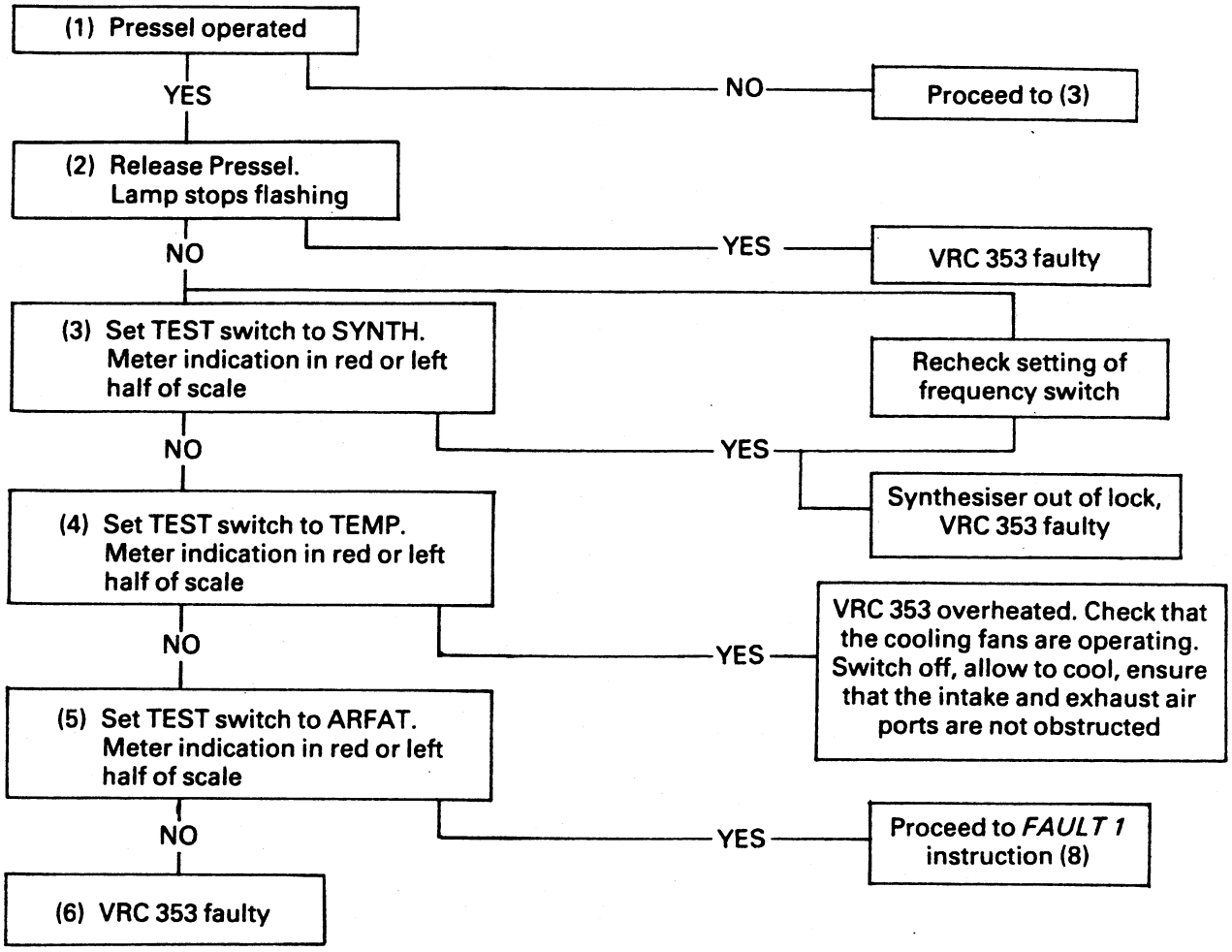


FAULT 1, No Transmission (Contd)



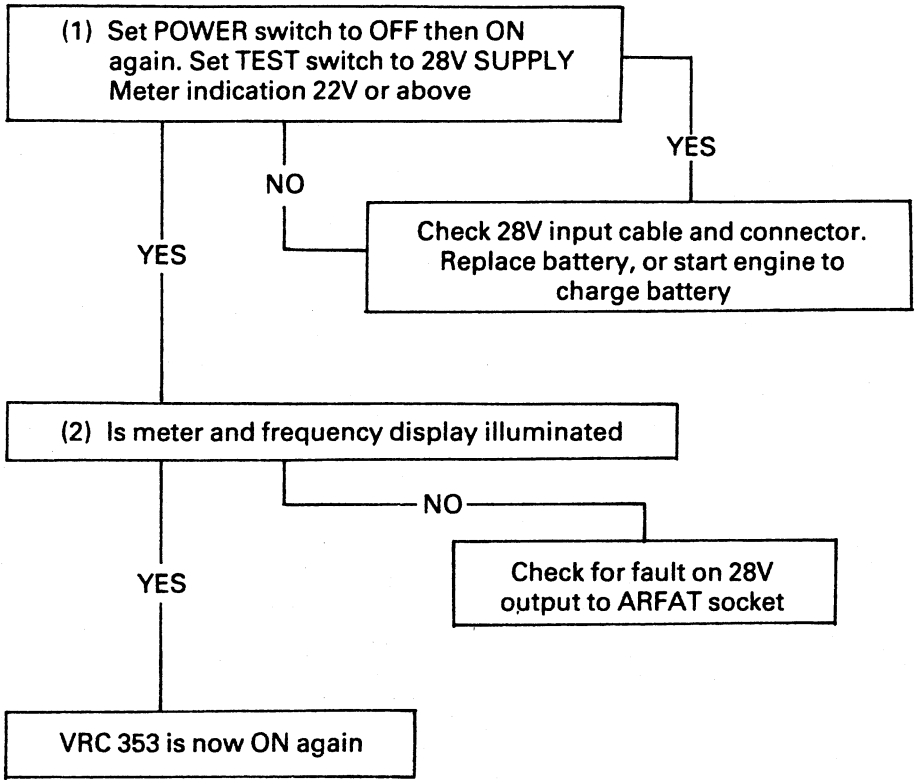
FAULT 2

Symptom: Frequency display illumination flashes for more than 10 seconds.



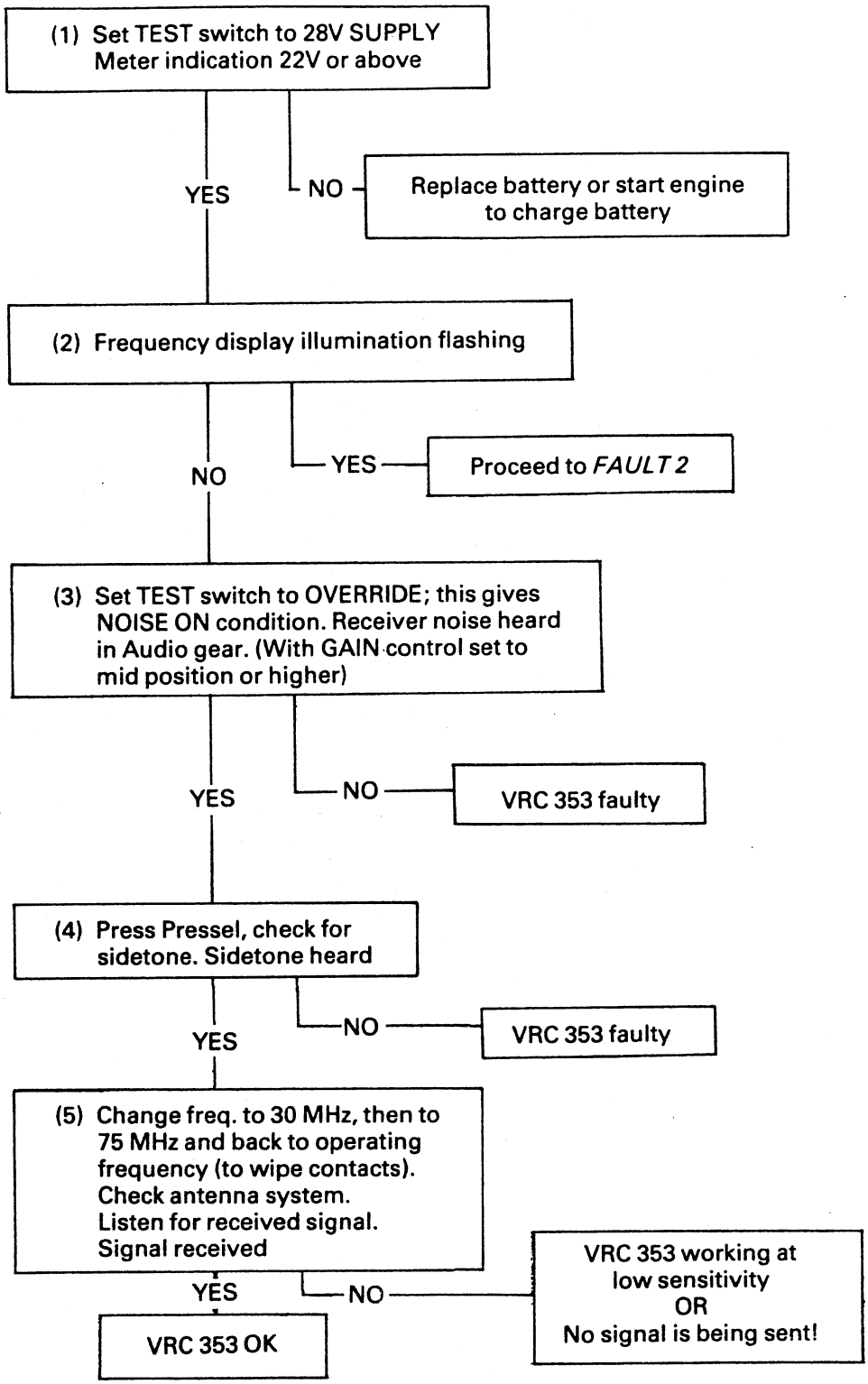
FAULT 3

Symptom: Radio will not switch ON, or repeatedly 'trips out'



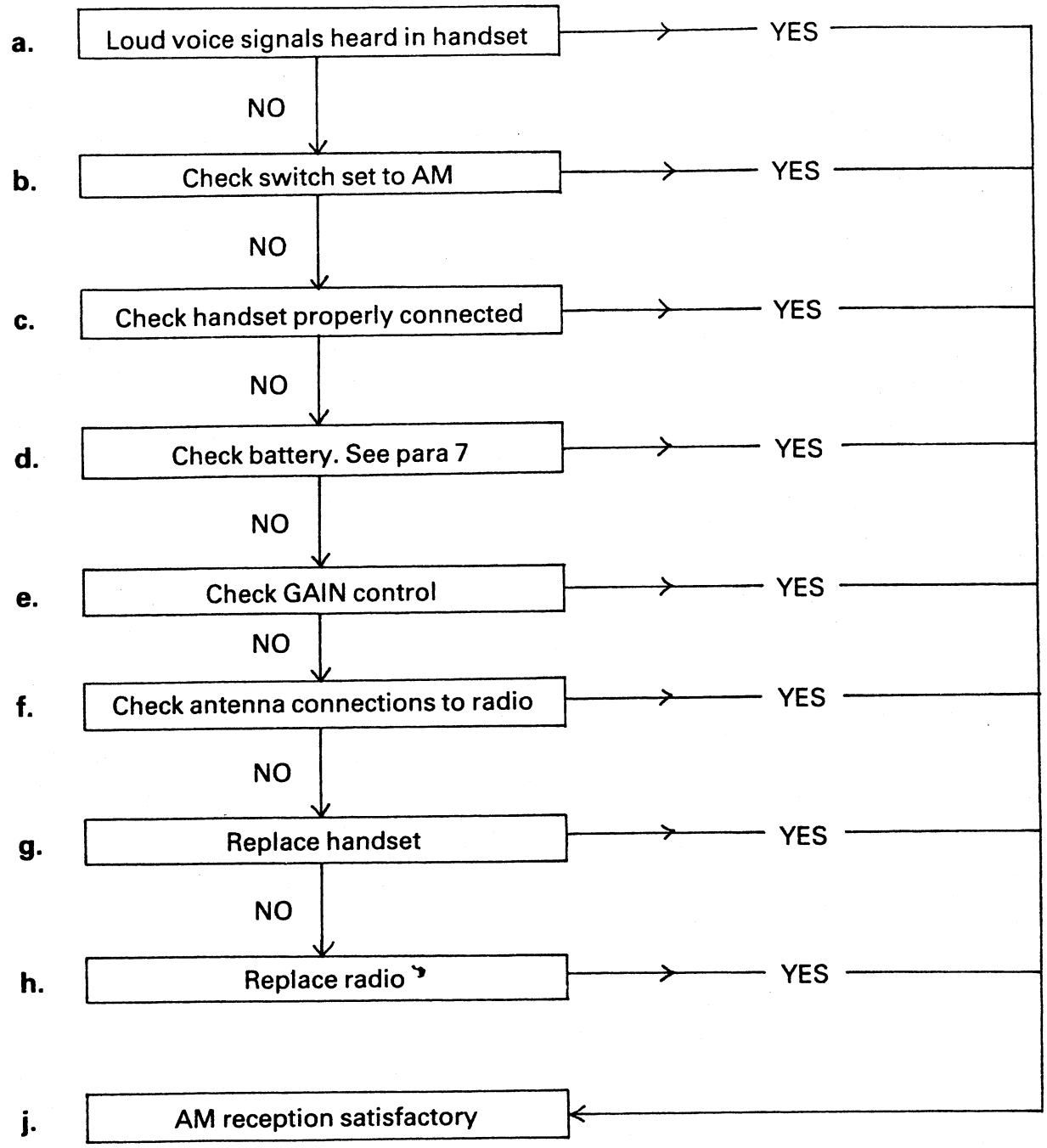
FAULT 4

Symptom: No Signal received

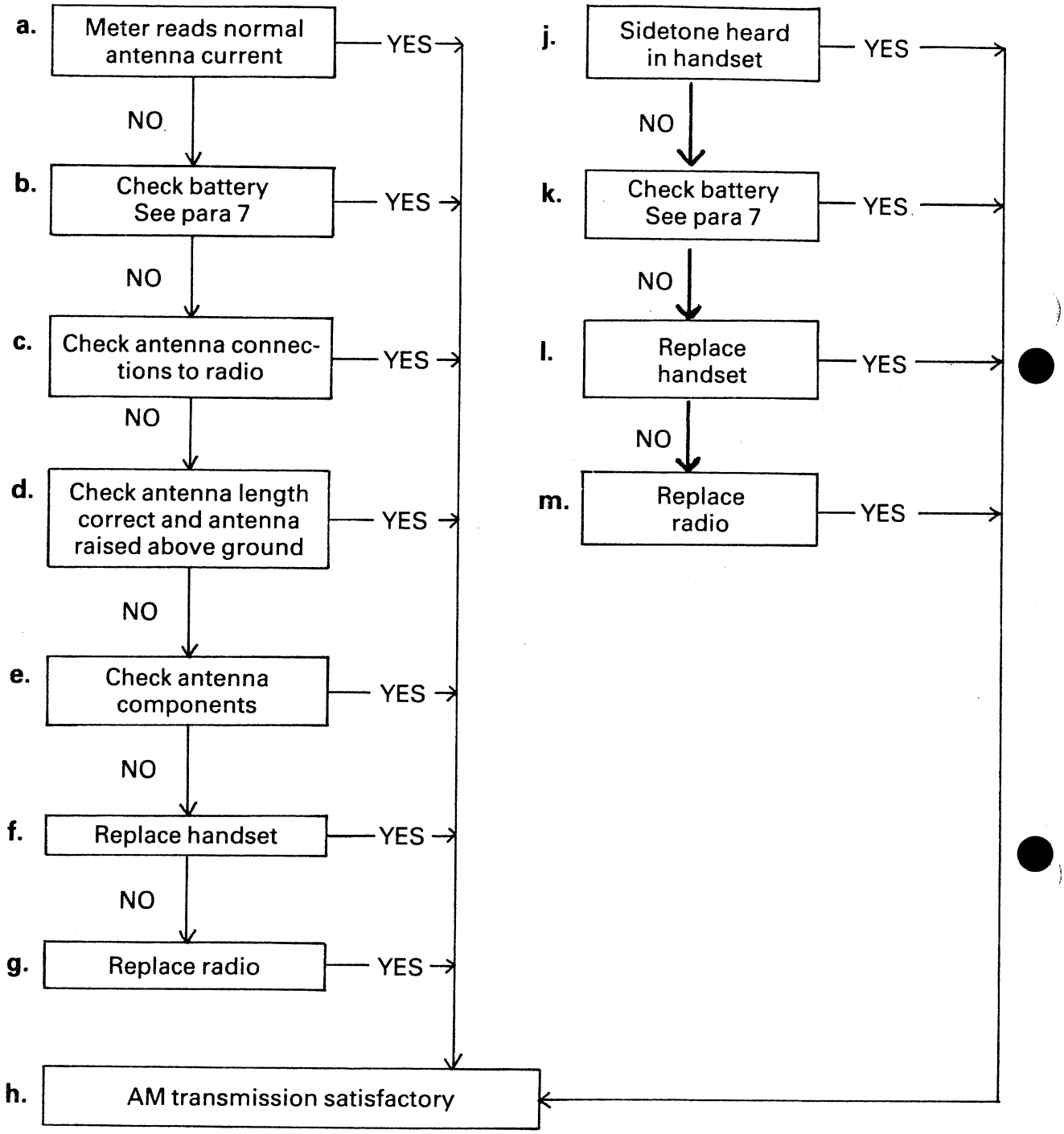


FUNCTIONAL CHECKS – UK/PRC 320

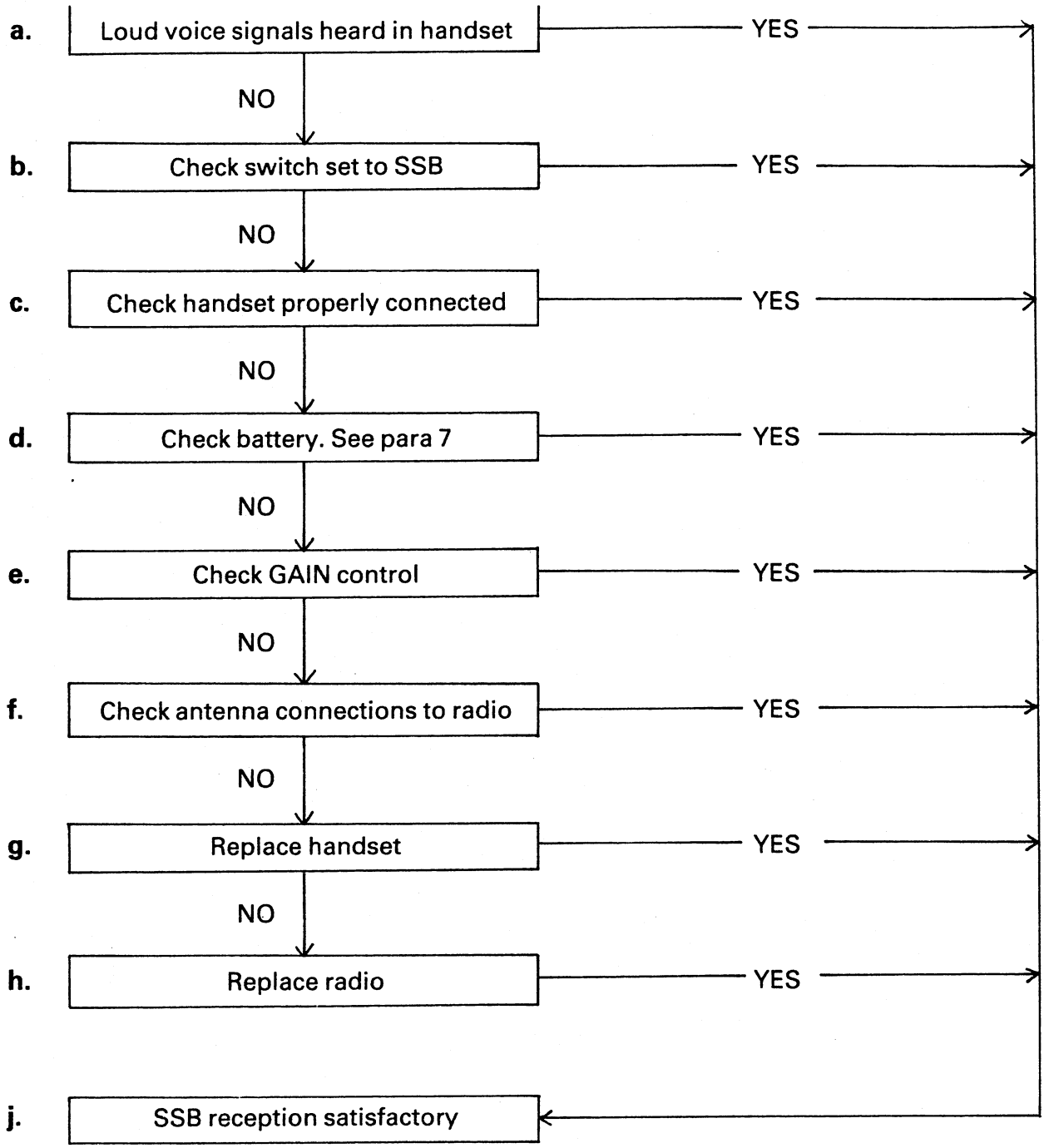
1. ***A.M. reception.*** Set the mode selector switch to AM and the GAIN control as required.



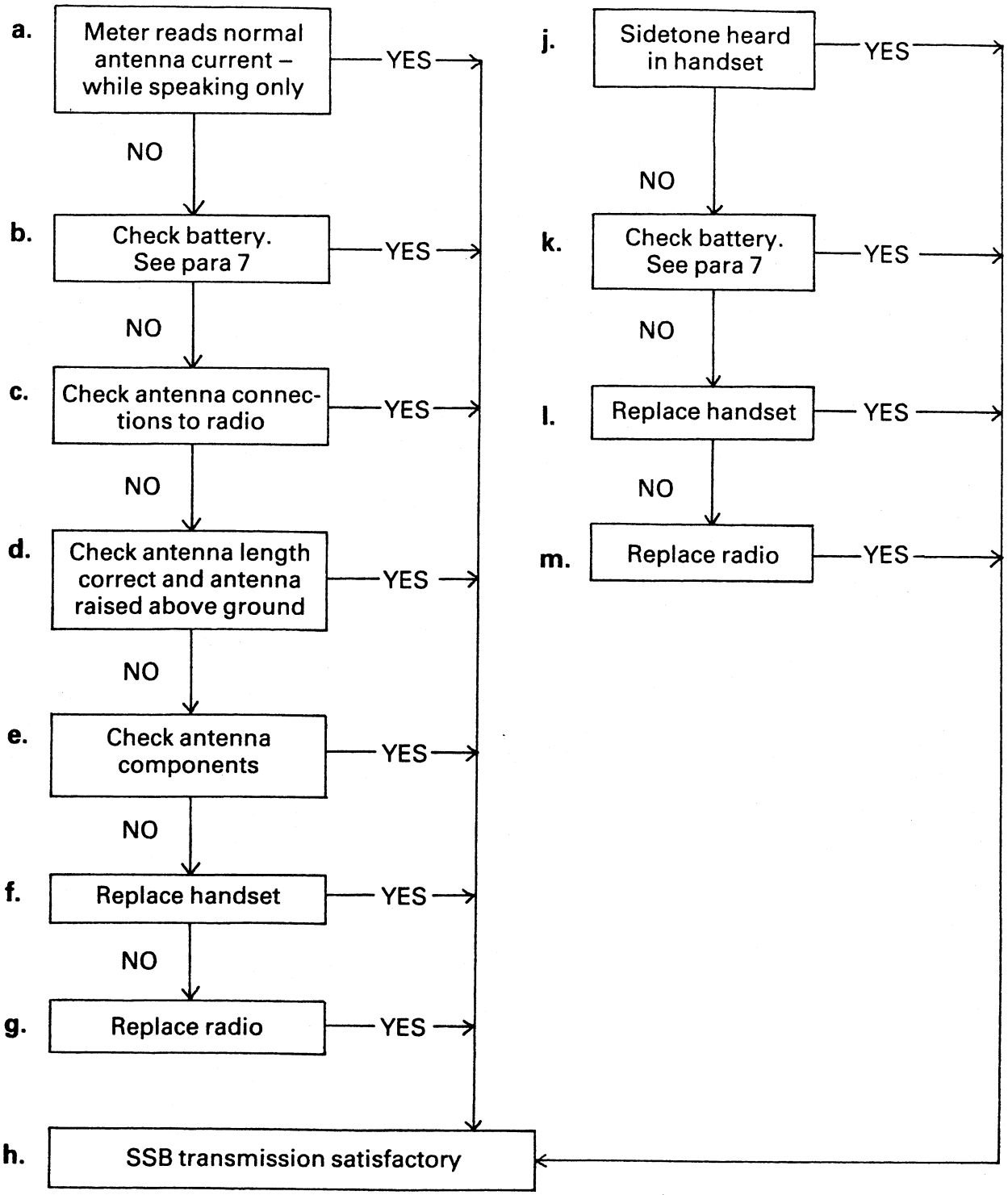
2. ***AM transmission.*** Set the mode selector switch to AM, the GAIN control as required, depress the pressel and speak into the microphone.



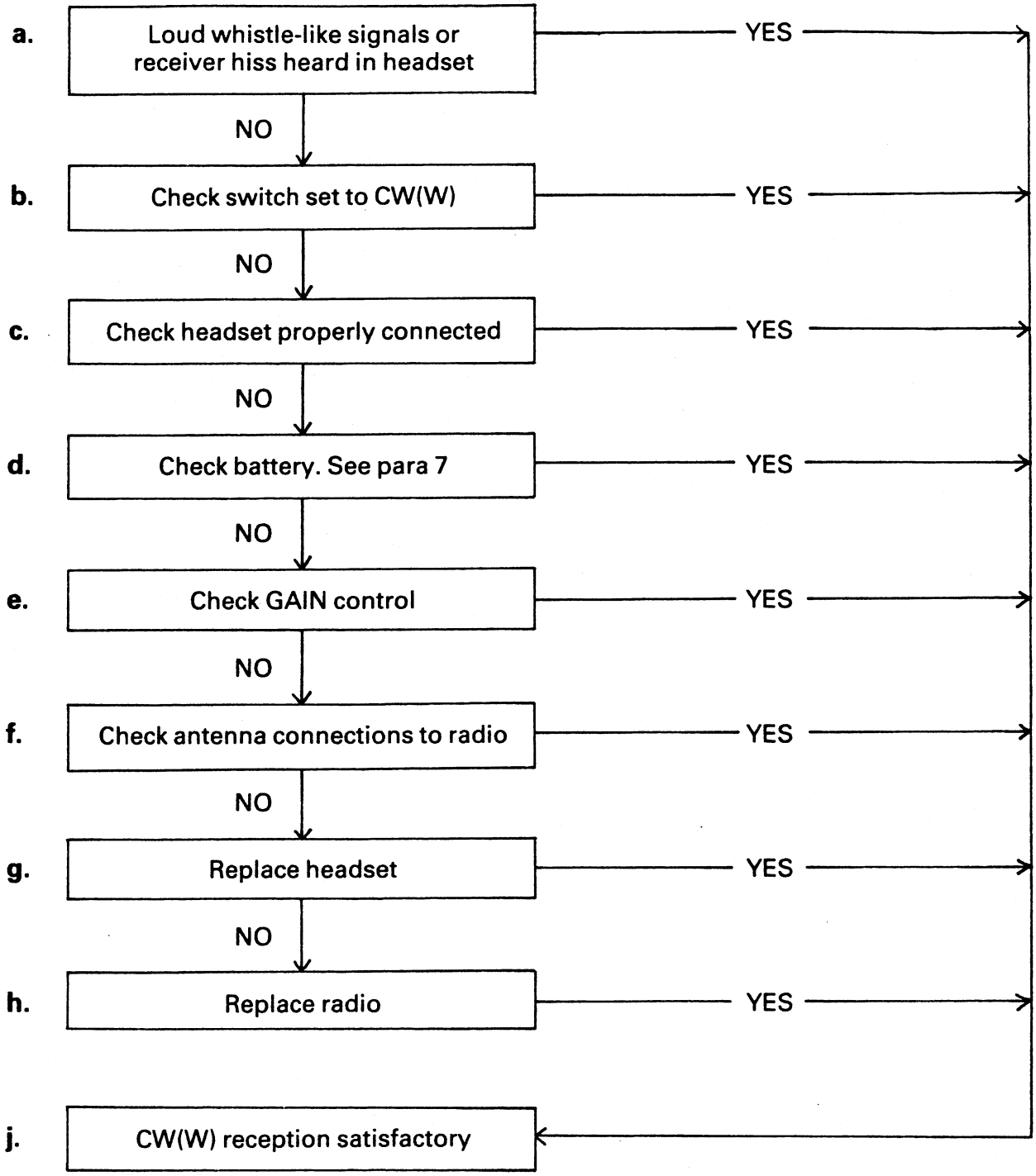
3. ***SSB reception.*** Set the mode selector switch to SSB and the GAIN control as required.



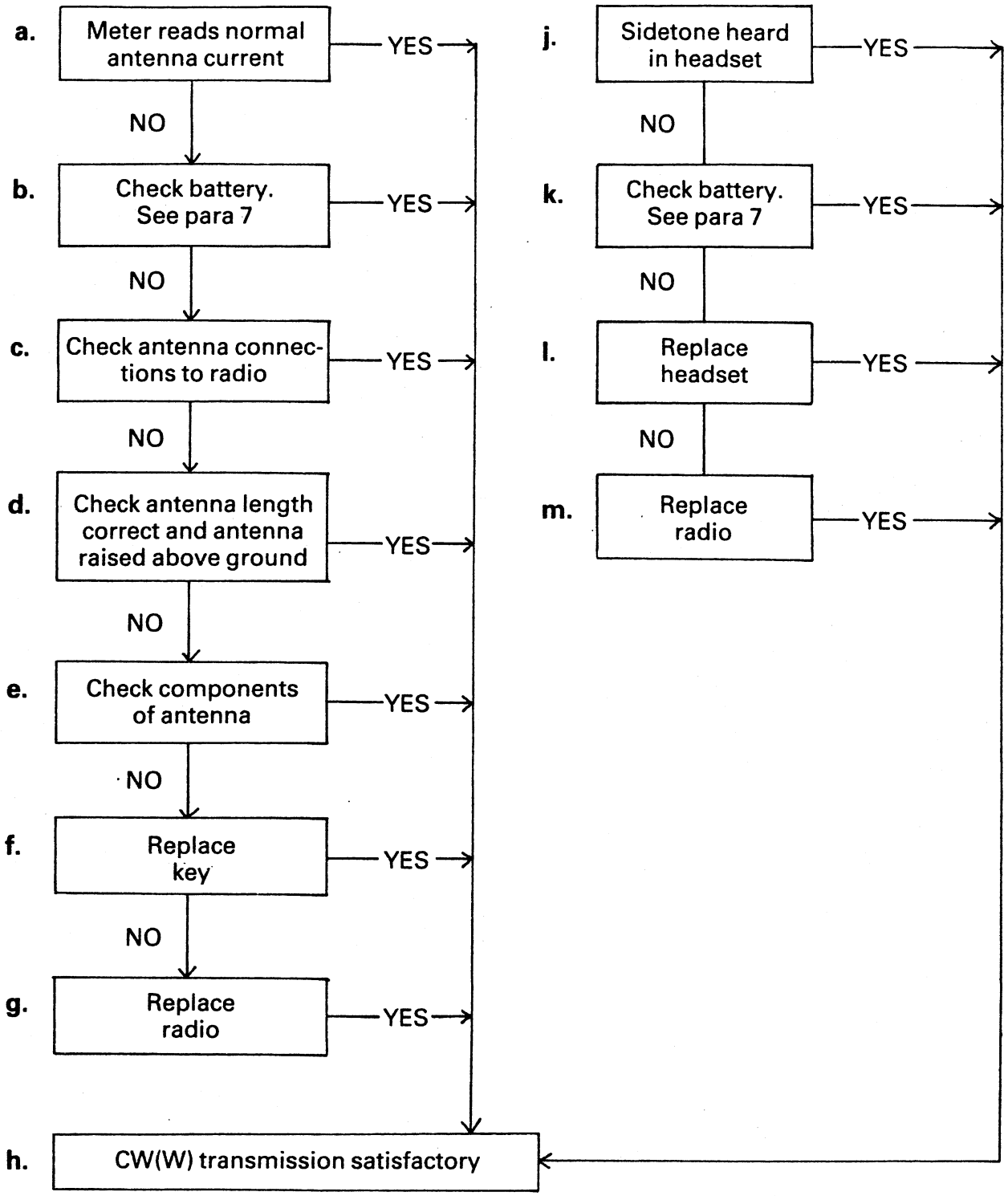
4. ***SSB transmission.*** Set the mode selector switch to SSB, the GAIN control as required, depress the pressel and speak into the microphone.



5. ***CW reception.*** Set the mode selector switch to CW(W) and the GAIN control as required. On completion of the check below, repeat it with the mode selector switch set to CW(N).



6. ***CW transmission.*** Set the mode selector switch to CW(W), the GAIN control as required and depress the morse key. On completion of the check below, repeat it with the mode selector switch set to CW(N).



