Army Code No.
61123
DSS(ARMY)44/8/212

USER HANDBOOK
FOR
RADIO STATION UK/PRC-320

WARNING

The voltages used in this equipment are high enough to endanger life

CARELESSNESS COULD BE FATAL

See First Aid instructions on page ii to vi

Published under the authority of:-
THE SIGNAL OFFICER IN CHIEF (ARMY)
Ministry of Defence

SEPTEMBER 1975

FIRST AID IN CASE OF ELECTRIC SHOCK

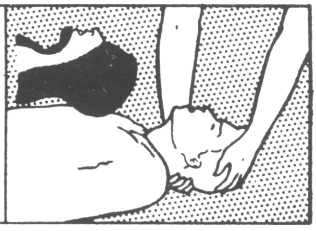
EXHALED AIR METHOD

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

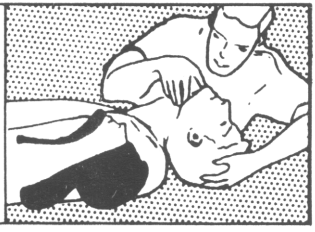
DON'T TOUCH THE VICTIM WITH YOUR BARE HANDS until he is clear of the conductor, but DON'T WASTE TIME.

2. (a) Lay the patient on his back. Quickly loosen waist band and clothing round neck. If his mouth is open, sweep a finger through his mouth to clear obstruction and remove loose dentures.

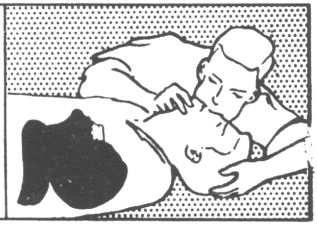
(b) Lift the head and tilt the head backwards by putting one hand underneath the neck and the other on the crown of the head.



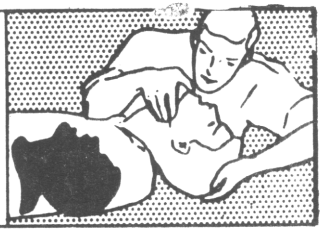
(c) Hold the head tilted as far back as possible and lift up the jaw firmly, closing the lips. This keeps the victim's airway clear by straightening the breathing passage.



(d) Take a deep breath. Open your mouth as wide as you can. Seal your lips on the victim's cheeks around his nose. Blow air into his nose until you see the chest rise (inspiration).



(e) Remove your mouth to let him breathe out; his chest will fall (expiration).



(f) Take another deep breath and blow again as soon as he has exhaled, and continue inflations 10 to 15 times a minute. (This is a little slower than the normal rate of 18.)

The movement of the victim's chest provides visual confirmation of the success of your efforts.

3. If you fail with the nasal route, try the mouth as follows:-

Lift the jaw and hold his mouth open slightly as you blow, keeping the head tilted well back with the other hand.

Seal your lips around his opened mouth and press your cheek against his nostrils to stop air leakage, and blow until you see the chest rise.

Continue as described in (e) and (f) above until normal breathing returns or medical assistance becomes available.

DO NOT GIVE LIQUIDS UNTIL VICTIM IS CONSCIOUS

NOTE:
If after 5 or 6 effective inflations of the patient's lungs there is:-

(i) no improvement in the colour of the face and lips

(ii) no constriction of the dilated pupils

(iii) no pulse to be felt in the neck or elsewhere,

this means that the heart is not beating.

Carry out EXTERNAL CARDIAC MASSAGE (see page v)

EXTERNAL CARDIAC MASSAGE

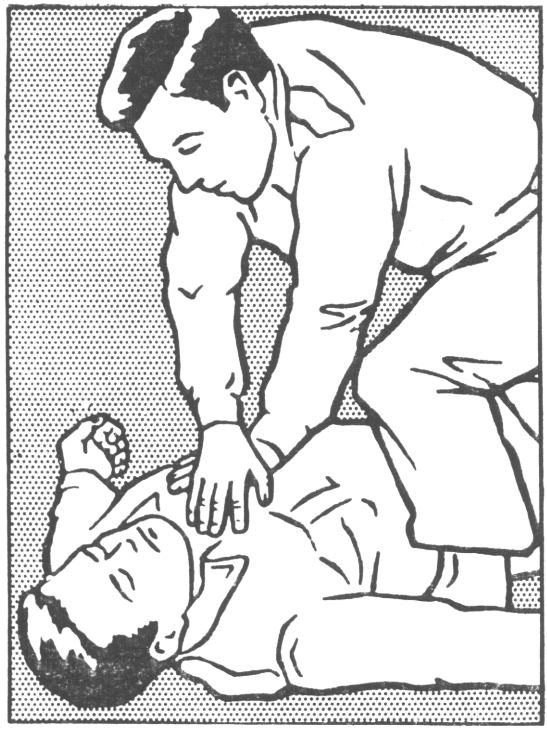
1. (a) Lay the victim on his back on the ground or on some other firm surface.

   (b) Place the heel of one hand, with the other on top of it, on the lower part of the sternum (breast bone) in the mid line of the chest: see Note 1 below.

(c) Apply firm pressure vertically downwards aided by the weight of the body, about 60 times a minute.

(d) At the end of each pressure stroke, the hands are to be lifted slightly to allow full recoil of the victim's chest.

(e) Sufficient pressure should be used to depress the sternum an inch or so towards the vertebral column (spine).



2. Artificial respiration must continue simultaneously with external cardiac massage at the rate of about 5 compressions of the heart to one inflation of the lungs

3. Massage should continue until the victim's pulse is clearly felt and the colour returns to normal, or until medical assistance arrives.

Notes: 1. Do not attempt cardiac massage if there is obvious damage to the victim's chest wall.

2. There is a real danger of damage to internal organs by the improper use of external cardiac massage.

3. Particular care must be taken with infants and small children, with whom much less pressure is required to depress the sternum than in the case of adults. In these cases the fingers should be used in preference to the palms of the hands.

CONTENTS

LIST OF ILLUSTRATIONS

LIST OF ASSOCIATED PUBLICATIONS

	Army Code
Radio Station UK/VRC-321	61253
Radio Station UK/VRC-322	61255
Radio Station UK/PRC-350	61124
Radio Station UK/PRC-351 and UK/PRC-352	61128
Radio Station UK/VRC-353	61393
Clansman Radio Control Harness	61172
Clansman Secondary Batteries, Battery Charging and Testing	61394
Adaptor, Telegraph, Radio low/high level	61466
Clansman VHF Antennas	61388
Test Set Audio, Radio Audio Accessories	NYA
Test Set, Condition 'Clansman Radio'	NYA
Test Set, Harness Connectors Clansman	NYA

Fig.1 The UK/PRC-320 Manpack

CHAPTER ONE

PURPOSE AND PLANNING INFORMATION

INTRODUCTION

1.1 The Radio Station UK/PRC-320 is based on the UK/RT320, a simple to operate lightweight transmitter/receiver operating in the 2 to 30 MHz range with operating frequency selection at 100 Hz intervals. The PRC-320 operates in the SSB, AM or CW modes and can be used as a manpack, ground station or vehicle radio.

The RT320 is fully sealed and operates from a clip-on 24V secondary battery. A headset assembly, handset and morse key are provided as basic items. A hand generator, a.c. and d.c. charging units are also available as ancillaries. The PRC-320 and its ancillaries are suitable for use in combat conditions anywhere in the world.

PURPOSE

1.2 Although it can be used as a ground station or vehicle radio, the PRC-320 is primarily a manpack radio operating in the SSB mode.

DESCRIPTION

1.3 As a manpack radio with a whip antenna, the PRC-320 provides reliable ground wave SSB communication for distances of up to 35km, day or night, over the kind of country found in Western Europe. The basic manpack weighs about 11kg, including GS carrier and adaptor. A lightweight carrier is also available.

As a ground station with a 7.9m vertical antenna, it provides ground wave communication for distances up to 50km. As a ground station using an end-fed or dipole antenna with optimum choice of frequency, the sky wave range is several thousand kilometres. These ranges are dependent on the choice of frequency.

As a vehicle radio, the PRC-320 can be operated independently or through the vehicle control harness. Its operating characteristics are similar to those of the manpack. The manpack carrier is used to mount the radio in a vehicle. The radio must be run from its own battery and not directly from the vehicle supply. However, the radio battery can be float charged by means of a d.c. charging unit.

Remote control, including intercommunication and call facilities, is available in conjunction with the Control Radio Set, Local/Remote and various alternative remote units. Manual rebroadcast facilities can be obtained in conjunction with units of the Clansman radio control harness.

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.

When it is necessary to operate two PRC-320 stations (or a PRC-320 and another HF station) in close proximity within the 19.1 MHz to 30 MHz frequency band, a Selectivity Unit, Radio Frequency 12W (SURF 12) can be used to reduce interference.

TECHNICAL DATA

1.4	Frequency Range	2 to 30 MHz
	Frequency Control	From built-in frequency synthesizer and reference oscillator.
	Frequency Indication	The frequency indicated by the decade switches is: a. 2 kHz above the suppressed carrier frequency on SSB. b. Carrier frequency on AM. c. The radiated frequency on CW.
	Frequency Selection	In increments of 100 Hz by means of six decade switches.
	Frequency Stability	1 ppm
	Operating Modes and Bandwidth	Voice: SSB (upper sideband) 2.7 kHz AM (double sideband) 6 kHz Key : CW (wideband)2.7 kHz CW (narrowband)250 Hz
	Operating Temperature	$-37^{\circ}C$ to $+52^{\circ}C$

Environmental Protection		Fully sealed
Receiver Sensitivity	SSB:	0.8μV for 10dB (S+N)/N
	AM:	3.3μV at 30% mod for 10dB (S+N)/N
	CW(W) :	0.8μV for 10dB (S+N)/N
	CW(N) :	0.8μV for 17dB (S+N)/N
Audio Output		7mW into 100Ω (less than 10% distortion)
Transmitter Power Output		High Power : 30W p.e.p. 10W mean Low Power : 3W p.e.p. 1W mean
Power Consumption (Average)		Receive : 3.6W Transmit : 40W
Power Supplies		24V d.c. 3.3Ah secondary battery which provides 12 hours of operation on a 1:9 transmit/receive ratio. 24V d.c. 1Ah secondary battery normally used with hand generator which can power the radio for long periods. 24V d.c. signal batteries when used with a special cable assembly fitted with non-reversible polarity connector.

BATTERY CHARGING FACILITIES

1.5 The 14V or 28V D.C. Charging Units can charge one Clansman 3.3Ah or 1Ah battery. They operate from a nominal 14V or 28V d.c. source and provide a constant current charge output. The units are intended primarily to float charge the radio battery in vehicle installations.

The A.C. Charging Unit will recharge up to 16 Clansman 3.3Ah or 1Ah batteries simultaneously. It operates from a 100-125V or 200-250V 50-60 Hz a.c. supply.

The approximate times for charging batteries from flat, using either a d.c. or an a.c. charging unit, are:-

3.3Ah	4 hours
1Ah	$1\frac{1}{4}$ hours

Charging control is automatic and overcharging or battery damage cannot occur.

The Hand Generator, which clips on to the RT320 and battery, will maintain the charge state of the battery for an indefinite period with a normal transmit/receive ratio of 1:9.

VEHICLE INSTALLATION

1.6 When the PRC-320 is installed in a vehicle, its carrier frame is clipped to a mounting frame. A clip-in kit is provided.

The battery is float-charged by the d.c. charging unit from the vehicle supply. The radio must not be powered directly from the vehicle supply since this could cause damage.

The radio can be operated with a headset assembly plugged in direct or it can be connected via a harness adaptor into the vehicle harness and operated through a control, radio set, local/remote (see Chapter 3). In both cases the radio is connected to the vehicle whip antenna.

Where it is not possible to install the RT320 close to the vehicle antenna, a Tuning Unit, RF 25W is connected between the vehicle antenna and the RT320.

CONSTRUCTION

1.7 The transmitter/receiver (RT320) is contained in a sealed light alloy case. All controls are mounted on the front panel and external connectors on the top and rear panel. Projections around the front and rear panels protect the controls and connectors. The RT320 is mounted on either a GS carrier with adaptor (see Fig.3a) or a lightweight carrier (see Fig.3b), and the battery is clipped to the bottom of the case of the transmitter/receiver. When a SURF 12 is used it is screwed directly to the case of the RT320.

The manpack whip antenna comprises eight sections of tubing threaded on a cord to facilitate assembly. When assembled, it has an overall length of 2.4m and is fitted to the RT320 using the antenna adaptor. The whip antenna can also be used with a 5.4m mast and adaptor to provide a 5.9m vertical antenna for ground station use. The 5.4m mast consists of six tubular fibreglass sections (approximately 1m in length) together with supporting guys and other accessories. When dismantled, it can be packed into a reinforced fabric case for ease of transportation. Assembly details are shown in Fig.9 (page 31).

The wire antenna consists of 47m of insulated braid wound on a bobbin. The braid has coloured markers at one, five and ten metre intervals to facilitate measurement of the required antenna length; a 40m throwing cord is attached to the bobbin. Two wire antennas can be used as a dipole, in conjunction with a dipole centre junction and antenna feeder cable.

The antenna counterpoise comprises four 9m lengths of insulated wire attached to a bobbin on which they are wound when not in use. A short lead joined to the wires on the bobbin provides an external connection.

TABLE 1

RADIO STATION UK/PRC-320 ITEMS

ITEM NAME (COMMON NAME)	NATO NO.	NOMINAL DIMENSIONS	NOMINAL WEIGHT	FIG. NO.
Transmitter receiver, radio UK/RT320 (RT320)	5820-99-114-3188	390 x 250 x 120mm	5.0kg	2a
Battery, secondary, 24V, 3.3Ah (3.3Ah battery)	6140-99-620-8057	180 x 130 x 70mm	3.4kg	2a
Plate, mounting, electrical equipment (GS carrier adaptor)	5999-99-620-9265	350 x 270 x 40mm	1.0kg	2a
Frame, packboard, Mk.2 (GS carrier)	8465-99-135-7135	450 x 440 x 200mm	1.4kg	2a
Carrier frame, electrical equipment (lightweight carrier)	5999-99-620-8027	400 x 250 x 150mm	1.2kg	2a
Adaptor, antenna (whip adaptor)	5820-99-621-9025	220 x 40 x 30mm	400g	2a
Antenna assembly 2.4m long (whip antenna)	5820-99-621-9029	2.4m x 9mm dia. (8 sections, 350mm long)	140g	2a

ITEM NAME (COMMON NAME)	NATO NO.	NOMINAL DIMENSIONS	NOMINAL WEIGHT	FIG. NO.
Headset, microphone assembly and cable assembly, switch, electrical, pressel (headset)	5965-99-620-8320 5965-99-620-5667	- -	500g	2a
Handset, general application (handset)	5965-99-620-5669	200 x 80 x 50mm	200g	2b
Key, telegraph, manual, manpack (morse key)	5805-99-117-7542	270 x 110 x 100mm	170g	2b
Solar shield (solar shield)	5820-99-620-2088	430 x 270mm	100g	2b
Bag, ancillaries (ancillaries bag)	5820-99-621-9028	310 x 230 x 100mm	110g	2b
Cable assembly, power, electrical, 2 conductor, 3m long (battery extension cable)	5995-99-620-2113	3m long	120g	2b
Generator, electrical, hand operated (hand generator)	5820-99-114-3390	210 x 130 x 80mm (210 x 150 x 80mm with handle in operating position)	2.5kg	2b

ITEM NAME (COMMON NAME)	NATO NO.	NOMINAL DIMENSIONS	NOMINAL WEIGHT	FIG. NO.
Battery, secondary, 24V, 1Ah (1Ah battery)	6140-99-620-8058	180 x 70 x 50mm	1.1kg	2b
Antenna, wire type, c/w reel (wire antenna)	5820-99-117-7440	140 x 120mm (47m extended)	650g	2c
Centre junction, dipole (dipole centre junction)	5820-99-117-7439	140 x 50 x 30mm	150g	2c
Cable assembly, r.f. UR76, 20m long (antenna feeder cable)	5995-99-620-5803	20m long	680g	2c
Antenna counterpoise (counterpoise)	5820-99-117-7438	110 x 80mm (9 x 9m extended)	140g	2c
Mast, antenna support, fibreglass, 5.4m (5.4m mast)	5820-99-621-9027	5.4m high (990 x 150 x 100mm in carrying case)	4.3kg	2c
Selectivity unit, radio frequency 12W (SURF 12)	5820-99-630-6174	260 x 120 x 50mm	1.5kg	8
Cable assembly, r.f. UR76, 106mm long (SURF 12 cable)	5995-99-630-6175	106mm long	50g	8

ITEM NAME (COMMON NAME)	NATO NO.	NOMINAL DIMENSIONS	NOMINAL WEIGHT	FIG. NO.
Control, radio set, local/ remote (CRL/R)	5820-99-117-0449	130 x 120 x 80mm	680g	15
Cable assembly, electrical, 6 conductor 500mm long (CRL/R cable)	5995-99-620-2352	500mm long	70g	15
Cable assembly, power, electrical, 2 conductor, 2.23m long (external supply cable)	5995-99-117-7435	2.23m long	140g	4b
Charger, battery, d.c. input, 14V (14V d.c. charging unit)	6130-99-620-2114	210 x 140 x 120mm	2.3kg	19
Charger, battery, d.c. input, 28V (28V d.c. charging unit)	6130-99-117-0450	210 x 140 x 120mm	2.3kg	19
Wiring harness, 2 conductor, 2m long (d.c. charging unit supply cable)	5995-99-117-7437	2m long	130g	19
Cable assembly, power,electrical,4 conductor,1m long (battery charging cable)	5995-99-117-7436	1m long	100g	19, 20

ITEM NAME (COMMON NAME)	NATO NO.	NOMINAL DIMENSIONS	NOMINAL WEIGHT	FIG. NO.
Charger, battery, a.c. (a.c. charging unit)	6130-99-117-0451	440 x 350 x 310mm	29.0kg	20
Cable assembly, power, electrical, 3 conductor, 3m long (a.c. charging unit supply cable)	5995-99-620-2112	3m long	120g	20

OPERATING INFORMATION

BASIC STATION AND ANCILLARY EQUIPMENT

2.1 The items comprising the basic station and its auxiliary equipment are illustrated in Fig.2a,b,c, in which they are referred to by their common names.