7. ***Battery Check.*** Check the charge state of the battery as follows:

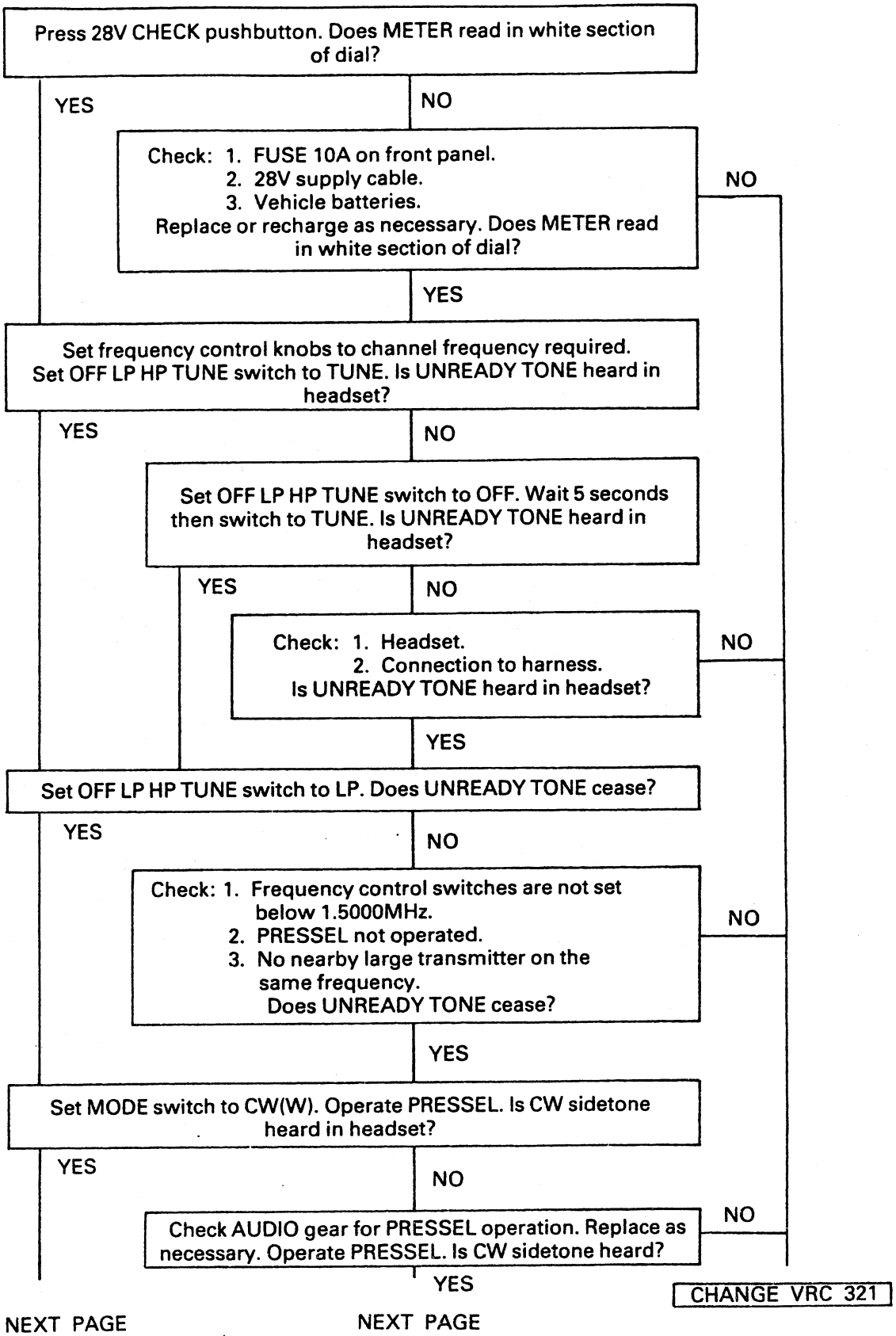
a. Set the transmitter power switch to BATT CHK and the mode selector switch to either of the CW positions.

b. Depress the pressel or the morse key and check that the meter needle registers on or above the second mark on the scale (*the first mark is zero*). Release the pressel. If the needle was below the second mark, replace the battery.

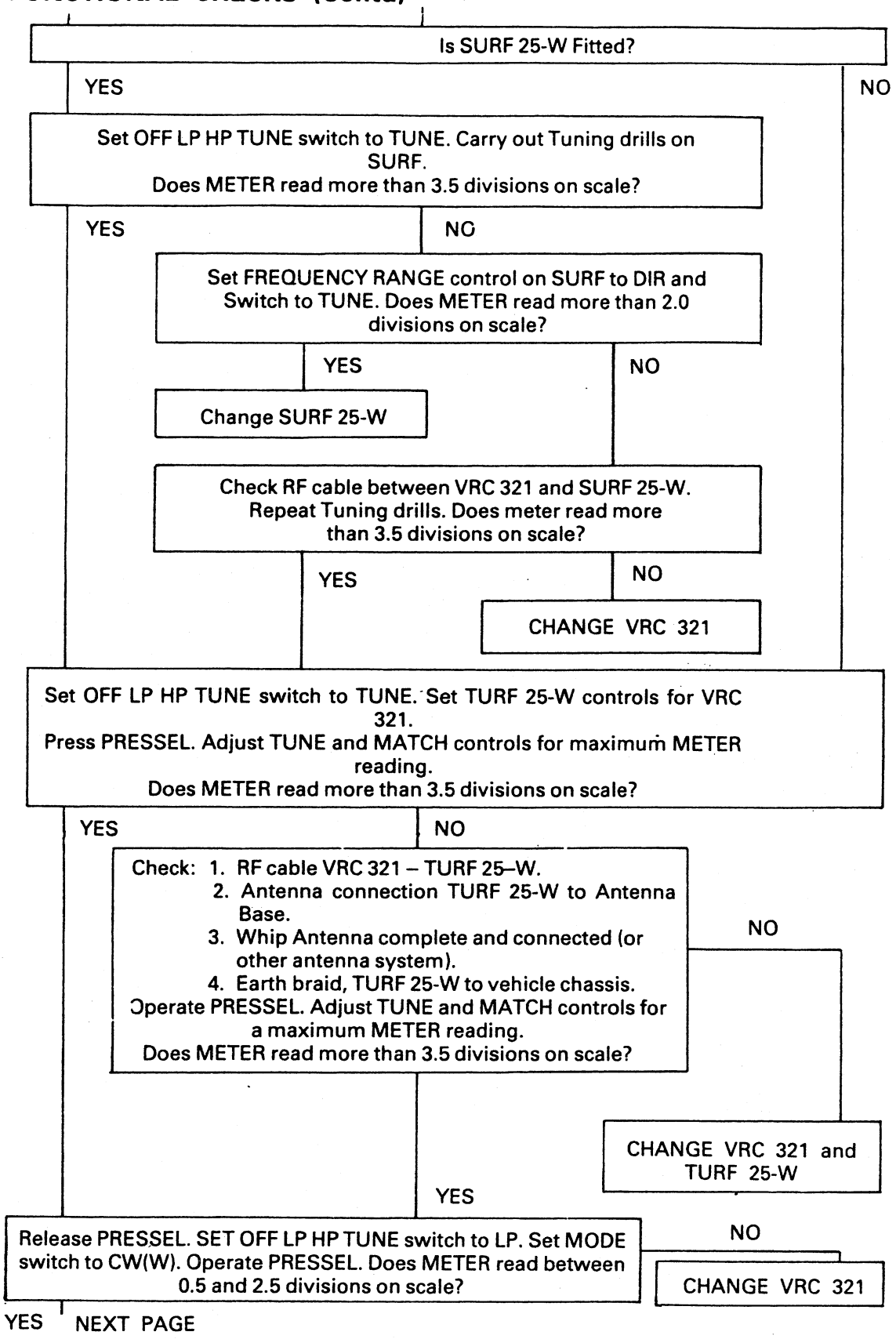
c. Tune the antenna as described in Chapter 2 and recheck the battery as described above.

8. ***Frequency Check.*** The operator can check the frequency accuracy of the PRC 320 by comparing its frequency with that of either a laboratory frequency standard or a standard frequency broadcast. It should be possible to hear one of the standard frequency broadcasts at any time of day, irrespective of location. Details are to be found in Sky Wave Charts, Army Code No. 60123 and Standard Frequency and Time Transmissions in Signals Communications in the Army, Volume III, Army Code No. 70026.

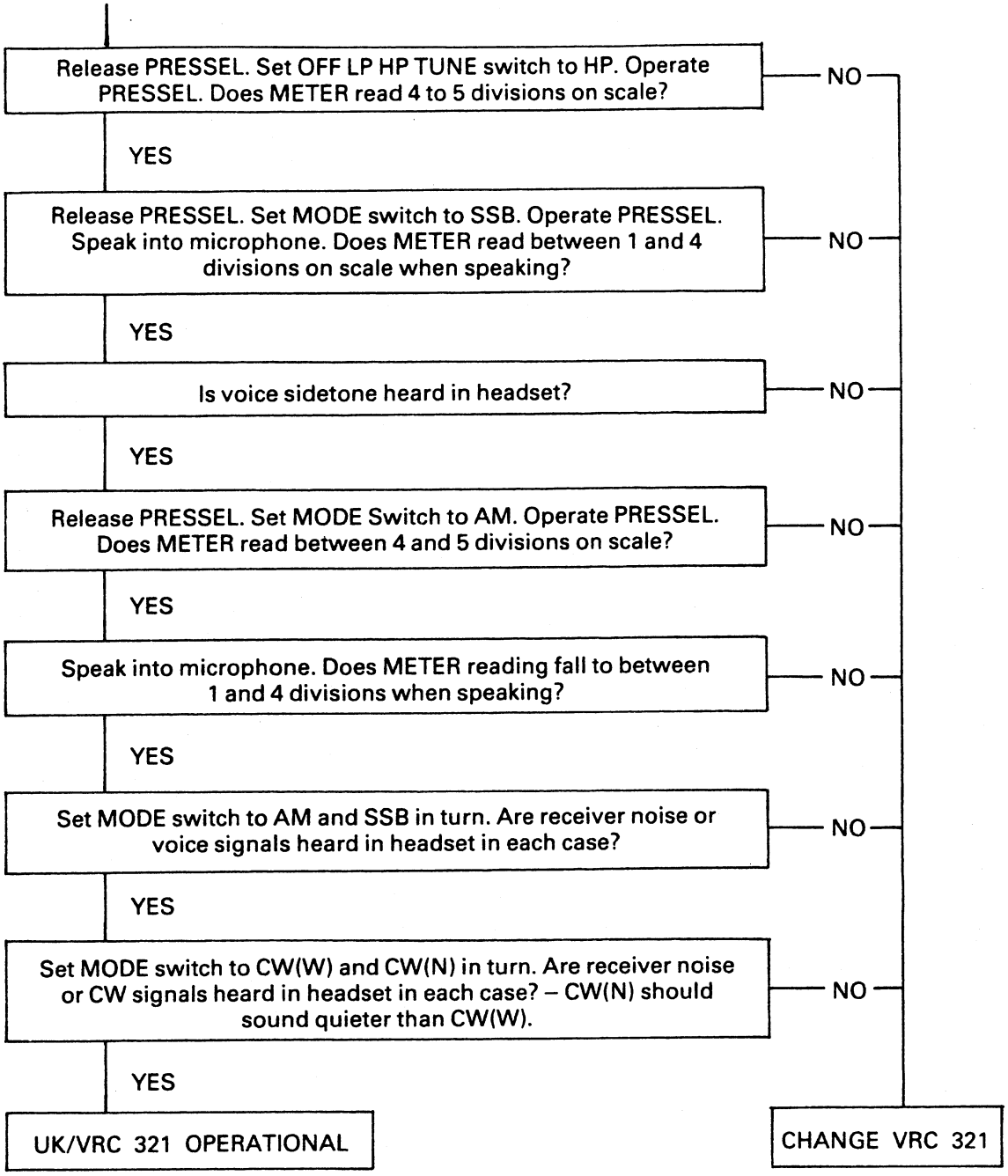
FUNCTIONAL CHECKS – UK/VRC 321



FUNCTIONAL CHECKS (Contd)



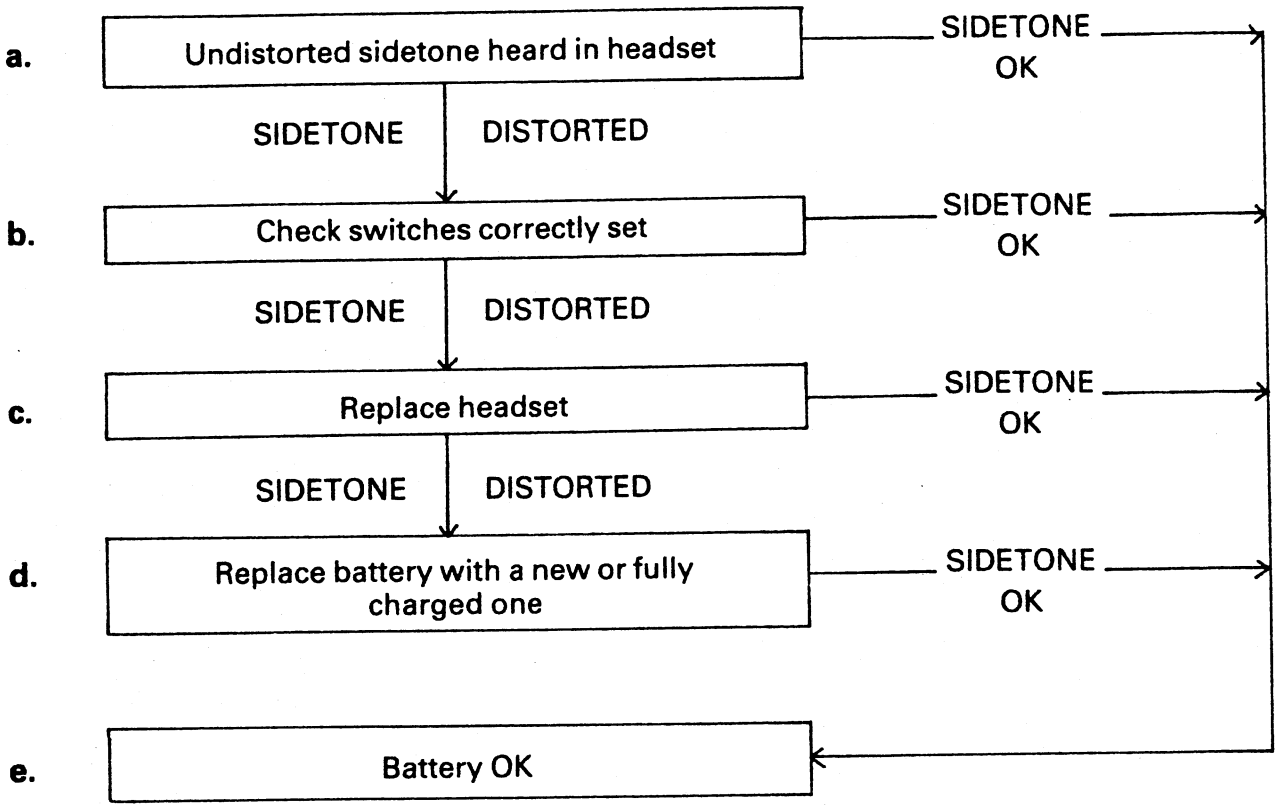
FUNCTIONAL CHECKS (Contd)



FUNCTIONAL CHECKS – UK/PRC 344

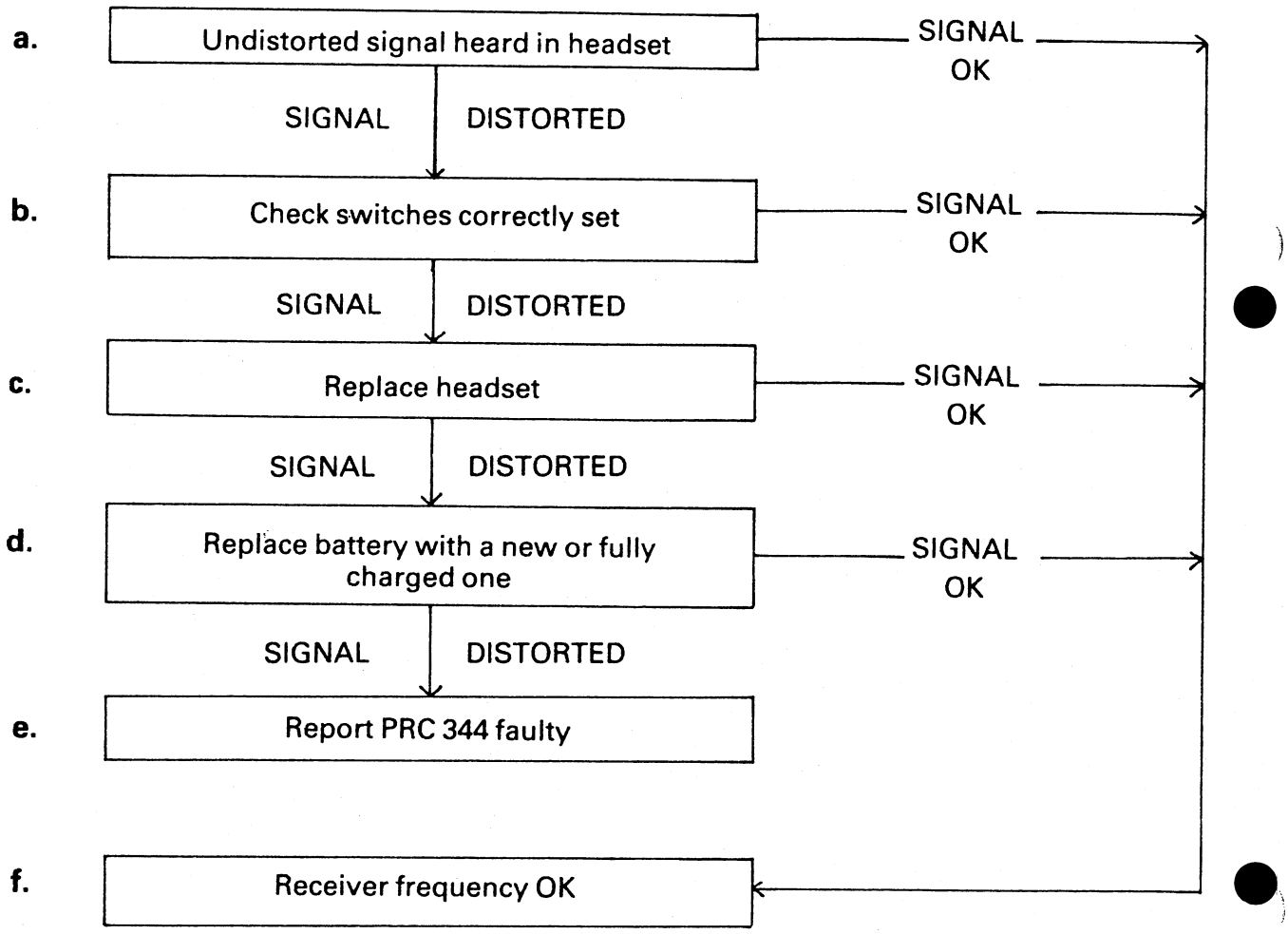
Battery Check

1. Turn the mode selector switch to 'LOCAL'.
2. Turn the 'VOLUME' switch to 3 and, when the equipment is operating, reset the switch to the position which gives the required volume in the headset.
3. Depress the pressel and speak into the microphone.



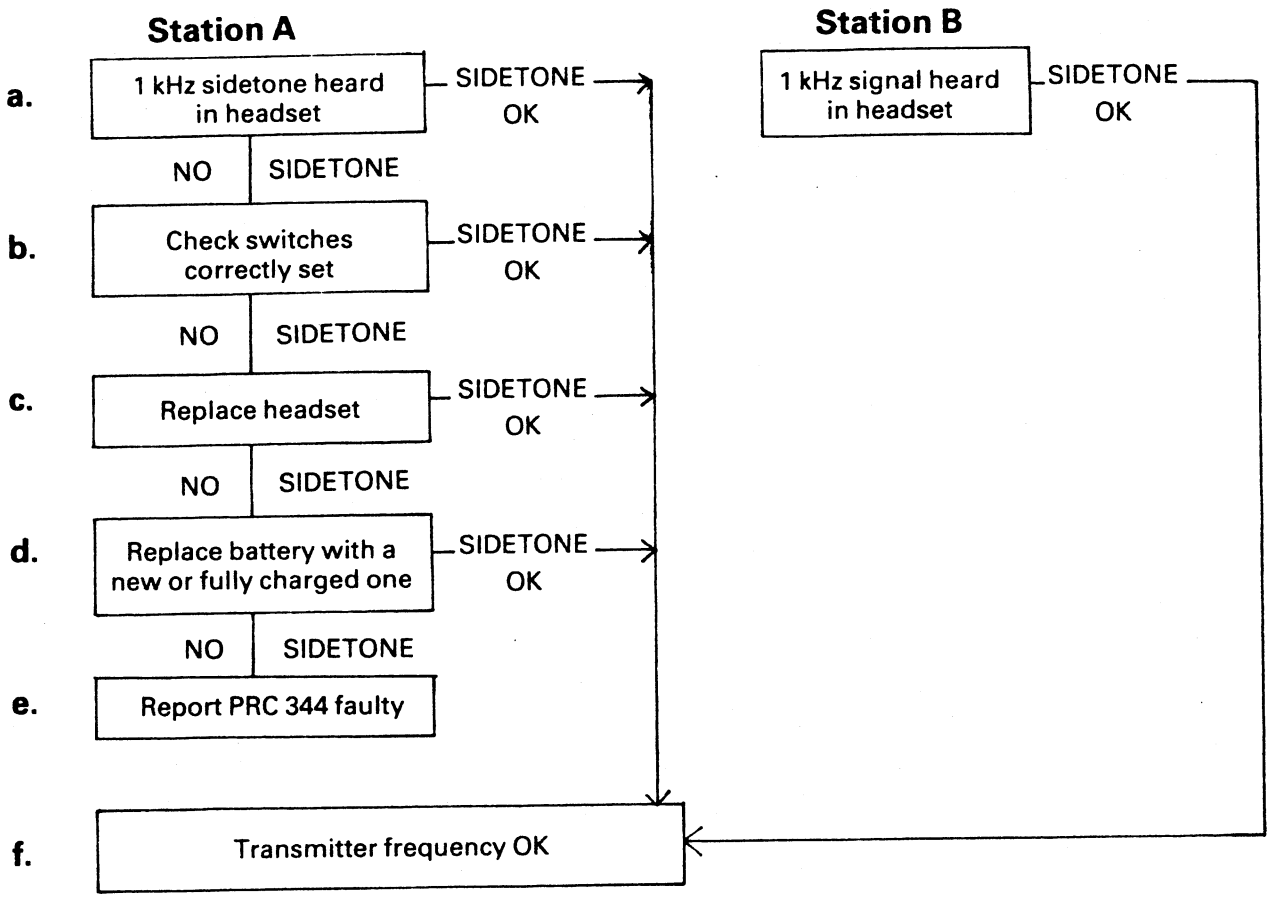
Receiver Frequency Check

1. Set up another PRC 344 at least 10m from set to be checked.
2. Do not connect antennas.
3. On Set A set mode selector to BEACON.
4. On Set B set mode selector to LOCAL and volume control to 3.



Transmitter Frequency Check

1. Set up 2×PRC 344 on same frequency.
2. Place sets at least 10m apart and do not connect antennas.
3. On A Set (*Transmit*) set mode to BEACON.
4. On B Set (*Receive*) set mode to LOCAL.
5. On both sets set volume to 3.



NOTE:

For all further checks refer to User Handbook Army Code 61351.

CHAPTER 3

B VEHICLE INSTALLATION AND CLANSMAN RADIO CONTROL HARNESS

SECTION 14 – INTRODUCTION

General

0301. This chapter is concerned with radio control harness, which through a system of control units and junction boxes, provides a means of controlling up to 3 radios from various positions in a vehicle.

0302. There are 2 types of harness designated as follows:

CLANSMAN Radio Control Harness – Primarily used for AFVs
CLANSMAN 'B' Vehicle Installation – Primarily used for FFR Landrovers

Aim

0303. The aim of this chapter is to provide an aide memoire for instructors teaching radio harness.

0304. Reference:

	User Handbooks		Army Code
1.	Radio Station	UK/PRC351/352	61128
2.	Radio Station	UK/VRC 353	61393
3.	Radio Station	UK/PRC 320	61123
4.	Radio Station	UK/VRC 321	61253
5.	CLANSMAN Radio Control Harness		61172
6.	CLANSMAN Radio Installations in Trucks, ½ tonne and ¾ tonne FFR and GS		61590 (Pts 1 and 7)

Teaching Techniques

0305. In the main harness is taught at Regular User and Standard II signaller level. It is for the Signal Officer to decide who is to have the various harness skills laid down in the training objectives. Generally this decision will be governed by the role or likely role of the battalion. Users and signallers will only become proficient in the harness of their concern with regular practice; class room *'Mock Ups'* are of immense value in providing this.

SECTION 15 – B VEHICLE INSTALLATION

General

0306. The CLANSMAN 'B' Vehicle Installation consists of a normal 2 or 3 set fit, with the addition of the *Remote Combining Unit* or *Set Combining Box.*

0307. ***Installation*** *(Fig 60 shows interconnections of installation).* All sets to be used in the 'B' Vehicle Installation are fitted as normal using normal power supply and antenna outlets. If the PRC 320 is in use it should be fitted on the right hand side behind the driver.

0308. Once the sets are fitted the RCU can be connected into the vehicle. Normal interconnections between the 2 selected radios and the RCU are made using D10.

0309. For a 3 set installation which includes the PRC 320 a CRSL/R is needed if the HF set is to be connected to the RCU. *(It is recommended that the HF set is normally independent.)*

0310.–0320. *Reserved.*

SECTION 16 – CLANSMAN RADIO CONTROL HARNESS
('A' Vehicle) (Fig 61)

General

0321. The CLANSMAN Radio Control Harness is an interconnected system of operating, junction and adaptor boxes, and audio gear, which permits the use of up to 3 CLANSMAN radios of the VRC 321, VRC 353 type, from various positions in a vehicle, and which also provides intercommunication between these positions which is independent of the radios. These facilities are also available in part to a remote user via a 2 wire line up to 3km *(2 miles)* long using D10 cable.

0322. The harness can also be used to provide rebroadcast facilities, which may be automatic or manually controlled, between 2 of the installed radios, or between any installed radio and a remote radio connected into the harness system by a 2 wire line as described above.

0323. The basic control harness is intended for use with a one or 2 radio installation, which form the majority of vehicle radio installations. It is a single system suitable for all such vehicle installations, the varying requirements being met by different arrangements of the standard range. The boxes are connected in series and the free ends may be joined by a standard cable, to give a measure of protection against cable failure.

0324. Three radio installations are built up from the basic 2 radio harness by adding boxes which provide the extra channels and control functions required.

0325. By using a *Harness Adaptor Box,* CLANSMAN manpack radios may be connected into the harness as if they were vehicle radios, and full facilities, including manual and automatic rebroadcast, where appropriate, are available.

0326. When using radio or IC, the operator hears transmit side tone in his headset. The side tone is heard in both ears if he is working radio or IC only.

When working radio or IC and monitoring another radio or IC, the working signal is heard in the left ear and the monitored signal in the right ear. This can be remembered by looking at the *Crew Box* volume controls, WORKING – left hand, MONITOR – right hand. An exception to this side tone rule is the rebroadcast operation from the *Interconnecting Box 2 Radio.*

0327. If, in certain armoured vehicles, a *Centralized Warning Indicator* (CWI) is fitted to give audible warning of certain incidents or failures, this warning can be fed into the harness system.

0328. The harness system operates from a nominal 28 volt DC supply derived from the vehicle electrical supply, or from a separate radio supply if it is fitted.

0329. The harness boxes are of cast light-alloy construction. Plug and socket connections are made at the sides, top or bottom of the boxes, and with minor exceptions, the controls are on the front face. Control boxes are flanged so as to protect knobs and switches. Boxes are fitted with flexible belting which retains the same stud fixing as the earlier LARKSPUR harness.

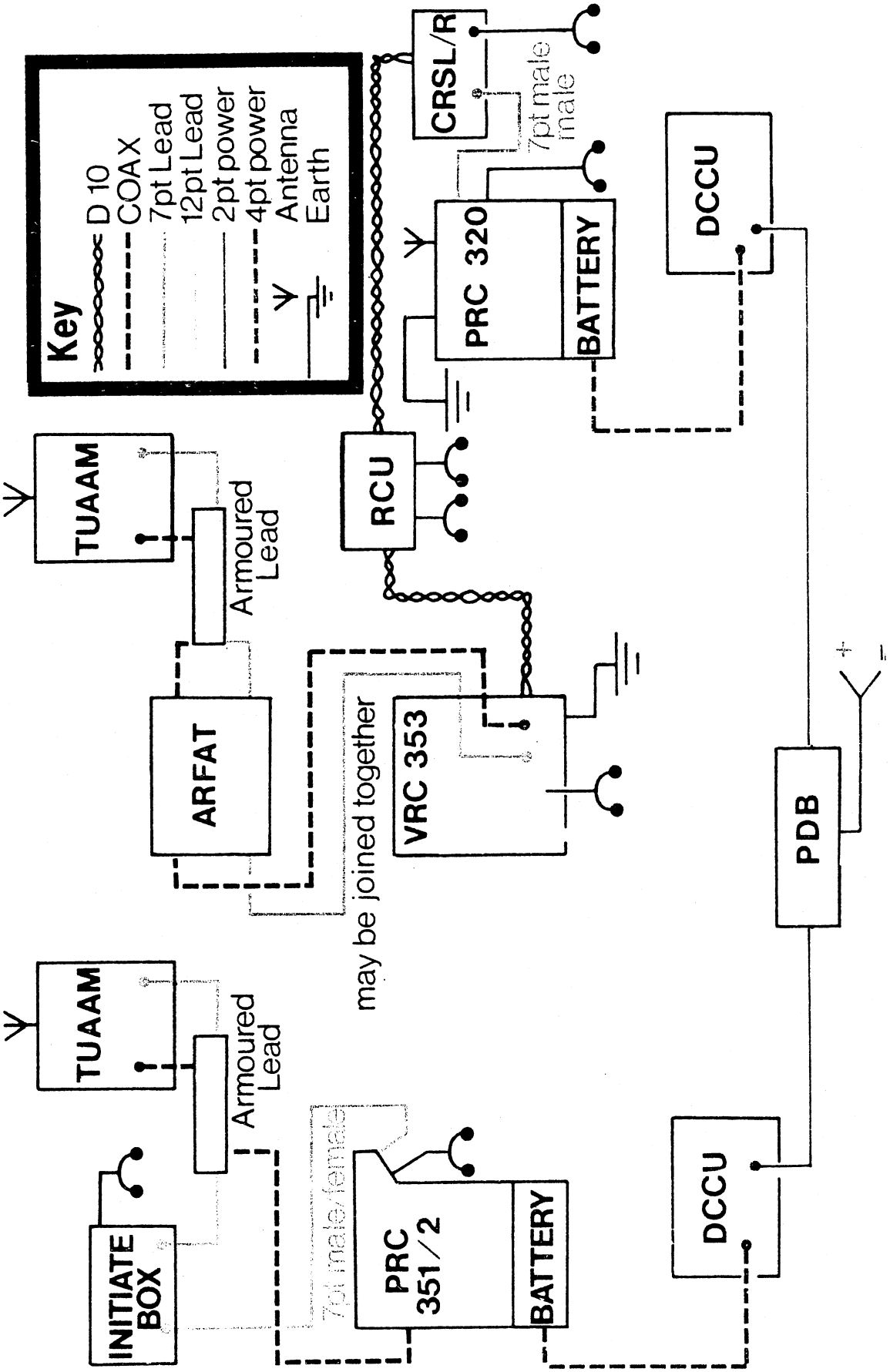


Fig 60.—'B' Vehicle Installation.

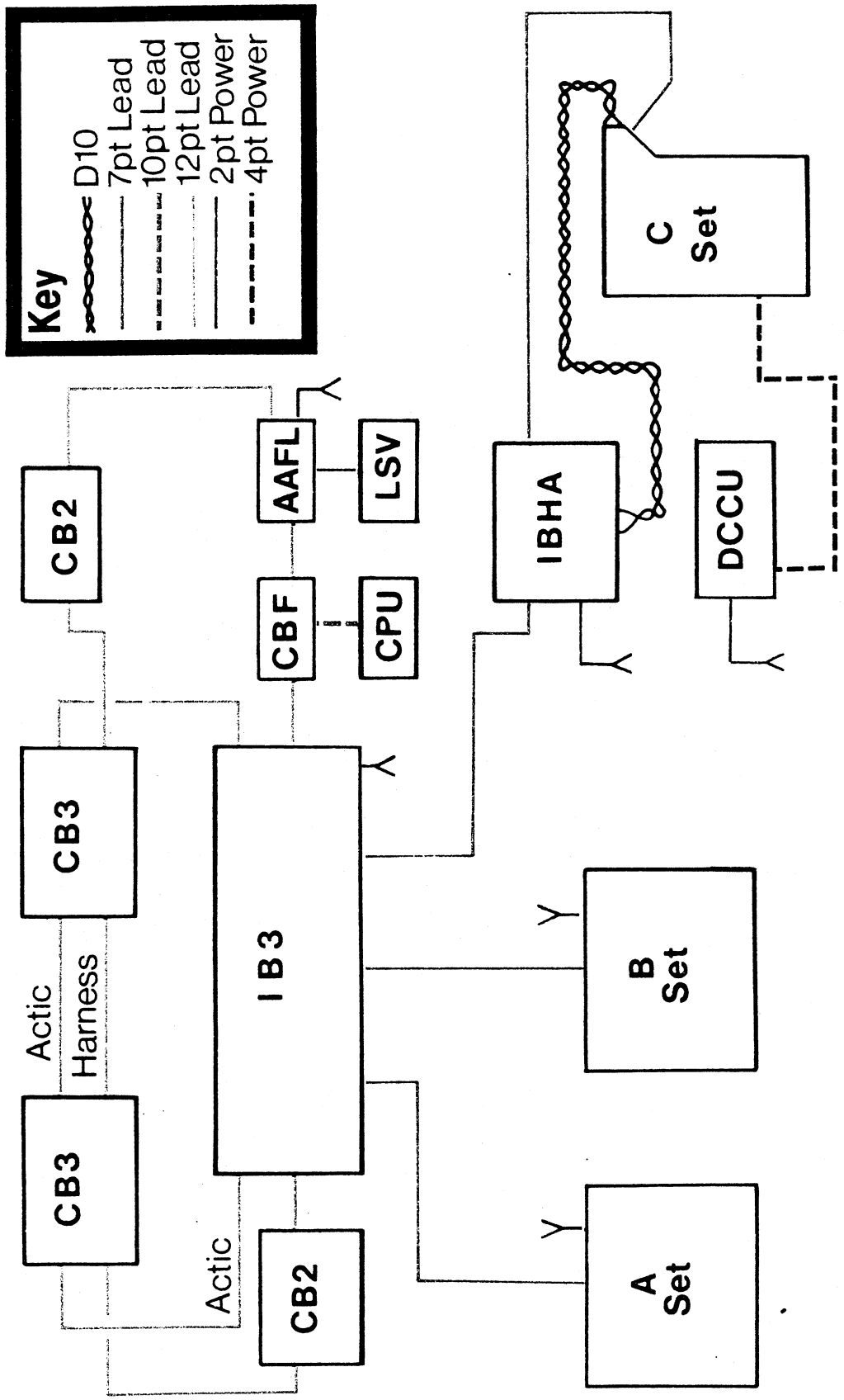


Fig 61.—'A' Vehicle Installation Layout.

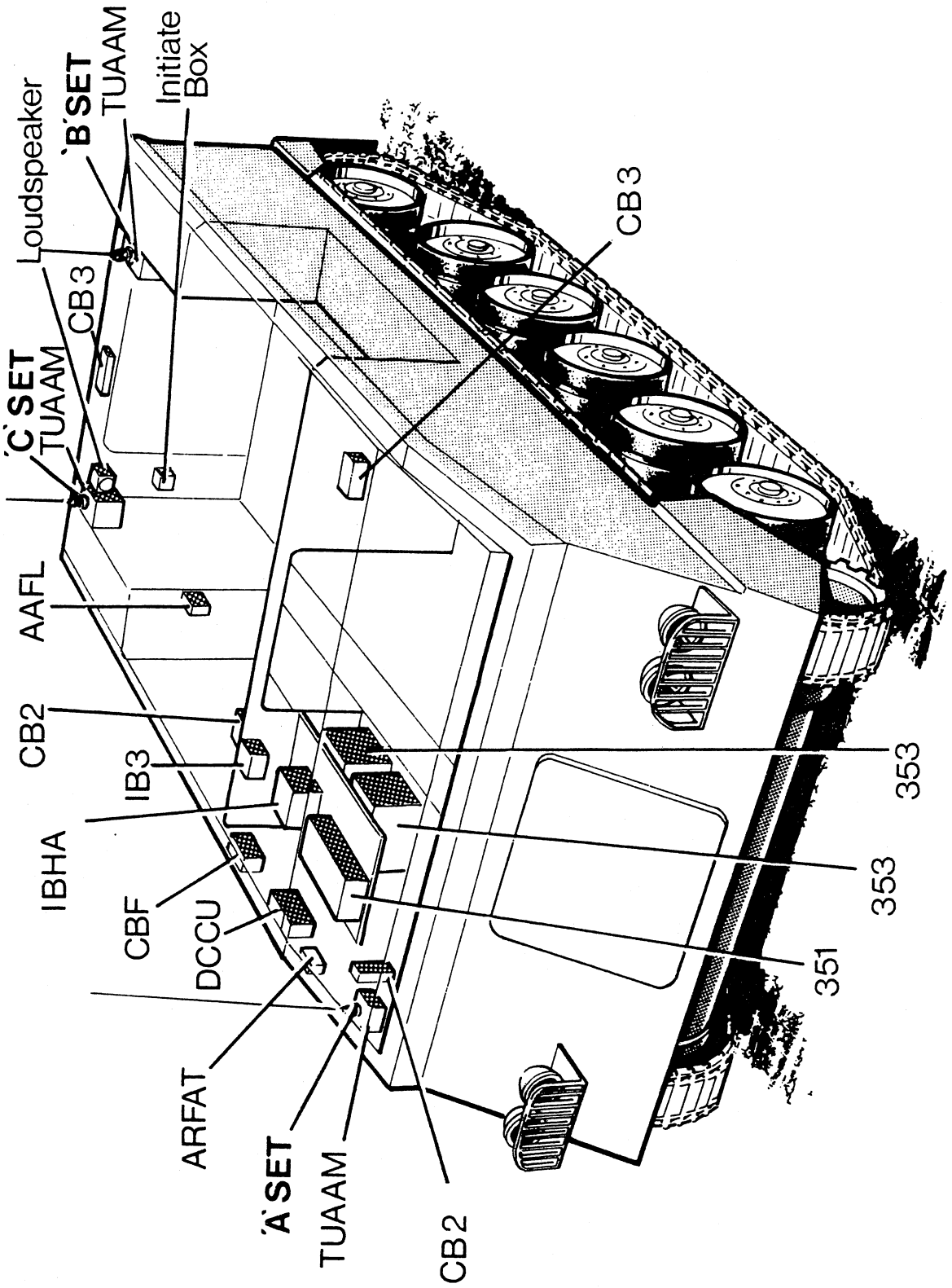


Fig 62.—Vehicle Radio Installation.

SECTION 17 – ITEMS OF THE HARNESS

General

0330. In this section an illustration and a brief written description of each item is given, and where appropriate, as in the case of an operating box, there is a diagram giving switch positions and related facilities.

0331. Cable assemblies are dealt with, and are referred to by the number of conductors in the cable and its application.

0332. CLANSMAN radio sets and CLANSMAN vehicle installations using the control harness are dealt with in separate chapters. The actual arrangement of radio sets and harness are shown in Figs 61 and 62.

0333. This section does not go into any detail regarding the operation of CLANSMAN radios, but it does refer to the switching of radios in connection with the rebroadcast and remote control facilities that can be provided by the control harness.

Crew Box 2 Set *(Fig 63)*

0334. ***The Crew Box 2 Set (CB 2)*** is the general purpose selection and control box. It enables the user to select and operate one of the 2 installed CLANSMAN radios and monitor the other and have intercommunication and O/R facilities.

0335. ***Facilities.***

Switch position		Facility
Working	Monitor	
A_B	OFF	Work 'A' set; press to talk; signal in both ears.
A_B	ON	Work 'A' set; press to talk; signal in left ear. Monitor 'B' set; signal in right ear.
B_A	OFF	Work 'B' set; press to talk; signal in both ears.
B_A	ON	Work 'B' set; press to talk; signal in left ear. Monitor 'A' set; signal in right ear.
I_A	OFF	Intercomm; press to talk; signal in both ears.
I_A	ON	Intercomm; press to talk; signal in left ear. Monitor 'A' set; signal in right ear.

Switch position		Facility
Working	Monitor	
O/R (Over-ride, spring loaded)	–	Voice call without use of pressel; heard by all crew members. Revert to I_A for subsequent communication. An O/R call from any other control box in the harness replaces the signal in the CB-2 operator's right ear, irrespective of any switch settings. The loudness of the O/R call will depend on the MONITOR – VOL setting.
A_B or B_A	LIVE IC	Microphone live – talk on IC; monitor IC in right ear. Press to transmit on selected 'A' or 'B' set; signal in left ear.
A_B or B_A	+	Microphone live – talk on IC; monitor 'B' or 'A' set and IC in right ear. Press to transmit on selected 'A' or 'B' set; signal in left ear.

Crew Box 3 Set *(Fig 64)*

0336. ***The Crew Box 3 Set (CB3)*** is used in the special case of a 3 radio installation and is used in conjunction with the *Interconnecting Box 3 Radio.* It enables the user to select and operate one of 3 installed CLANSMAN radios, to have intercommunication and O/R facilities, with the ability to simultaneously monitor one, 2 or all 3 of the installed radios.

0337. ***Facilities.***

Switch position		Facility
Working	Monitor	
A, B or C	A, B and C OFF	Work selected 'A', 'B' or 'C' set; press to talk; signal in both ears.
A or B	C ON	Work selected 'A' or 'B' set; press to talk; signal in left ear. Monitor 'C' set; signal in right ear.

Switch position		Facility
Working	Monitor	
B or C	A ON	Work selected 'B' or 'C' set; press to talk; signal in left ear. Monitor 'A' set; signal in right ear.
A or C	B ON	Work selected 'A' or 'C' set; press to talk; signal in left ear. Monitor 'B' set; signal in right ear.
A or B	A and B ON	Work selected 'A' or 'B' set; press to talk; signal in left ear. Monitor other set; signal in right ear.
I	A, B and C OFF	Intercomm; press to talk; signal in both ears.
I	A, B or C ON	Intercomm; press to talk; signal in left ear. Monitor 'A', 'B' or 'C' set; signal in right ear.
O/R (Over-ride, spring loaded)	Any combination ON/OFF of A, B and C	Call to all crew members without use of pressel. Microphone automatically made live. Revert to I for subsequent communication. An O/R call from any other control box in the harness replaces the signal in the CB-3 operator's right ear, irrespective of any switch settings. The loudness of the O/R call will depend on the MONITOR – VOL setting.

Commander's Box Fixed and Personal Unit *(Fig 65) (CBF and CPU)*

0338. The commander's boxes comprise a fixed box installed in the vehicle and a personal unit carried by the commander. These boxes are always used together and are connected by a 2m or 10m flexible lead. They are intended for use in a 2-radio installation.

0339. ***The Commander's Fixed Box*** is mounted on flexible belting which fits standard 2 stud fixing.

0340. ***The Commander's Personal Unit*** is carried by webbing around the commander's neck. A standard CLANSMAN headset is used. Webbing and headset cable are fitted with snatch release devices.

0341. The boxes together provide facilities similar to those of the crew box 2 set. The imperative controls, such as radio selection, press to talk and over-ride are carried in the personal unit.

0342. An independent pressel may be plugged into the fixed box and it is in parallel with the press to talk button on the personal unit. When not in use, the 'IND PRESSEL' switch should be off, to prevent accidental operation.

0343. In certain armoured vehicles, a *Centralized Warning Indicator* (CWI) at the commanders position gives visual warning of failures and incidents. It is connected into the harness at the *Commander's Fixed Box,* and in parallel with the warning light, operates the over-ride and feeds a high-pitched bleeping note to the right ear of harness users. The warning note is fed to all crew members.

0344. ***Facilities.***

Switch Positions				Facility
Fixed Box		Personal Unit		
Live IC	Ind Pressel	Radio	Monitor	
(a)	(b)	(c)	(d)	(e)
NORM	OFF	A	OFF	Work 'A' set; press to talk; signal in both ears.
NORM	OFF	B	OFF	Work 'B' set; press to talk; signal in both ears.
NORM	OFF	I	OFF	IC; press to talk; signal in both ears.
NORM	OFF	A	ON	Work 'A' set; press to talk; signal in left ear. Monitor 'B' set; signal in right ear.
NORM	OFF	B	ON	Work 'B' set; press to talk; signal in left ear. Monitor 'A' set; signal in right ear.
NORM	OFF	I	ON	IC; press to talk; signal in left ear. Monitor 'A' set; signal in right ear.

Switch Positions				Facility
Fixed Box		Personal Unit		
Live IC	Ind Pressel	Radio	Monitor	
(a)	(b)	(c)	(d)	(e)
LIVE IC	OFF	A or B	OFF	IC without use of pressel; monitor IC in right ear. Press to talk on selected 'A' or 'B' set; signal in left ear.
LIVE IC	OFF	A or B	ON	IC without use of pressel; monitor 'A' or 'B' set and IC; signal in right ear. Press to talk on selected 'A' or 'B' set; signal in left ear.
NORM	IND PRESSEL	A or B	ON or OFF	Separate pressel or morse key, in parallel with press to talk button on personal box. Switch OFF when not used.
–	OVER-RIDE	–	–	IC; breaks in on all crew members. Microphone automatically made live. O/R from any other control box in the harness replaces the signal in the commander's right ear, irrespective of any switch settings. The loudness of the O/R will depend on the MONITOR VOLUME setting on the Fixed Box.

ALARM: An audio alarm from the *Centralized Warning Indicator* heard in the right ear irrespective of any switch positions.

Remote Personal Unit *(Fig 66)*

0345. ***The Remote Personal Unit*** permits the operation of CLANSMAN radios, and call and IC with an operator at the radio, at distances of up to 3km over D10 cable. It is intended primarily for use with ear defending or head protecting

headgear so that the user need not remove his headgear when remote use is required.

0346. The cable is connected between the terminals on the unit and the REMOTE terminals on the radio, or the REMOTE terminals on the *Interconnecting Box 2* in an Installation.

0347. The unit is carried by webbing around the neck of the user and the headset plugs into it. Both webbing and headset cable are fitted with snatch release devices.

0348. The unit contains an amplifier to increase the signal power to the line and to provide a locally generated side tone. The amplifier obtains its DC supply along the cable from the radio or IB2.

0349. When the *'CALL'* button is pressed, a tone is generated within the connected working radio, which is heard by the local operator and, if the radio is in harness, by any crew member who has selected that radio as the Working or Monitor Set. Similarly, if connected to the line terminals of an IB2 switched to *'I REM'* a tone will be heard by all crew members who have selected *'I'*.

Interconnecting Box 3 Radio *(Fig 67)*

0350. ***The Interconnecting Box 3 Radio*** (IB3) is a junction and power supply unit for harness items in installations of up to 3 radios, where rebroadcast facilities are not important.

0351. The IB3 connects the radios into the harness so that:

a. A, B or C radio, IC or O/R may be selected and operated from a *Crew Box 3 Set* connected to the harness and ACTIC sockets on the IB3.

b. Normal A or B radio, IC or O/R may be selected and operated from any 2 radio control box connected to the HARNESS socket on the IB3.

c. A or C radio, IC or O/R *(A, C, together with IC – ACTIC)* may be selected and operated from a 2 radio control box connected to the ACTIC socket on the IB3. The operator will read C for B on the control box selector switch.

0352. The IB3 does not provide remote control or rebroadcast facilities. These must be met by connections outside the harness to the remote terminals on the radios. However, line terminals are provided for communal IC purposes.

0353. 28 volts DC is fed from the vehicle supply into the box where it is switched and fused and fed out to the harness items. The IB3 does not supply power to the radios, *Amplifier A.F. Loudspeaker, Emergency Crew Control Boxes* or to the *Centralized Warning Indicator* system.

Interconnecting Box 2 Radio *(Fig 68)*

0354. ***The Interconnecting Box 2 Radio (IB2)*** is used in 2 radio installations and is a combined control, junction and power supply unit for harness items.

0355. It contains an IC amplifier and acts as the inlet and outlet to the main harness for radios, remote users and communal IC users.

0356. it enables the 2 installed radios, or one installed radio and a remote radio to be connected for manual or auto rebroadcast, as appropriate; or a remote user to be connected into the harness to use an installed radio or talk to the crew using IC. These facilities are controlled by an operator whose headset is plugged into the IB2.

0357. 28 volts DC is fed into the box from the vehicle supply, and a regulated 18 volts is distributed to all crew boxes. The harness is protected by a 1 amp fuse in the IB2. The IB2 does not supply power to the radios, *Amplifier A.F. Loudspeaker* or *Emergency Crew Control Boxes,* or the *Centralized Warning Indicator* system.

Operating Notes:

1. For normal harness use, switch 28V ON, and right hand switch to 'N' *(Normal),* and switch the radios as follows:

   HF radios *('RAB' or CLANSMAN)* to 'REM'.
   VHF radios *('RAB' or CLANSMAN)* to 'AUTO'.

2. If an interfering signal is received by a VHF radio switched to *'AUTO',* it will not be possible for that radio to transmit without first switching it to *'REM'.*

0358. ***Facilities***

'N'	Normal use of 'A' or 'B' installed radios from IB2, or from any harness box. All other controls and the REMOTE terminals are inoperative.
'REM'	*REMOTE CONTROL.* A remote user can control the selected 'A' or 'B' radio and can call any operator monitoring these radios from a harness box. He also has full IC facilities to any crew member when IC is selected.
'I'	*INTERCOM.* The following IC facilities are available to the IB2 operator, according to the switch positions.
I + N	IC within vehicle: no connection to remote user.
I + REM	IC within vehicle: to remove user and for communal IC.
I + RRB	IC to remote user: no connection to vehicle.

CALL	Call the remote user. The outgoing call tone is heard by the IB2 operator, but is not heard in the harness.	The IB2 operator can be called by a remote operator or station. *(Except from the PRC 351/352 which has IC but no call facility when in harness.)*
	Revert to I for subsequent communication. The IB2 operator will hear O/R *(Over-ride)* from any harness box, in his right ear, at all times.	
LRB	*LOCAL REBROADCAST.* 'A' or 'B' installed radios are connected for Manual or Auto rebroadcast as selected.	On rebroadcast the IB2 operator hears the 'A' or Local set in his left ear and the 'B' or Remote set in his right ear. If rebroadcast is working, he hears the same signal in both ears.
MANUAL	Controlled by the IB2 operator.	
TXA TXB	'A' radio transmits the signal received by the 'B' radio. 'B' radio transmits the signal received by the 'A' radio.	'A' and 'B' radios cannot be operated from harness.
BK-IN AUTO RRB	*BREAK-IN.* IB2 operator hears received signals from 'A' and 'B' radios. 'A' and 'B' radios are connected for auto rebroadcast. (See Page 2–47). No operator intervention is necessary. *REMOTE REBROADCAST.* The selected 'A' or 'B' radio is connected to a remote radio for Manual or Auto rebroadcast as selected.	IB pressel causes 'A' and 'B' radios to transmit. Pressel at harness box, switched to 'A' or 'B' causes 'A' and 'B' radios to transmit. See note against LOCAL REBROADCAST.
MANUAL	Controlled by the IB2 operator.	
LOCAL REMOTE	Selected 'A' or 'B' radio transmits the signal received by the remote radio. Remote radio transmits the signal received by the selected 'A' or 'B' radio.	Only local radio not selected for rebroadcast can be operated from harness.

BK-IN	*BREAK-IN.* IB2 operator hears the received signals from local and remote radios.	IB2 pressel causes local and remote radios to transmit. Pressel at harness box, switched to local radio on RRB causes local and remote radios to transmit.
AUTO	'A' or 'B' radio connected to remote radio for auto rebroadcast. No operator intervention is necessary.	Pressel at any harness box switched to local radio on RRB causes selected local and remote radios to transmit.

Interconnecting Box Harness Adaptor *(Fig 69)*

0359. The ***Interconnecting Box Harness Adaptor*** adapts the CLANSMAN manpack radio PRC 320 or PRC 351/352 for connection into the harness system, and provides control and rebroadcast through the harness, as if the manpack radio was a vehicle radio. The unit also contains an amplifier which raises the audio output level of the manpack radio to that of a vehicle radio harness output.

0360. The radio is powered from its own battery, which may be float charged from a *DC Charging Unit.* The *DC Charging Unit* can obtain its 28V supply through the Harness Adaptor.

0361. The Harness adaptor is used in conjunction with the CRSL/R unit of the PRC 320, and is connected as shown in *Fig 70.* CRSL/R will be switched to 'REM'.

0362. The normal selection and operation of the PRC 351/352 is available from control boxes in the harness. The radio will be switched to *'REM'.*

0363. Manual or auto, local or remote rebroadcast is possible through the *Inter-connecting Box 2 Radio.* The radio will be switched to 'REM' for manual rebroadcast and to *'AUTO'* for auto rebroadcast, as for any other VHF radio.

Radio Adaptor Box (RAB) *(Fig 71)*

~~0364. ***The Radio Adaptor Box*** *(LARKSPUR to CLANSMAN Harness Adaptor Box)* is not a true item of CLANSMAN harness, but permits LARKSPUR radios (SR.C11, C13; SR.B47, B48; SR.C42, C45) to be used to their full potential in CLANSMAN harness.~~

~~0365. The toggle switch marked 'AUTO' 'REM/J1' is used as follows:~~

~~'AUTO' For normal harness use or when carrying out rebroadcast from the harness or the REMOTE terminals.~~

~~'REM/J1' For when the J1 box is connected or when an interfering signal received by a VHF radio prevents transmission in the 'AUTO' position.~~

~~**NOTE:** If the REMOTE terminals are used for carrying out local rebroadcast with a VRC 353 in an installation which includes a *Crew Box 3 Set*, an undesirable audio tone will be produced if the monitor switches of the CB3 appropriate to the sets in use for rebroadcast are operated when the VRC 353 is switched for *'Break-In'* operation. To prevent this malfunction do not monitor either set at a CB3 when the VRC is switched for *'Break-In'*.~~

~~**Interconnecting Box Radio Adaptor** *(IBRA)*~~

~~0366. The *IBRA* is not a true item of CLANSMAN harness, but permits any installed CLANSMAN radio to be used by vehicle crew members using LARKSPUR harness, headgear and remote control gear.~~

~~0367. *IBRA* converts a VRC into a C13/42/45 type radio, and a PRC into a B47/48 type radio. In the latter case, it is necessary to use a *LARKSPUR I Box* in the installation if the PRC plus *IBRA* combination is to be used as the 'A' set since the I/C amplifier in *IBRA* is used to increase the PRC audio output, and therefore is not available for I/C use.~~

~~0368. The type of radio input, VRC or PRC, is selected by a preset switch. Power supply is fed through the box to the radios.~~

Amplifier AF Loudspeaker *(Fig 72)*

0364
~~0369.~~ ***The Amplifier AF Loudspeaker (AAFL)*** connects into the main harness distribution ring and amplifies the selected A, B radio or IC signal sufficiently to drive 4 loudspeakers *(Vehicle Mounting).*

0365
~~0370.~~ A radio may be connected into the system at *'EXT INPUT'*; a local radio into rhe *'PRC'* socket, or a remote radio into the terminals; and its output broadcast by switching to 'EXT'.

NOTE (1): IMPORTANT NOTE ON USE OF LIVE IC.
The above facility should only be used when hands free operation of the IC is essential due to extreme circumstances, i.e. battle conditions. Every extra live microphone on the IC circuit picks up extra vehicle noise and reduces the efficiency of the IC system. Prolonged, inessential use of this facility will cause crew fatigue and will reduce the hearing ability of the crew. This reduction in hearing may be temporary or permanent depending on the length of exposure to this high noise level. It can cause DEAFNESS.

NOTE (2): Increased noise pick up results when the microphone is exposed in a moving air stream as, for example, when the Driver or Commander is in the 'head out' position whilst the vehicle is moving. This wind noise can be effectively eliminated by use of a microphone cover, NSN 5965–99–620–5673 and should always be used in these circumstances.

0366
~~0371.~~–0390. *Reserved.*

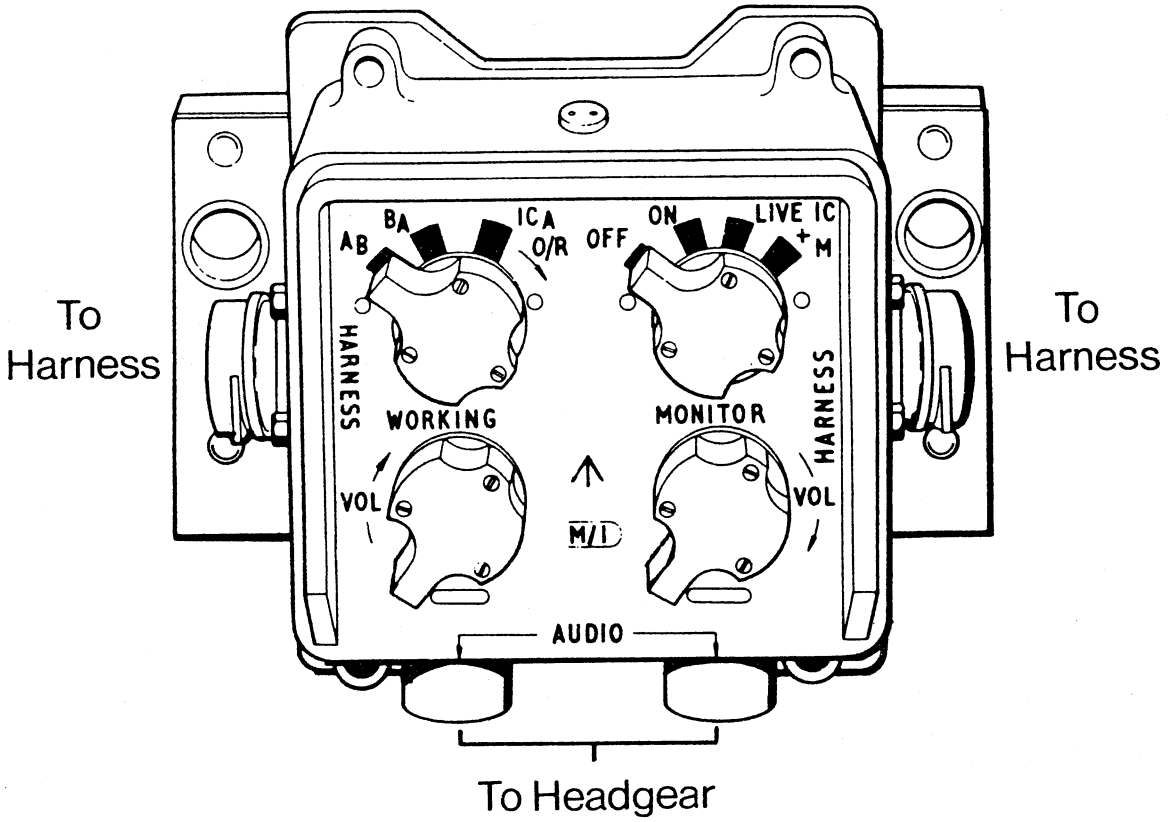


Fig 63.—Crew Box 2 set (CB-2)

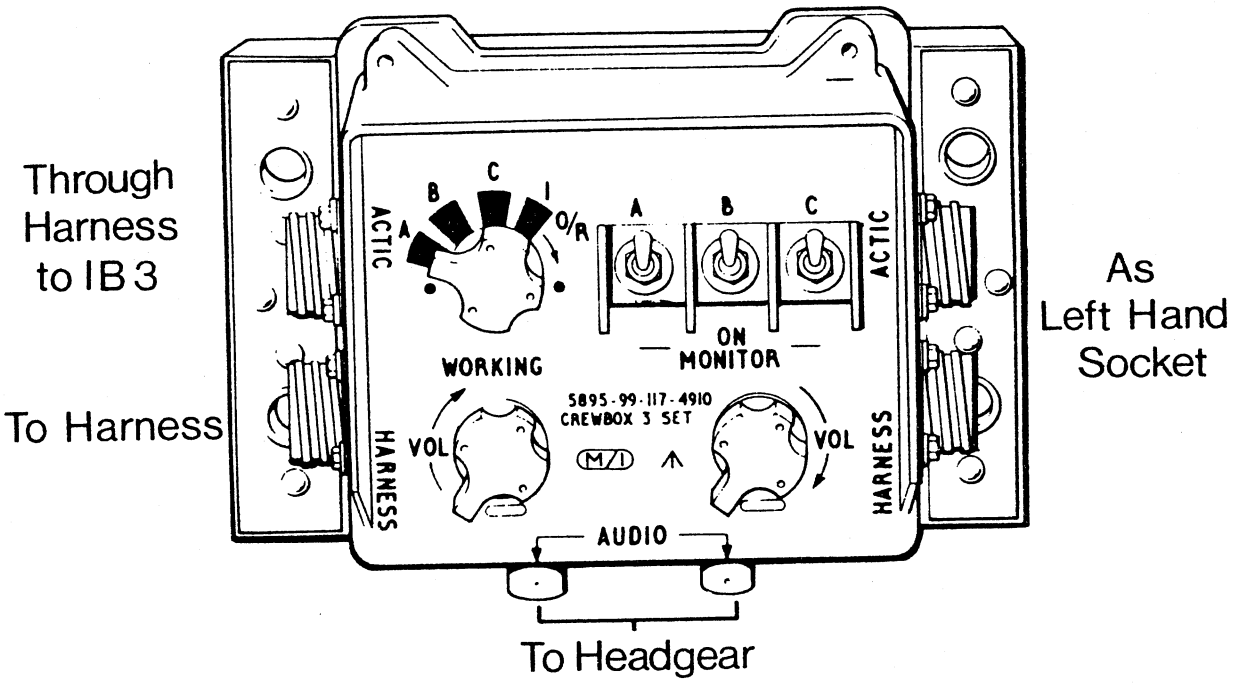


Fig 64.—Crew Box 3 set (CB-3)

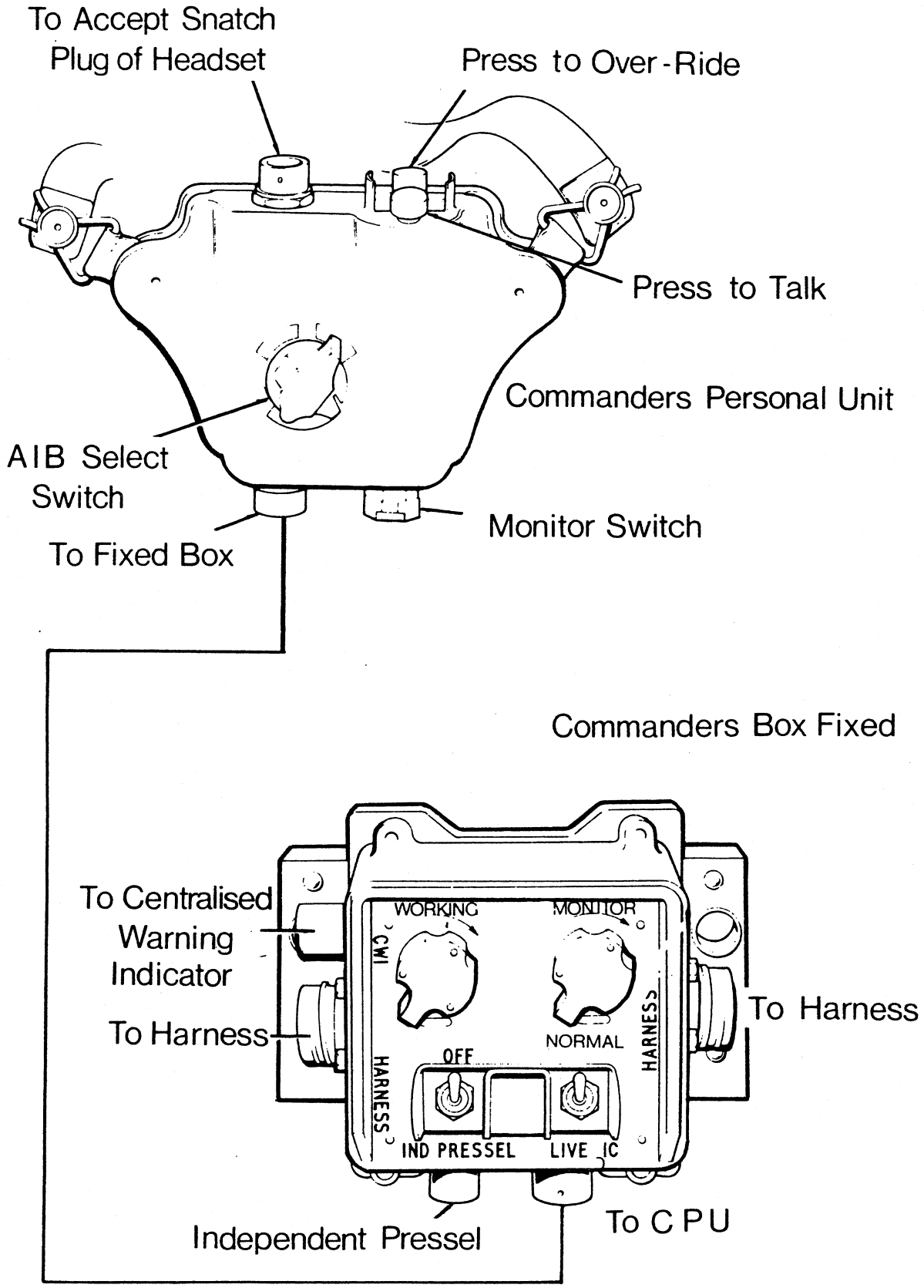


Fig 65.—Commanders' Personal Unit and Fixed Box

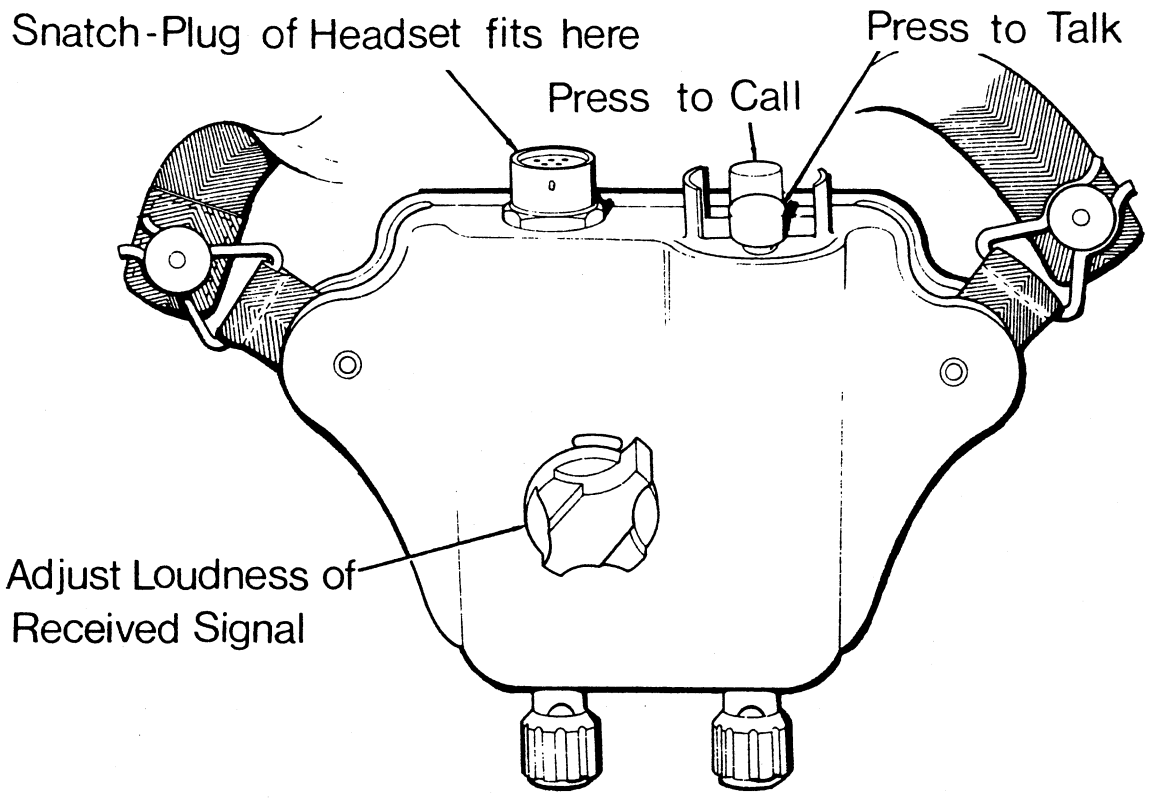


Fig 66.—Remote Personal Unit

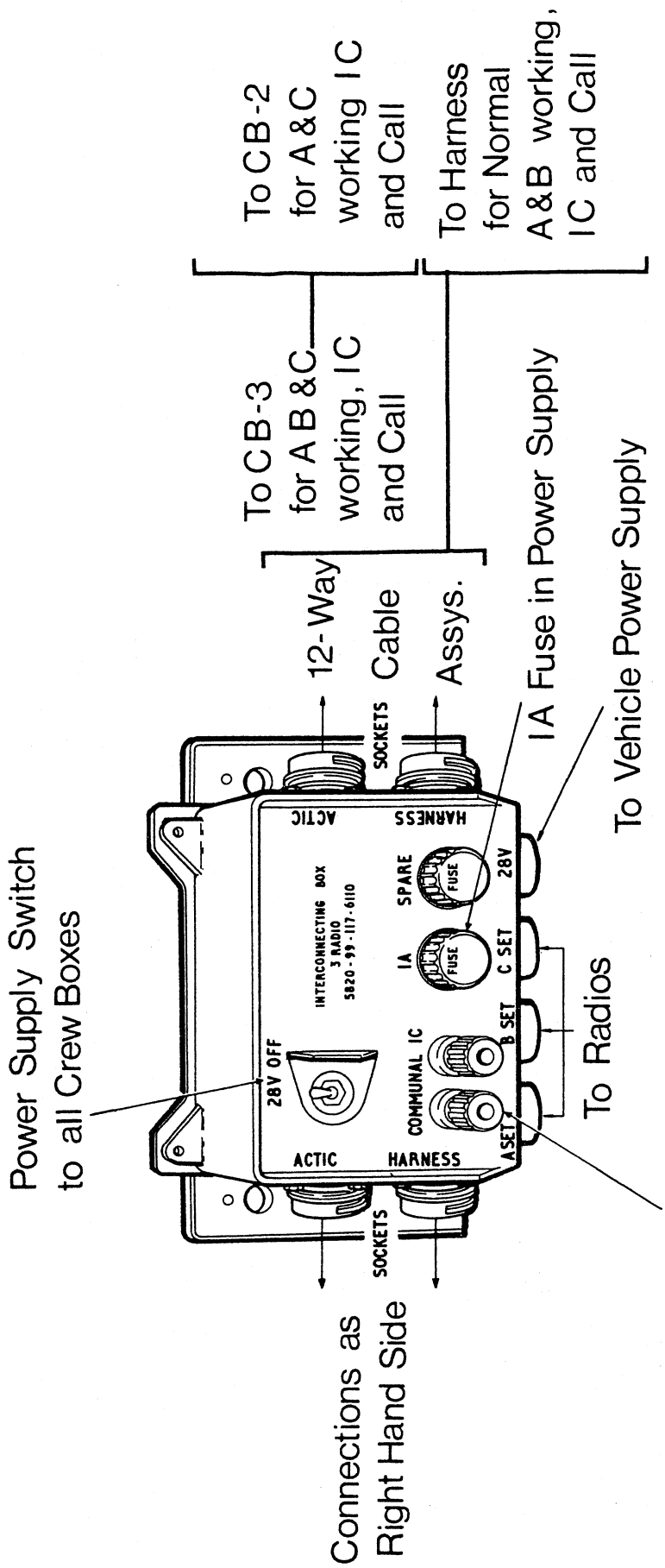


Fig 67.—Interconnecting Box 3 Radio (IB-3)