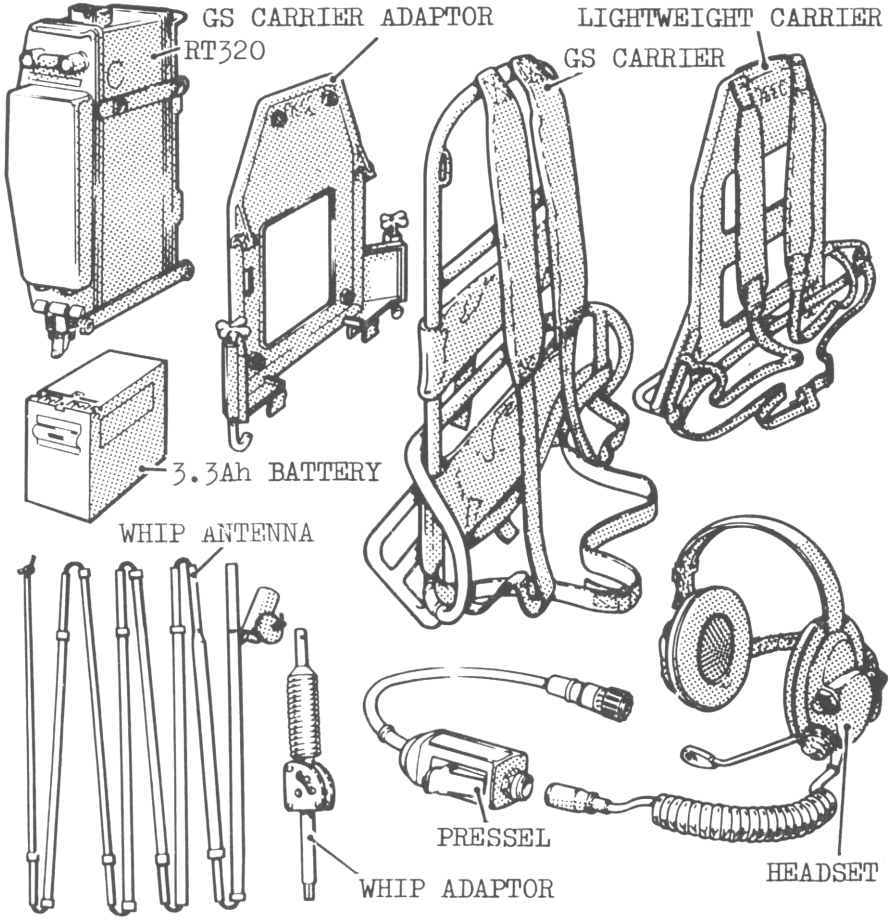


Fig.2a Basic Station and Ancillary Equipment

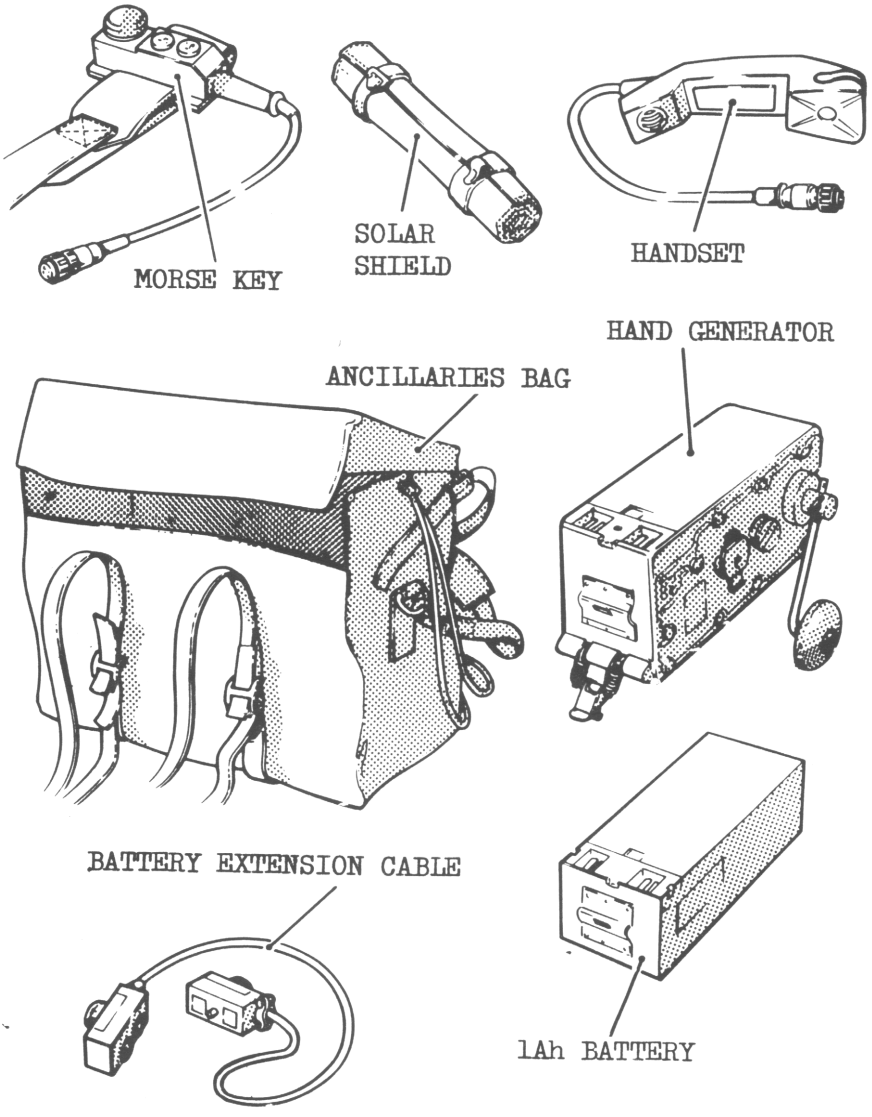


Fig.2b Basic Station and Ancillary Equipment

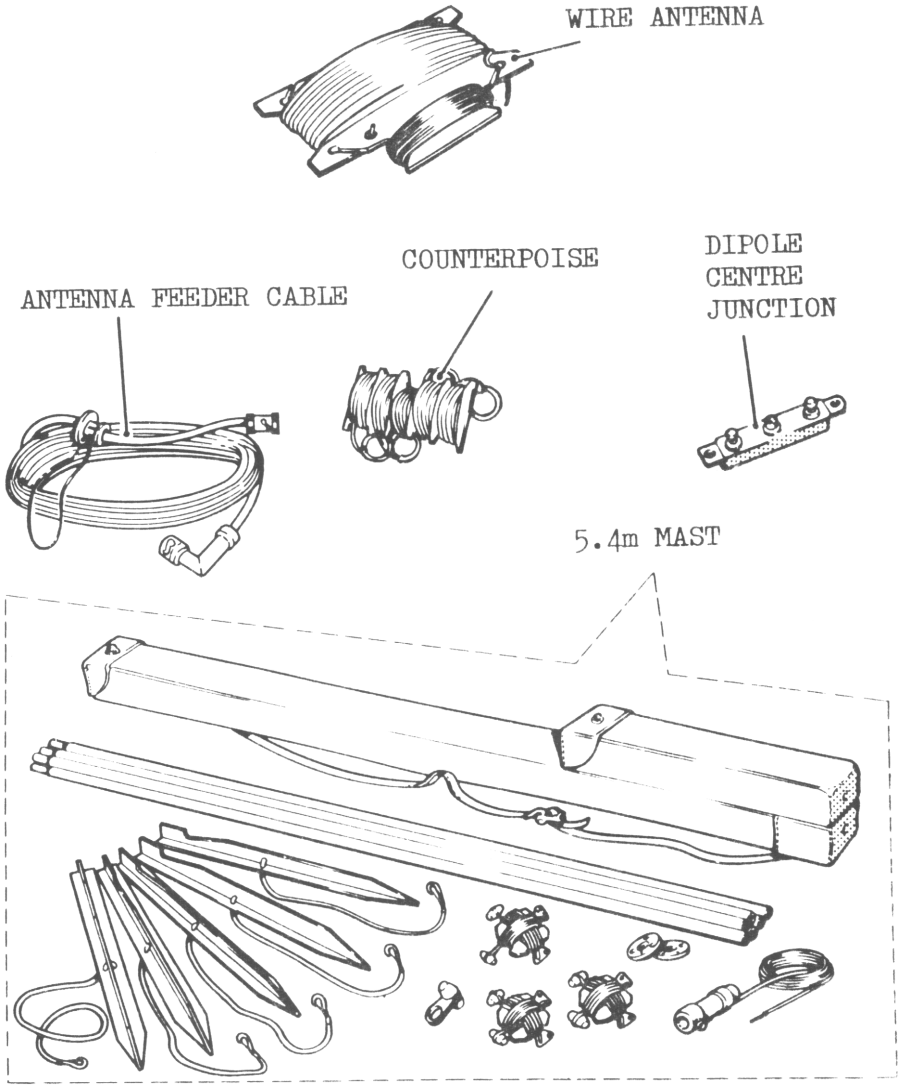


Fig.2c Basic Station and Ancillary Equipment

ASSEMBLY OF STATION

2.2 Fitting RT320 to carrier (Fig.3a & b). Proceed as follows:-

2.2.1 If the GS carrier is to be used, secure the RT320 to the GS carrier adaptor by means of the four captive screws, hook the adaptor on to the carrier and secure in position by tightening the two screw clamps.

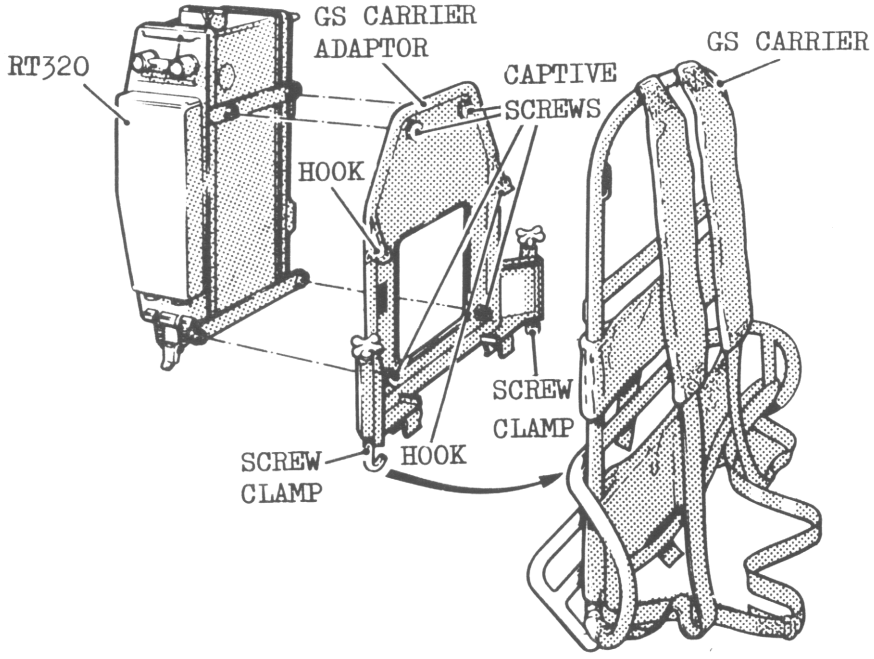


Fig.3a Fitting RT320 to Carrier (GS)

2.2.2 If the lightweight carrier is to be secure the RT320 to the carrier by means of four captive screws.

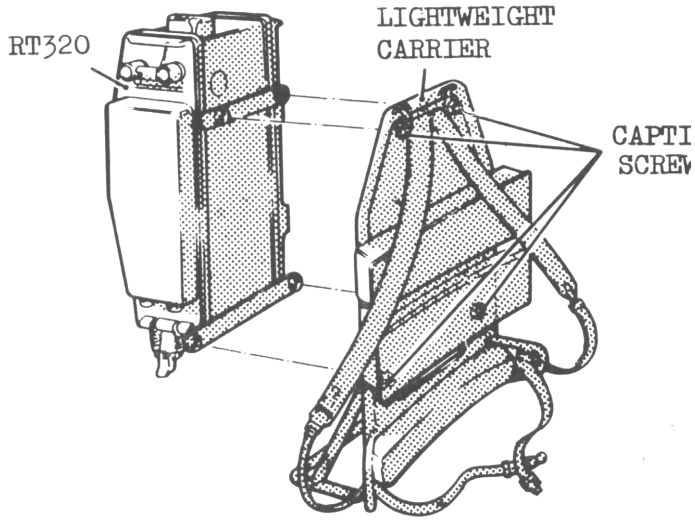


Fig.3b Fitting RT320 to Carrier (Lightwei

2.3 Connecting battery to RT320 (Fig.4a & b). as follows:-

2.3.1 At the RT320, turn the transmitter switch to OFF.

2.3.2 Lift the battery retaining latches RT320, fit the battery to the RT320 so tha contacts of both engage and then secure th retaining latches.

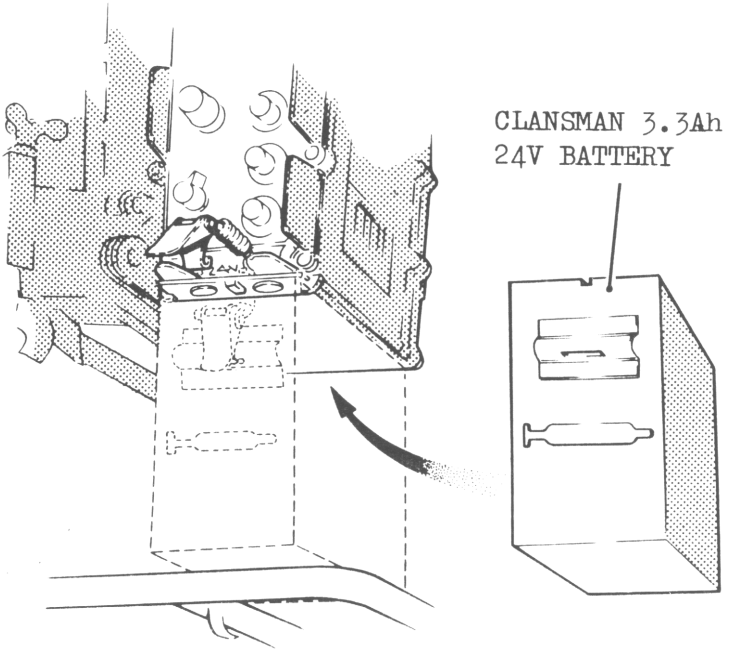


Fig.4a Fitting Battery

2.3.3 If it is required to operate the RT320 with the battery separated, connect the battery with the battery extension cable, ensuring that the plug and socket are correctly orientated on the battery and RT320 respectively by means of the locating studs and that the plug and socket securing screws are tightened.