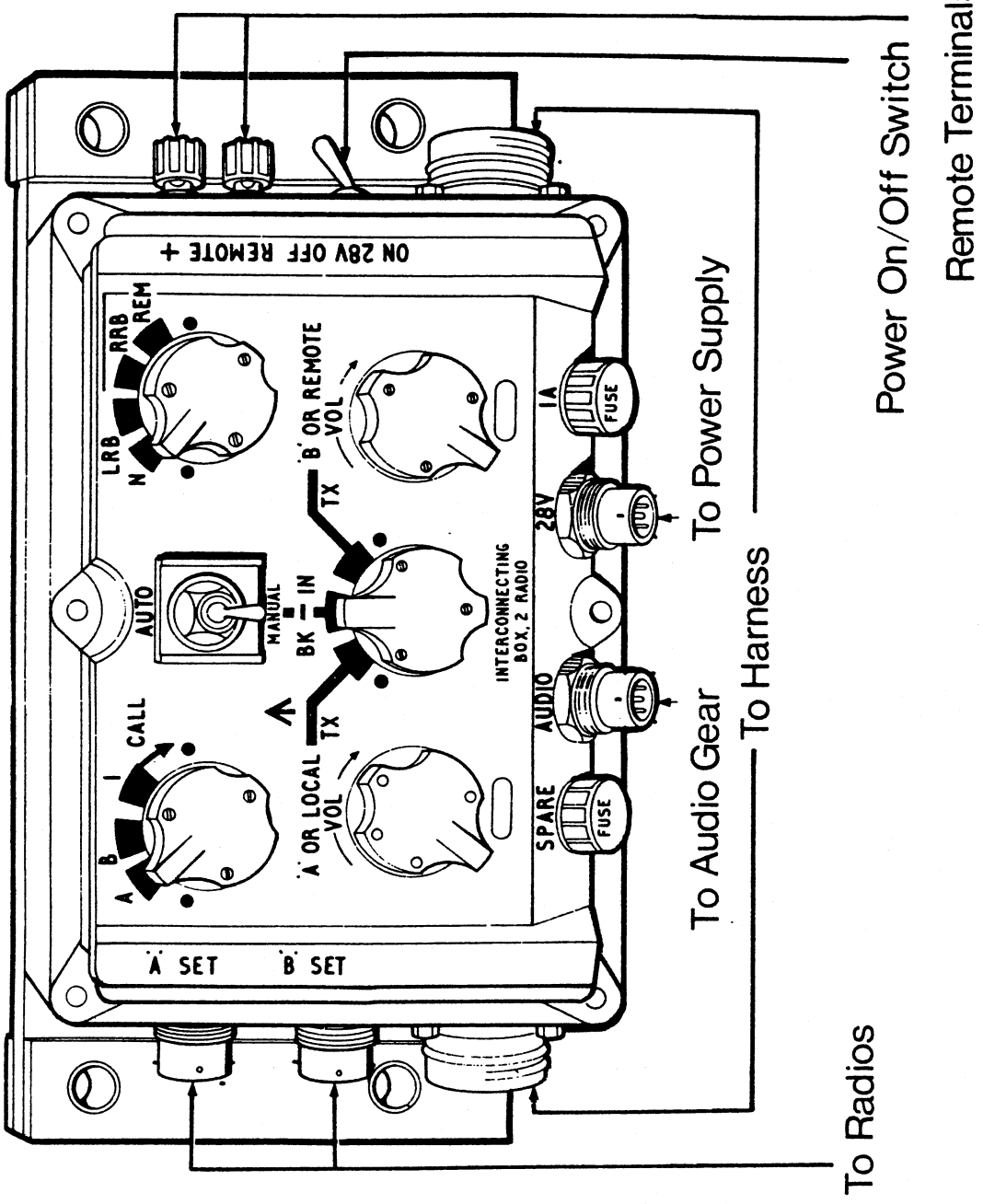


Fig 68.—Interconnecting Box 2 Radio (IB-2)

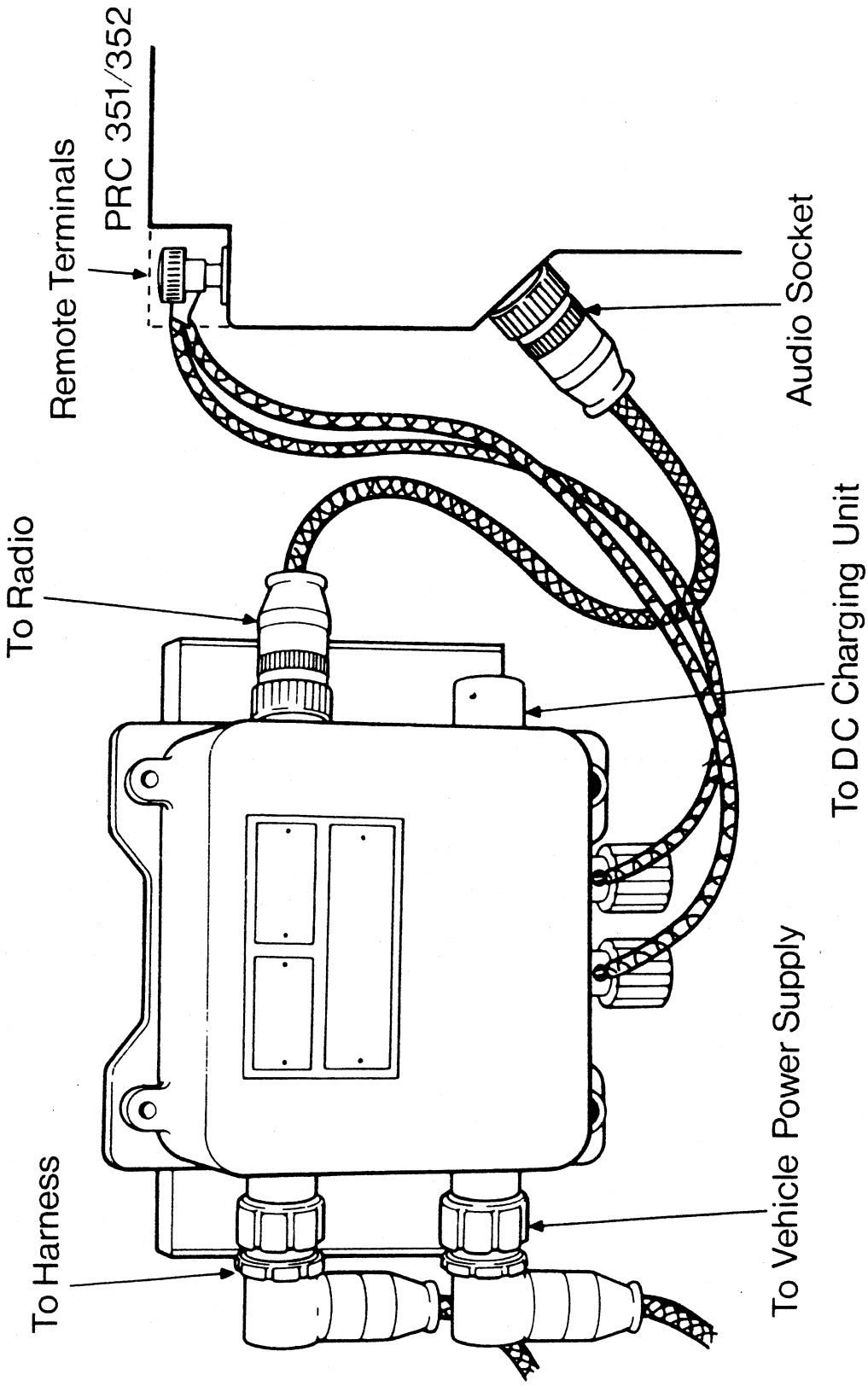


Fig 69.—Interconnecting Box Harness Adaptor

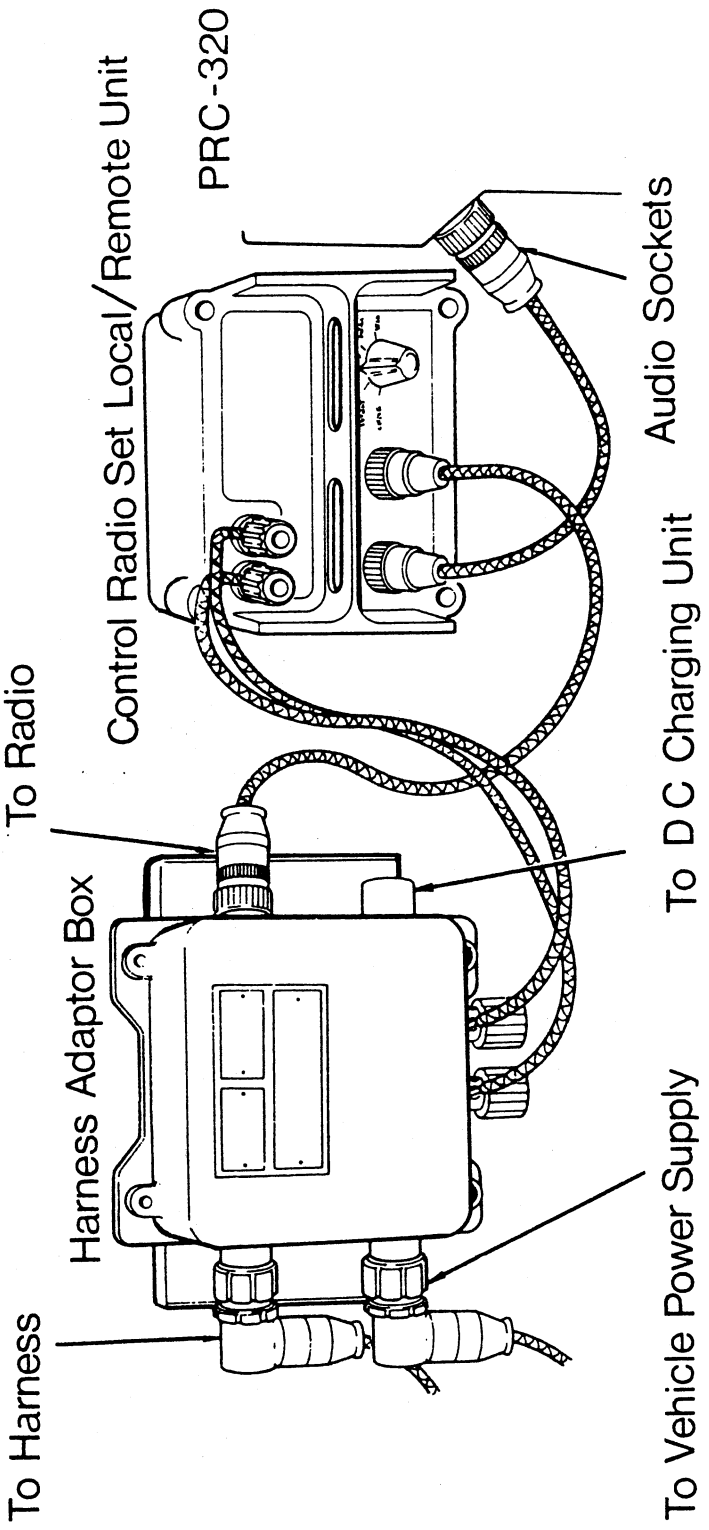


Fig 70.—Control Radio Set Local/Remote (CRSL/R)

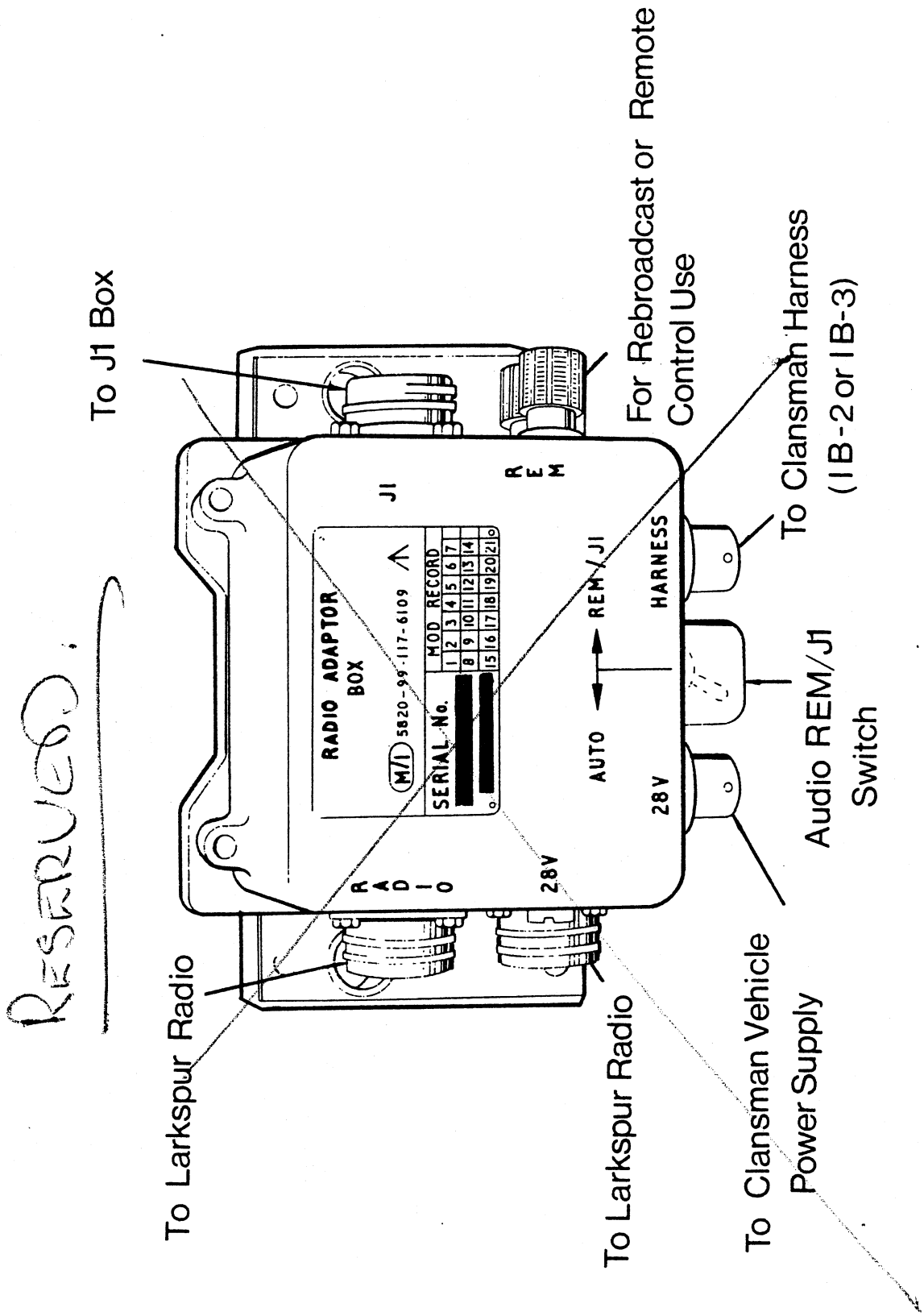


Fig 71.—Radio Adaptor Box

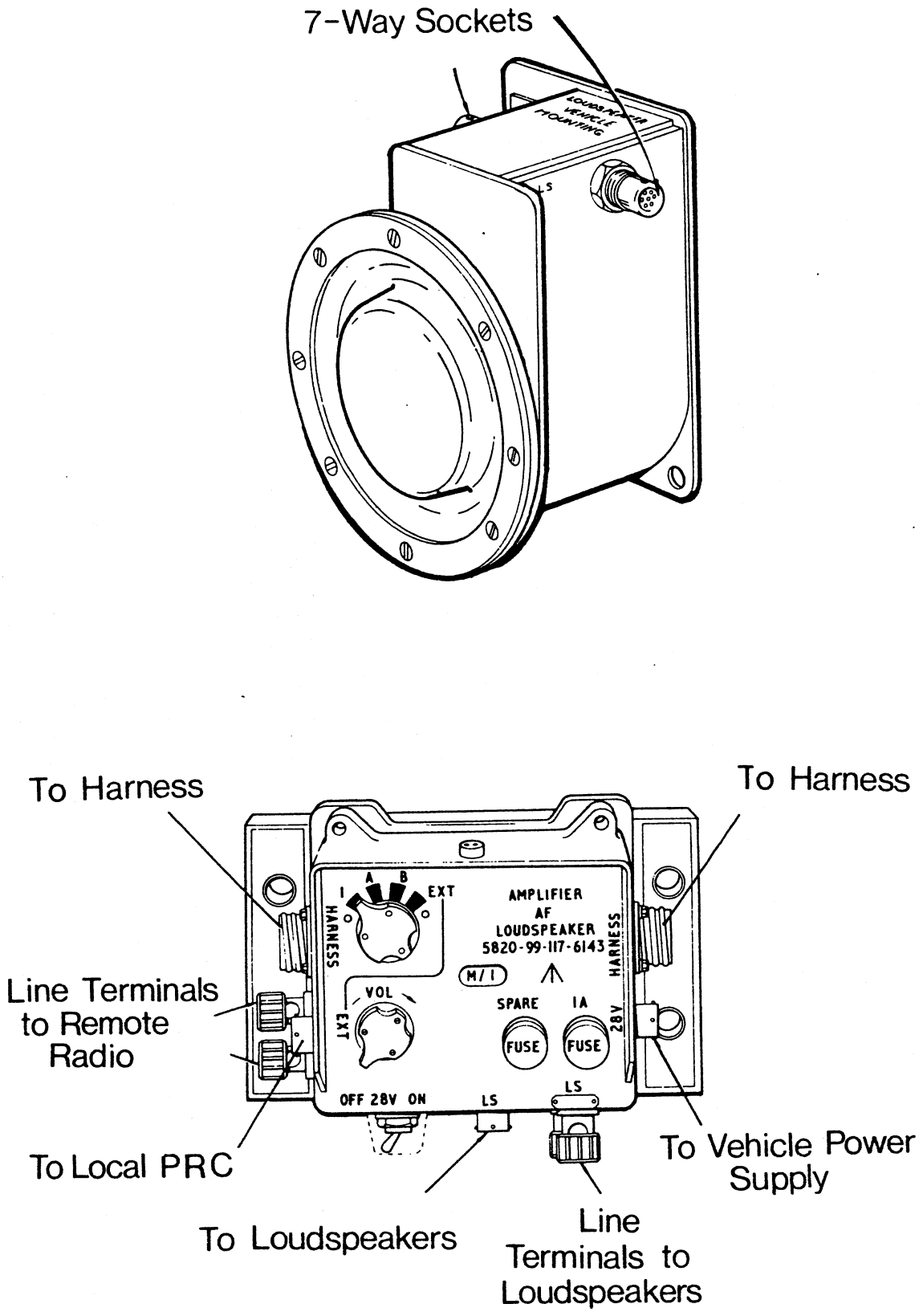


Fig 72.—Amplifier Loudspeaker and Speaker

CHAPTER 4

CLANSMAN TEST KITS

SECTION 18 – INTRODUCTION

General

0401. This chapter is concerned with test kits issued to infantry and mechanized units. The information contained in the chapter is taken from User Handbooks and set out in a possible sequence of instruction.

Aim

0402. The aim of this chapter is to enable the user of HF and VHF radios to carry out fundamental checks and user repairs of all equipment and ancillaries used.

References

0403. The following publications have been used in the compilation of this chapter.

a. Infantry Training Volume VIII, Infantry Signal Training, Pamphlet No. 40 Parts 1 and 2 – (to be promulgated).

b. ***User Handbooks:***	***Army Code.***
Test Set Condition	61655
Test Set Audio, Audio Accessories User Repair Information for CLANSMAN Audio Accessories	61656
Test Set Harness Connector	61657

SECTION 19 – TEST KIT, CONDITION CLANSMAN RADIO

Description *(Fig 73)*

0404. ***Role.*** To enable users of CLANSMAN HF and VHF radios to check the battleworthiness of their sets.

0405. ***Facilities.*** This portable equipment allows the user to check transmitted power of the *radio under test* (RUT) and with a *working radio* (WR) the receiver sensitivity, modulation, demodulation, frequency setting and RF continuity of the antenna system. The working radio needs to have similar frequency coverage

to the radio under test except for the PRC 349. The PRC 349 cannot be used as a WR for other types of RUT. Abridged operating instructions are given on the lid of the *test kit condition* (TKC). The lid of the TKC contains all the necessary leads and ancillaries for all tests.

0406. ***Power Supply.*** No separate power source is necessary as the TKC is powered by either the RUT or WR depending on the test instruction, the voltage required is between 12–29 volts.

0407. ***Weight and Dimensions.*** The TKC complete with case and ancillaries are as follows:

a. *Dimensions.* 265mm×220mm×355mm.

b. *Weight.* 11.5kg.

Operation

0408. ***Transmitter Output Power.*** Connect the equipment as shown in *Fig 74* using the appropriate cables and adaptors provided.

0409. Set the *'TKC TX POWER CHECK/RX COMMS CHECK' switch to 'TX POWER CHECK'.* Care should be taken to ensure that the switch is set to the required position and not somewhere in between.

0410. Set the *'TKC RADIO SELECTOR'* switch to the correct position for the RUT *(see Table 1).*

TABLE 1

Radio	Freq	Power and/or Mode	SW Position
(a)	(b)	(c)	(d)
PRC 320	ALL	HP AM, SSB, CW(N) PEAK, CW(W) STEADY	6
		LP AM, SSB, CW(N) PEAK	8
		LP CW(W) STEADY	7

Radio	Freq	Power and/or Mode	SW Position
(a)	(b)	(c)	(d)
VRC 321	1.5 MHz to 20 MHz	HP CW(N) CW(W) AM SSB	12
	20 MHz to 30 MHz	HP CW(N) CW(W) AM SSB	13
	ALL	LP CW(N) CW(W) AM SSB	14
PRC 349	ALL	W, L AND *	15
PRC 350	ALL	W, L AND *	2
PRC 351	ALL	W, L AND *	3
PRC 352	ALL	W, L AND *	4
VRC 353	ALL	50W 15W 1W	9 10 11

WARNING. The TKC MUST NOT be used during periods of RADIO SILENCE.

0411. Switch on the RUT in accordance with the relevant user handbook, setting the frequency switches to the desired TEST FREQUENCY and MODE and LOCAL.

0412. TKC TONE/SPEECH switch to TONE.

WARNING. DO NOT OPERATE THE TONE SWITCH/PRESSEL FOR MORE THAN 10 MINS CONTINUOUSLY or damage to TKC may occur.

0413. The *'TX POWER OUTPUT'* is indicated on the TKC meter and is SATISFACTORY when the meter reads in the *'GREEN'* segment.

0414. Repeat test at any other required frequency and all power outputs *(except MIN on the UK/VRC 353).*

Communication Check

0415. These checks are to be carried out at the positions given in Table 3 only.

a. Connect the equipment as shown in *Fig 77* using the appropriate cables and adaptors provided.

b. Set the *'TKC RADIO SELECTOR'* switch to the correct position for RUT *(and mode)* given in *Table 1.*

c. Set the *'TKC TX POWER CHECK/RX COMMS CHECK'* to *'RX COMMS CHECK'.*

d. Set the *'TKC RECEIVER SENSITIVITY'* controls to zero.

e. Set the *'TKC ADJUST LEVEL'* control to the midway position.

f. Switch on the *'WR'* and *'RUT'* in accordance with previous information and switch to the positions given in *Table 3.*

g. Set the *'RUT'* to the desired test frequency and mode.

h. Set the *'WR'* to the test frequency ±200 kHz and the same mode as the RUT.

j. Transmit a modulated signal from *'RUT'* by one of the following methods:

(1) By operating TKC TONE switch
(2) By operating the morse freq
(3) By any other method appropriate to the 'RUT'.

NOTE. *Method 1 to be used for testing the PRC 349.*

k. On all voice operated MODES if ~~speech~~ TONE is used for modulation then a WARBLING TONE should be heard in the WR phones. On CW modes a constant frequency TONE should be heard in the WR phones. In all cases the signals should be clear and undistorted.

l. Remove the *'TKC AUDIO/POWER LEAD'* from the *'RUT AUDIO SKT'* and connect it to the *'WR AUDIO SKT'.*

m. Transmit a modulated signal from the *'WR'* in the same manner as the *'RUT'* and listen in the *'RUT'* phones. Signals should be as in para k.

n. Repeat paras g to l at any other required frequency and for all modes of operation. *(Except data modes on the UK/VRC/353.)*

TABLE 2

Radio	Power and/or Mode	Tone	Speech
(a)	(b)	(c)	(d)
PRC 320	LP AM SSB CW(W) CW(N)	41 50 40	35 44
VRC 321	LP AM SSB CW(W) CW(N)	28 43 38 41	22 37
PRC 349	W or L	20	14
PRC 350	W or L	33	27
PRC 351	W or L	35	29
PRC 352	W or L	35	29
VRC 353	1 WATT	35	29

TABLE 3

RADIO	POSITION
320	LP
321	LP
349	W or L
350	W or L
351	W or L
352	W or L
353	1 WATT

Receiver Sensitivity

0416. There are two ways of conducting this check.

a. ***Method 1.*** When only one operator is available using the *'TKC WARBLING TONE'* oscillator as the modulating signal.

b. ***Method 2.*** When two operators are available using speech as the modulating signal.

Method 1.

0417. **a.** Connect the equipment as shown in *Fig 75 ('TKC AUDIO/POWER' lead connected to the 'WR AUDIO SKT').*

b. Set the *'TKC RADIO SELECTOR'* Switch to the correct position for the *'RUT' (and mode)* as shown in *Table 1.*

c. Set the *'TKC TX POWER CHECK/RX COMMS CHECK'* to *'RX COMMS CHECK'.*

d. Set the *'TKC RECEIVER SENSITIVITY'* controls to the correct setting for *RUT (and mode)* given in *Table 2.*

e. Switch on the *'RUT'* in accordance with previous instructions, set to the desired test frequency and mode. Switch to position given in Table 3.

f. Switch on the *'WR',* in accordance with previous instructions, set to the desired test frequency ±200 kHz and the same mode as *'RUT'.* Switch to the position shown in *Table 3.*

g. Operate the *'TKC TONE'* switch and set the *'TKC ADJUST LEVEL'* control until the TKC meter reads on the junction of the *'BAD/GOOD'* segments.

WARNING. DO NOT OPERATE TONE SWITCH/PRESSEL FOR MORE THAN 10 MINUTES CONTINUOUSLY or damage to the *'TKC'* may occur.

h. Operate the *'TKC TONE'* switch. The Receiver Sensitivity is satisfactory if the tone can be heard in the RUT phones; any noise present can be ignored. For CW a tone of constant pitch will be heard and for all other modes a warbling tone will be heard.

j. Repeat d to h for any other test frequency and all modes of operation *(EXCEPT DATA MODES ON THE VRC 353).*

Method 2. *(Para a–g and j as for Method 1.)*

0418. Operate the *'WR'* pressel and speak into the MIC. The speech heard in the 'RUT' phones should be intelligible.

NOTE.

1. If when checking an HF radio using method 1 the result obtained is inconclusive a more definite result will be obtained using method 2.
2. Method 1 is to be used for testing the PRC 349.

Antenna Check

0419. **a.** Connect the equipment as shown in *Fig 76* using the appropriate cables and adaptors provided.

b. Carry out tests as for communications check.

c. Further isolation of the fault is possible by substituting, or missing out, parts of the *'ANTENNA'* system i.e. SURF or coaxial cables etc, until the faulty item is found.

TABLE 4

RADIO	ANTENNA SYSTEM EQUIPMENTS
320	SURF 12W TURF (built into Radio)
321	SURF 25W TURF 25W
350	SURF 2W
351	SURF 4W or Initiate Box. TUAAM.
352	SURF 4W or Initiate Box. TUAAM.
353	ARFAT. TUAAM.

Note. SURF not to be used in a TUAAM Antenna System.

Self-Checking Facilities

0420. ***Power Supply.***

a. Switch TKC radio selector switch to power supply.

b. Meter should read in orange band *(this merely indicates that the TKC supply is correct. It is not an indication of the state of the radio battery).*

0421. ***Co-axial Cables.***

a. Connect the equipment as shown in *Fig 77.*

b. *'SUPPLY'* lamp will light if supply voltage is being applied to the cable checker.

c. *'CABLE'* lamp will light if the co-axial cable is serviceable, it will not light if the cable is faulty.

d. To detect an intermittent fault, *'waggle'* both ends of the cable.

e. When testing the PRC 350 a short adaptor lead is used to connect between the antenna socket on the radio, and the 2m *(or 10m)* test cable. It is not possible to check this adaptor lead in isolation, using the cable checker. To test this combination of cables, first check the cables keeping them connected together. If the cable lamp does not light, then the adaptor

cable should be removed, and the 2m *(or 10m)* cable should be checked. If:

(1) Cable lamp does not light, the 2m *(or 10m)* cable is faulty.

(2) Cable lamp lights, the 2m *(or 10m)* cable is serviceable and the adaptor cable is faulty.

Deployment

0422. ***Checks using the TKC may be carried out:***

a. *On the bench.* This method is suitable for checking manpack radios; or radios being tested in the store before and after use.

b. *In vehicles housing radio installations.* These radio stations can be checked in a number of different ways:

(1) Between 2 radios fitted in the same vehicle in a multi-radio installation.

(2) Using a manpack as a WR to check a radio in a vehicle installation.

(3) Between 2 separate vehicle installations.

0423. The most suitable should be chosen by the user, having considered the particular circumstances under which the checks have to be conducted.

Maintenance

0424. The TKC is a sealed equipment and therefore very little user maintenance is required. It must not be opened by any user other than a REME/R SIGNALS technician and then, only if a clean, dry and comparatively dust-free area is available.

0425. The TKC cannot be expected to work indefinitely without some falling-off in performance. Preventative maintenance is required to ensure that it retains its operational efficiency. To this end, positive action by the user is necessary to reduce the probability of the TKC failing due to:

a. Gradual deterioration in performance not normally detectable during operation but which can be minimized by regular specification testing.

b. Non-catastrophic failure *(e.g. badly frayed leads, failure of mode not actually in use).*

0426. The user should keep the TKC clean, the paintwork sound, and ensure that all cables are in good condition, all knobs, covers and lid screws are secure and serviceable.

0427. The TKC should be specification tested as laid down in EMER TELS M662 and a record card maintained by the user.

0428.–0430. *Reserved.*

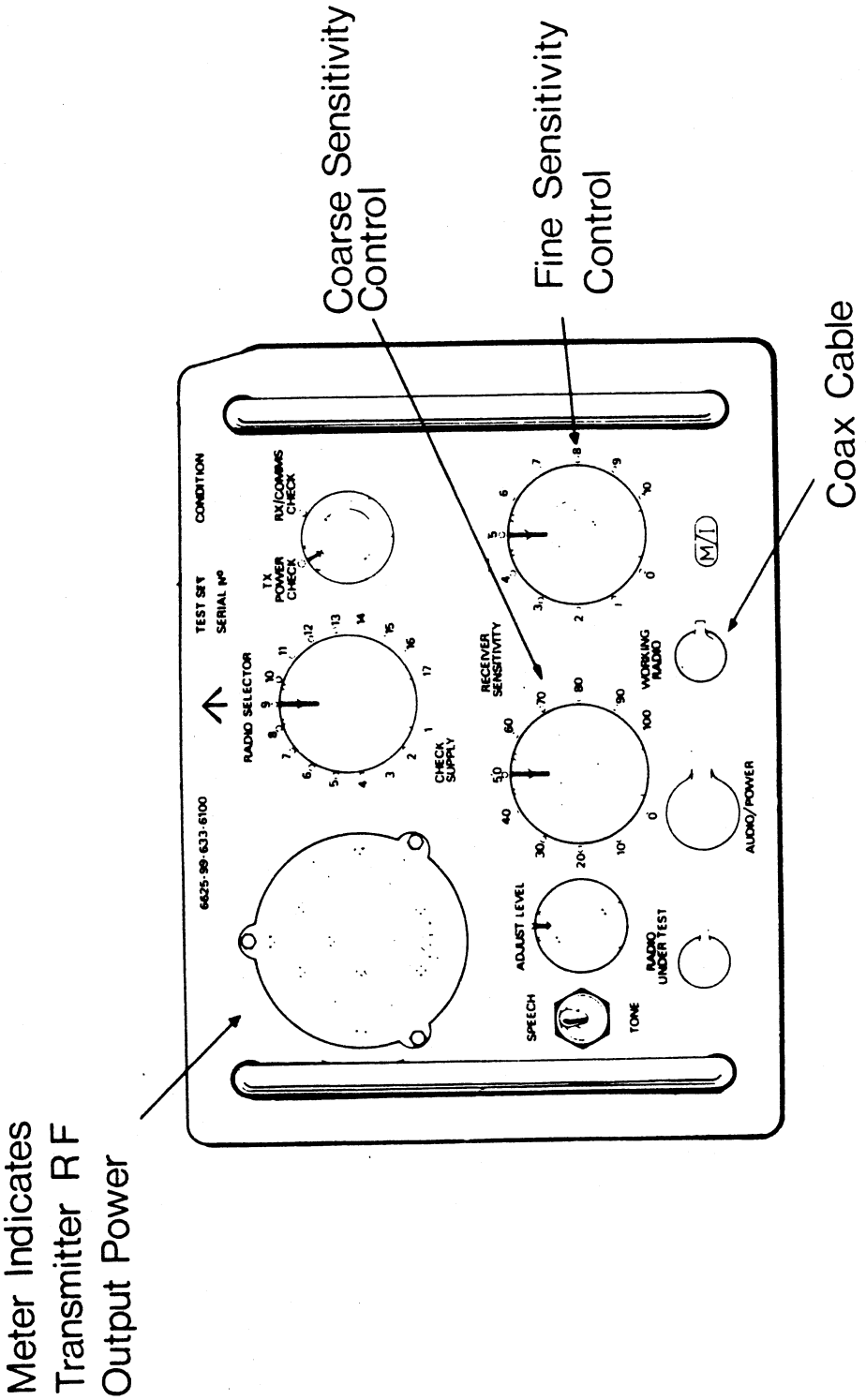


Fig 73.—Test Set Condition, CLANSMAN Radio, Front Panel

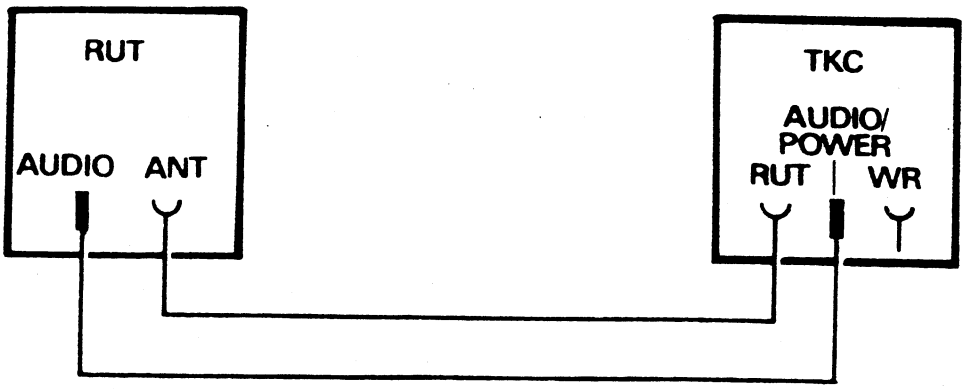


Fig 74.—Transmitter Output – Power Check

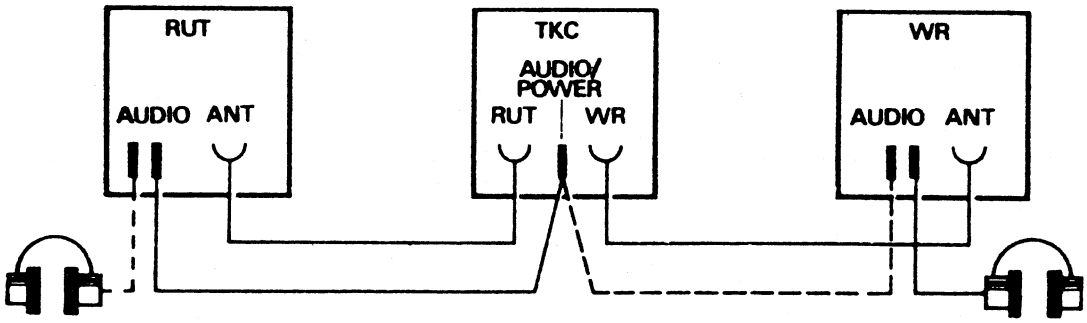


Fig 75.—Communication Check

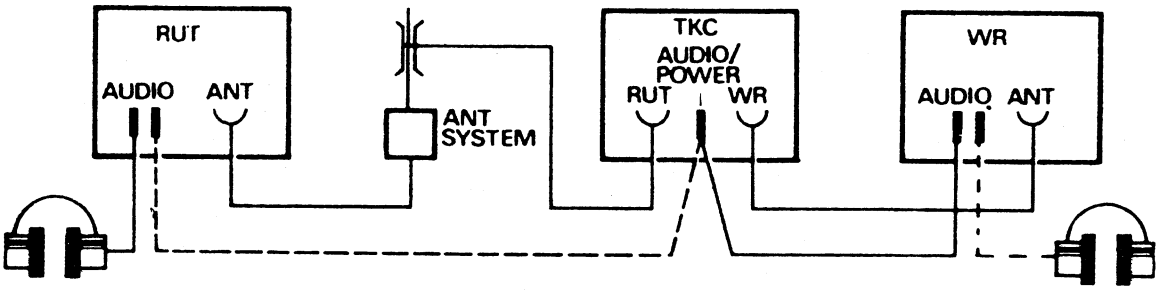


Fig 76.—Antenna Check

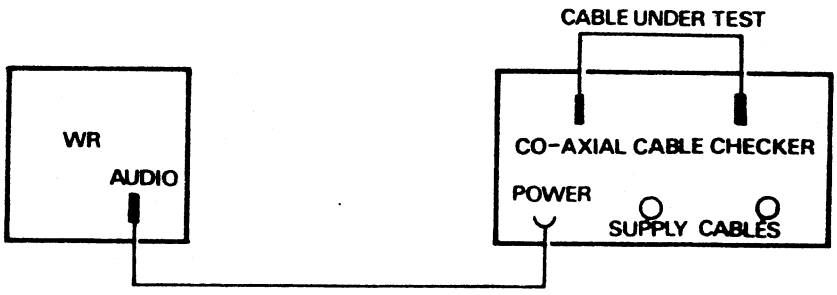


Fig 77.—Coaxial Cable Check

SECTION 20 – TEST SET AUDIO RADIO AUDIO ACCESSORIES 'CLANSMAN'

Role

0431. *The Test Set Audio, Radio Audio Accessories* is for use by regimental signallers, R SIGNALS and REME electronic tradesmen for the testing of CLANSMAN type audio gear and accessories.

Description *(Fig 78)*

0432. The table below gives a brief description of the various controls and connections shown in *Figs 79, 80, 81 and 82.*

Ref	Designation	Function
(a)	(b)	(c)
1	Test Card retaining screw	Secures test cards when not in use.
2	Co-axial cable inputs	Co-axial cables are tested using the *'Shorting block'* contained in the lid.
3	AUDIO 7-way socket	**SIMULATED HEADSET** Connecting the Test Set to an equipment under test via this socket, is equivalent to connecting a headset or handset with pressel facilities to the equipment under test. It will simulate LEFT *(working)* and RIGHT *(monitor)* phones in conjunction with the AUDIO switch and Test Set loudspeaker. It will simulate a transmit condition in conjunction with the PRESSEL switch.
4	MIC 3-way socket	**SIMULATED RESPIRATOR MICROPHONE** This socket provides a modulating tone to the microphone lines of the headset under test via a 3-way lead. The lead also short circuits the boom microphone. The socket is also used to test respirator microphones.

Ref	Designation	Function
(a)	(b)	(c)
5	T/R 7-way socket	**SIMULATED TRANSMITTER/RECEIVER** Connecting an equipment under test to this socket is equivalent to connecting the equipment under test to a radio. It will simulate a RECEIVE condition *(HIGH TONE)* on the LEFT or RIGHT phone lines in conjunction with the PHONE switch. It will simulate a transmit condition when the Pressel of the equipment under test is actuated. Under these conditions it provides Side Tone from a microphone. The high tone is also present under transmit conditions as a fault finding aid.
6	PHONE switch	**PHONE LINE ROUTING** Routes outgoing signals to left or right phone lines of T/R socket. Routes incoming signals on the left or right phone lines of the AUDIO socket to the Test Set loudspeaker, thus simulating a LEFT or RIGHT earphone.
7	LINE terminals	**SIMULATED 'REMOTE' TERMINALS** These terminals are used for supplying power to *'Remote'* items of equipment. Audio signals are also passed to or from *'Remote'* equipments via these terminals. When testing CRLS/R units the LINE terminals act as a *'Remote'* unit and draw Receive, Transmit or Call command currents.

Ref	Designation	Function
(a)	(b)	(c)
8	PRESSEL ON/OFF switch	**SIMULATED PRESSEL FACILITIES** Used in conjunction with the AUDIO socket will simulate a receive condition in the *'OFF'* position and transmit condition in the *'ON'* position. The switch will usually produce a HIGH or LOW frequency tone respectively on the Loudspeaker.
9	POWER ON switch	**POWER ON/OFF SWITCH** This switch is biased in the *'OFF'* position to conserve battery power. The switch must be operated for EACH test.
10	Internal Loudspeaker	**AUDIO MONITOR** The Loudspeaker monitors tones applied to the AUDIO socket or LINE terminals. Tones are generally as follows: **a.** Low frequency tone-simulated modulation. **b.** High frequency tone-simulated received signal. **c.** Morse tone, **d.** CALL tone } frequencies vary with equipment
11	FUSE test contacts	**TESTING OF FUSES** Continuity of fuses is indicated on the meter. FUSES RATED LESS THAN 100mA MUST NOT BE TESTED.

Ref	Designation	Function
(a)	(b)	(c)
12	FUNCTION switch	**SELECTS APPROPRIATE INTERNAL CIRCUITS FOR EQUIPMENTS UNDER TEST** **a.** *'AUDIO'* – All units except remote equipments. **b.** *'REM'* – All tests on remote equipment except CRSL/R. **c.** *'CRSL/R Rx'* } Provide simulated Remote Control **d.** *'CRSL/R Tx'* } Unit commands for testing the **e.** *'CRSL/R CALL'* } CRSL/R only.
13	EXTERNAL BATTERY	**EXTERNAL BATTERY CONNECTIONS 20–32 volts DC** This function will be used when the internal batteries cannot be used due to extreme climatic conditions, or when there are no internal batteries available. Do NOT use with charging equipment connected.
14	Meter	**PROVIDES AN INDICATION** **a.** Pressel switch and morse key operation *(RED)* **b.** Remote transmit command currents *(GREEN).* **c.** Remote call command currents *(RED)* **d.** Continuity *(RED).* **e.** Battery condition *(RED, A or B).*

Ref	Designation	Function
(a)	(b)	(c)
15	Test Cards	**TESTING INSTRUCTIONS FOR EQUIPMENT** The equipment listed in Section 1 can be tested on a Go/No-Go basis using the cards. No previous knowledge of testing is required.
16	Internal Power Supply	Self contained primary cells to provide power to the Test Set under portable conditions. To obtain access to the 27 volt supply remove the 4 cover screws.
17	O/P LEVEL NORMAL/LOW switch	**AUDIO LEVEL** This switch enables the operator to set the output level from the Test Set Loud-speaker to that most suitable for his working conditions.

Power Supplies

0433. **a.** ***Internal.*** Normal operation is from three 9 volt primary cells or similar commercial device *(Fig 80).*

b. ***External.*** Provision is made to use an external 24V DC 'CLANSMAN' secondary battery.

Weight and Dimensions

0434. The weight and dimensions of the test set are as follows:

a. ***Length.*** 44cm

b. ***Width.*** 18cm

c. ***Height.*** 25cm

d. ***Weight.*** 8.15kg

Operation of the Test Set

0435. The test set is operated as follows:

a. Open the test card cover.

b. Carry out the self check and battery test *(see Fig 81)* and note the output levels of the tones for comparison tests.

c. Locate the test card(s) applicable to the equipment under test.

d. Connect the equipment under test to the Test Set as instructed.

e. Carry out the test instructions in sequence.

f. Repair the equipment if any test produces an incorrect result *(see General Repair Instructions).*

g. If the repairs are beyond the capability or permitted repair level, backload the faulty equipment to REME ~~Unit technicians~~/2nd line repair point.

General Repair Instructions

0436. In order to aid the repair/replacement of parts, push-on types of connections are used. These give good electrical and mechanical joints and eliminate the need for soldering. However, care must be taken when separating a joint and excessive force must never be used. If any difficulty is experienced in separating joints, then the whole of the faulty item should be ~~passed to the unit technician.~~ BACK LOADED TO SECOND LINE REPAIR OR REPLACED.

0437. Faulty cable sockets, or faults at the sockets themselves, are rectified by replacement of the complete cable assembly.

0438. Before attempting a repair on a suspect item of audio gear carry out the following procedures:

a. Ensure that the controls of the radio set, or the harness box to which the suspect item is connected, are properly selected for the facility required.

b. Check that the snatch plug of the audio gear connecting cable is correctly fitted into the appropriate audio socket.

c. If one is available, substitute a known 'good' item for the suspect item to confirm that the suspect item is faulty.

Fault Location

0439. Using the AATS test the Headset Microphone *(BV and I)* according to the instructions on the relevant test cards.

0440. Continue testing until a test fails and then disconnect the headset from the AATS and refer to the relevant paragraph in the TEST SET AUDIO, RADIO AUDIO ACCESSORIES Handbook, to locate the part of the headset that is faulty.

0441. To use the AATS as a Continuity Tester:

a. Continuity between 2 points can be checked using the AATS, the Co-axial Test Lead and the Fan-out Socket.

b. Position the AATS function switch to AUDIO, phone switch to LEFT and pressel switch to OFF.

c. Connect the Co-axial Test Lead to the appropriate co-axial socket on the AATS.

d. Plug the headset 7 point connector (PLA) into the socket on the Fan-out.

e. Insert the plug of the Co-axial Test Lead into the appropriate socket of the Fan-out, and the clip of the Co-axial Test Lead to the point to which continuity is to be checked.

f. Switch on the AATS Power Switch and hold it on. The meter should read in the RED section *(or beyond).*

g. If it does not read in the RED section *(or beyond),* it means that there is no connection between the points under test. For further details refer to User Handbook Army Code 61656.

0442. An alternative approach to fault finding using circuit diagrams, as taught at the Signal Wing, School of Infantry can also be adopted.

0443-0445. *Reserved.*

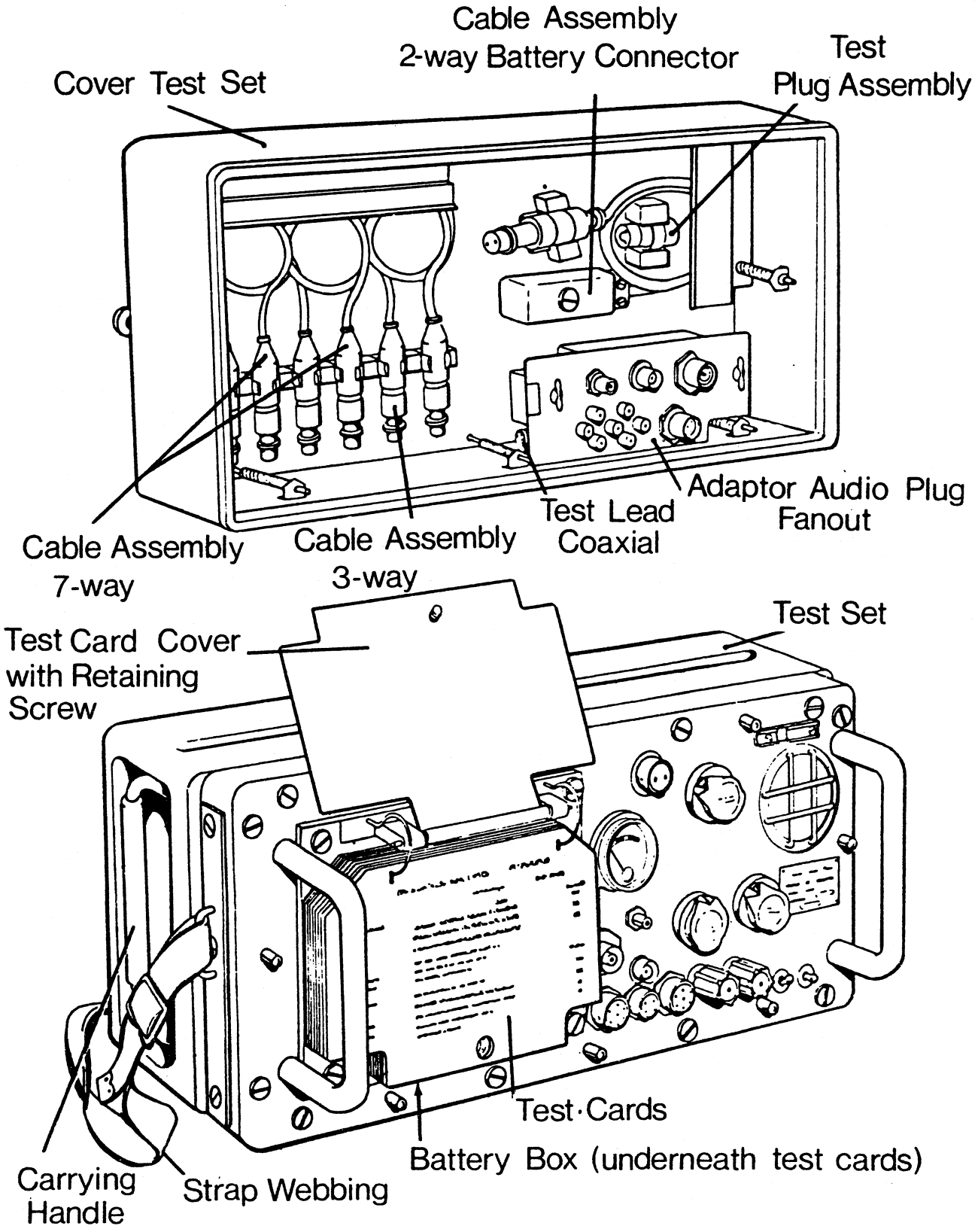
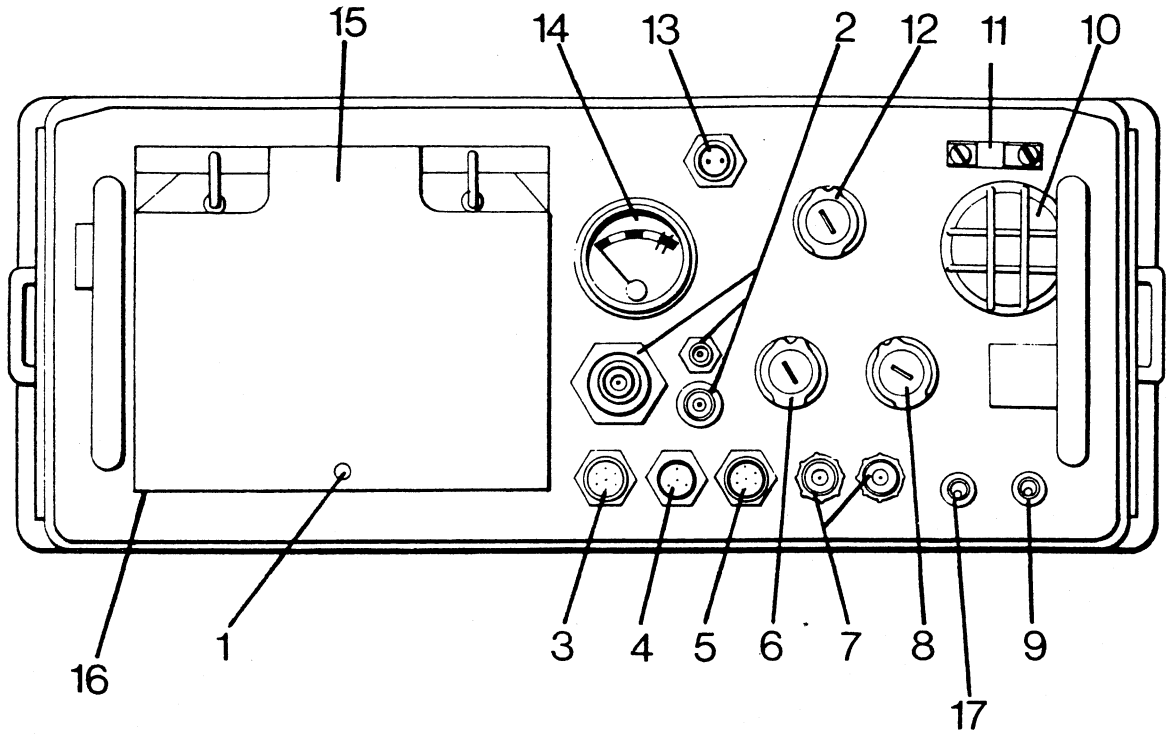


Fig 78.—Test Set Audio, Radio, Audio Accessories



1, Test Card Retaining Screw
2, Coaxial Cable Inputs
3, Audio 7-way Socket
4, Mic. 3-way Socket
5, T/R 7-way Socket
6, Phone Switch
7, Line Terminals
8, Pressel On/Off Switch
9, Power On/Off Switch
10, Internal Loudspeaker
11, Fuse Test Socket
12, Function Switch
13, External Battery 2-way Plug
14, Meter
15, Test Cards
16, Internal Power Supply
17, Normal/Low Switch

Fig 79.—Controls and Connections

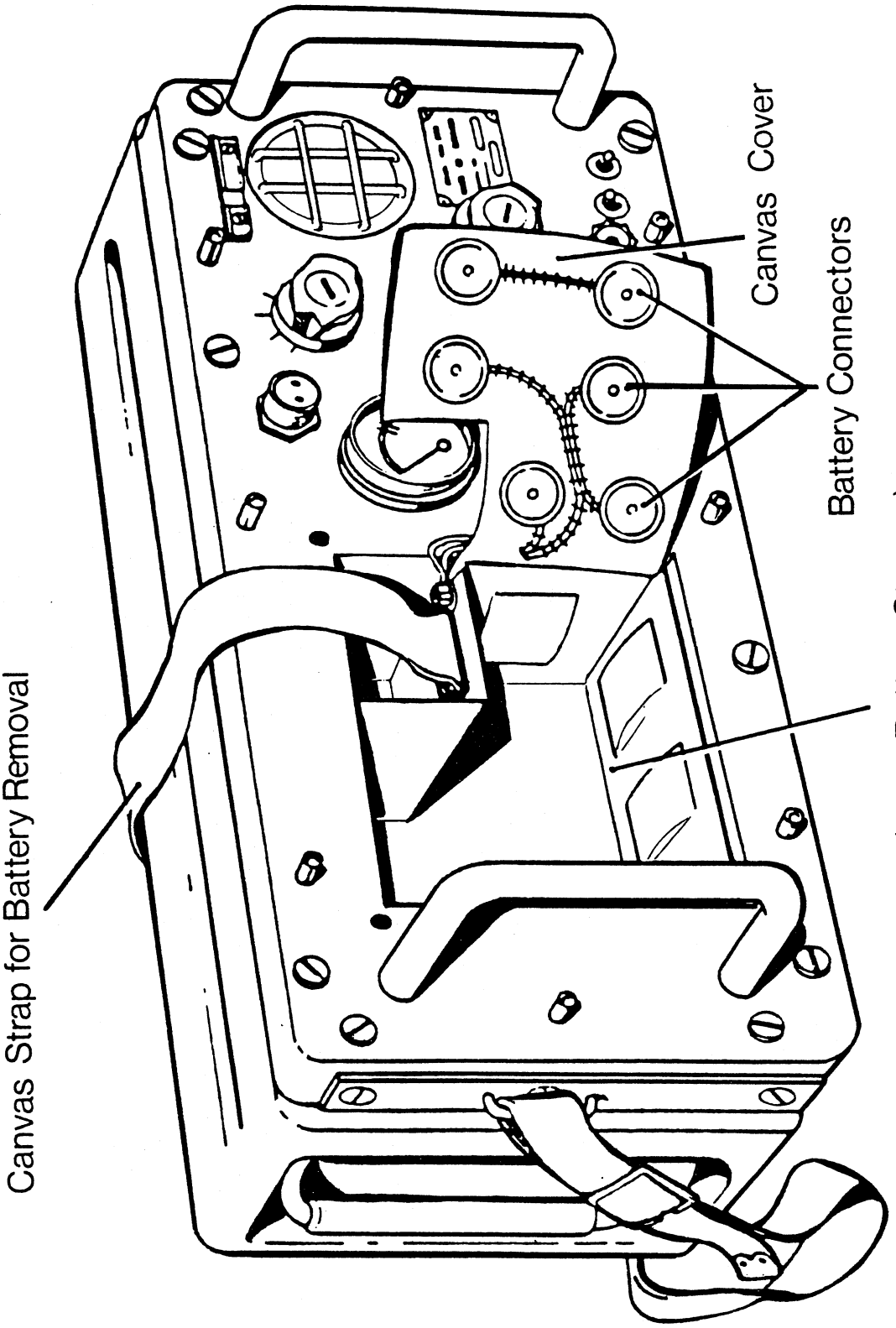


Fig 80.—Test Set Battery Box

TEST SET SELF CHECK & BATTERY CHECK

Initial Test Set Switch Positions:

FUNCTION	PHONE	PRESSEL
AUDIO	RIGHT	OFF

NOTE: An additional Switch 'O/P LEVEL' is provided to give an audio output convenient for local conditions. This should be set as required.

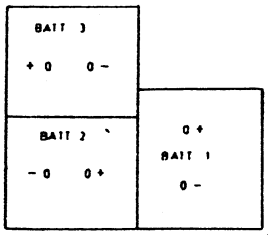
1. Join AUDIO and T/R Sockets with cable provided.
2. Switch on POWER and hold. - Meter remains in BLACK. High pitch tone in Test Set speaker.
3. Switch PHONE to LEFT. - High pitch tone in Test Set speaker. Meter remains in BLACK.
4. Switch PRESSEL to ON. - Low pitch tone in Test Set speaker. Meter reads on BATT 'B' line or beyond to test CRL/R. All other items, meter to read BATT 'A' line or beyond.

To replace Batteries, see Card 2 of 2. Page 5

Card 1 of 2 Page 4 Iss 2

BATTERY CHANGING

1. Remove Battery Cover by releasing 4 slotted knurled screws located at each corner.
2. Carefully lift canvas terminal strip and lay aside.
3. Remove BATT.1 (See Diag.) by pulling upwards on the canvas strap passing under the battery. Remove BATT.2 and BATT.3.
4. Replace the batteries with three 9 volt NATO No. 6135-99-945-6814 in the reverse order to above noting polarities as shown and ensuring that the canvas strap passes under BATT.1. Replace terminal strip and Battery Cover ensuring that it is firmly tightened down.



Card 2 of 2 Page 5 Iss 3

Fig 81.—Test Set Card for Self Check and Battery Test

SECTION 21 – TEST SET, HARNESS CONNECTORS 'CLANSMAN'

General Description (Fig 82)

0446. ***Purpose and Facilities.*** The *TEST SET, HARNESS CONNECTORS* which consists of a *TEST SET CONTINUITY,* an *ADAPTOR TEST, SHORTING* and an *ADAPTOR TEST, CONNECTOR,* is used to test the serviceability of any CLANSMAN cable assembly having between 2 and 12 conductors and a braid. Coaxial cables cannot be tested. Indication of test results is by coloured lamps.

0447. ***Principles of operation***

a. Cable continuity is checked by independently testing each core, through the ADAPTOR TEST, SHORTING, using one of the cores as a common return. Selection of the core to be tested is by a rotary switch on the TEST SET, CONTINUITY.

b. An internal sensing device, in conjunction with the CORE TESTED switch, checks the insulation between each core and between each core and the connector shell.

c. The particular core tested in each position of the CORE TESTED switch is shown in the CORE TEST DETAILS on page 2–25.

0448. ***Power requirements.*** The *TEST SET, CONTINUITY* is designed to be powered by the 18V DC available at the HARNESS socket of any installed CLANSMAN harness containing an IB2 or IB3 box, but can quite safely be powered by a 24V DC source. Cables for both methods of supply are included in the TEST SET, HARNESS CONNECTORS 'CLANSMAN' CES.

0449. ***Weights and dimensions***

Item	Height	Width	Depth	Weight
Test Set	85mm	78mm	200mm	1.36kg
Adaptor Test, Shorting	48mm	102mm	102mm	—
Adaptor Test, Connector	48mm	102mm	102mm	—

NOTE: The equipment is carried in a haversack, the weights and dimensions of which are not given.

Operation

0450. ***Connections to Power Source.*** The *TEST SET, CONTINUITY* may be connected to either:

a. The 18V DC supply available at the HARNESS socket of any installed CLANSMAN harness containing an IB2 or IB3 box, using the CABLE ASSEMBLY, 2 branches, *(see Fig 83).*

b. A 24V DC supply using the WIRING HARNESS, 2 conductors, *(see Fig 84).*

NOTE: Ensure that when a 24V DC battery is used as the power source the correct polarity is observed.

0451. ***Continuity testing (Fig 85).*** All controls are situated on the *TEST SET, CONTINUITY.*

a. Connect the *TEST SET, CONTINUITY* to the appropriate power sources as above.

b. Connect the *ADAPTOR TEST, CONNECTOR* to the *TEST SET, CONTINUITY* using the *CABLE ASSEMBLY,* 12 conductors.

SET TEST SWITCH TO CONT

c. Connect the cable to be tested between the appropriate plugs/sockets of the *ADAPTOR TEST, CONNECTOR* and *ADAPTOR TEST, SHORTING.*

d. Depress the *BRAID* switch in any one of the *CORE SELECTED* switch positions appropriate to the cable under test.

e. A satisfactory test is indicated by illumination of the *PASS* (green) lamp and an unsatisfactory test by the illumination of the *FAIL* (red) lamp.

f. Insulation. SET TEST SWITCH TO "INS"

NOTE. All controls are situated on the *TEST SET, CONTINUITY.*

a. Connect the *TEST SET, CONTINUITY* to the power source in the appropriate manner as above.

b. Connect the *ADAPTOR TEST, CONNECTOR* to the *TEST SET, CONTINUITY* using the *CABLE ASSEMBLY,* 12 conductors.

c. Connect the cable to be tested to the appropriate plug/socket of the *ADAPTOR TEST, CONDUCTOR.*

DO NOT connect the ADAPTOR TEST, SHORTING.

d. Depress the *BRAID* switch in any one of the *CORE SELECTED* switch positions appropriate to the cable under test.

e. A satisfactory test is indicated by illumination of the *PASS (green)* lamp and an unsatisfactory test by the illumination of the *FAIL (red)* lamp.