2.3.4 If it is required to operate the RT320 with a 24V signal battery, connect the battery with the external supply cable, ensuring that the socket is correctly orientated on the RT320, the

socket securing screw is tightened and the red and black leads are connected to the battery positive and negative terminals respectively.

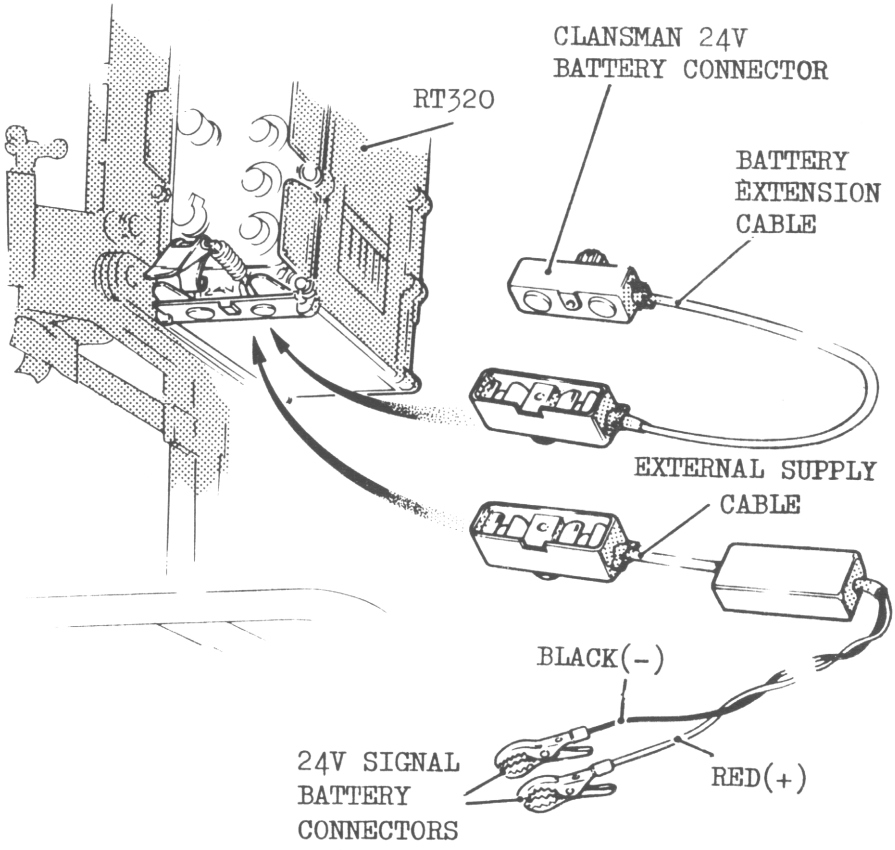


Fig.4b Fitting Battery Cables

2.4 Assembling manpack. Proceed as shown in Fig.5

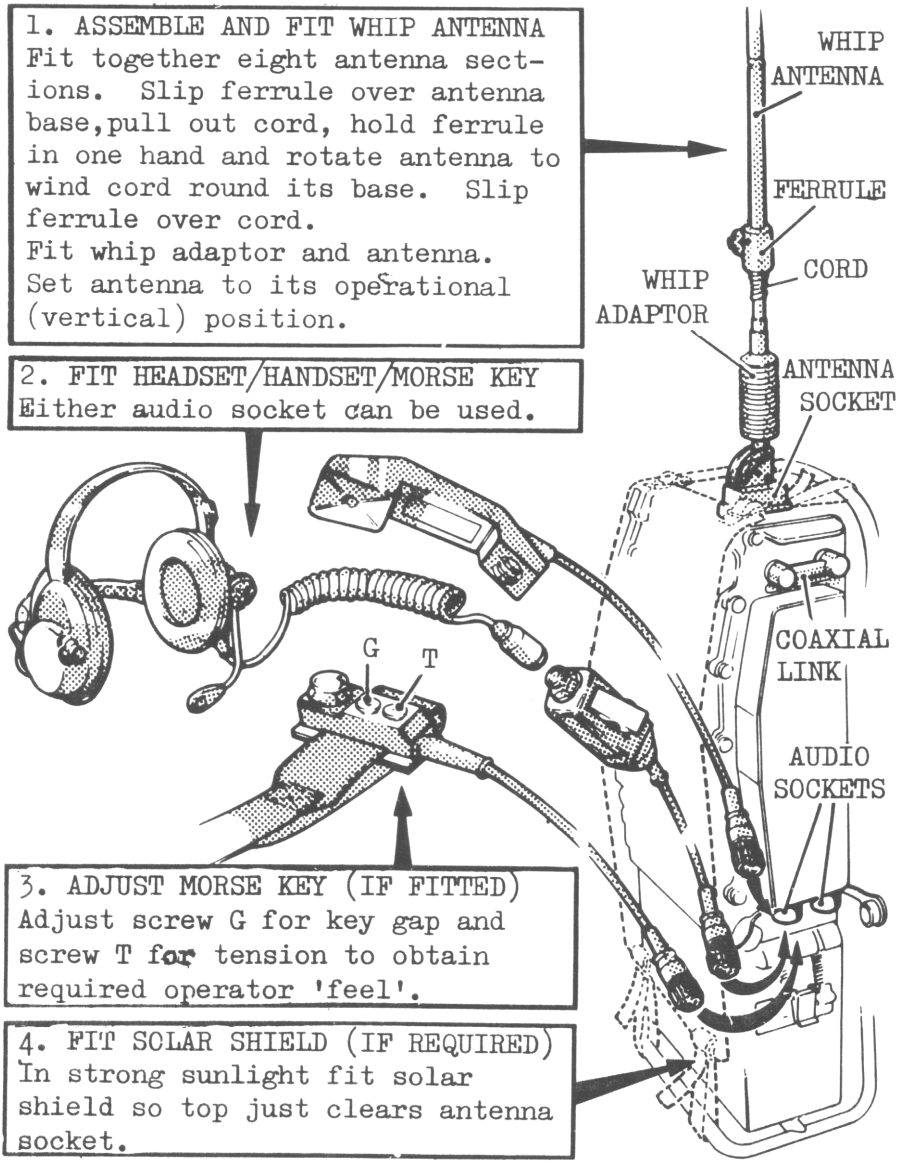


Fig.5 Assembling Manpack

CARRYING POSITION

2.5 The correct carrying position for the manpack is as shown in Fig.1 (page xii). The lightweight carrier illustrated in Fig.2a (page 13) can be used as an alternative.

OPERATING INFORMATION

2.6 Set up and tune the PRC-320 as shown in Fig.6

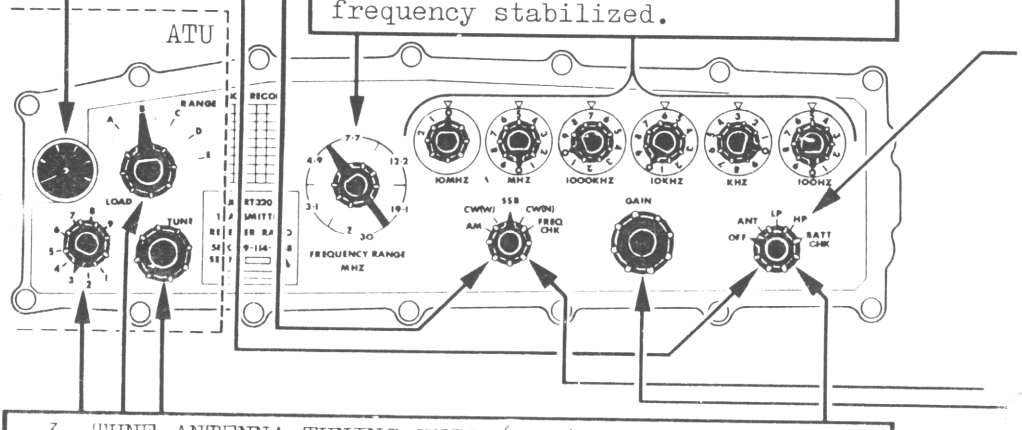
ANTENNA TUNING

2.7 The settings of the RANGE and LOAD switches on the RT320 antenna tuning unit (ATU) are determined by the operating frequency and the type of antenna (various configurations are described in para. 2.15 to 2.20), as shown in the ATU RANGE AND LOADING TABLE (Fig.7, page 24) on the equipment case. Switch settings for V dipole and vehicle 4m whip antennas are not given in this table and form the subject of a separate table, also illustrated in Fig.7. The method of using the tables is as follows:-

2.7.1 Determine which block in the appropriate ANTENNA column corresponds with the selected operating frequency in the FREQ MHz column and initially set the RANGE and LOAD switches respectively to the letter and number given in the block, e.g. if the operating frequency is 5.7635 MHz, set the switches to B and 3 respectively when using the manpack whip antenna, B and 6 with the 5.5m vertical antenna and B and 2 with the vehicle 3m and 4m whip antennas. When using the 7.9m vertical antenna, set the switches to B and the position between 6 and 9 inclusive which enables the highest meter reading to be achieved when adjusting the TUNE control.

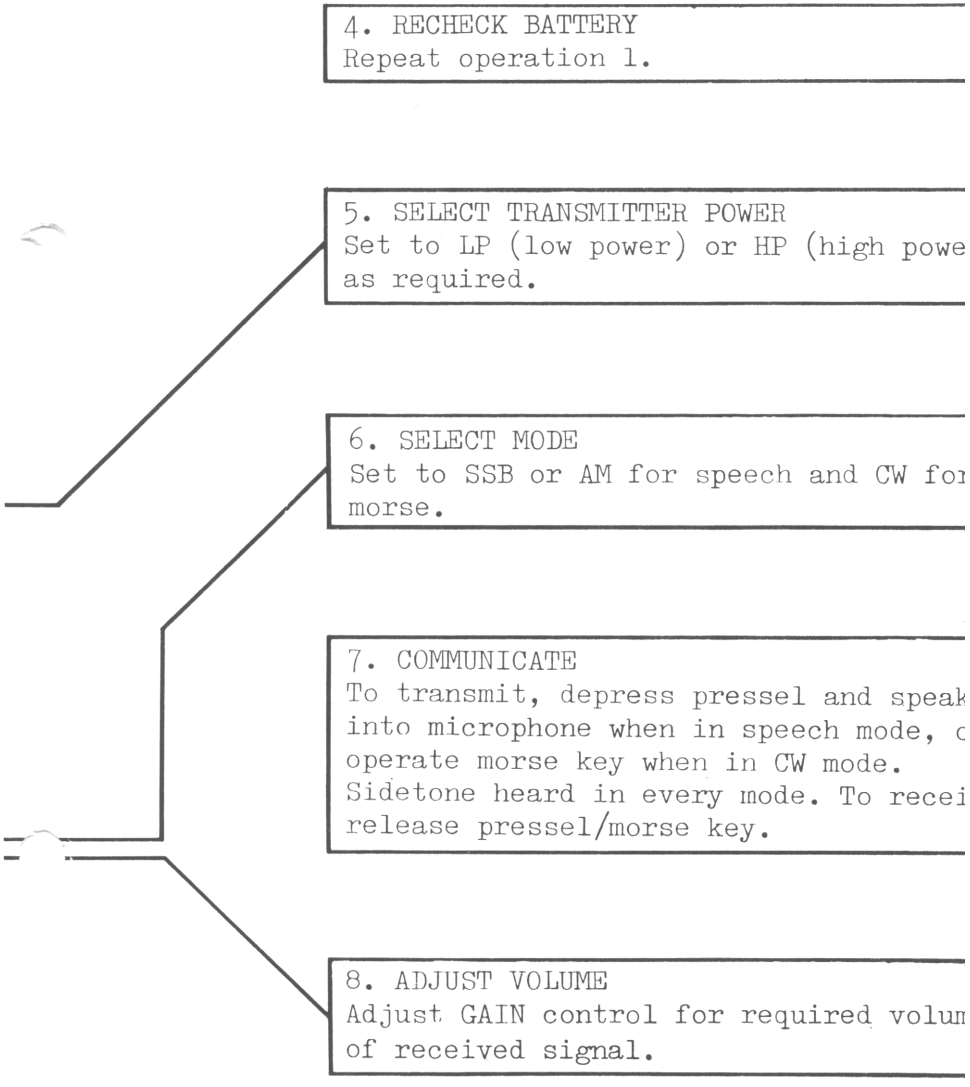
1. CHECK BATTERY
Set to BATT CHK and CW (W or N). Depress pressel/morse key. Check meter needle registers on or above second mark. (The first mark is zero). Release pressel. If needle was below second mark, replace battery.

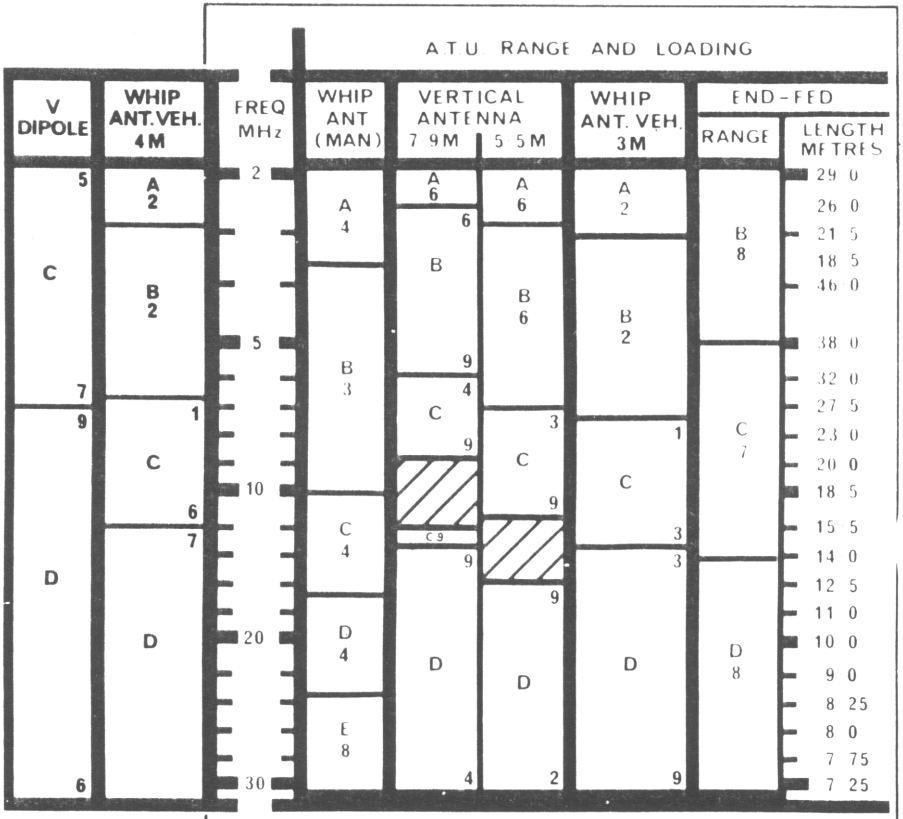
2. SELECT FREQUENCY
Set switches (shown set to 5.7635 MHz) to required frequency (stop at zero positions enables frequency to be set by touch in dark). Set FREQUENCY RANGE switch (no stop fitted) to corresponding frequency band. Tone heard in headset/handset ceases when correct band selected and frequency stabilized.



3. TUNE ANTENNA TUNING UNIT (ATU)
Set to ANT. Set RANGE and LOAD switches to suit antenna and frequency (see para. 2.7). Depress pressel/morse key and adjust TUNE control for maximum reading. Adjust LOAD switch for maximum reading, selecting lower number position if two give same reading. Re-adjust TUNE control for maximum reading and release pressel.