CORE TEST DETAILS

Core test Number	Core Tested				
	2 way cable	5 way cable	7 way cable	10 way cable	12 way cable
2	B	B	B	B	P
3		C	C	C	O
4		D	D	D	M
5		E	A	E	L
6			F	F	K
7			G	G	H
8				H	E
9				J	D
10				K	C
11					B
12					A
Core tested in all positions	A	A	E	A	S

0452.–0460. *Reserved.*

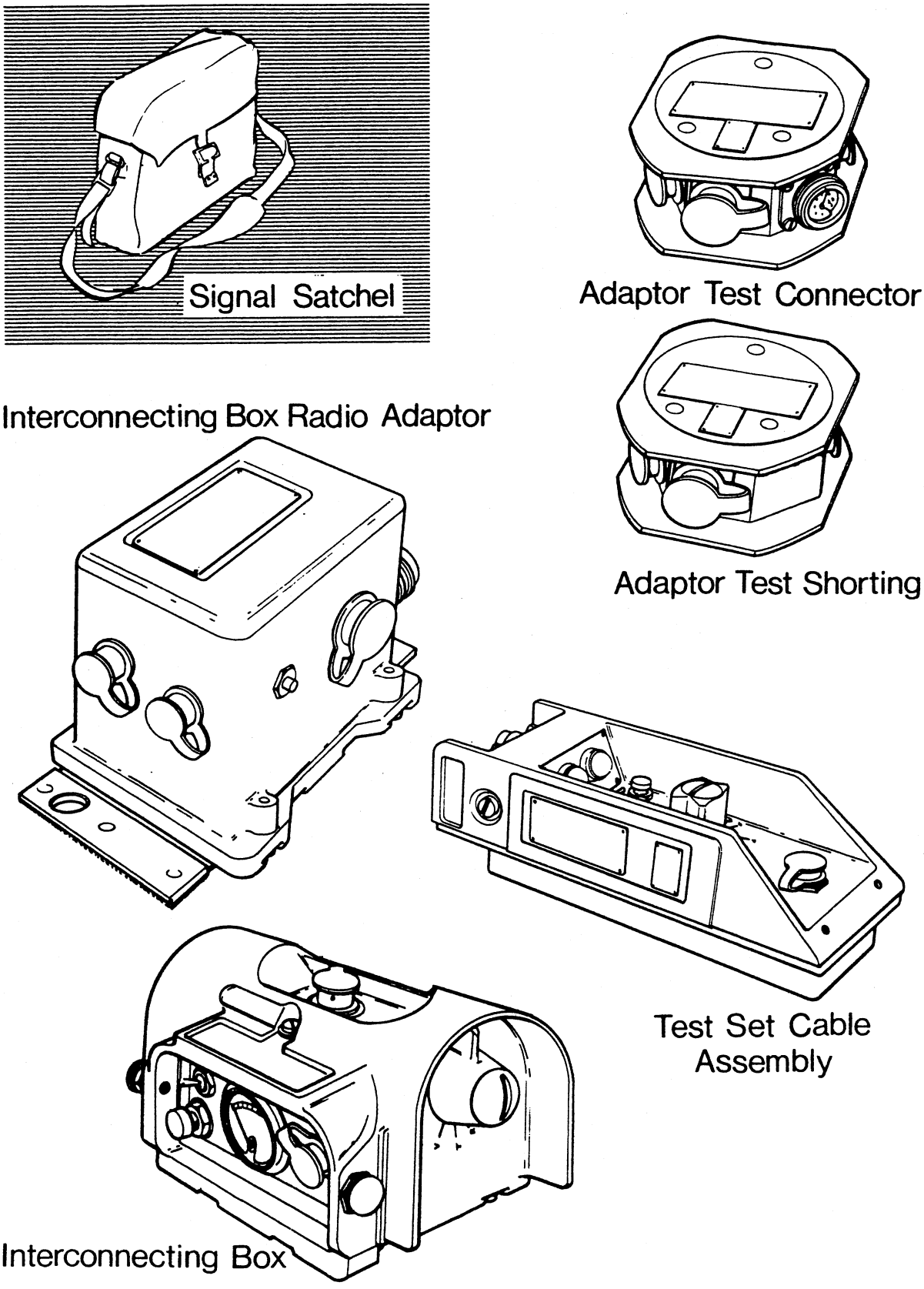


Fig 82.—Test Set Harness Connectors

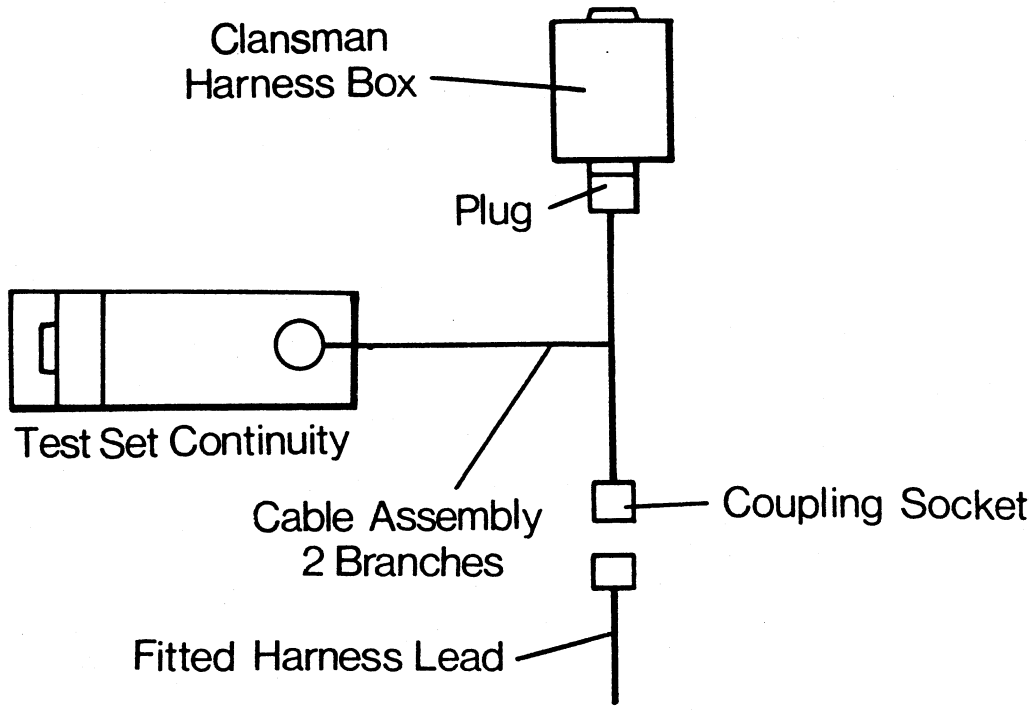


Fig 83.—Test Set 18V DC Harness Connection

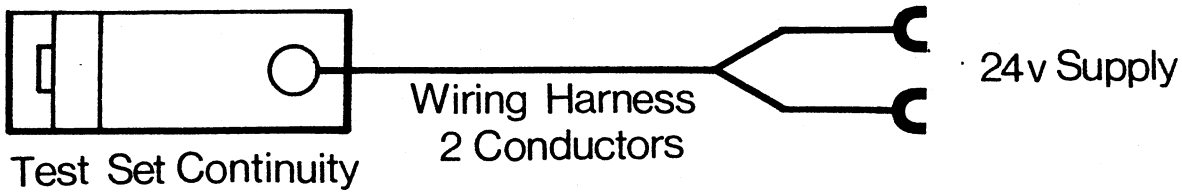


Fig 84.—Test Set 24V DC Battery Connections

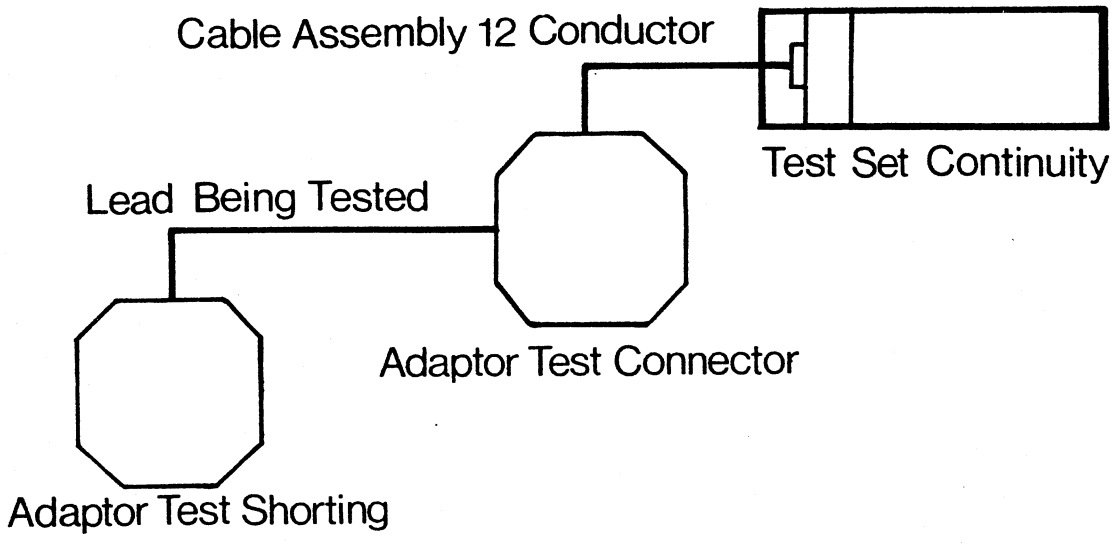


Fig 85.—Continuity Testing

CHAPTER 5

ANTENNAS AND MASTS

SECTION 22 – INTRODUCTION

General

0501. This chapter contains information on the range of VHF antennas and masts that have been designed for use with the CLANSMAN VHF series of radios. These are:

a. VHF Ground Spike Antenna.

b. VHF Elevated Ground Spike Antenna Kit.

c. VHF Ground Mounted Monopole Antenna.

d. VHF Inverted 'V' Antenna.

e. VHF Elevated Broadband Antenna.

f. 5.4m Mast.

g. 8m Telescopic Mast.

h. 12m Telescopic Mast.

0502. The antennas and masts are not restricted in use to CLANSMAN radios but can be used in conjunction with existing VHF radios often enhancing the performance normally obtained with these sets.

0503. The frequency range covered by each of these antennas is 30 MHz to 76 MHz.

Aim

0504. The aim of this chapter is to guide instructors and users so that masts and antennas will be used efficiently.

References

0505. The following references have been used in the compilation of this chapter:

	Army Code No.
a. Signal Communications in the Army Volume II – Part 3 Antennas for Regimental Signalling	70449
b. 5.4m Mast	61004 (Revised 1976)

c. User Handbook for:

(1) CLANSMAN VHF Antennas	61388
(2) UK/PRC 320	61123
(3) UK/VRC 321	61253

Teaching Techniques

0506. Practice in the erection of masts and antennas is best carried out in small supervised groups. Supervision should ensure correct use of the equipment and that all associated ancillaries are at hand.

0507.–0510. *Reserved.*

SECTION 23 – VHF GROUND SPIKE ANTENNA

Introduction

0511. *The VHF Ground Spike Antenna* is a portable ground mounted antenna designed for use with the PRC 350, PRC 351 and PRC 352 radios. It may also be used with the VRC 353 providing the power output does NOT exceed 15W.

0512. This antenna can be mounted in an elevated position when used in conjunction with the *Elevated Antenna Kit (Section 24 refers).*

Description

0513. *Data*

a. *Physical*

(1) Height fully erected	2.4m
(2) Complete weight	1.86kg

b. *Components (Fig 86)*

Antenna Element	– 5 *(1 spare)*
Matching Unit	– 1
Cable Assembly RF 400mm	– 1
Cable Assembly RF 6m	– 1
Case Carrying	– 1
Ground Spike	– 1

Assembly (Fig 87)

0514. At the chosen site *(preferably open damp ground)* assemble and erect the antenna as follows *(sequence not important):*

a. Connect straight plug of 6m cable to matching unit and fit cable strainer over plug.

b. Fit matching unit into ground spike ensuring it is secured.

c. Push ground spike and matching unit into ground ensuring clearance hole in ground spike is above the surface.

d. Select number of antenna elements according to frequency in use:

30–40 MHz	5 Elms
40–53 Mhz	4 Elms
52–71 MHz	3 Elms
70–76 MHz	2 Elms

e. Ensure elements are fitted firmly together and pushed firmly into the matching unit.

f. Connect antenna to radio, depending on type, as follows:

(1) For PRC 351, PRC 352 or VRC 353 connect right-angle plug of 6m cable direct to antenna socket on radio, attaching cable strainer to suitable part of set.

(2) For PRC 350 connect right-angle plug of 6m cable to 400mm cable and 400mm cable to antenna socket on radio ensuring cable strainers are used.

Dismantling

0515. Dismantle antenna in reverse order of assembly ensuring all items are thoroughly cleaned, and that the protective dust cap is fitted to the antenna base before packing in carrying case.

0516.–0520. *Reserved.*

SECTION 24 – VHF ELEVATED GROUND SPIKE ANTENNA KIT

Introduction

0521. *The Elevated Kit* enables the *VHF Ground Spike Antenna* to be used in an elevated position, thereby increasing the range over that provided by the ground mounted antenna.

0522. The kit enables the antenna to be fitted to the top of a 5.4m mast or to be elevated using any convenient projection, such as the branch of a tree.

Description

0523. ***Data.***

a. *Physical.* Complete weight 2.07kg.

b. *Components (Fig 88).*

Adaptor	– 1
Carrying Case	– 1
Cable Assembly RF 1m	– 1
Cable Assembly RF 1.4m	– 1
Cable Assembly 2m	– 1

Cable Assembly RF 20m	– 1
Cord Assembly	– 1
Inductor Unit	– 1

Assembly (Using 5.4m Mast)

0524. At the chosen site, assemble and erect the antenna as follows *(Fig 89):*

a. Fit matching unit into adaptor and secure with locking key.

b. Fit inductor unit to top section of 5.4m mast.

c. Assemble but do not erect mast, using the adaptor in place of the top-plate supplied with the mast, securing the adaptor to the mast by the toggle attached to the adaptor.

d. Select the number of antenna elements according to the frequency in use and fit them firmly into the matching unit.

e. Select the cable assembly which has the number of beads equal to the number of antenna elements, and connect it between the matching unit and the inductor unit ensuring the cable strainers are fitted to the spring clips at either end.

f. According to the distance to the radio, connect the straight plug of the 6m or 20m cable to the inductor unit socket and secure with the cable strainer.

g. Erect the mast as shown in *Section 28.*

h. Connect the antenna to the radio as instructed for the *Ground Spike Antenna.*

Assembly *(suspension from overhead projection)*

0525. At the chosen site, assemble and erect the antenna as follows *(Fig 90):*

a. Fit the ring on the end of the throwing cord over the stub of the matching unit, and fit the matching unit into the adaptor securing it with the locking key.

b. Select and fit antenna elements together but, before fitting them into the matching unit, slip the second ring on the throwing cord over the antenna element socket on the matching unit and push the spring clip attached to the cord, into the clearance hole in the matching unit.

c. Select and fit the relevant cable assemblies between the matching unit and the inductor unit, and between the inductor unit and the radio, ensuring they are secured by the cable strainers.

d. Throw the cord over the selected projection and raise the antenna to the required height, taking care to avoid damage to the antenna and ensuring the cable strainers are taking the weight.

e. Secure the cord, ensuring the inductor unit is hanging freely above the ground.

Dismantling

0526. Dismantle the antenna in the reverse order of assembly ensuring all items are thoroughly cleaned, and that the protective dust caps are fitted to the antenna base and inductor unit before stowing all items in their correct cases.

0527.–0535. *Reserved.*

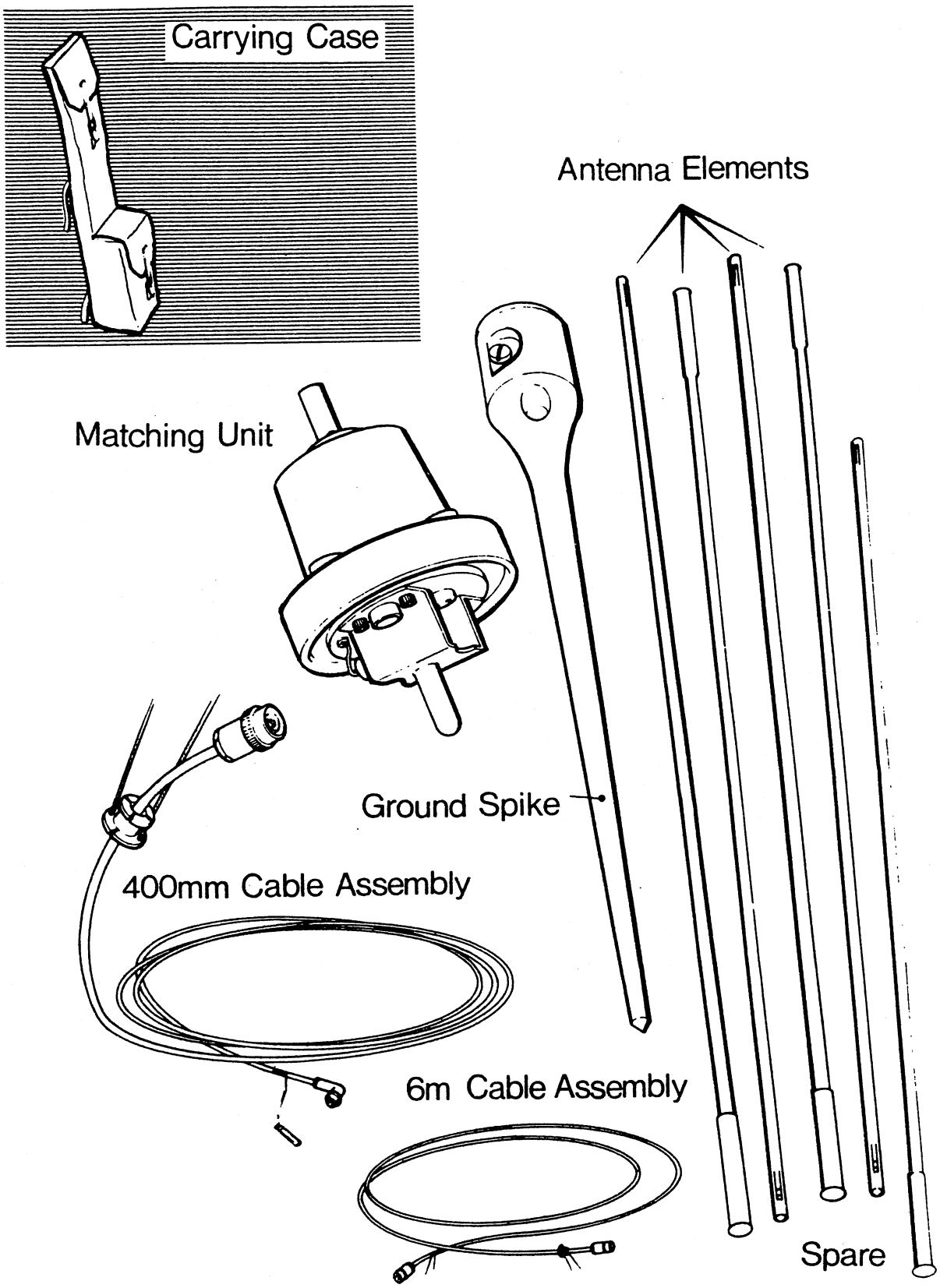


Fig 86.—VHF Ground Spike Antenna—Components

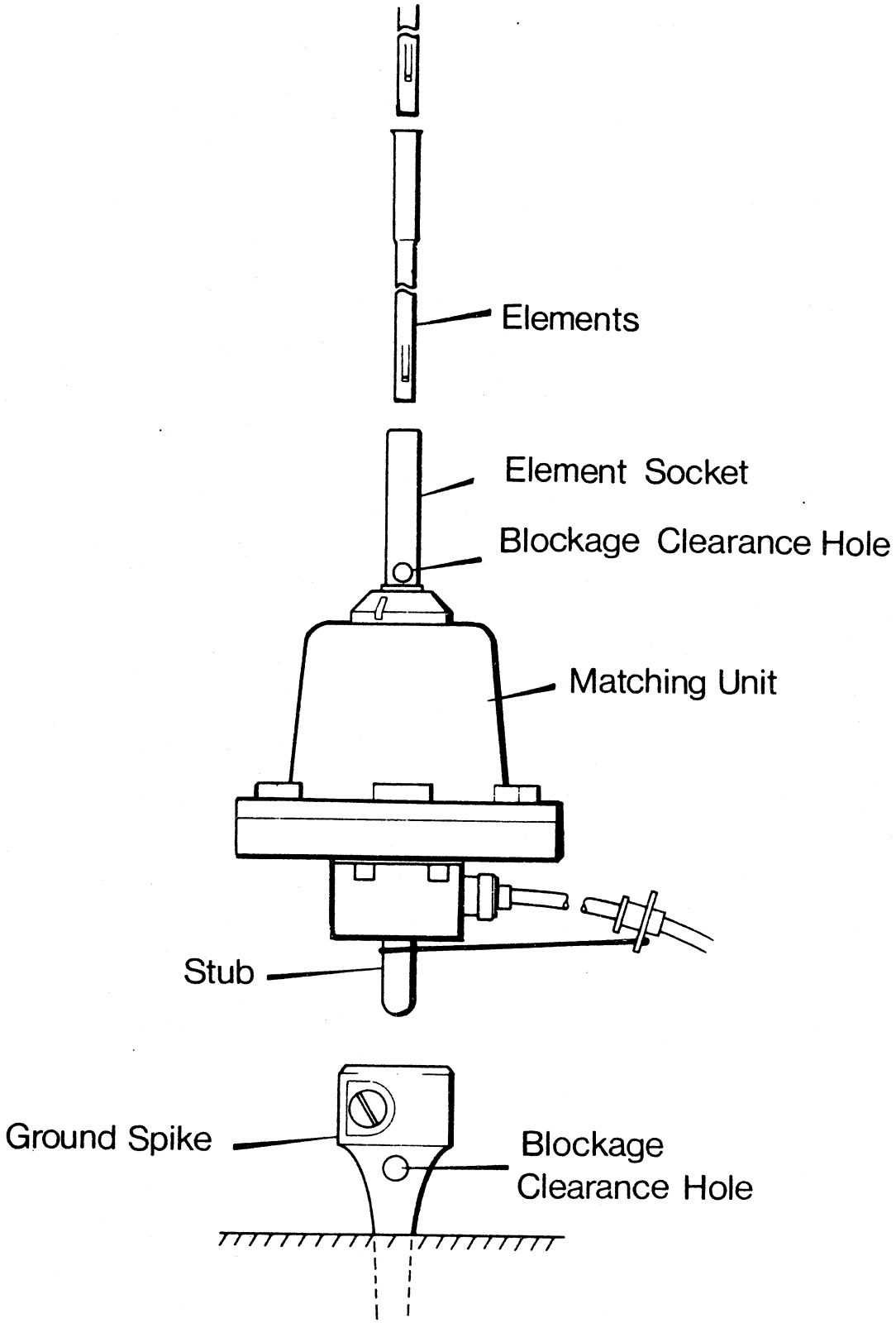


Fig 87.—VHF Ground Spike Antenna—Assembly

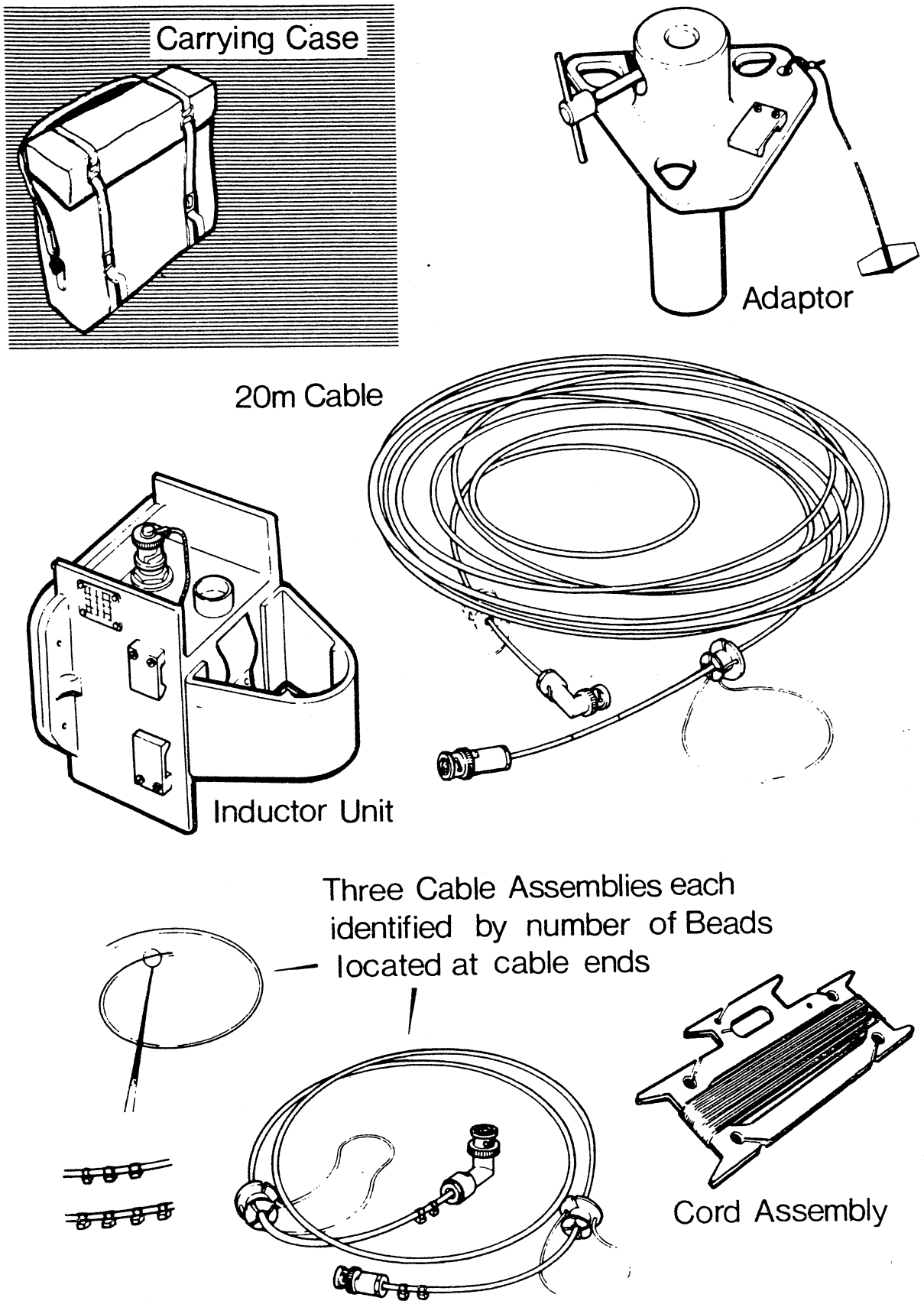


Fig 88.—VHF Elevated Ground Spike Antenna—Components

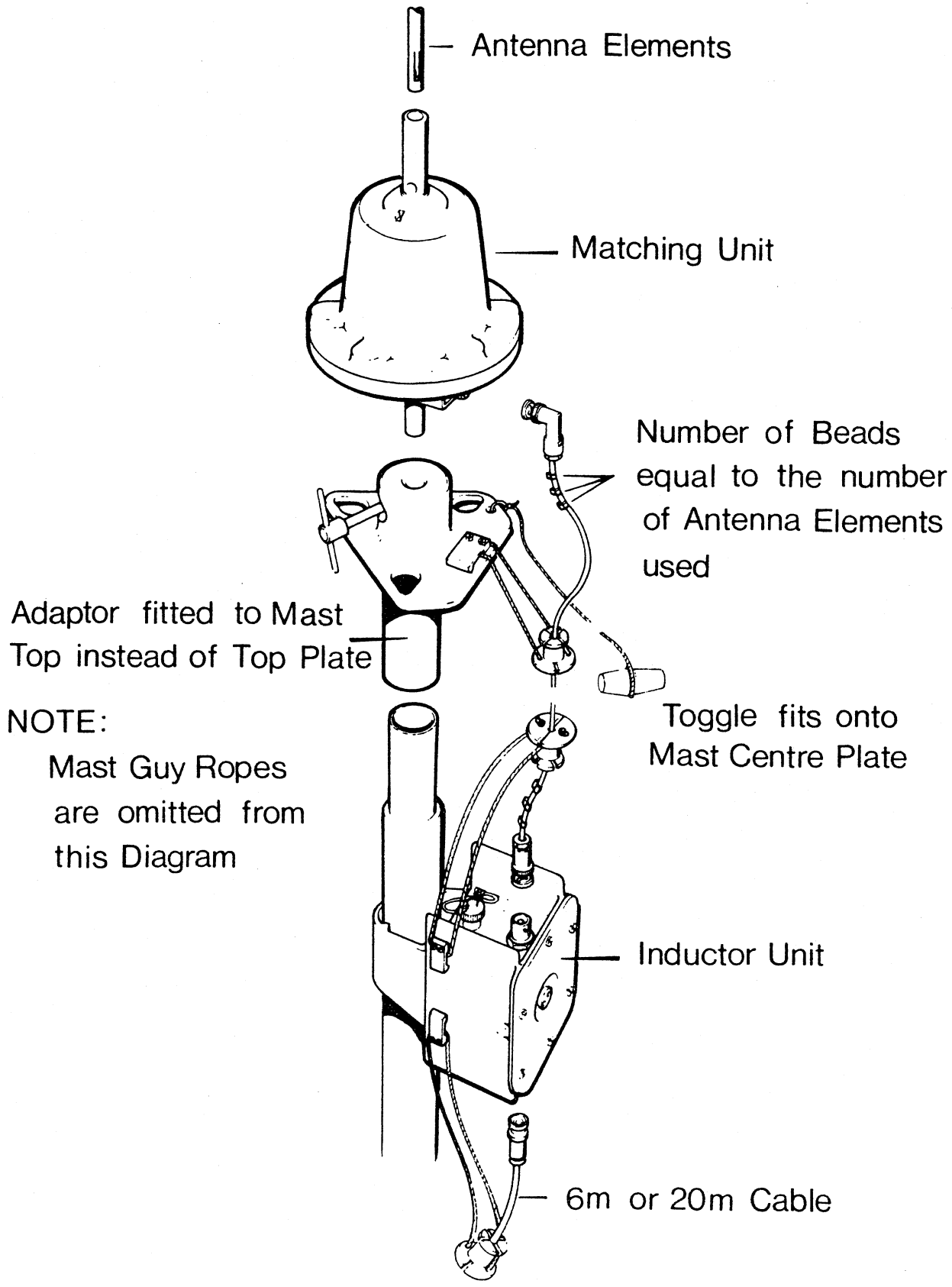


Fig 89.—VHF Elevated Ground Spike Antenna Assembly, Using a 5.4m Mast

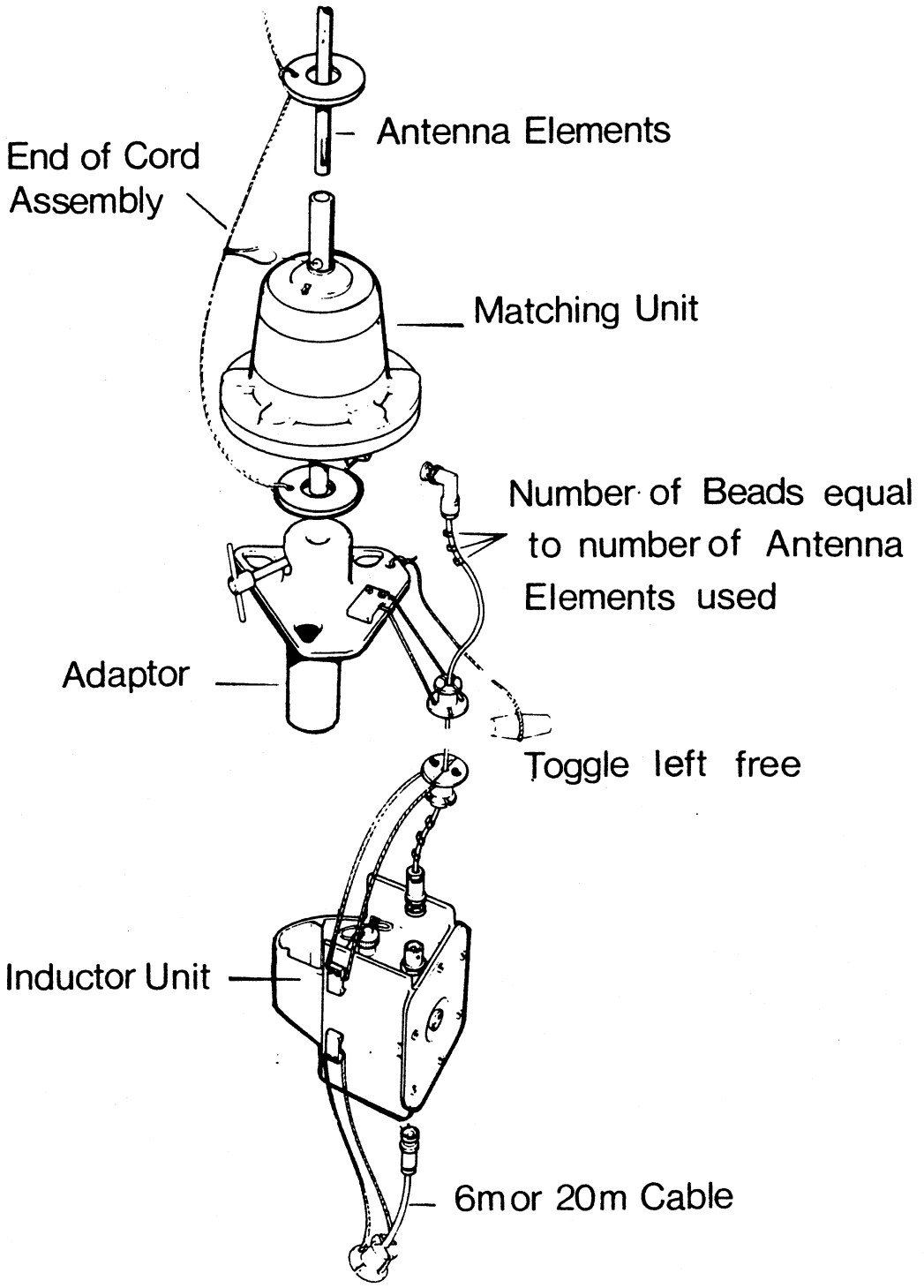


Fig 90.—VHF Elevated Ground Spike Antenna, Assembly, for Suspension

SECTION 25 – VHF GROUND MOUNTED MONOPOLE ANTENNA

Introduction

0536. *The VHF Ground Mounted Monopole* is an omnidirectional wide-band antenna consisting of a conical radiator mounted on a ground plane.

0537. The antenna was primarily designed for use with the PRC 351, PRC 352 and VRC 353 radios but it can be adapted for use with the PRC 350 using the 400mm cable assembly issued with the *Ground Spike Antenna.*

0538. The antenna is collapsible for transportation and can be carried and erected by one man.

Description

0539. ***Data***

a. *Physical*

(1) Height	1.2m
(2) Width when erected	1.1m square
(3) Weight	12.7kg

b. *Components (Fig 91)*

Antenna Assembly	– 1
Cable Assembly RF 6m	– 1
Cable Assembly RF 15m	– 1
Case Antenna	– 1
Ground Spike	– 4
Instruction Card	– 1

Assembly

0540. At the chosen site, preferably an open, level position, assemble and erect the antenna as follows *(Fig 92):*

a. Connect the socket end of the 15m cable to the fixed plug on the antenna base ensuring the cable strainer is attached to the clip on the side of the antenna base.

b. Stand the antenna upright and release the 2 straps which secure the folded antenna.

c. Pull each of the 4 arms of the groundplane outwards and secure them by locking the toggle catches on the centre post to the hooks on the traverse ring.

d. Secure the antenna to the ground by pushing the ground spikes through the holes in the tips of the groundplane arms.

e. Connect the antenna to the radio, depending on type, as follows:

(1) For the PRC 351, PRC 352 or VRC 353 radios connect the straight plug on the 6m cable to the 15m cable via the cable adaptor and connect the right angle plug of the 6m cable direct to the antenna socket on the radio ensuring all cable strainers are secured.

(2) To adapt the antenna to fit the PRC 350, the 400mm cable supplied with the *Ground Spike Antenna* is connected between the 6m cable and the antenna socket on the radio.

Dismantling

0541. Dismantle the antenna in reverse order of assembly ensuring that all items are thoroughly cleaned and that the protective dust caps are fitted to the antenna base and cable adaptor before stowing all items in the antenna case.

0542.–0550. *Reserved.*

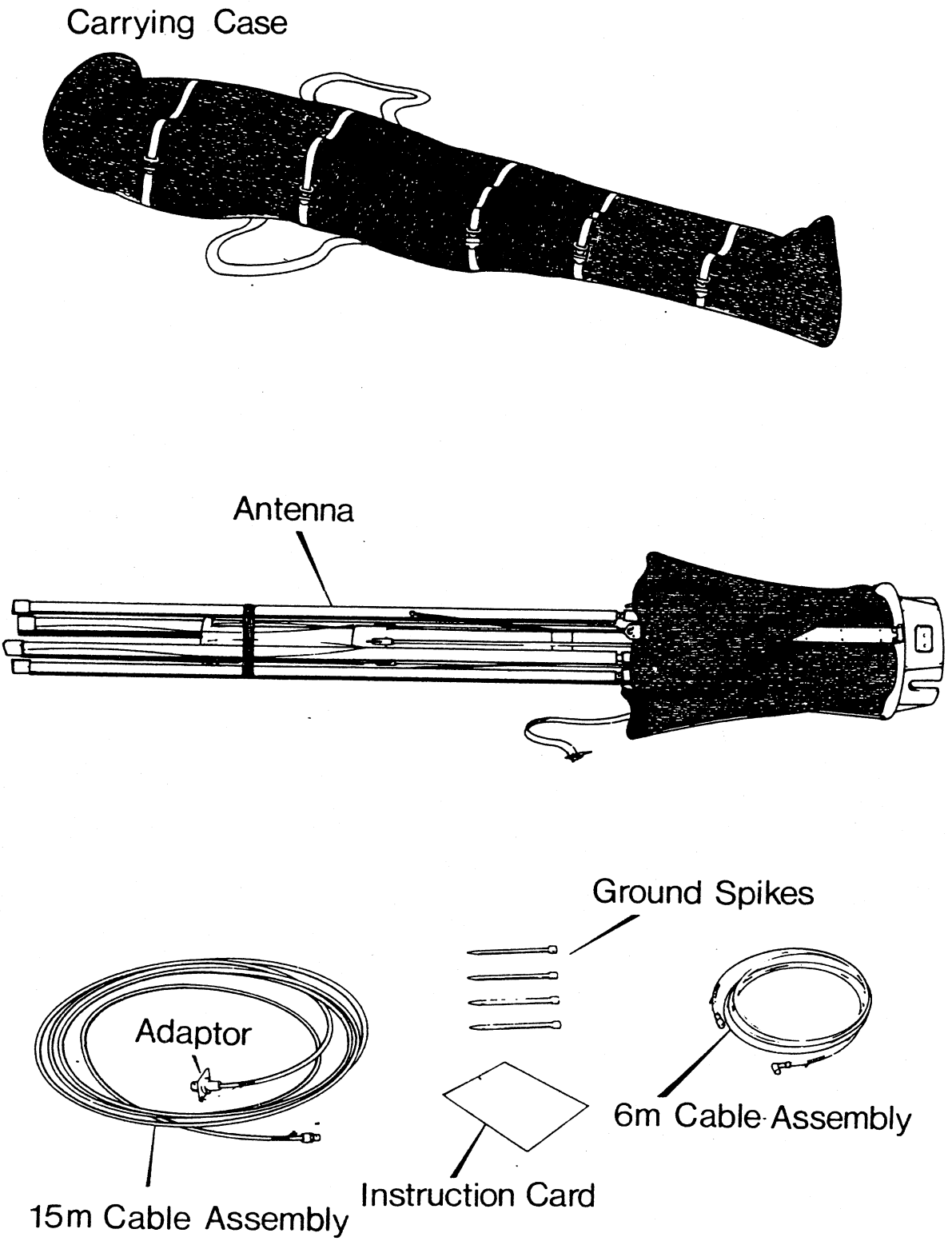


Fig 91.—VHF Ground Mounted Monopole—Components

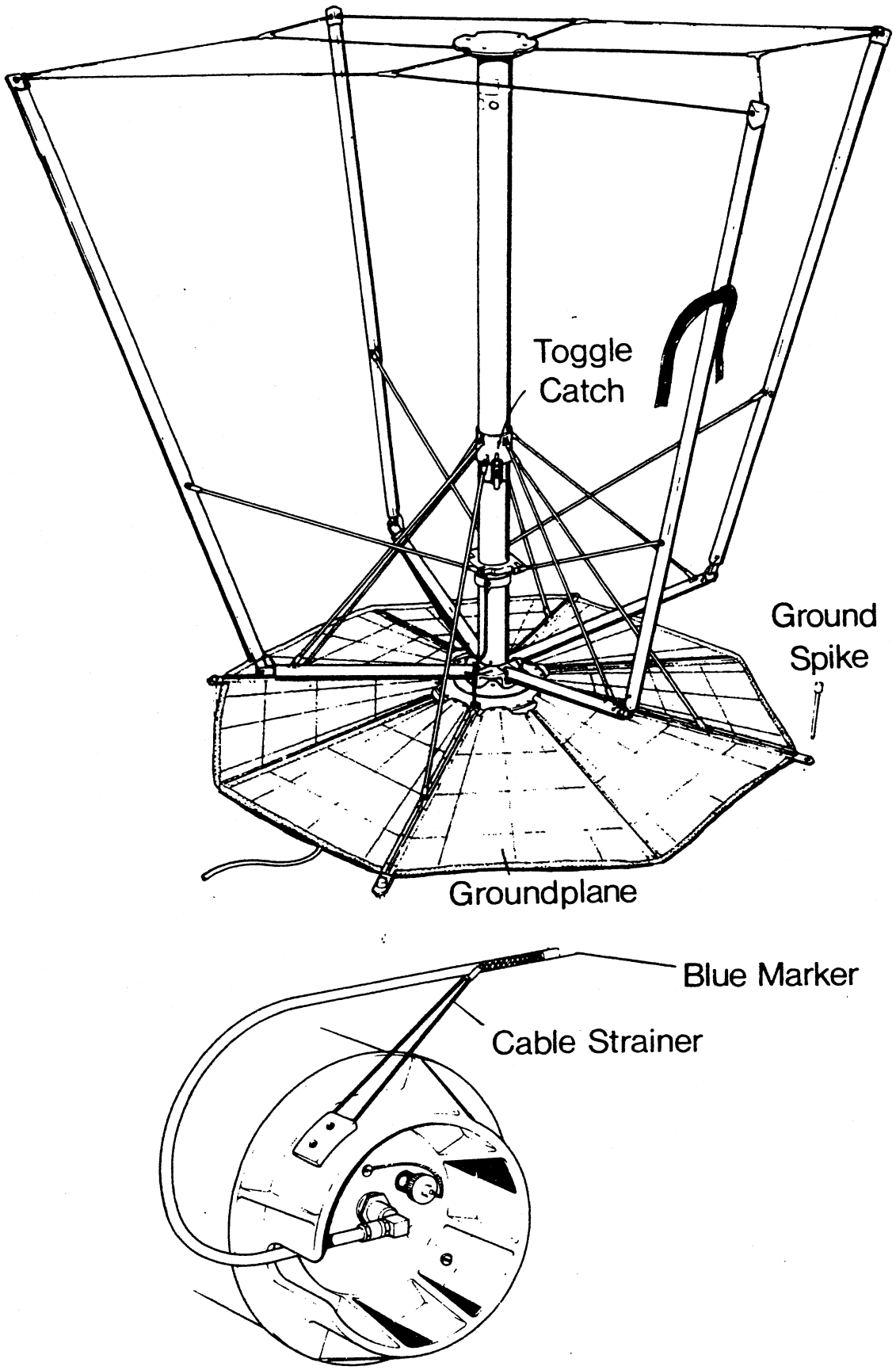


Fig 92.—VHF Ground Mounted Monopole—Assembly

SECTION 26 – VHF INVERTED 'V' ANTENNA

Introduction

0551. *The VHF Inverted 'V'* is a directional wide-band long wire type antenna normally used for long range working.

0552. The antenna system is supported in the centre by a 9m mast and anchored at each end to pickets. The 9m mast is provided by using the 12m mast with the top and bottom sections in the retracted position.

0553. This antenna was designed for use with the PRC 351, PRC 352 and VRC 353 radios. It can be adapted for use with the PRC 350 using the 400mm cable issued with the *Ground Spike Antenna.*

0554. The erection of this antenna is a 2 man operation although it is possible for one man to erect it in ideal conditions.

Description

0555. ***Data.***

a. *Physical*

(1) Height when erected	9m
(2) Length when erected	33m
(e) Weight	11kg

b. *Components (Fig 93)*

Antenna Element	– 2
Cable Assembly RF 6m	– 1
Cable Assembly RF 15m	– 1
Carrying Case	– 1
Mast Cap	– 1
Picket	– 2
Resistance Unit	– 1
Transformer Unit	– 1
Instruction Sheet	– 1

Assembly

0556. At the chosen site, an unobstructed space 33m long and 9m high in line with the distant station, assemble and erect the antenna as follows *(Fig 94):*

a. Unwind one of the antenna wires from its dispenser and lay it along the ground in line with the distant station. Since this is a directional antenna, it should if possible be laid out on a compass bearing. This wire will be used as the earth.

b. Assemble and erect but do not raise the 12m mast at the centre of the earth wire which is indicated by the 2 marker beads.

c. Fit the mast cap assembly into the top section of the mast and secure it by tightening the clamp screw.

d. Unwind the second antenna wire from its dispenser, laying it along side the earth wire.

e. Place the antenna wire in the slot of the mast cap ensuring the mast cap is between the 2 bead markers at the centre of the wire.

f. Raise and secure the mast to a height of 9m in accordance with Section 30. The height of 9m is attained by leaving the top and bottom sections in the retracted position.

g. Pull the antenna wire taut by placing the plastic strainer plates over the pickets and drive the pickets into the ground with the flat face nearest to the mast *(Fig 95).*

h. Fit both ends of the earth wire to the pickets by hooking the hole of the plastic strainer over one side of the U-shaped stop on the pickets *(Fig 95).* The earth wire will now be loose, this looseness should be taken up using a sheep shank knot and not coiled.

j. Clamp the transformer and resistance units to the flat face of the pickets *(Fig 94),* ensuring the resistance unit is on the picket nearest to the distant station.

k. Connect the earth and antenna wires to the appropriate terminals on the transformer and resistance units *(Fig 95).*

l. Connect the socket of the 15m cable at the end without the adaptor to the plug on the transformer unit and secure it by looping the cable strainer over the U-shaped stop on the picket.

m. Connect the antenna to the radio, depending on type, as follows:

(1) For the PRC 351, PRC 352 and VRC 353 radios, connect the straight plug on the 6m cable to the 15m cable via the adaptor and connect the right angle plug on the 6m cable direct to the antenna socket on the radio ensuring the cable strainers are used for security.

(2) To adapt the antenna for use with the PRC 350, the 400mm cable supplied with the *Ground Spike Antenna* must be connected between the radio and the 6m cable.

Dismantling

0557. Dismantle the antenna in reverse order of assembly ensuring all items are thoroughly cleaned and that the protective dust caps are fitted to the transformer unit and cable adaptor before stowing in the carrying case.

0558. Particular attention is to be paid to the reeling in of earth and antenna wires. Fold the wire so that the ends are level and pass the loop formed at the centre through the wire guide on the dispenser and then onto the button provided. Wind up keeping the wire taut.

0559.–0570. *Reserved.*

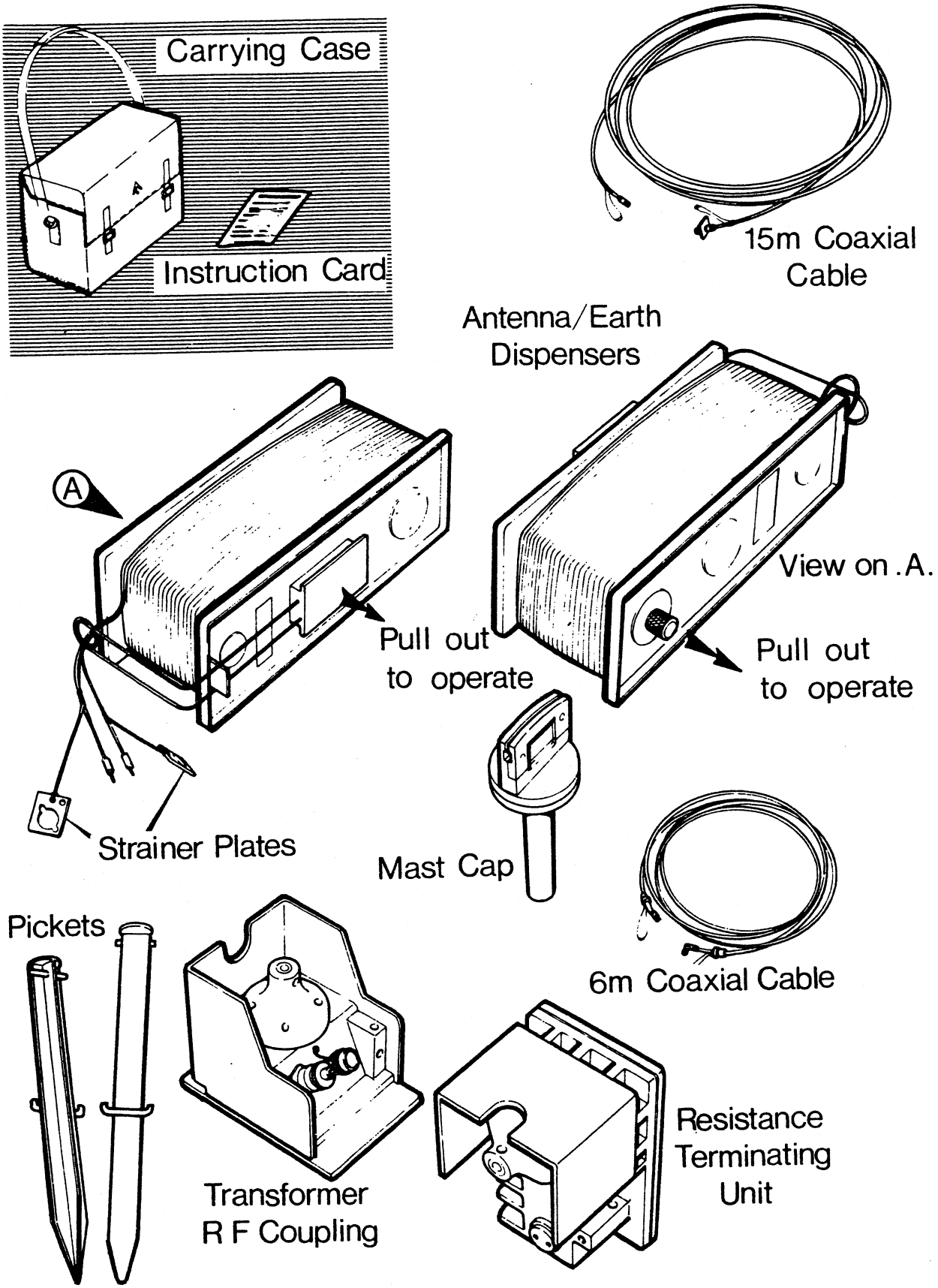


Fig 93.—VHF Inverted 'V' Antenna-Components

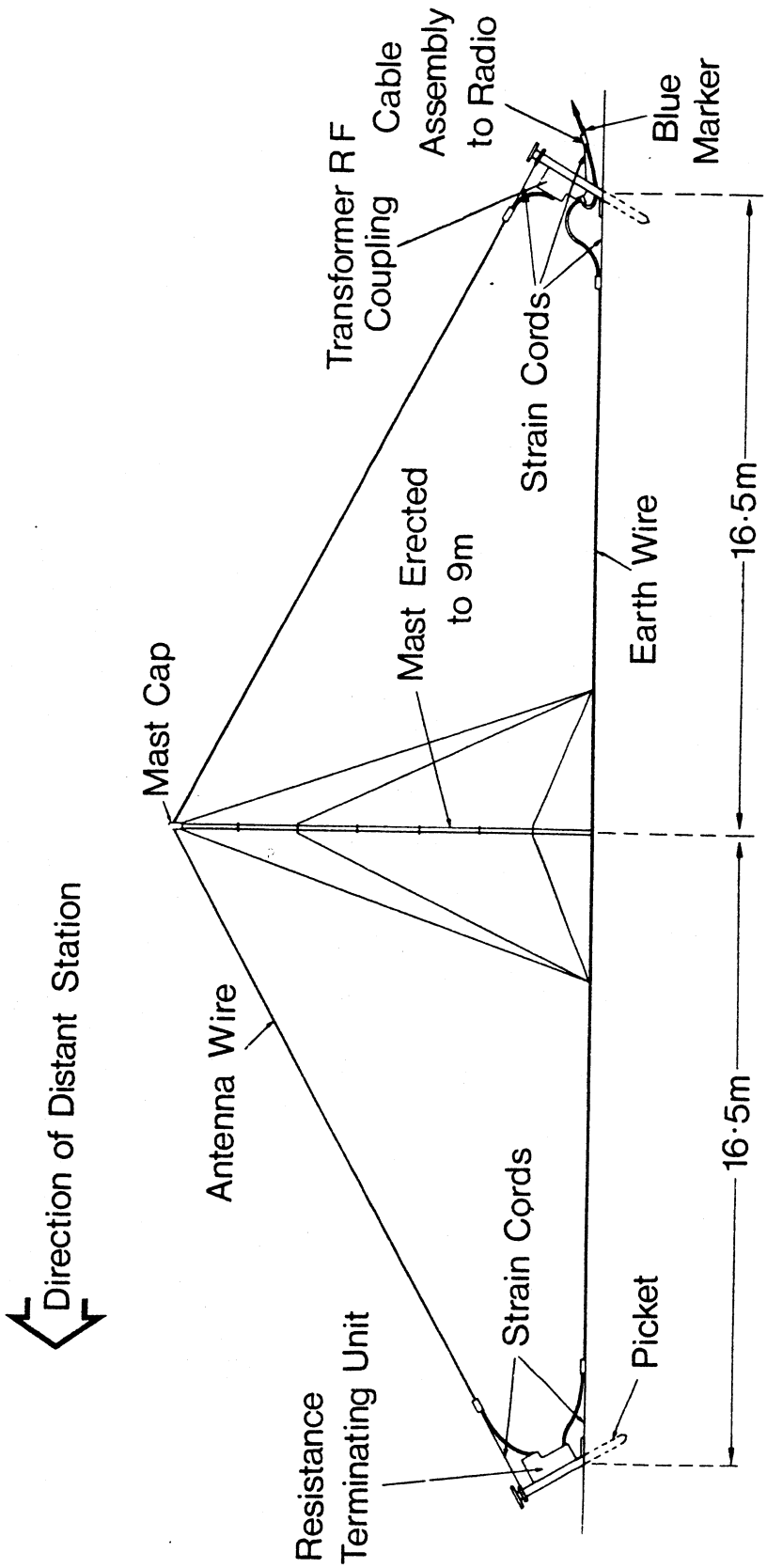
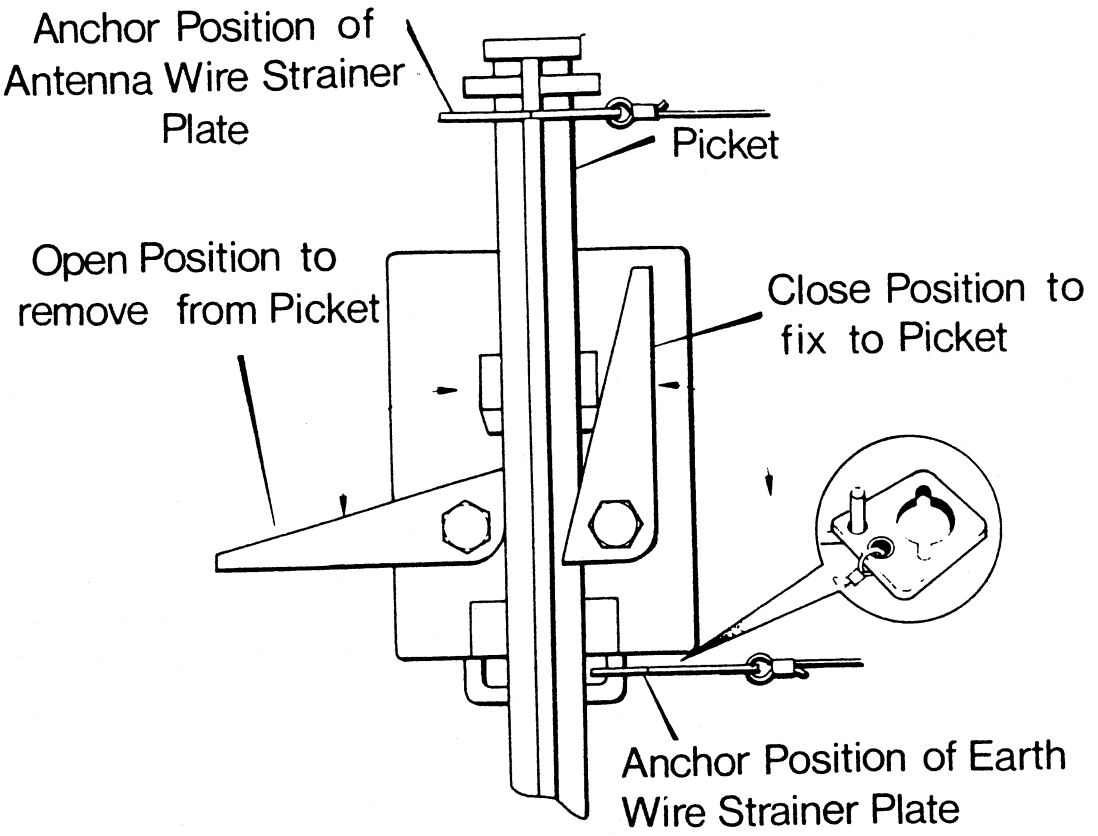


Fig 94.—VHF Inverted 'V' Antenna—Erected



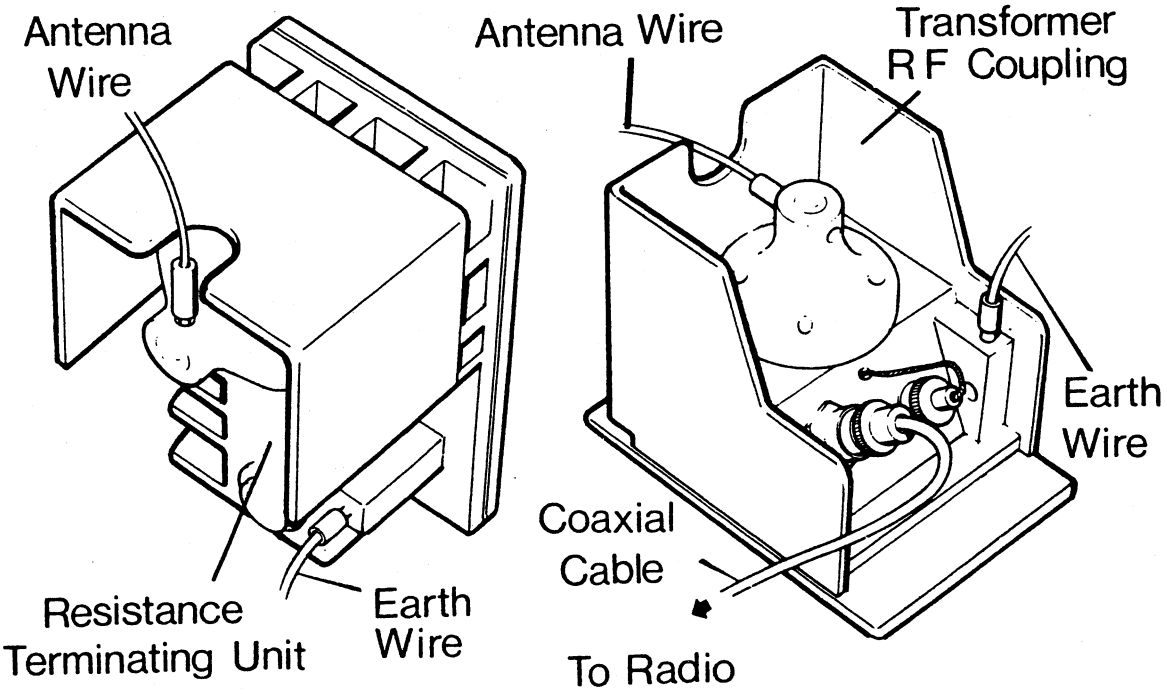


Fig 95.—Transformer and Resistor Unit for Inverted 'V' Antenna

SECTION 27 – VHF ELEVATED BROADBAND ANTENNA

Introduction

0571. *The VHF Broadband* is an omnidirectional centre fed dipole antenna which can be elevated using either the 8m or 12m mast. The use of one elevated antenna will increase the range of the radio in use by approximately 50%.

0572. This antenna was primarily designed for use with the VRC 353 but will still give an increased range when used with the PRC 351 or PRC 352. It can be adapted for use with the PRC 350 using the 400mm cable assembly issued with the *Ground Spike Antenna.*

0573. The antenna system can be erected by one man when used with the 8m mast, but it is suggested that if the 12m mast is used it then becomes a 2 man operation.

Description

0574. ***Data.***

a. *Physical*

(1) Height excluding mast	3.4m
(2) Weight	6.3kg

b. *Components (Fig 96)*

Antenna Element	– 1
Antenna Whip Sections	– 2
Base Antenna Element	– 1
Cable Assembly RF 6m	– 1
Cable Assembly RF 15m	– 1
Case Ancillaries	– 1
Case Antenna	– 1

Assembly

0575. At the chosen site, assemble and erect the antenna as follows:

a. Assemble and erect but do not raise the 8m or 12m mast as detailed in *Sections 29 and 30.*

b. Insert the antenna base into the top section of the mast and secure by tightening the clamp screw.

c. Screw all 3 antenna elements together and screw complete antenna into the top of the antenna base.

d. Connect the socket end of the 15m cable to the fixed plug on the antenna base ensuring the cable strainer is attached to the clip on the side of the antenna base.

e. Raise and secure the mast to its full height as described in *Section 29 or 30.*

f. Connect the antenna to the radio, depending on type, as follows:

(1) For the PRC 351, PRC 352 or VRC 353 radios, connect the straight plug of the 6m cable to the socket of the 15m cable via the socket adaptor. Connect the right angle plug of the 6m cable direct to the antenna socket on the radio ensuring all cable strainers are used.

(2) To adapt this antenna for use with the PRC 350, the 400mm cable assembly issued with the *Ground Spike Antenna* is connected between the 6m cable and the radio antenna socket.

Dismantling

0576. Dismantle the antenna in the reverse order of assembly ensuring that all items are thoroughly cleaned and that the protective dust caps are fitted on the antenna base and cable adaptor before stowing all items in their relevant cases.

0577.–0590. *Reserved.*

SECTION 28 – 5.4m MAST

Introduction

0591. *The 5.4m Mast* is a lightweight mast comprising of 6 fibreglass tubular sections, which when fitted together can be used as an antenna support, a 5.4 vertical radiator or a 7.9 vertical radiator *(2.4m whip added).*

0592. This mast can be carried and erected by one well trained man. However, if 2 men are used, it both simplifies and cuts down the time of erection. This mast should only be used as a last resort especially on operations.

0593. ***Data.***

a. *Physical*

(1) Height when erected	5.4m
(2) Length in carrying case	9m
(3) Weight	4.9kg

b. *Components (Fig 97)*

Adaptor Mast	– 1
Case Mast	– 1
Former	– 3
Guy Assembly	– 6
Mast Section	– 6
Peg Assembly	– 5 *(2 spare)*
Plate Guy	– 2
Plate Tie	– 1

Assembly

0594. At the chosen site, assemble and erect the mast as follows *(Fig 98)*:

a. Lay all 6 sections of the mast end to end along the ground and fit together, interposing a guy plate between the third and fourth sections and the tie plate between the lowermost 2 sections.

b. Fit the appropriate component(s) to the top of the mast:

(1) *For 5.4m vertical radiator.* Fit second guy plate and adaptor complete with down lead ensuring the down lead is threaded down through the small holes in the guy plates.

(2) *For 7.9m vertical radiator.* Fit second guy plate and adaptor complete with down lead and insert a 2.4m whip antenna in the top of the adaptor. Ensure the down lead is threaded down through the small holes in the guy plates.

(3) *For 5.4m Support.* Fit second guy plate and ensure the throwing cord of the relevant antenna is threaded down through the small holes in the guy plates and secured to the tie plate.

(4) *For VHF Elevated Ground Spike.* Fit the elevated ground spike adaptor instead of the second guy plate.

c. Unwind the guys from the formers and feed the toggles through the underside of the elongated holes in the guy plates ensuring the toggles will not pull through the holes when the guys are under tension.

d. Drive 3 pegs into the ground equally spaced in a circle 3m from the base of the mast ensuring that the wire hooks on the pegs are facing inwards.

e. Stand the base of the mast on the reinforced lid of the mast case in the centre of the 3 pegs and attach the loop at the end of the upper and lower guys to the relevant pegs by means of the wire hooks.

f. Tighten the guys to maintain the mast in a vertical position.

Dismantling

0595. Dismantle the mast in the reverse order of assembly ensuring that all items are thoroughly cleaned and that the guys are neatly wound onto the formers before stowing all items in the mast case.