Fig.6 Operating Information


4. RECHECK BATTERY
Repeat operation 1.
5. SELECT TRANSMITTER POWER
Set to LP (low power) or HP (high powe
as required.
6. SELECT MODE
Set to SSB or AM for speech and CW for
morse.
7. COMMUNICATE
To transmit, depress pressel and speak
into microphone when in speech mode, c
operate morse key when in CW mode.
Sidetone heard in every mode. To recei
release pressel/morse key.
8. ADJUST VOLUME
Adjust GAIN control for required volum
of received signal.



DIPOLE ELEMENTS

FREQ MHz	LENGTH METRES	FREQ MHz	LENGTH METRES	FREQ MHz	LENGTH METRES
2·0	34 0	5 0	13 5	12 0	5 5
2 2	31 0	5 5	12 5	14 0	4 75
2 4	28 5	6 0	11 5	16 0	4 5
2 6	26 0	6 5	10 75	18 0	3 75
2 8	24 5	7 0	10 0	20 0	3 5
3 0	23 0	7 5	9 25	22 0	3 25
3 3	21 0	8 0	8 5	24 0	3 0
3 6	19 0	9 0	7 5	26 0	2 9
4 0	17 0	10 0	6 75	28 0	2 6
4 5	15 0	11 0	6 0	30 0	2 5

Fig.7 ATU Range and Loading and Dipole Elements Tables

2.7.2 In the case of an end-fed antenna, set the antenna length and the switches according to the table, e.g. for a frequency of 5.7635 MHz set the antenna to a length of 32 metres and the switches to C and 7.

2.7.3 In the case of a dipole antenna using a dipole centre junction and antenna feeder cable, antenna tuning is performed solely by adjusting the length of each dipole element to the nearest frequency listed in the table, e.g. for a frequency of 5.7635 MHz, set the length of each element to 11.5 metres.

2.7.4 In the case of a dipole antenna in which the elements are connected directly to the RT320 (V dipole), the switches are set as shown in addition to adjusting the element lengths, e.g. for a frequency of 5.7635 MHz, set each dipole element to a length of 11.5 metres. Set the switches to C and the position between 5 and 7 inclusive which enables the highest meter reading to be achieved when adjusting the TUNE control.

SELECTIVITY UNIT, RADIO FREQUENCY, 12W (SURF 12)(Fig.8

2.8 The SURF 12 is used in the manpack role if the PRC-320 is to be operated in the frequency band 19.1 MHz to 30 MHz within 100m of another HF radio. It reduces unwanted radiation from the transmitter.

2.9 Fitting SURF 12. Proceed as follows:-

2.9.1 Secure the SURF 12 to the RT320 by means of the four captive screws.

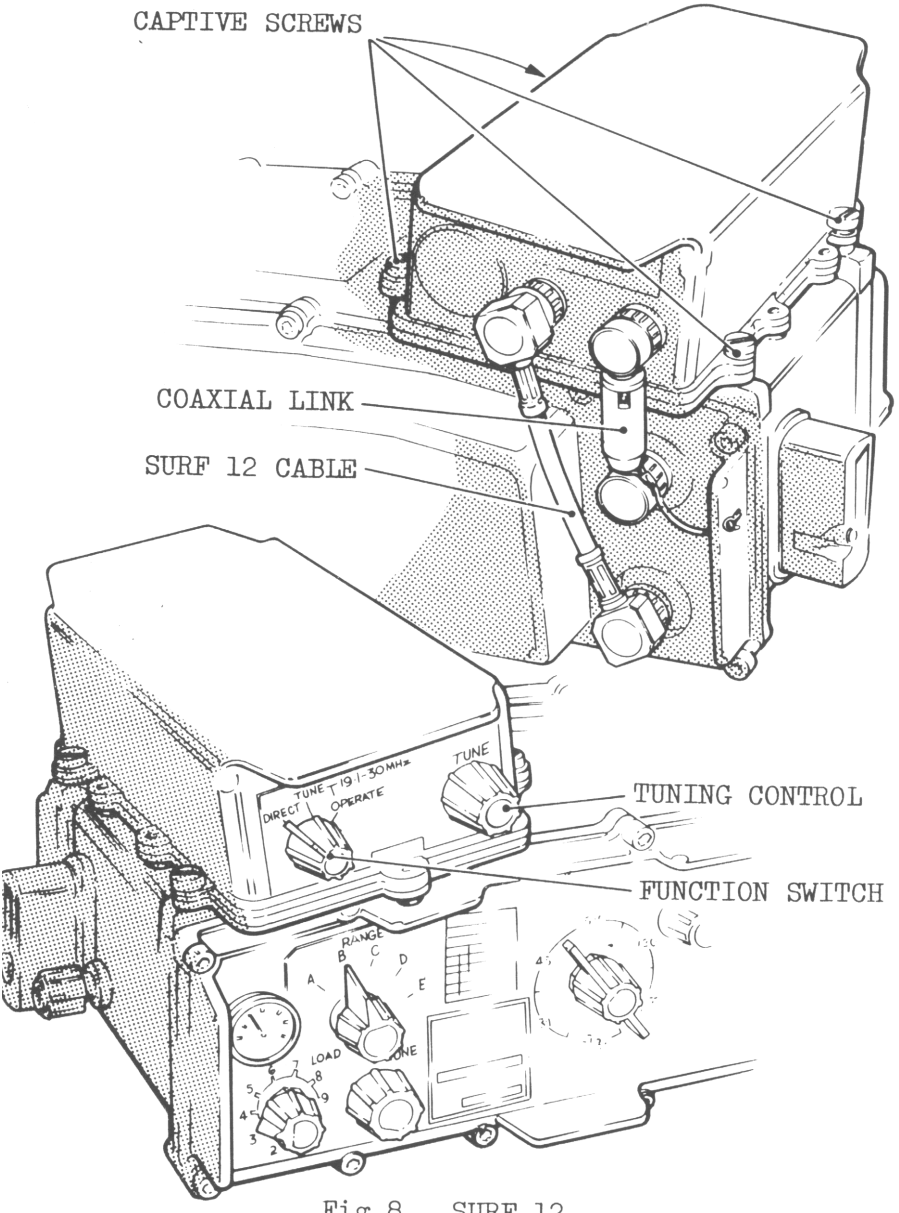

CAPTIVE SCREWS
COAXIAL LINK
SURF 12 CABLE
TUNE T 19 1-30 MHz
DIRECT
OPERATE
TUNE
TUNING CONTROL
FUNCTION SWITCH
RANGE
A
B
C
D
E
LOAD
TUNE

Fig.8 SURF 12

5.4M MAST (Fig.9 page 31, Fig.11 page 34)

2.11 The 5.4m mast forms the basis of the 7.9m and 5.5m vertical antennas used for ground wave operation and can also be used as a support for various dipole and end-fed antenna configurations. It comprises six tubular sections which, when fitted together, are supported by three pairs of guys. For ease of transport, the mast is supplied as a kit (5820-99-621-9027) containing the following items:-

Mast section assembly (section) 5820-99-621-9017	-	6 off
Guy assembly (guy) 5820-99-621-9018	-	6 off
Stake, peg assembly (stake) 4030-99-621-9019	-	5 off
Adaptor, mast assembly (adaptor) 5820-99-621-9020	-	1 off
Plate, guy (guy plate) 5820-99-621-9021	-	2 off
Former 5820-99-621-9022	-	3 off
Plate, tie (tie plate) 5820-99-621-9023	-	1 off
Case, mast (case) 5820-99-621-9024	-	1 off

2.12 To assemble and erect the mast, proceed as follows:-

2.12.1 Remove all items from the case and fit together the six sections, interposing a guy

2.9.2 Transfer the coaxial link from between the RT320 INT TUNER and T/R sockets to the INT TUNER sockets of both units and connect the T/R sockets of both by the SURF 12 cable. Ensure that all four coaxial connectors are locked in position by their retaining rings.

2.9.3 If required, fit the solar shield, which is of sufficient length to accommodate the SURF 12.

2.10 Tuning SURF 12. Proceed as follows:-

2.10.1 Carry out operations 1 and 2 in Fig.6 (Operating Information, pages 22 and 23).

2.10.2 If the frequency selected is between 2 MHz and 19.1 MHz, set the SURF 12 function switch to DIRECT. At any other frequency, set the switch to TUNE, the RT320 power switch to ANT, depress the pressel and adjust the SURF 12 TUNE control for maximum meter reading. Release the pressel.

2.10.3 Carry out operations 3 to 8 in Fig.6.

plate between the third and fourth and the tie plate between the two lowermost sections.

2.12.2 Fit to the top of the mast the second guy plate and:

a If the mast is to be used for a 5.5m vertical antenna add the adaptor complete with down lead.

b If the mast is to be used for a 7.9m vertical antenna add the adaptor complete with down lead and then fit the 2.4m whip antenna into the adaptor.

2.12.3 Remove the guys from the formers on which they are wound and feed the guy toggles through the underside of the elongated holes in the guy plates. Locate the toggles so that they will not pull through the holes when the guys are under tension.

2.12.4 If the mast is to support a wire dipole or end-fed antenna, feed the throwing cord of the wire antenna (para.2.16) through the top of the circular holes in the upper and lower guy plates. If the mast is to be used as a vertical antenna, feed the adaptor down lead through the guy plates.

2.12.5 Drive into the ground three of the stakes, equally spaced in a circle of 6m diameter. In soft ground, dig holes for the stakes and embed them to a depth sufficient to withstand the tension of the guys.

2.12.6 Stand the base of the mast on the reinforced lid of the case in the centre of the

circle and attach the loop at the end of the upper and lower guy of each pair to a stake by means of its hook. Tighten the guys to maintain the mast in a vertical position.

2.12.7 If the mast is to support a wire dipole or end-fed antenna, pull the throwing cord of the wire antenna tight and tie off round the tie plate.

ANTENNA COUNTERPOISE (Fig.10, page 32)

2.13 The antenna counterpoise provides an artificial earth for all antennas when used on ground of poor conductivity such as desert or frozen snow and ice and should always be used with the ground wave vertical and end-fed antennas. In use, the four wires are spread radially around the RT320 and the short lead is connected to the earth terminal of the RT320. The counterpoise should always be used if doubtful about the ground conditions, because its use will never reduce performance and will often improve it.

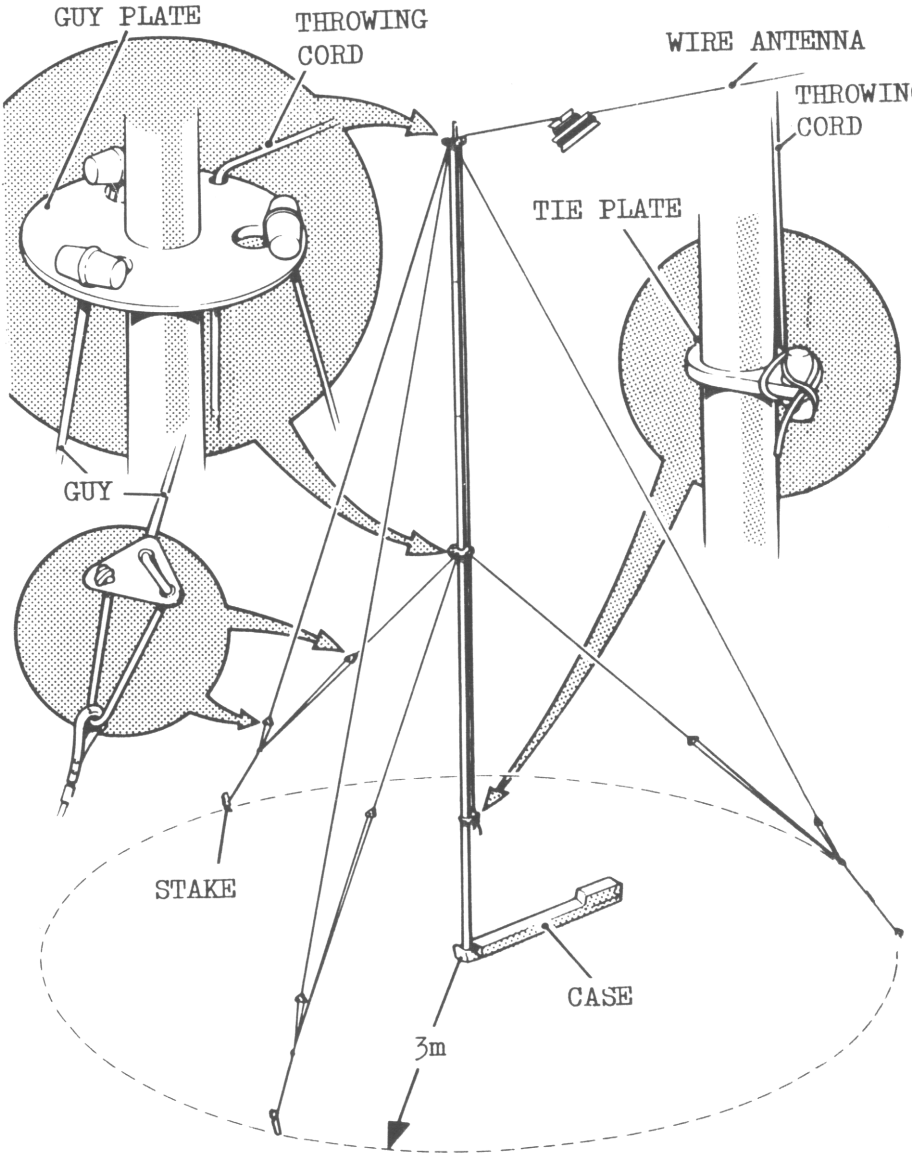


Fig.9 Erection of 5.4m Mast with Wire Antenna

2.14 The setting up procedure for the RT320 when used in conjunction with the counterpoise is as shown in Fig.6, but if the counterpoise is added after setting up, the equipment should be retuned.

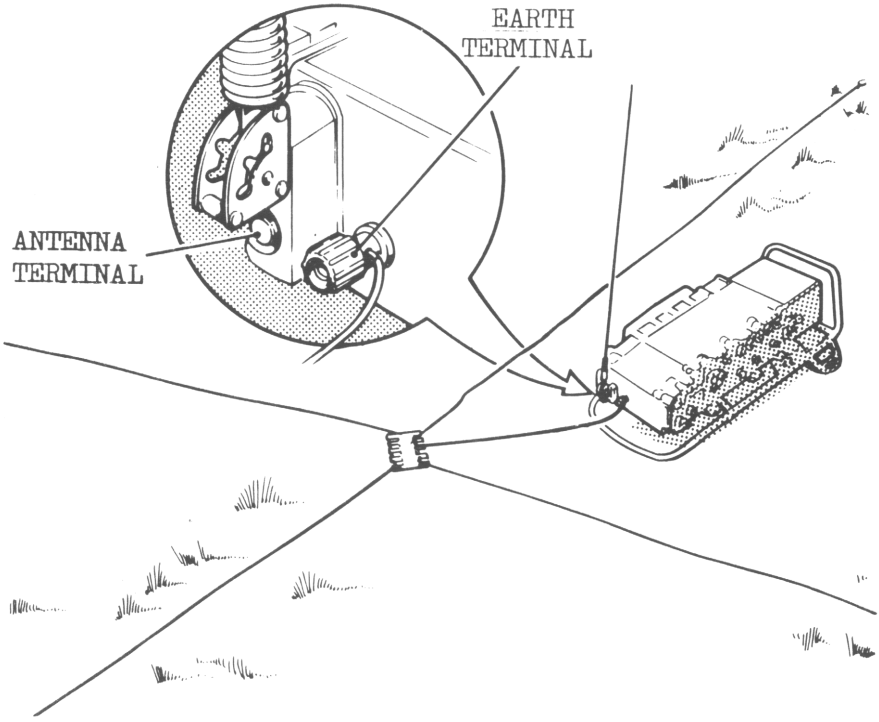


Fig.10 Antenna Counterpoise

GROUND WAVE VERTICAL ANTENNAS (Fig.11 overleaf)

2.15 For ground wave operation the RT320 uses vertical antennas based on the 5.4m mast (see para.2.12 on page 28). In both the 5.5m and the 7.9m antennas the down lead is connected to the RT320 antenna terminal, as shown, and the setting up procedure is as shown in Fig.6. Both antennas can be used throughout the frequency range of the equipment, except within the dead spots shown hatched in the ATU RANGE AND LOADING table. In these cases, an end-fed antenna should be used, as described in para.2.20. The antenna counterpoise must be used with these antennas (see para.2.13).

SKY WAVE DIPOLE AND END-FED ANTENNAS (Fig.12,13,14, pages 37,38,39)

2.16 For sky wave operation the RT320 can use either a dipole or an end-fed antenna, both based on the wire antenna. This comprises 47m of insulated braid, marked at one metre intervals with one green marker, at five metre intervals with two yellow markers and at ten metre intervals with three blue markers; it is wound on a bobbin equipped with a throwing cord.

2.17 Various dipole configurations, each using two wire antennas, are possible. In each case the direction of the antenna is not critical for communication over distances up to 300km, but in tropical areas the antenna should run N - S for the lowest unwanted noise level. For distances greater than 300km the antenna should be erected broadside on to the direction of communication.

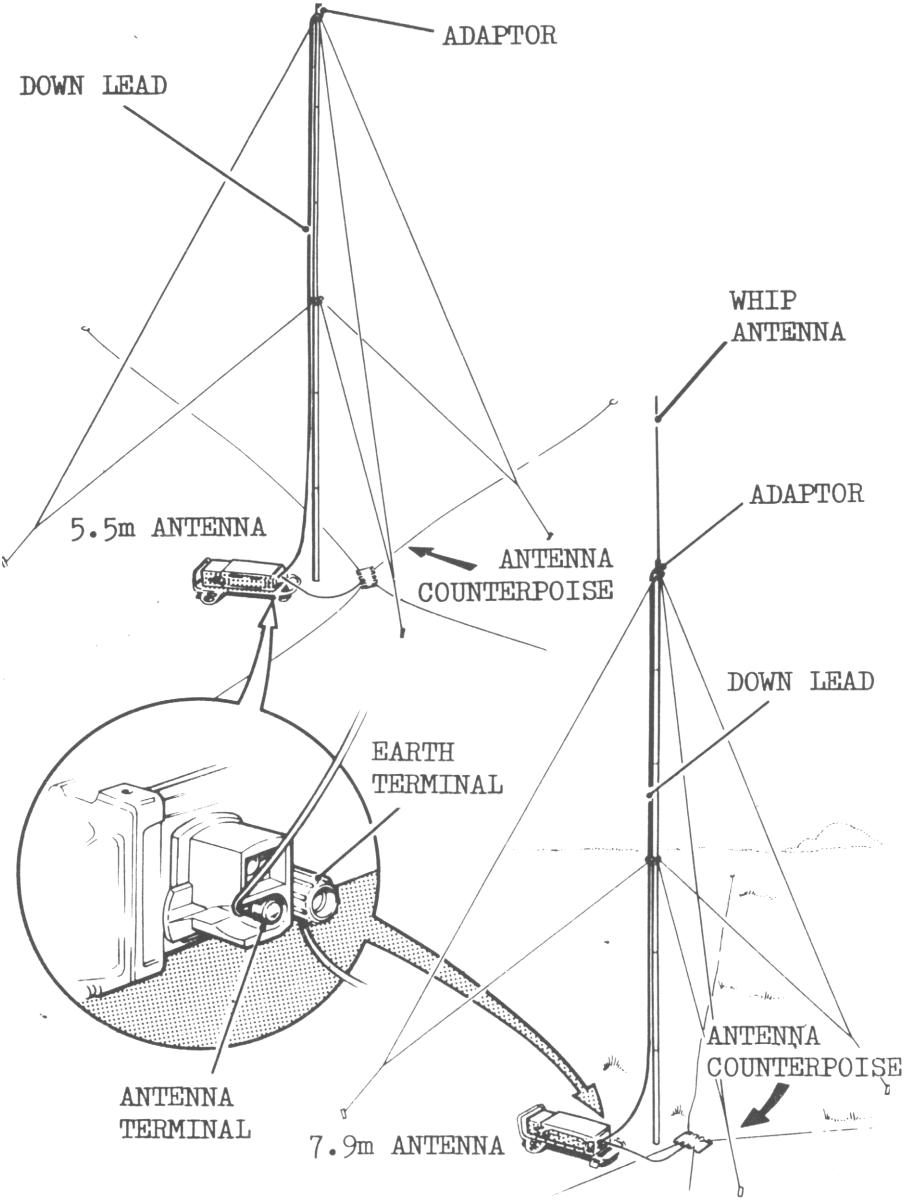


Fig.11 5.4m Mast with Ground Wave Vertical Antennas

2.18 The dipole configurations which give best results at maximum range are shown in Fig.12. The setting up procedure for these configurations is as follows:-

2.18.1 Establish the required length of each dipole element from the table on the case of the RT320.

2.18.2 Unwind the required lengths of antenna wire from each bobbin and tie off with a double loop or clove hitch so that the coloured length marker is just free of the knot.

2.18.3 Erect the horizontal dipole as shown in Fig.12 (the side of a house or wall could be used instead of a tree), using a suitable weight, such as a jack knife, on the throwing cord to get the wire or cord through the branches of the tree. Tie off the cord in the same way as the antenna wire.

2.18.4 When only a 5.4m mast is available to support the antenna, a centre supported dipole can be used. This dipole is erected as shown in Fig.12 and the dipole centre junction is secured to the top of the mast with a length of cord. The bobbins of the wire antennas are supported by securing the throwing cords to the spare stakes included in the mast kit.

2.18.5 Remove the coaxial link between the RT320 INT TUNER and T/R sockets and connect the latter to the dipole centre junction by means of the antenna feeder cable. If the SURF 12 is fitted, remove the cable from between the two T/R sockets and connect the RT320 T/R socket to the dipole

centre junction. Ensure that no strain is applied to the terminals and coaxial socket of the dipole centre junction by looping the antenna wires through its lugs and suspending the antenna feeder cable from it by means of the loop of cord attached to the cable, as shown.

2.18.6 Set up the equipment as shown in Fig.6, (pages 22 and 23) but do not tune the ATU (operation 3) as, in this configuration, antenna matching is provided solely by the lengths of the dipole elements.

2.19 Examples of other dipole configurations are given in Fig.13. In these examples the dipole centre junction and antenna feeder cable are not used, the coaxial link between the INT TUNER and T/R sockets remains fitted and the wire antenna ends are connected directly to the RT320 antenna and earth terminals as shown. The lengths of the dipole elements are specified in the table on the radio set (also shown in Fig.7, page 24). The equipment is set up as shown in Fig.6 (pages 22 and 23), using the RANGE and LOAD switch settings given for the V dipole in Fig.7 (page 24).

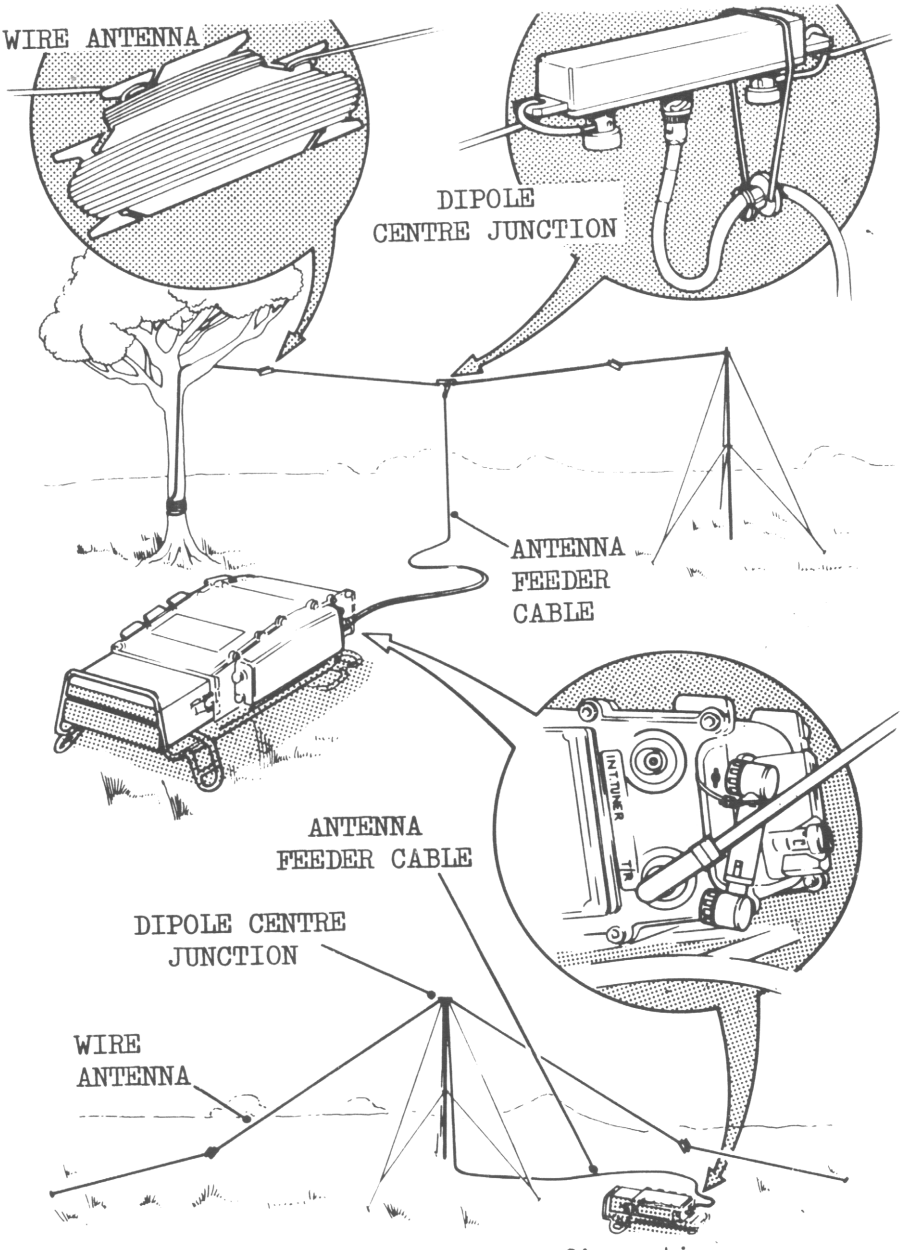


Fig.12 Dipole Configurations using Antenna Feeder Cable

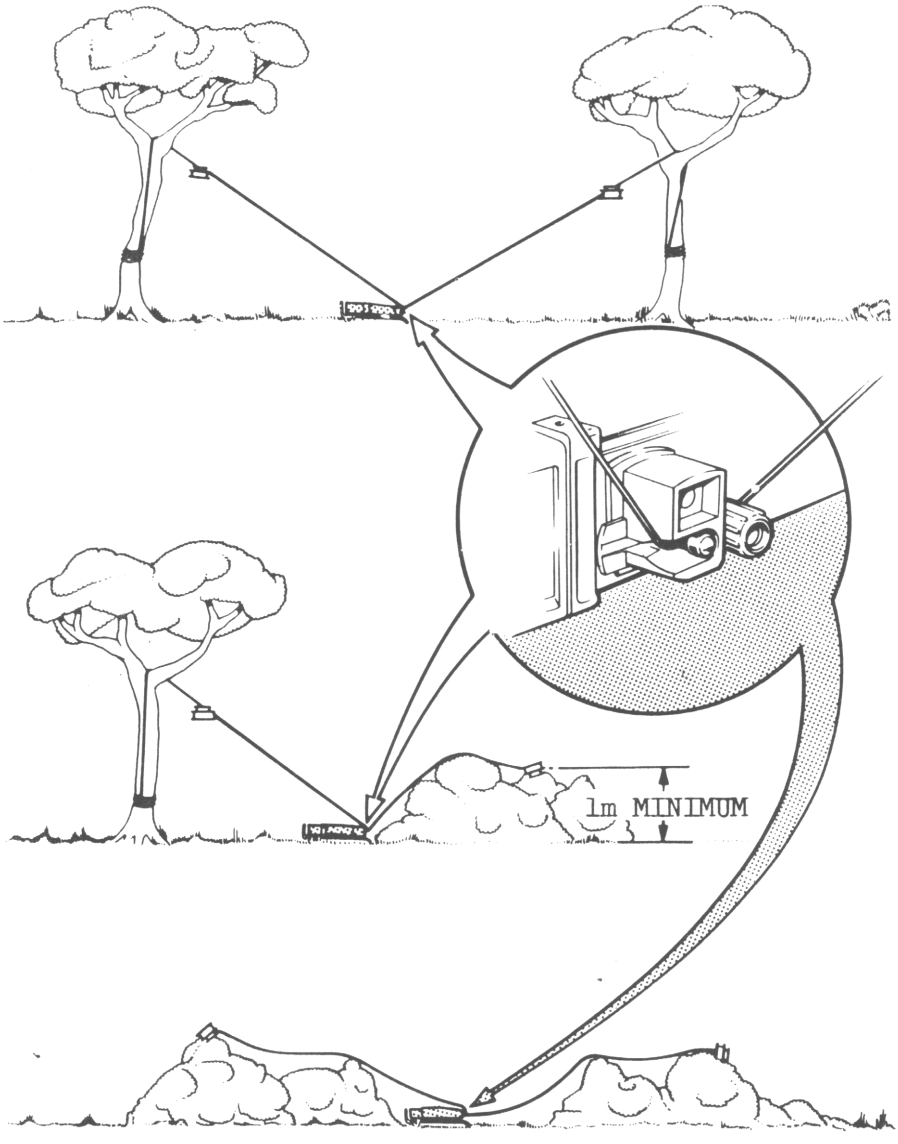


Fig.13 Examples of other Dipole Configurations

2.20 The end-fed antenna, an example of which is shown in Fig.14, uses one antenna wire connected to the RT320 antenna terminal and can be supported by a mast or a wall, instead of a tree. After setting the antenna length, as specified in the END-FED column of the ATU RANGE AND LOADING table, Fig.7 (page 24), the equipment is set up as shown in Fig.6 (pages 22 and 23) using the RANGE and LOAD switch settings given in the table. The antenna counterpoise must be used with this antenna (see para.2.13).

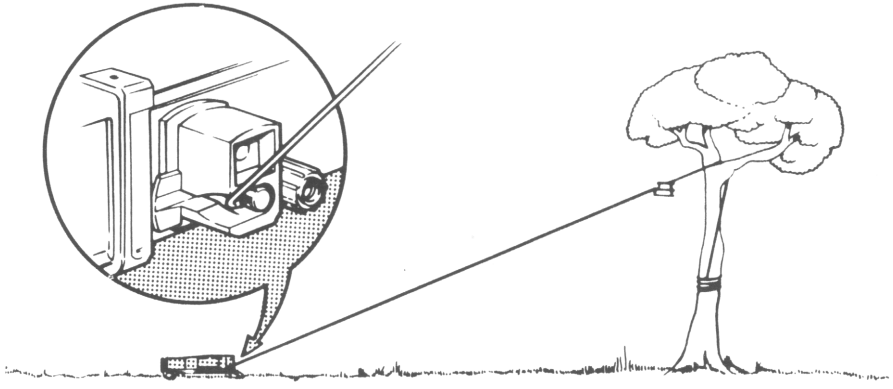


Fig.14 Example of End-Fed Antenna

REMOTE OPERATION (Fig.15, page 41)

2.21 The PRC-320 can be operated remotely from a distange of up to 3km by the use of other items from the Clansman range of equipment as described overleaf.