0596.–05100. *Reserved.*

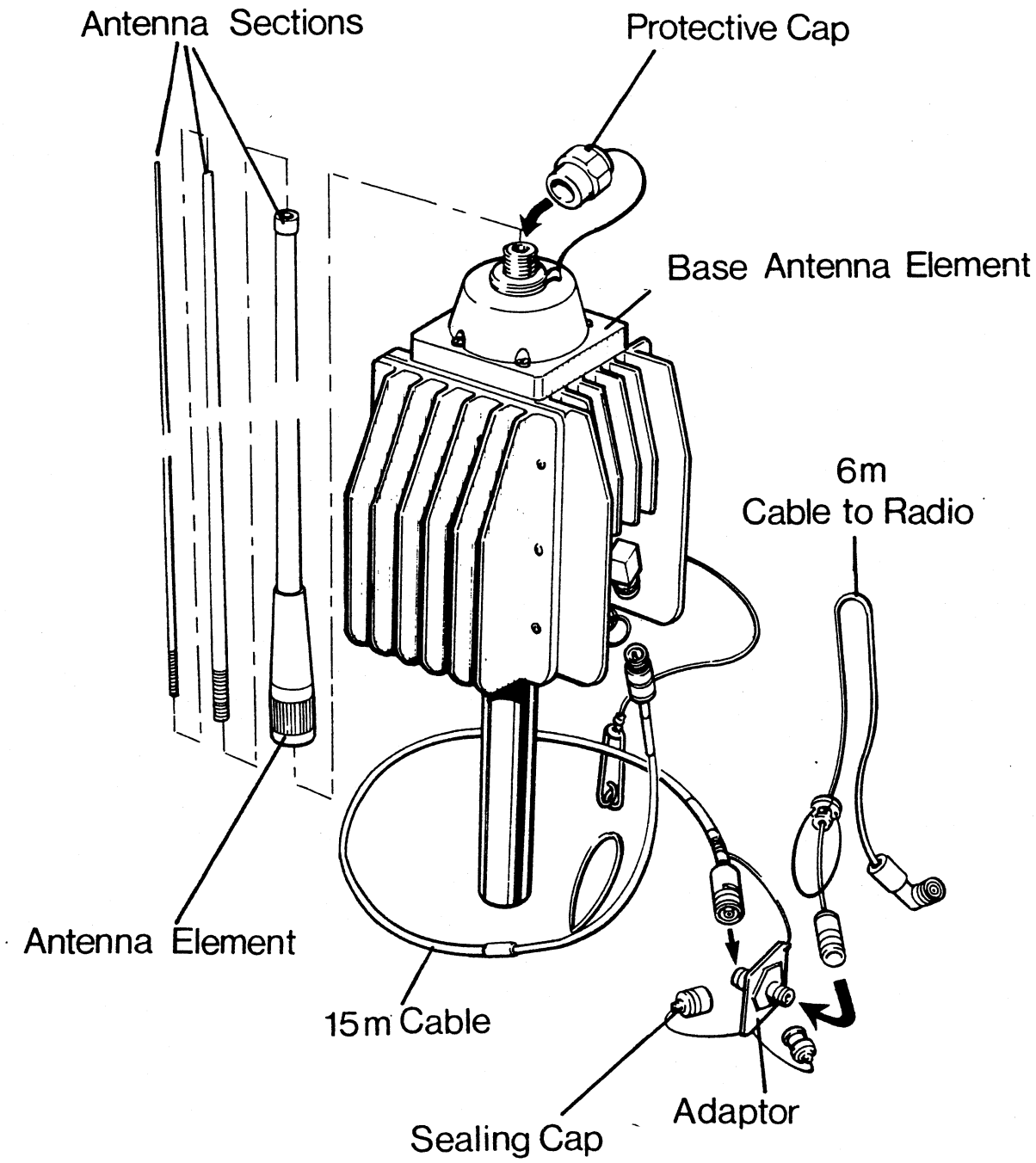


Fig 96.—VHF Elevated Broadband Antenna – Components

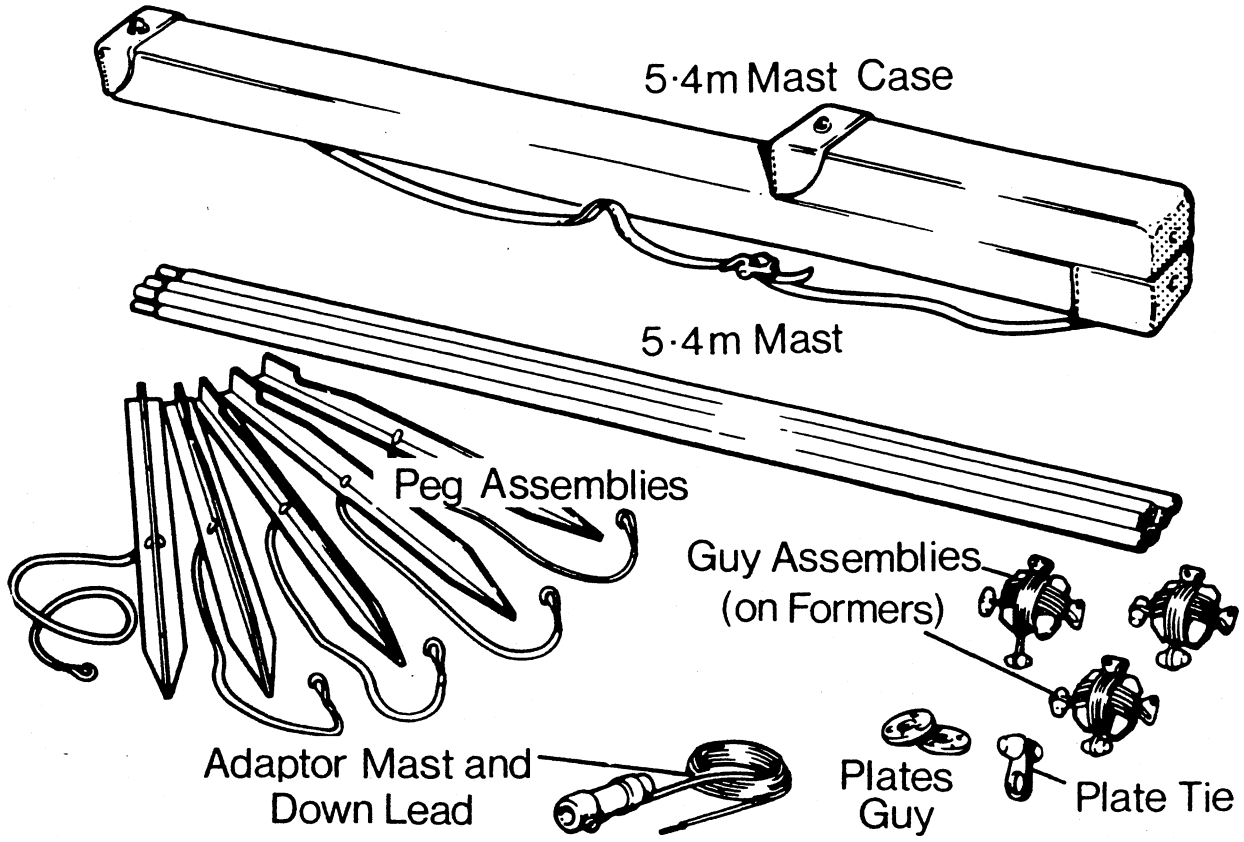


Fig 97.—5.4m Mast – Components

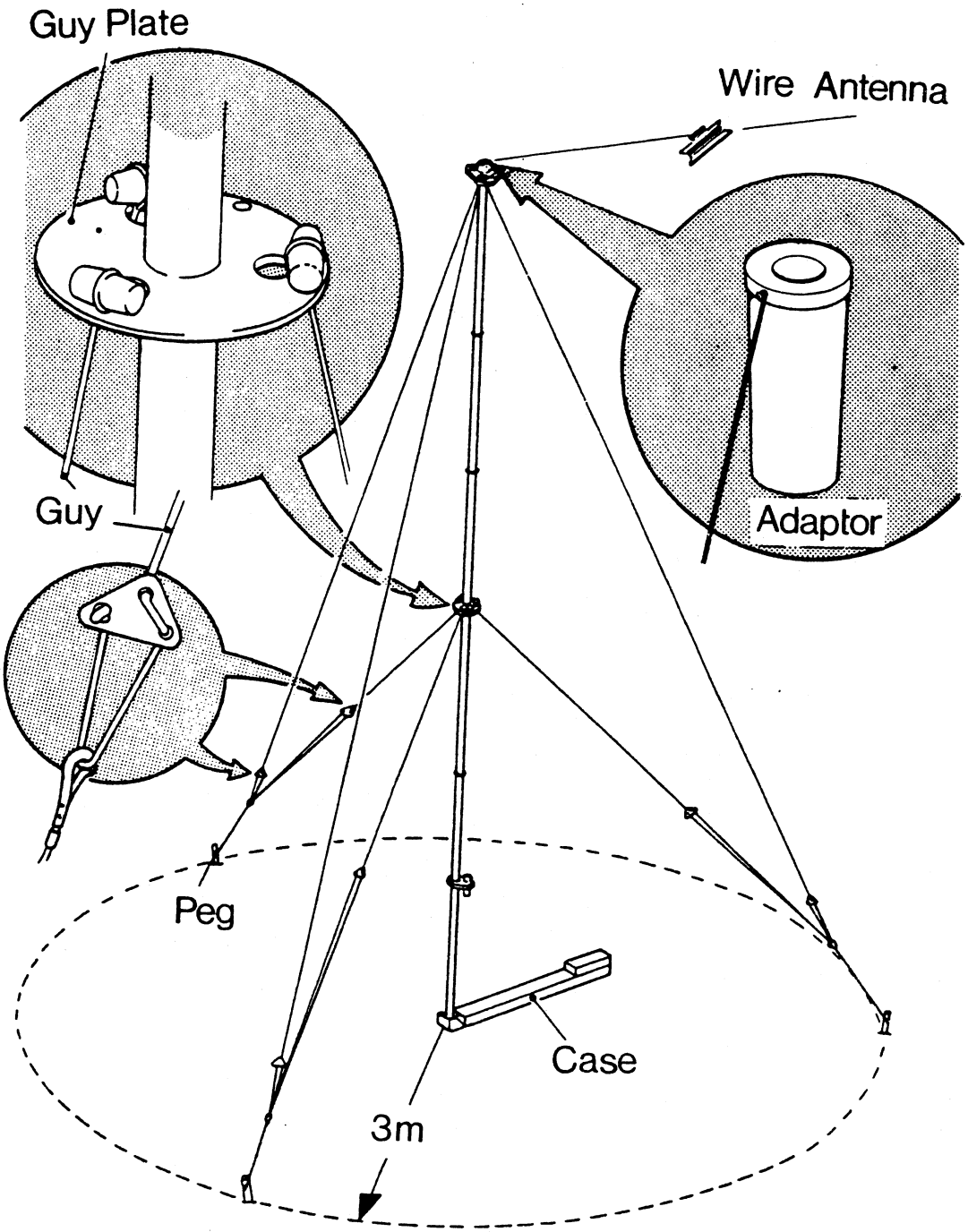


Fig 98.—5.4m Mast – Erected

SECTION 29 – 8m TELESCOPIC MAST

Introduction

05101. *The 8m Mast* is a light, alloy, 7 section telescope mast that may be used as a 'support' for an HF wire antenna or to elevate a VHF antenna.

05102. This mast is carried in a case and the accessory equipment in a webbing bag. It is manportable and can be erected by one man.

Description

05103. ***Data.***

a. *Physical*

(1) Height retracted	1.4m
(2) Height extended	8.0m
(3) Weight of complete equipment	30.5kg

b. *Components (Fig 99)*

Adaptor	– 1
Bag Webbing	– 1
Case Mast	– 1
Guy Erecting	– 3
Guy Middle	– 3
Guy Upper	– 3
Halyard	– 1
Hammer	– 1
Insulator	– 1
Line Radius	– 1
Mast Cover	– 1
Mast Telescope	– 1
Pin Steel	– 3
Plate Mast	– 1
Stake Guy	– 3
Tool Kit	– 1

Assembly

05104. At the chosen site – preferably flat unobstructed ground, assemble and erect the mast as follows: *(See Fig 100.)*

a. Secure the baseplate to the ground by driving the 3 steel pins through the holes provided. Ensure that the slot in the baseplate is not facing downhill. If the mast is used as a support for a wire antenna, position the baseplate so that one of the pins is directly behind the line of the wire.

b. Insert the bobbin of the radius line into the centre of the baseplate and locate the 3 stakes at the full extent of the radius line, using the baseplate securing pins as a guide to the correct angle. Hammer the stakes into the ground at an angle of 30 degrees with the guy rings facing the baseplate. Rewind and stow the radius line.

c. Unwind and attach the erecting guys to the stakes by means of the snap hook ensuring that the guy tensioners are closest to the mast.

d. Insert the mast into the baseplate by tilting at an angle and engaging the spigot into the slot in the baseplate, slide the mast into the centre hole and bring it into a vertical position.

e. Clip the erecting guys to the 3 lower eyes on the mast and tighten all guys evenly until the mast is vertical as shown by the spirit level. These guys must be as tight as possible as they bear the entire load of the mast whilst erecting.

f. Unwind the middle guys *(indicated by the round tallies)* and clip the adjuster ends of each guy to the stakes. Clip the other end of each guy to the middle guy plate. Repeat this process with the upper guys *(indicated by the square tallies)* clipping them to the top guy plate.

g. If required, unwind the halyard and attach the 'S' hook to the fourth hole in the top guy plate on the mast. Ensure that the top guy plate is correctly orientated. Attach the wire antenna to the halyard.

h. If the mast is to be used as a support for a vertical wire antenna the base insulator must be fitted before attaching the mast to the baseplate. To do this, remove the spigot from the base of the mast and screw the base insulator into the mast in its place, rescrew the spigot into the base insulator. Insert the antenna adaptor into the socket at the top of the mast and tighten the clamp screw. Depending on the height of antenna required, insert the 2.4m whip antenna into the antenna adaptor. Attach the down lead to the adaptor and unwind the down lead so that it will pay out when the mast is raised.

j. Ensure that all guys, halyard and down lead are free from tangles and that all clamp levers on the mast are in the closed position.

k. Raise the mast by releasing the top clamp lever and lifting the top section until it is fully extended, close the clamp lever. Repeat this process with the remaining sections until the mast is fully extended.

l. Adjust the middle and upper guys to secure the mast in a vertical position.

Dismantling

05105. Dismantle the mast in the reverse order of assembly ensuring that all items are thoroughly cleaned and that the guys are wound onto the formers and tied with the cord before checking the items and stowing them in the carrying bag.

05106.–05110. *Reserved.*

SECTION 30 – 12m TELESCOPIC MAST

Introduction

05111. *The 12m Mast* is a light, alloy, 8 section telescopic mast that may be used as a support for an HF wire antenna or to elevate a VHF antenna.

05112. This mast is carried in a case and the accessory equipment in a metal box. It is man portable and although it is possible for one man to erect it, 2 men make the ideal team for all weather conditions.

05113. ***Data.***

a. *Physical*

(1) Height retracted	1.8m
(2) Height extended	11.4m
(3) Weight of complete equipment	32.7kg

b. *Components (Fig 101)*

Mast Telescopic 12m	– 1
Pin Cross Locking	– 16 *(8 spare)*
Carrying Strap	– 1
Cover Nylon	– 1
Adaptor Antenna	– 1
Base Mast	– 1
Equipment Box	– 1
Guy Upper	– 6
Guy Lower	– 2
Guy Lower with anchor	– 1
Halyard Antenna	– 1
Hammer	– 1
Insulator	– 1
Line Radius	– 1
Pins Steel	– 2
Stake Guy	– 3
Tool Kit	– 1

Assembly

05114. At the chosen site – preferably flat unobstructed ground, assemble and erect the mast as follows: *(See Fig 102)*

a. Secure the baseplate to the ground by driving the 2 steel pins through the holes provided.

b. Insert the base insulator into the ring of the radius line and insert the insulator into the base plate.

c. Using the yellow guide lines on the baseplate, locate the 3 stakes at the full extent of the radius line and hammer the stakes into the ground at an angle of 30 degrees with the guy rings facing inwards. Rewind the radius line and re-insert the insulator in the baseplate.

d. Attach the lower guys to the bottom eyelets on the stakes by means of the snap hooks and lay the tensioner ends of the guys by the baseplate.

e. Insert the mast in the base insulator and hold upright, slip the guy tensioners on the lower guys into the sockets on the lower mast collar and tighten all guys evenly until the mast is in a vertical position as indicated by the spirit level. One of the guys has an extra tensioner, slip this into the lug on the baseplate and tension hard. This is the anchor guy and prevents the mast from being lifted from the baseplate during erection.

f. Hook the 3 upper guys to the top guy collar and attach the tensioners to the upper fixing holes on the stakes ensuring the guys are fully unwound.

g. Attach the antenna, antenna adaptor or halyard adaptor *(if issued)* to the top of the mast, the mast is now ready for erection.

h. Unlatch the top guy collar, lift up the top section by hand until the cross hole shows clear. Remove a cross pin from its holder and insert it right through the hole and lock by turning the tail half a turn. Repeat this procedure until the mast is fully extended.

j. Take up the slack on the upper group by pulling the guys through the tensioners attached to the stakes. Adjust so that the mast is in a vertical position.

Notes: (1) Use of extra guys. If the mast is being used as a support for an HF wire antenna it is recommended that the second set of upper guys be attached to the middle collar and middle fixing holes on the stakes. One set of guys must also be in line with and behind the antenna to take the strain.

(2) When using the mast as a support for the VHF inverted V antenna, the top and bottom mast sections must be left retracted. To do this, the yellow line-up dots must be in line to enable the cross pin to go through the hole in the second top section.

(3) In some circumstances, pulling out the mast sections is made easier by standing on the equipment box.

Dismantling

05115. Dismantle the mast in the reverse order of assembly ensuring that all items are thoroughly cleaned and that the guys are neatly wound onto the formers before checking the items against the list on the inside of the box lid.

05116.–05120. *Reserved.*

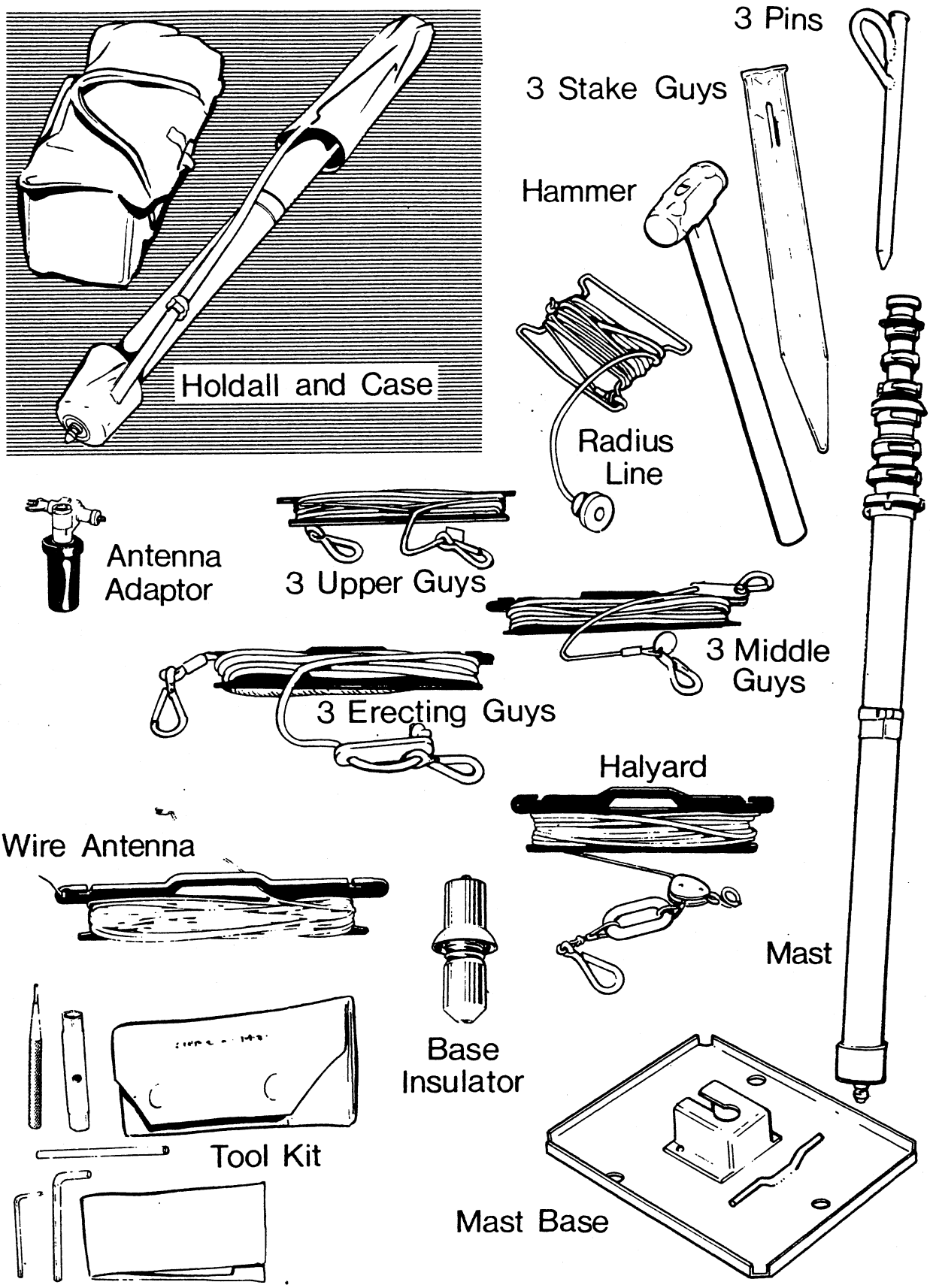
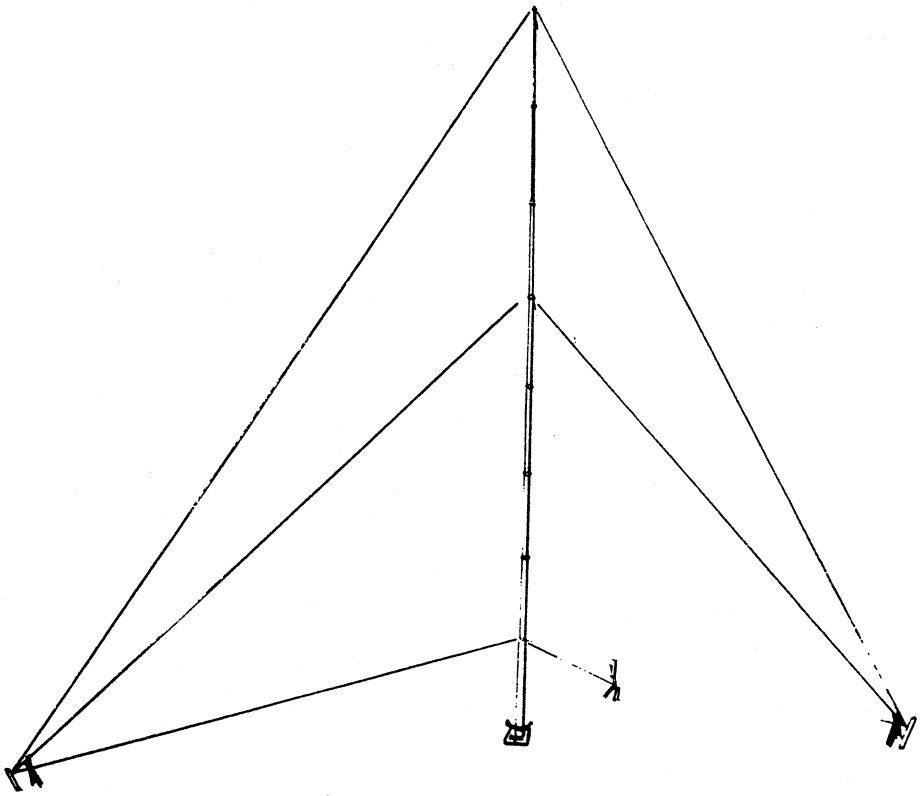
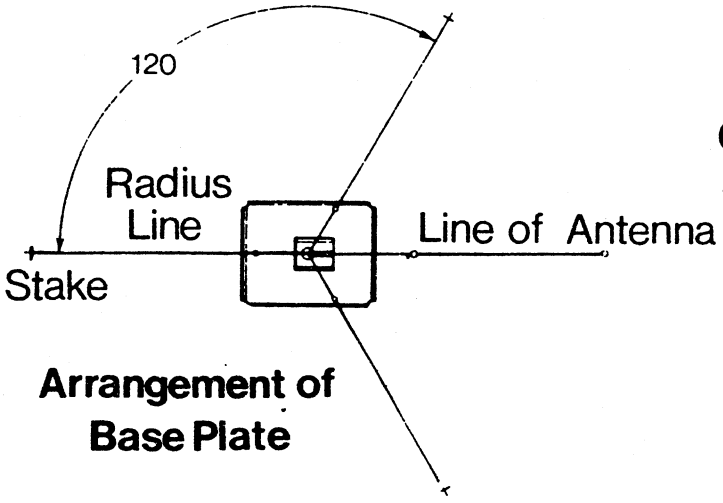
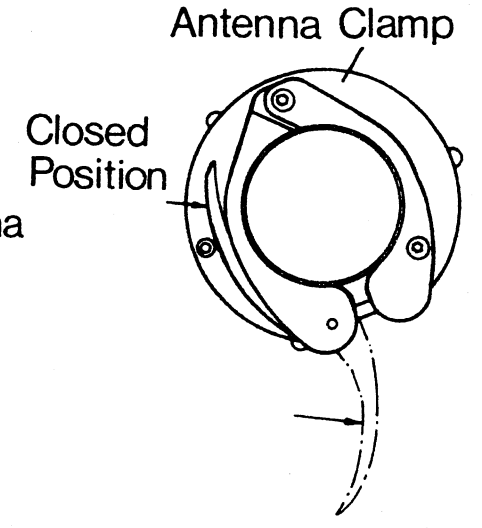


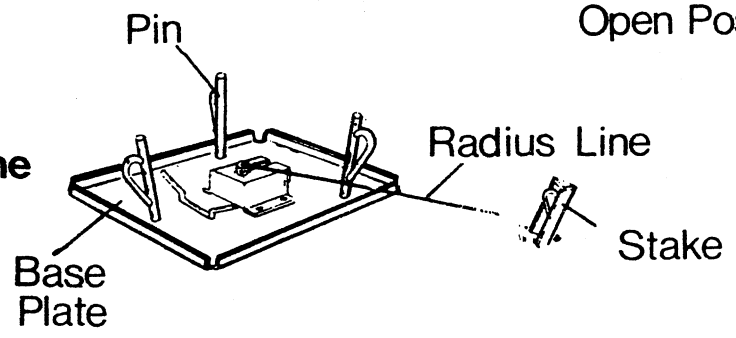
Fig 99.—8m Mast – Components





Arrangement of Base Plate





Positioning the Stakes

Fig 100.—8m Mast – Erected

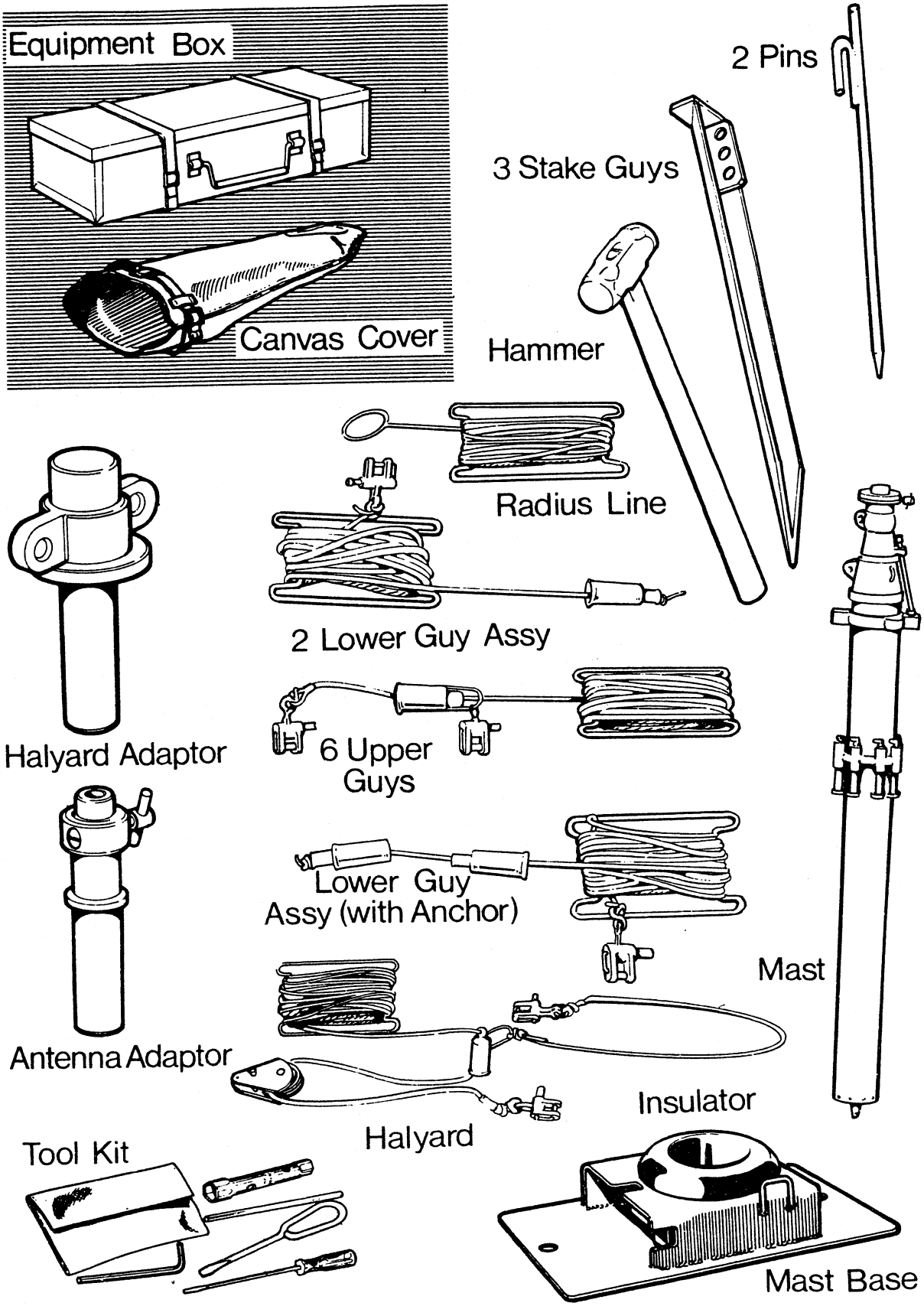


Fig 101.—12m Mast – Components

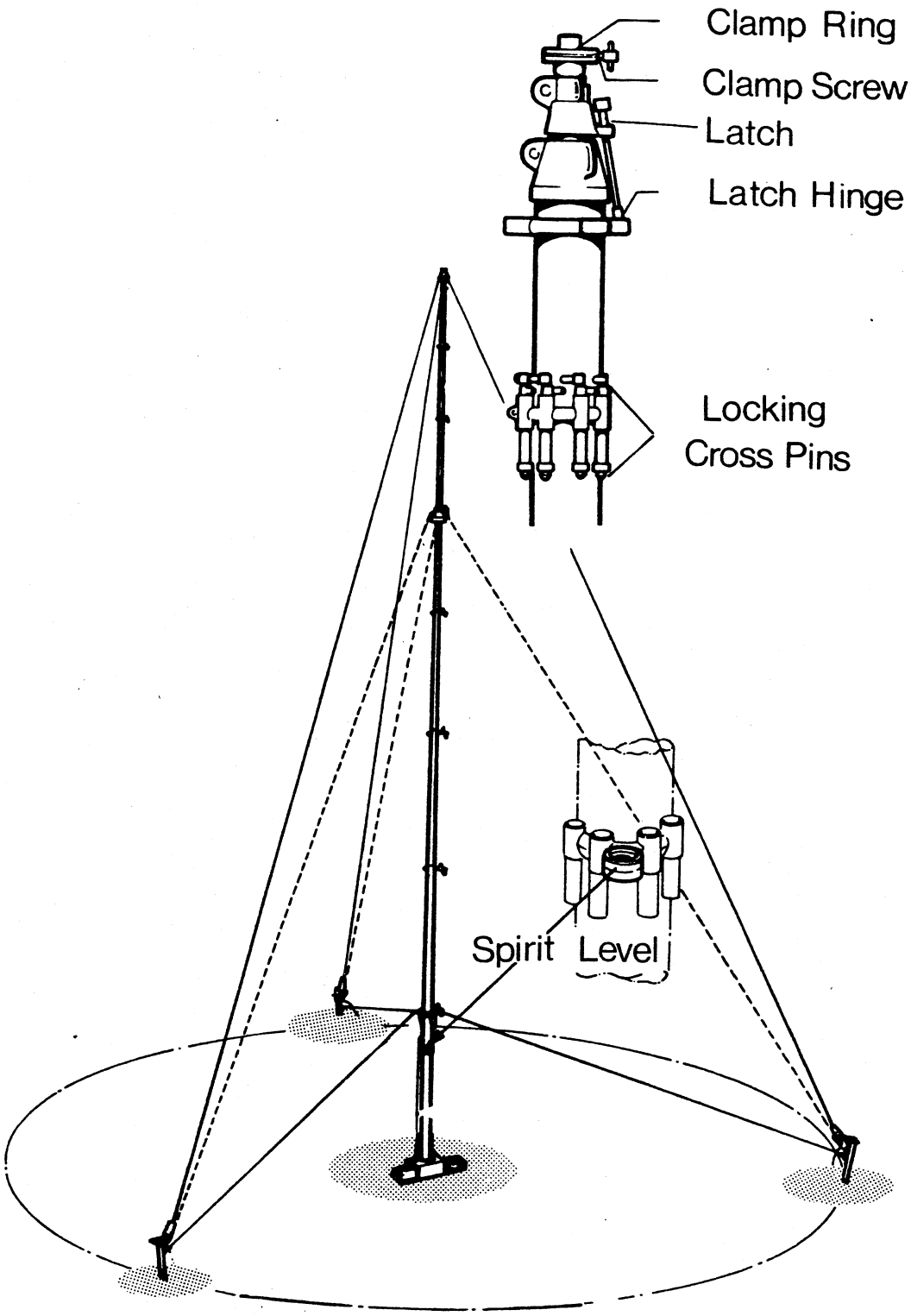


Fig 102.—12m Mast – Erected

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