2.22 Speech operation. For operation in a speech mode (SSB or AM), the PRC-320 is used in conjunction

with a control, radio set, local/remote (CRL/R) at the local position, connected by up to 3km of D10 cable to a remote control handset at the remote position, as shown. (Details of the method of connecting D10 cable to the handset are given in the User Handbook for Clansman Radio Control Harness, Army Code No. 61172.) The setting up and operating procedure is as follows:-

2.22.1 Set the CRL/R function switch to LOCAL and set up the RT320 as shown in Fig.6 (pages 22 & 23).

2.22.2 At the RT320, select the required speech mode (SSB or AM). The equipment is now ready for operation from either the local or the remote position, depending on the setting of the CRL/R function switch, the facilities provided in each position of which are as follows:-

a LOCAL - RT320 controlled by local operator's pressel. Both operators hear received signal and transmitter sidetone.

b REM - RT320 controlled by remote operator's pressel, but local operator can override remote operator by operating his pressel. Both operators hear received signal and transmitter sidetone.

c I/C - Intercommunication between both operators on operation of their respective pressels. Both operators hear received signal superimposed on their intercommunication.

d CALL - Local operator calls remote by a tone. Switch spring loaded to return to I/C

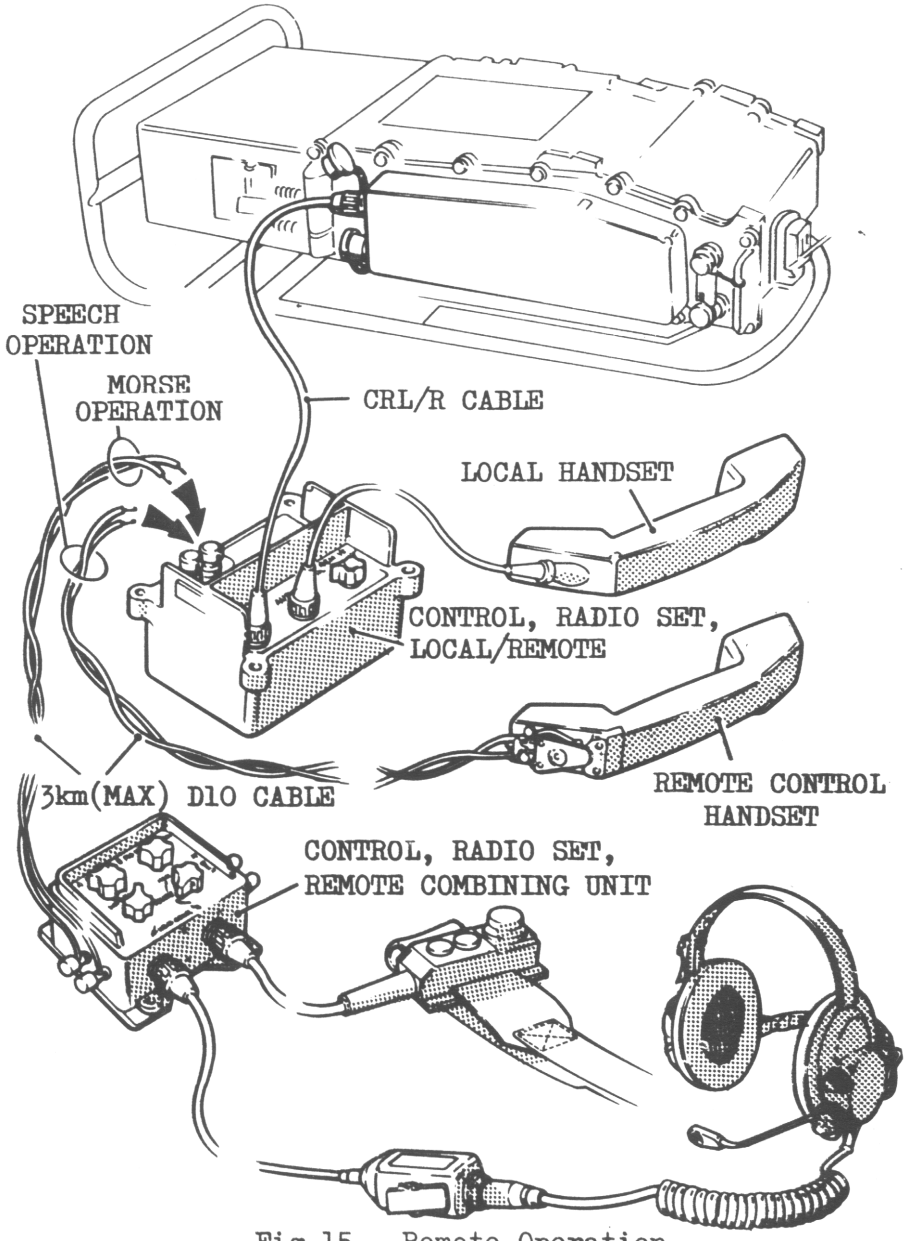


Fig.15 Remote Operation

position. (Remote operator can call local in any position of CRL/R function switch by depressing call button on handset.)

2.23 Morse operation. For morse operation (CW), a morse key and/or headset/handset at the remote position is connected via a control, radio set, remote combining unit (RCU) to the D10 cable in place of the remote control handset, as shown. The setting up and operating procedure is as described for speech operation in para. 2.22, except that a CW mode (N or W) is selected at the RT320. The setting up and operating procedure for the RCU, details of which are given in the User Handbook for Clansman Radio Control Harness, Army Code No. 61172, is as follows:-

2.23.1 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.

2.23.2 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 CRL/R function switch, as previously described. When the equipment is operating, set the WORKING control to obtain the required volume in the remote headset or handset. To call the local operator, turn the function switch to the spring loaded CALL position.

2.23.3 If required, the RCU can be operated in the speech mode by setting the function switch to VOICE and the RT320 to SSB or AM.

REBROADCASTING (Fig.16)

2.24 The PRC-320 can be operated as a manual rebroadcast station in conjunction with a control, radio set, local/remote (CRL/R), an interconnecting box, harness adaptor (IBHA) and an interconnecting box, 2 radio (ICB2). Interconnections between the units are shown in block diagram form in Fig.16, but reference should be made to the User Handbook for Clansman Radio Control Harness, Army Code No. 61172.

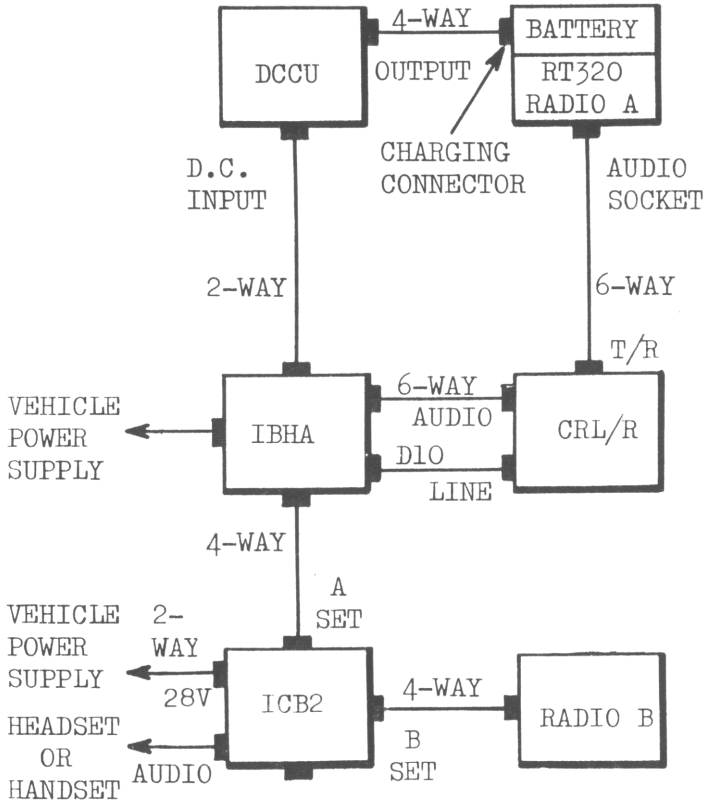


Fig.16 Local Rebroadcast Interconnections

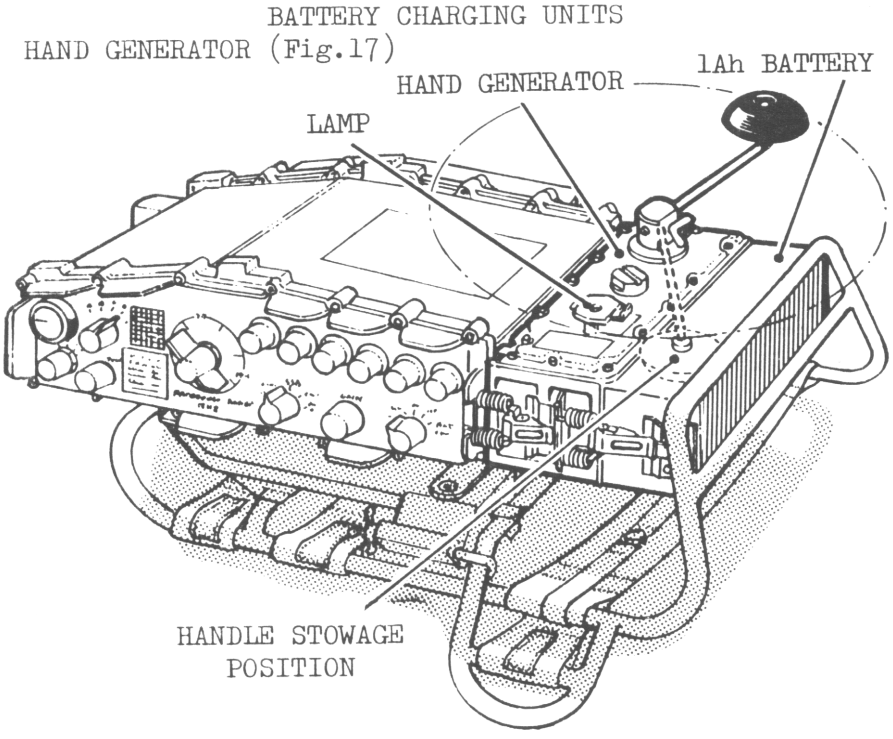


Fig.17 PRC-320 with Hand Generator

2.25 The hand generator enables a PRC-320 to be operated for an indefinite period without changing the battery and, complete with a 1Ah secondary battery, is latched to the RT320 in place of a 3.3Ah battery. In an emergency, the generator alone (without the battery) can be used to power the RT320 when in the receive condition. The generator can be used with the equipment in any position, but it will be found easiest to operate with the equipment on the ground. If required, a 3.3Ah battery may be used instead of the 1Ah, but in this case the equipment must be removed from the carrier.

The procedure for fitting and operating the generator is as follows:-

2.25.1 Lift the battery retaining latches on the RT320, fit the generator so that its spring contacts engage with the contact studs of the RT320 and then close the retaining latches.

2.25.2 Lift the battery retaining latches on the generator, fit the battery so that its spring contacts engage with the contact studs of the generator and then close the retaining latches.

2.25.3 Loosen the generator handle retaining wing nut, set the handle to the winding position and tighten the wing nut.

2.25.4 Turn the handle. As the turning speed is increased, the generator indicator lamp (provided with a sliding shutter for night operation) will light until a speed is reached at which the lamp extinguishes. Continue to turn the handle at this speed to keep the lamp extinguished.

2.25.5 When using the RT320 at a normal transmit:receive ratio of 1:9, the battery should remain charged by continuous operation of the generator. If the normal ratio is exceeded, it will be necessary to operate the generator after the radio is switched off in order to fully charge the battery.

2.25.6 On completion of an operating period, return the generator handle to its stowage position, as shown.

D.C. CHARGING UNITS (Fig.18)

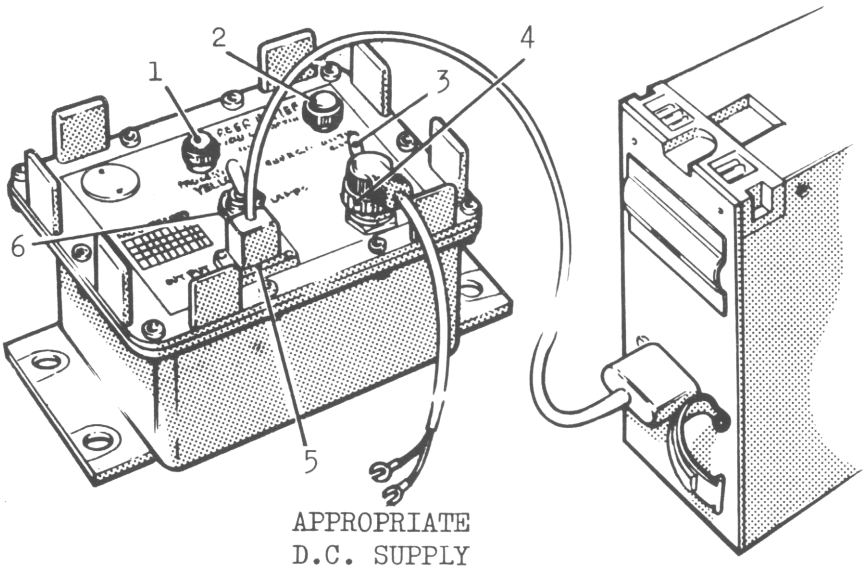


Fig.18 D.C. Charging Unit

2.26 The d.c. charging units (14V and 28V d.c. input) are primarily designed to float charge a Clansman manpack secondary battery used with a vehicle radio. The charging procedure is as follows:-

2.26.1 Using the d.c. charging unit supply cable, connect the D.C.INPUT plug (4) to the appropriate d.c. supply (14V or 28V), ensuring correct polarity.

2.26.2 Using the battery charging cable, connect the charging connector on the battery to the OUTPUT connector (5).

2.26.3 Set the INPUT switch (3) to ON.

2.26.4 Set the LAMPS switch (6) down (on). The CHARGE PROCEEDING YELLOW lamp (1) will light to indicate that the battery is properly connected and is being charged. When the battery is fully charged this lamp will extinguish and the CHARGE COMPLETE GREEN lamp (2) will light. The approximate charging times from flat are:-

a	1Ah battery	$1\frac{1}{4}$ hours
b	3.3Ah battery	4 hours

2.26.5 Except when connecting the battery, or inspecting its charge state, set the LAMPS switch to OFF. No damage to the battery or the charging unit will occur if a fully charged battery is left connected.

A.C. CHARGING UNIT (Fig.19)

W A R N I N G

The voltages used in this equipment are high enough to endanger life.

CARELESSNESS COULD BE FATAL

See First Aid instructions on page (ii) to (vi).

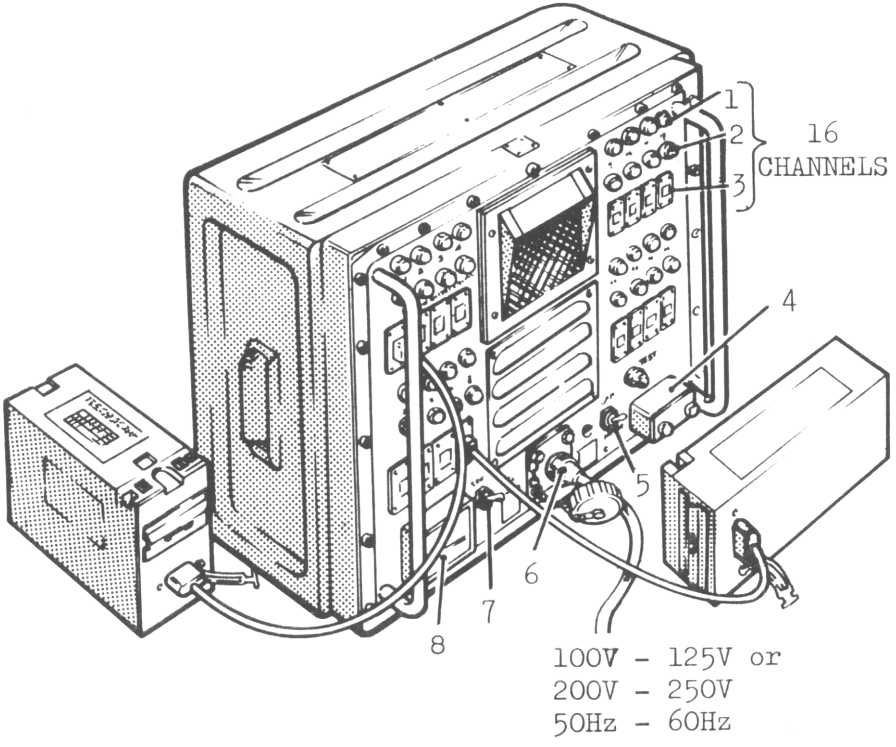


Fig.19 A.C. Charging Unit

2.27 The a.c. charging unit enables up to 16 Clansman 3.3Ah and 1Ah secondary batteries to be recharged simultaneously, regardless of their state of discharge. The charging procedure is as follows:-

2.27.1 Remove the cover from the charging unit.

2.27.2 Adjust the voltage selector panel (8) to correspond with the voltage of the 50 - 60 Hz a.c. mains supply.

WARNING: Ensure that the unit is disconnected from the supply whilst making adjustments.

2.27.3 Remove the cover from the a.c. mains fuse (4) and ensure that it is of the correct rating, i.e. 20A for a 100 - 125V supply and 10A for a 200 - 250V supply.

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

2.27.5 Using the a.c. charging unit supply cable, connect the INPUT plug (6) to the a.c. mains supply.

2.27.6 Set the LAMPS switch (7) down (on).

2.27.7 Using the battery charging cables, connect the charging connector of each battery to be charged to an outlet connector (3) and set the MAINS switch (5) down (on). Each outlet has an associated yellow lamp (1), which will light to indicate that the battery is properly connected and is being charged. When the battery is fully charged this lamp will extinguish and an associated green lamp (2) will light.

2.27.8 Record each charge by crossing off one of the white squares on top of the battery after charging. The approximate charging times from flat are:-

a	1Ah battery	$1\frac{1}{4}$ hours
b	3.3Ah battery	4 hours

2.27.9 Replace charged batteries with discharged ones (there is no need to switch off when doing so). No damage to the battery or the charging unit will occur if a fully charged battery is left connected.

WORKING TO OTHER RADIOS (Fig.20)

2.28 The PRC-320 will work to another PRC-320 and to Clansman radios VRC-321 and VRC-322 in any transmission mode and on any selected 100 Hz channel in the frequency range 2 MHz to 30 MHz. It will also work in limited modes of transmission and on limited frequencies to the other radios shown.

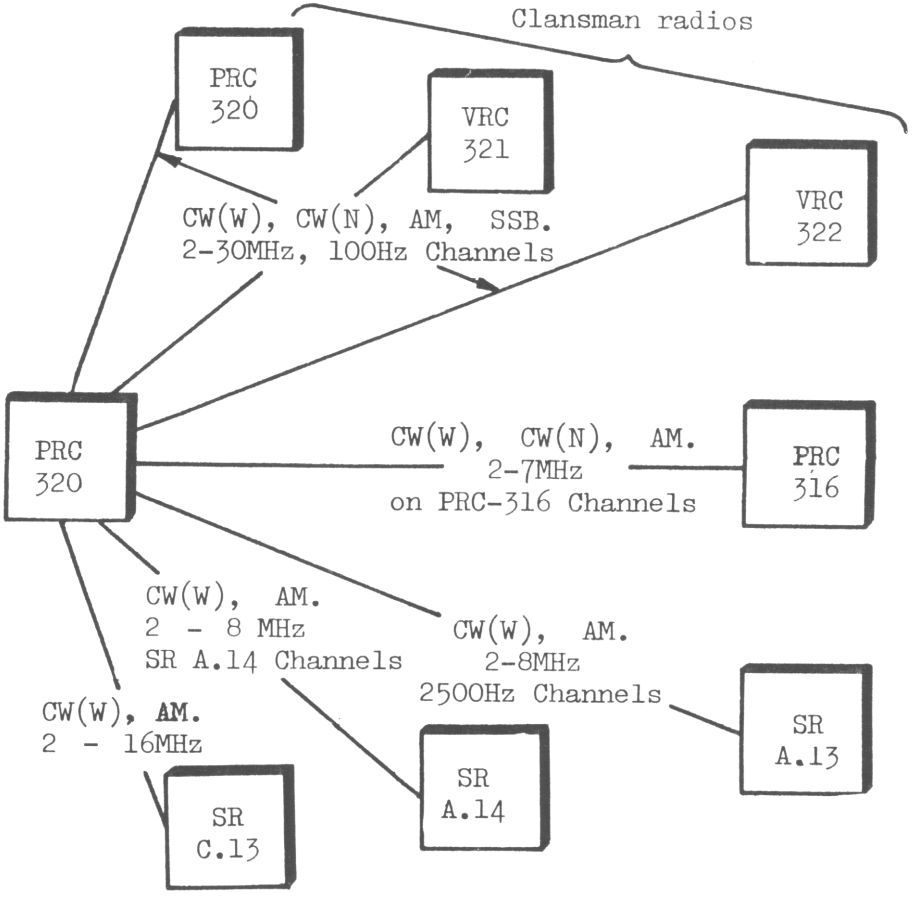


Fig.20 Working to other Radios

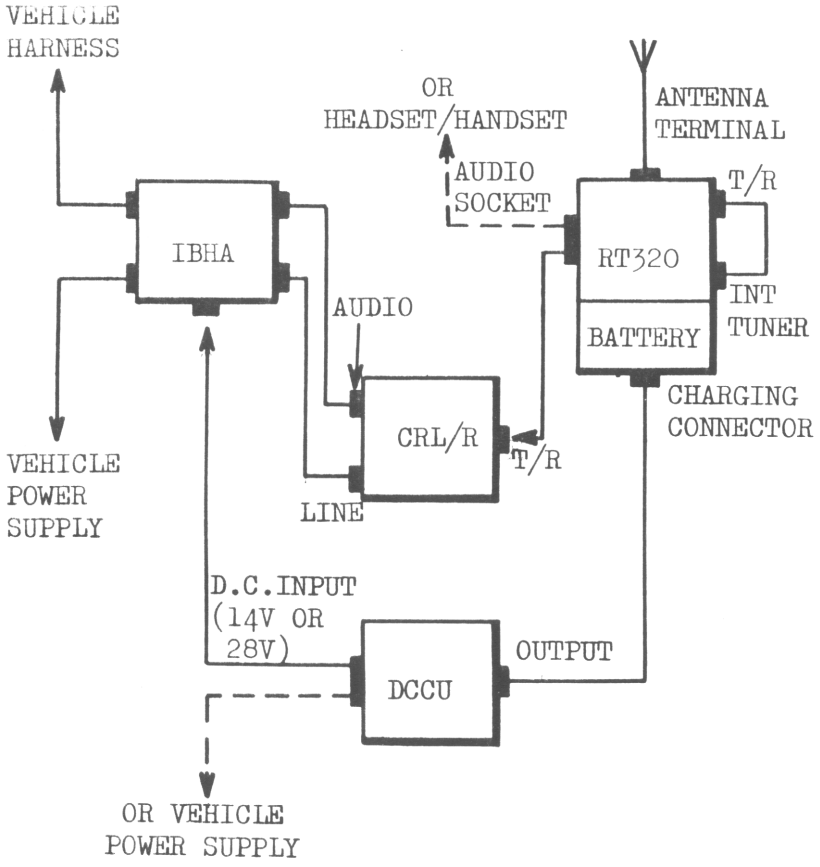


Fig.21 Vehicle Harness Interface

CHAPTER THREE

USE OF RADIO IN A VEHICLE

INTRODUCTION

3.1 This Chapter gives general information on the use of the RT320 in a vehicle installation. Detailed information on individual vehicle installations is covered in the appropriate vehicle installation handbook.

INSTALLATION

3.2 The RT320 is normally mounted on its carrier, which is secured to a mounting frame installed in the vehicle by means of clips, and connected via its antenna terminal to the vehicle whip antenna. The equipment can be connected directly to a headset or handset via an audio socket, as in the manpack role, or into the vehicle harness (28V vehicles only) via a control, radio set, local/remote (CRL/R) and interconnecting box, harness adaptor (IBHA), as shown in block diagram form in Fig.21. The battery is normally float-charged by either a 14V or a 28V input d.c. charging unit (DCCU), depending on the vehicle electrical supply. Under no circumstances is the RT320 to be powered directly by the vehicle electrical supply as damage would result from so doing.

TUNING UNIT RF 25W

3.3 In circumstances where it is not possible to install the RT320 close to the vehicle antenna, the Tuning Unit RF 25W (TURF 25W) is connected between the vehicle antenna and the transmitter/receiver section of the RT320, and is located close to the vehicle antenna. The latter is connected to a

terminal on the rear of the TURF 25W; the input coaxial socket in the centre of the tuning data disc on the front is connected to the RT320 T/R coaxial socket (after removal of the coaxial link) as shown in block diagram form in Fig.22.

The TURF 25W takes the place of the RT320 ATU and is tuned as follows:-

3.3.1 Set the RT320 transmitter power switch to ANT.

3.3.2 Unlock the TURF 25W controls and rotate the tuning data disc to the frequency nearest the operating frequency, interpolating between the frequencies on either side if necessary.

3.3.3 Read across the disc to obtain the settings of the TUNE, MATCH and SELECT controls and set these controls accordingly.

3.3.4 Depress the pressel and adjust the TUNE and MATCH controls to obtain maximum reading on the RT320 meter (the TURF 25W meter is inoperative when used with the RT320).

3.3.5 Release the pressel and lock the TURF 25W controls.

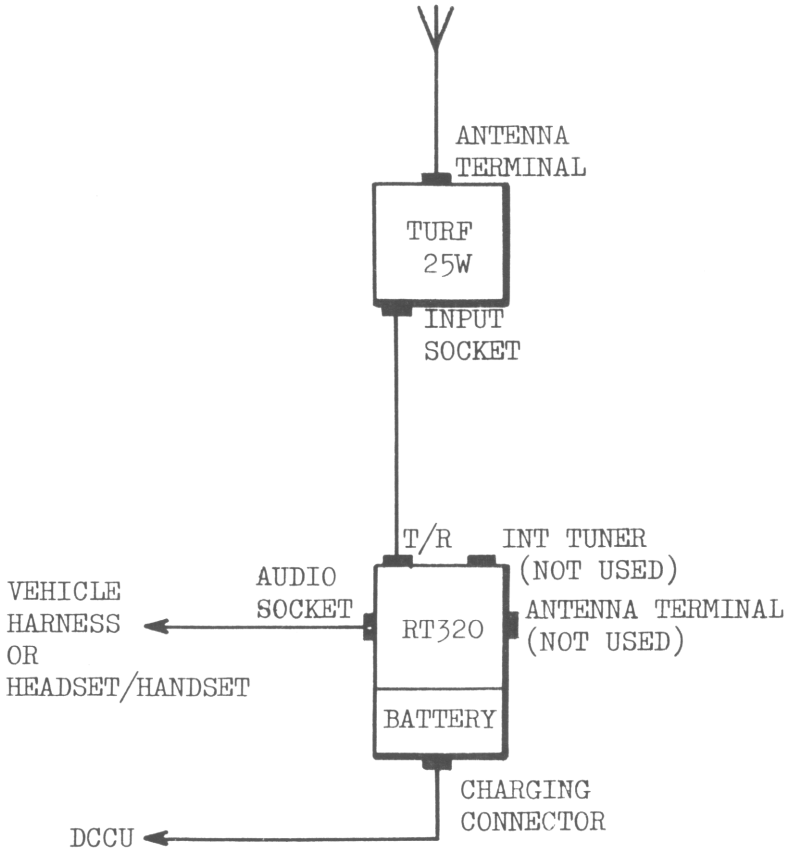


Fig.22 TURF 25W Connections

CHAPTER FOUR

PREVENTIVE MAINTENANCE

GENERAL

4.1 No equipment can be expected to work properly unless it is kept in first-class condition by regular maintenance conscientiously carried out. This is the responsibility of the NCO or man who is in direct charge of the equipment and NOT of the workshop or repair staff, although they may be called upon to carry out certain servicing tasks.

4.2 To guide the NCO or man responsible for maintenance, and to ensure that it is carried out regularly, signal equipment is serviced on a task system. The tasks in the case of the PRC-320 are simple and few in number, as listed below.

4.3 Instructions regarding the supervision of servicing, frequency of performing each task and recording the completion of tasks will be issued by unit commanders. Army Form B2661 is to be used for recording purposes.

4.4 The RT320 is a fully sealed radio and is NOT to be opened by the operator under any circumstances.

OPERATOR'S SERVICING

4.5 The following tasks are to be carried out by the operator at the times specified or as required:-

4.5.1 Keep the equipment clean and dry. Remove any dust or dirt from the connectors,

control knobs and terminals. If the equipment has been subjected to immersion, remove loose water from all connectors. Dry the headset or handset thoroughly and remove loose water from cavities by shaking. Remove water from inside the morse key by shaking and from the contacts by blowing through the hole below the knob.

4.5.2 Check switches and controls to ensure that they are functioning correctly and are securely mounted on the case.

4.5.3 Inspect the case for damage and corrosion.

4.5.4 Check that battery connections are clean and undamaged.

4.5.5 Check the battery fixing clamps and latches for security. Report any weak or broken springs.

4.5.6 Check the security of the RT320 on its carrier.

4.5.7 Examine cable assemblies for frayed ends or damaged insulation. Pay particular attention to coaxial connectors used on antenna feeders.

4.5.8 Check that wire antenna connections are clean and in good condition. If an antenna wire breaks, strip back the insulation on each side of the break and, as a temporary measure, tie the bared ends together. If the ferrule breaks off from the end of an antenna wire, strip back the insulation and, again as a temporary measure, connect the bared end to the appropriate terminal on the RT320.

4.5.9 Carry out the functional tests described in Chapter 5.

CHAPTER FIVE

CORRECTIVE MAINTENANCE AND FUNCTIONAL CHECKS

GENERAL

5.1 The procedures outlined in this chapter are to be followed when checking the RT320 and its ancillary equipment. These checks are to be carried out as part of the preventive maintenance given in Chapter Four or in the event of equipment failure. They are designed to enable an operator to quickly prove that the equipment is functioning correctly or to localise the fault if it is not. The following points are to be observed at all times:-

5.1.1 The operator is not to open sealed equipment under any circumstances.

5.1.2 The equipment is not normally to be removed from its parent installation in order to perform maintenance.

5.1.3 The user is only to take remedial action where this is stated to be specifically within his capability.

5.1.4 The user is not to make adjustments or replace items unless he can make a confirmatory test.

FUNCTIONAL CHECKS

5.2 When carrying out the functional checks following, it is to be ensured that the equipment has been correctly set up and is being operated in accordance with the operating information given in Chapter Two (page 21).

BATTERY CHECK

5.3 Check the charge state of the battery as follows:-

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

5.3.2 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.

5.3.3 Tune the antenna as described in Chapter Two (page 21) and recheck the battery as described above.

FREQUENCY CHECK

5.4 The operator can check the frequency accuracy of the RT320 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. The check procedure is as follows:-

5.4.1 Set the frequency of the RT320 to that of the check station, ensuring that the latter is transmitting CW only so that a pure tone is heard in the headset. (Any other mode of transmission

from the check station might cause a warbling tone that could be mistaken for frequency instability in the RT320.)

5.4.2 Set the mode selector switch to FREQ CHK and listen to the two tones now present, adjusting the GAIN control as necessary.

a If the tones fluctuate slowly, the RT320 frequency accuracy is satisfactory, the rate of fluctuation indicating the amount by which the frequency is off tune. If speech is badly distorted at the higher frequencies in the SSB mode, the equipment should be sent to workshops for recalibration as soon as possible.

b If a rapid warble is heard, the frequency is well off tune and the equipment should be sent to workshops for recalibration. Even with the frequency well off tune, in an emergency it might be possible to communicate with another PRC-320 in the AM or CW(W) modes.

OPERATING MODE CHECKS

5.5 Check the PRC-320 for correct operation in each position of the mode selector switch as described below. When checking reception in each mode, another PRC-320 can be used as a transmission source by transmitting (on the same frequency as the equipment being checked) speech in the voice modes and keyed CW in the CW modes. The check procedure is as follows:-

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

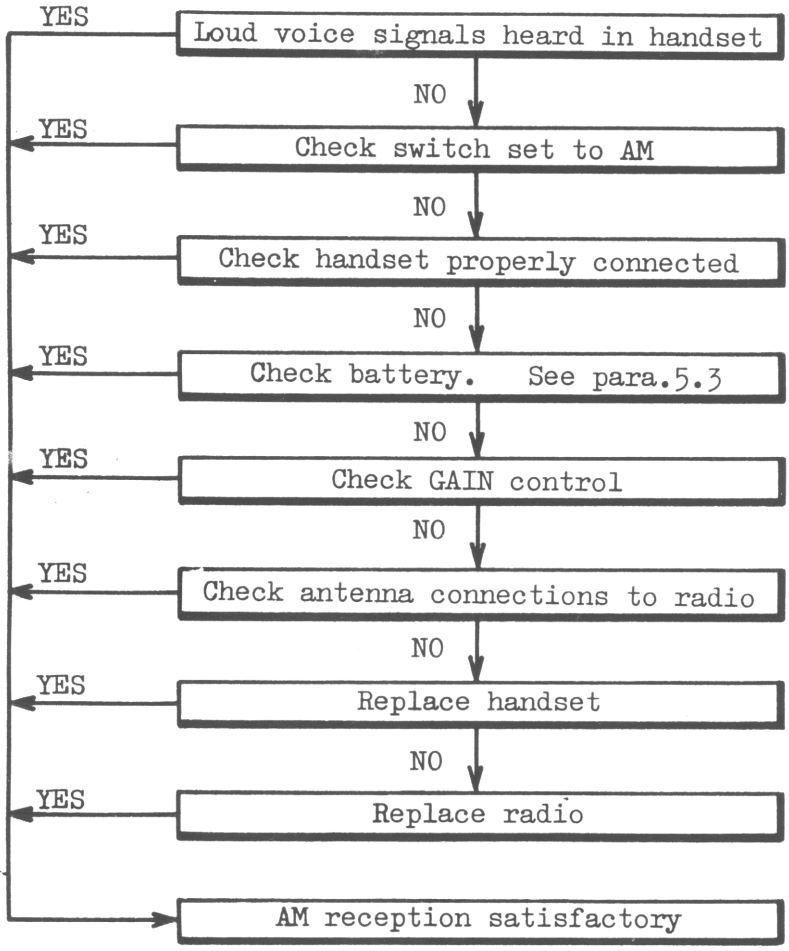


Fig.23 AM Reception Check

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

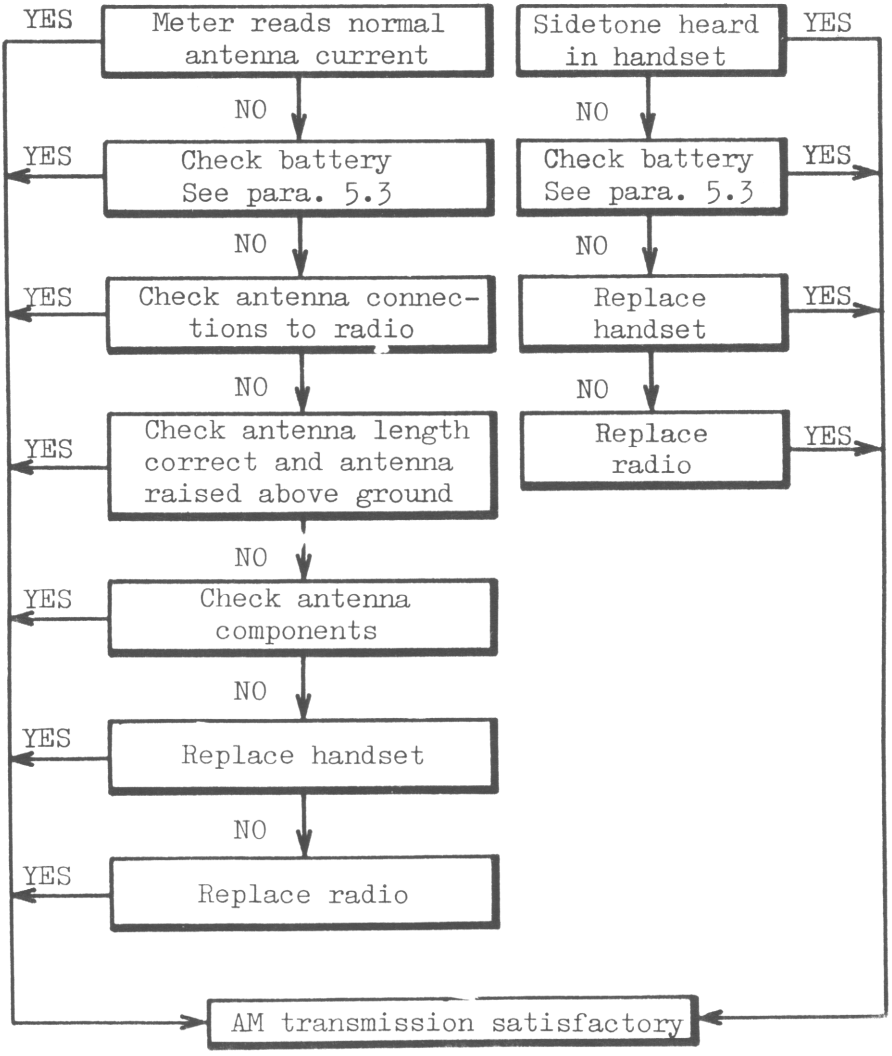


Fig.24 AM Transmission Check

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

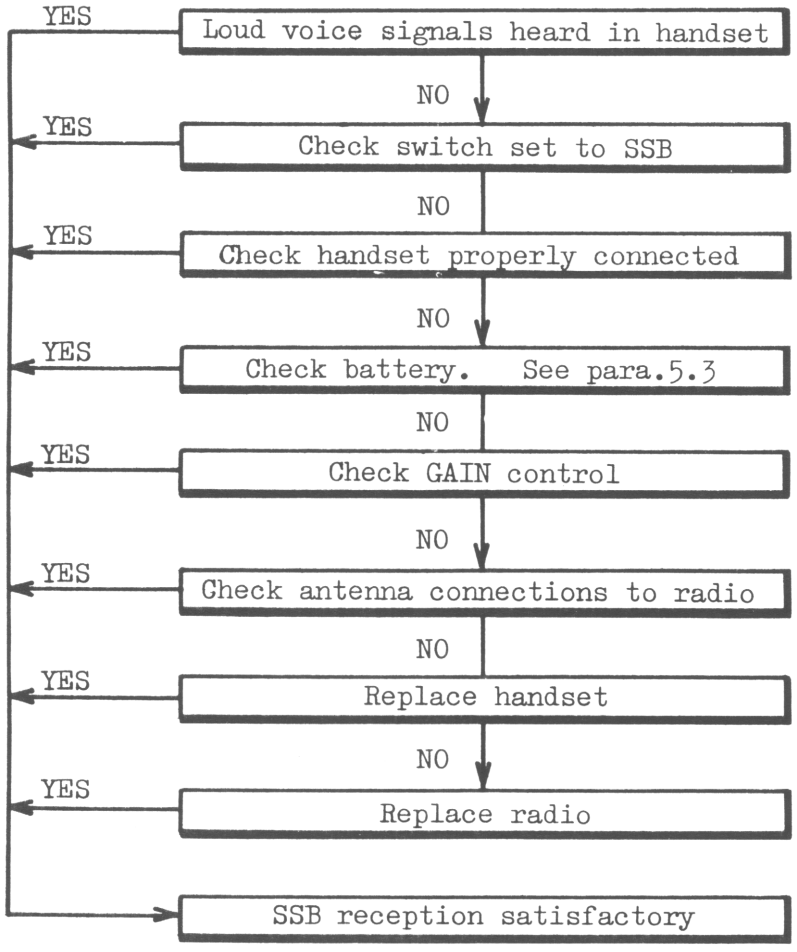


Fig.25 SSB Reception Check

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

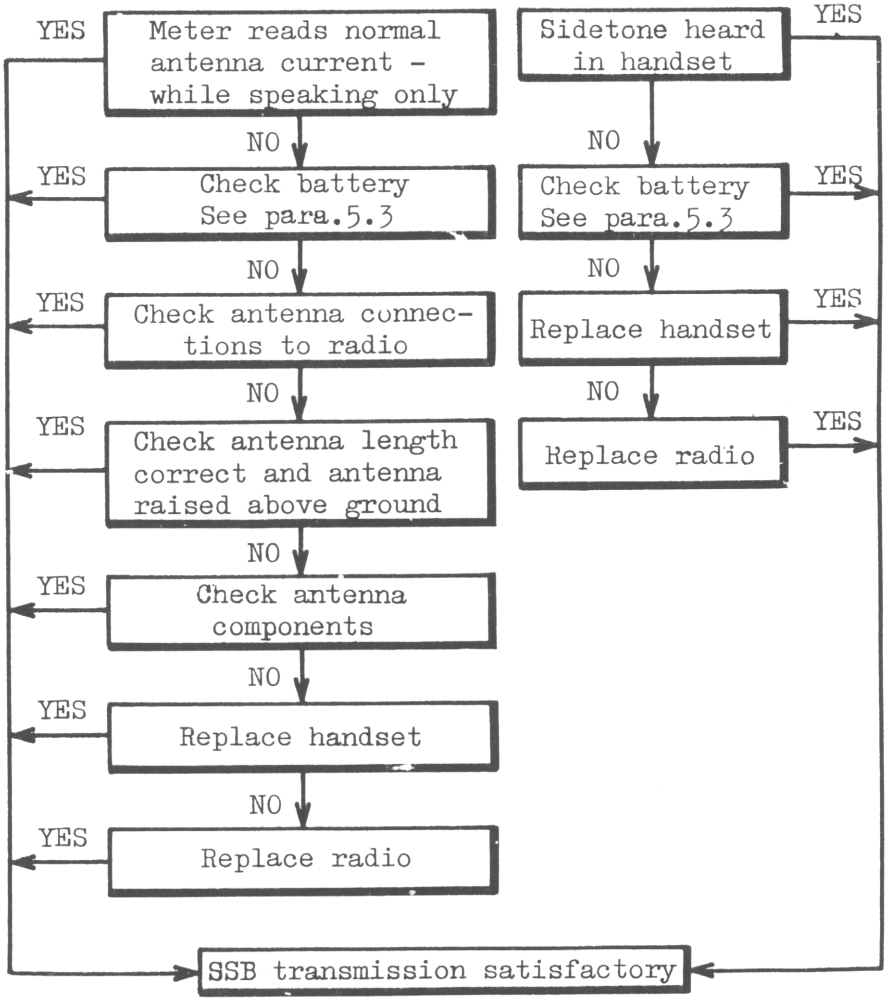


Fig. 26 SSB transmission Check

5.5.5 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).

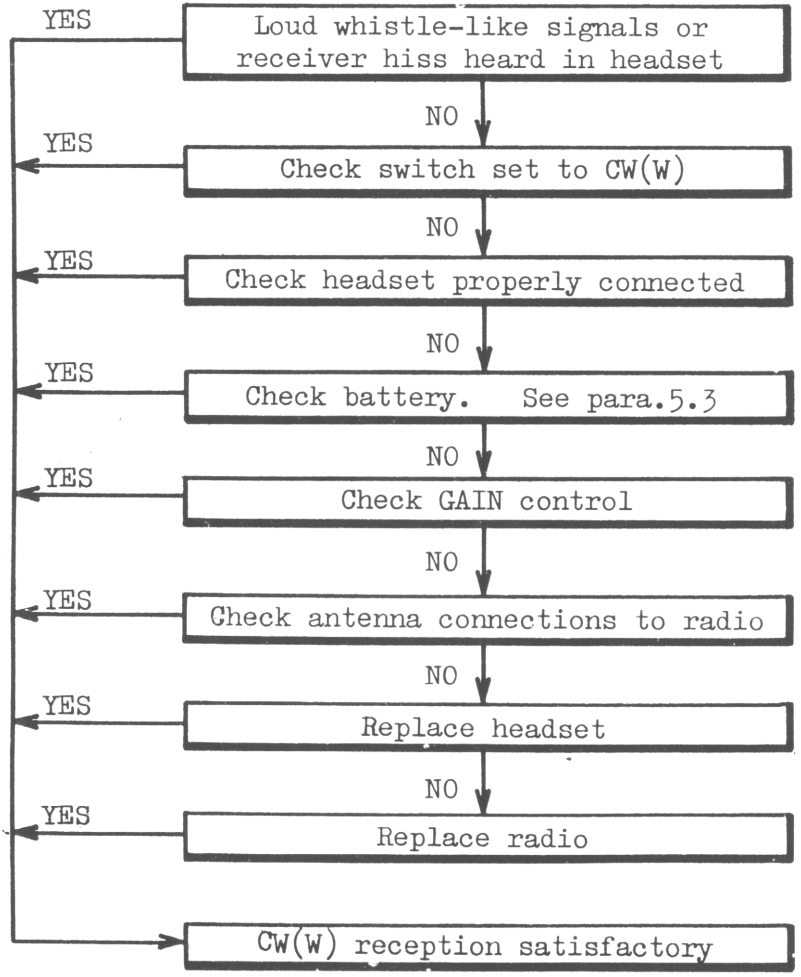


Fig.27 CW Reception Check

5.5.6 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).

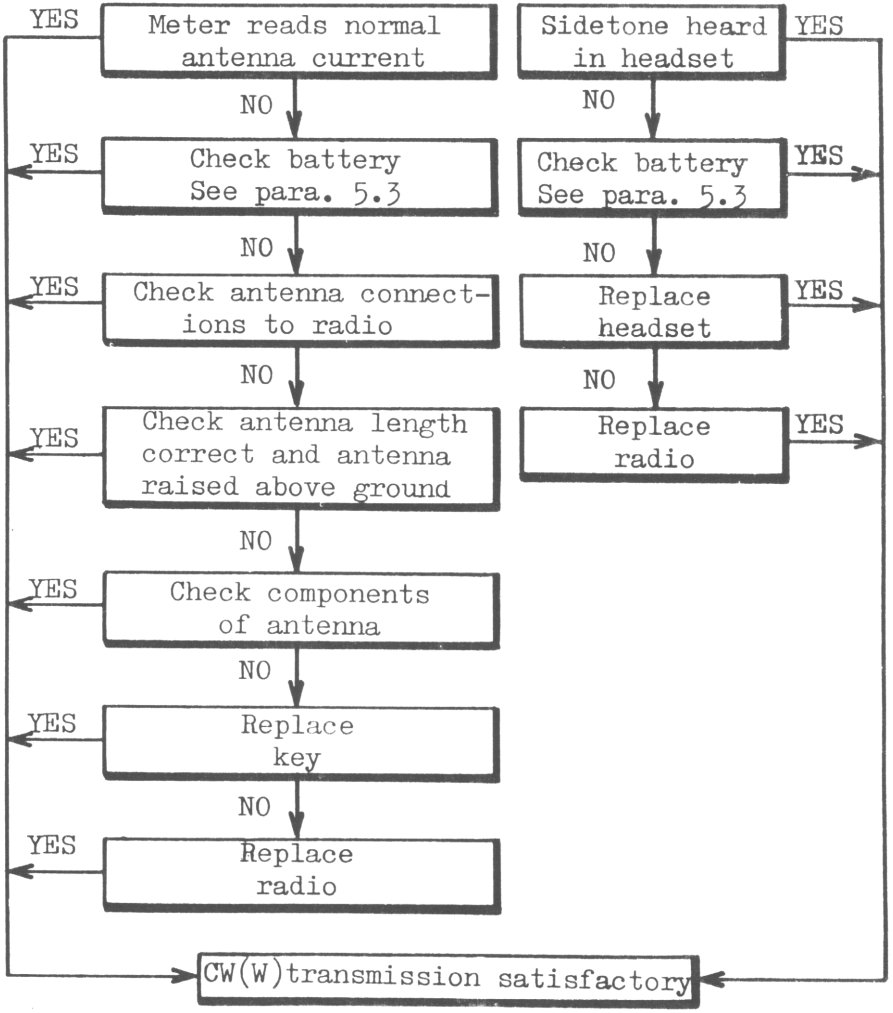


Fig. 28 CW Transmission Check

RESTRICTED

IDEAS SUGGESTIONS DEFECTS

YOU are the user of this equipment—can it be improved?

If you have any good suggestions about this or ANY Signals equipment, the Ministry of Defence Army Department is interested.

Ideas and Suggestions

If you can suggest:

(a) an improvement in design or shape,

(b) a better method of installation, operating, or servicing,

(c) other equipments which might do the job better,

the procedure is quite simple—pass it to your OC or Adjutant for transmission to the local Chief Signal Officer.

It will remain YOUR idea.

See the Signal Equipment Performance Report (AF B63), details for completion of which are found on the cover of the pad.

Defects

If there is something wrong with the equipment AS IT STANDS, other than a fair wear and tear fault, it is a defect.

Again don't keep it to yourself, pass it to your OC. The procedure for him to follow is given in EMER Management N200. (AFG3660 is the form to use).