CANADIAN ARMY

OPERATOR'S HANDBOOK

RADIO SET CPRC-26

SUPERSEDES PROVISIONAL WORKING INSTRUCTIONS
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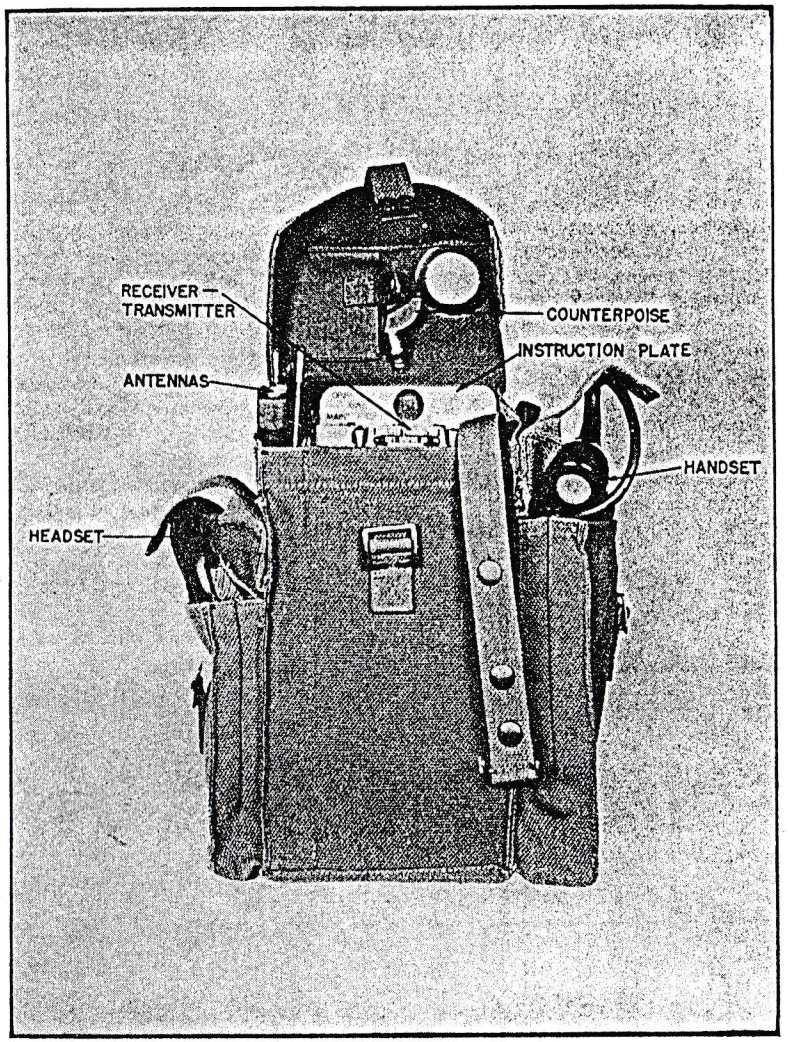

PLATE 1—Radio Set CPRC-26

CHAPTER 1

INTRODUCTION

1.1 Purpose and Facilities (*See* Plate 2)

Radio Set CPRC-26 is a lightweight manpack radio telephone set designed for short range communication in forward areas. It has a working range under unfavourable communication conditions of approximately 1 mile and provides a choice of six channels in the 47-55·4 mc range of the very high frequency (VHF) band. It is frequency modulated (FM) for voice transmission only.

The receiver-transmitter and its dry battery are contained in two metal cases which clamp together. The complete radio set is contained in a web bag. The set may be worn in any one of several positions on the body. (*See* Plate 4).

The equipment is immersion-proof and shock-proof, and will withstand dropping by parachute and jumping by parachutist. When provided with a special loop antenna, Radio Set CPRC-26 can be used to home on any other set within working range on the same frequency.

For cold weather operation a remote battery cable is provided so that the battery can be carried inside the clothing (*See* Plate 5).

1.2 Dimensions and Weights

The approximate dimensions and weights of Radio Set CPRC-26 are shown in Table 1 below.

TABLE 1—DIMENSIONS AND WEIGHTS

Unit	Overall dimensions in inches			Weight in	
	Height	Width	Depth	lb	oz
Complete Station	$11\frac{1}{4}$	$10\frac{1}{2}$	4	10	8
Receiver-Transmitter and Battery	$10\frac{3}{4}$	5	$3\frac{3}{8}$	6	14
Receiver-Transmitter (less battery box)	7	5	$3\frac{3}{8}$	4	3
Battery	$3\frac{3}{4}$	$4\frac{3}{8}$	$2\frac{5}{8}$	2	11

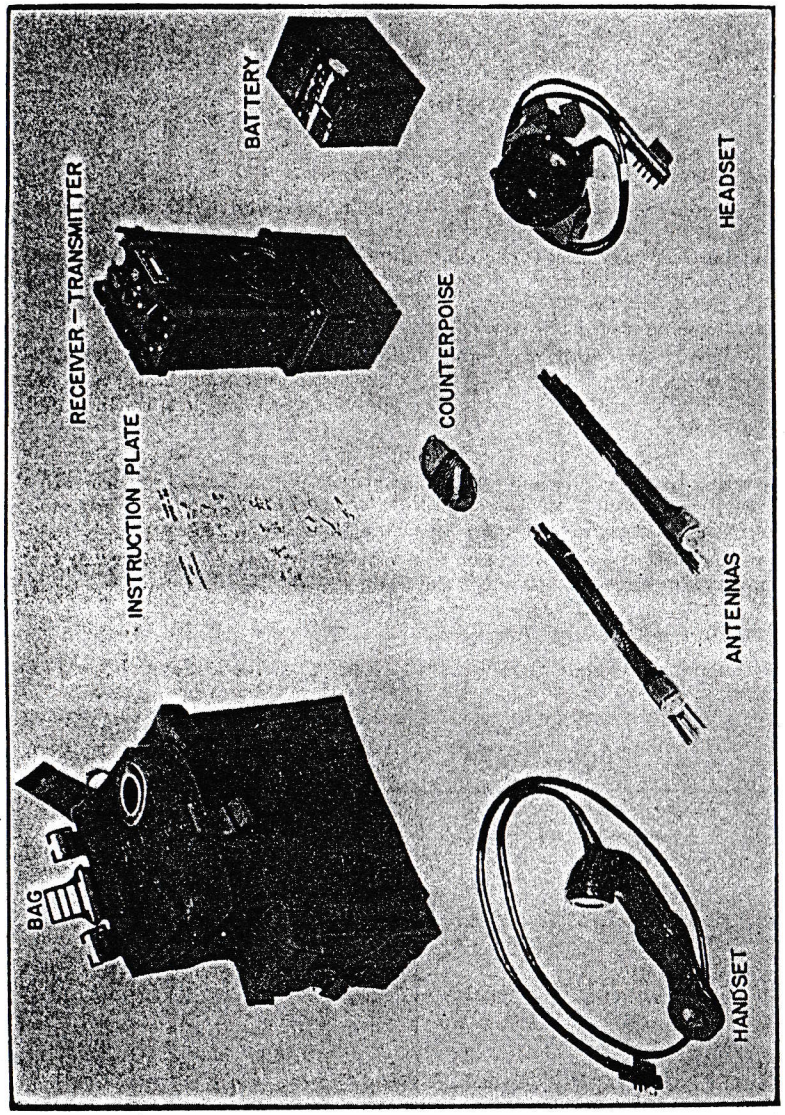

PLATE 2—Radio Set CPRC-26 Components

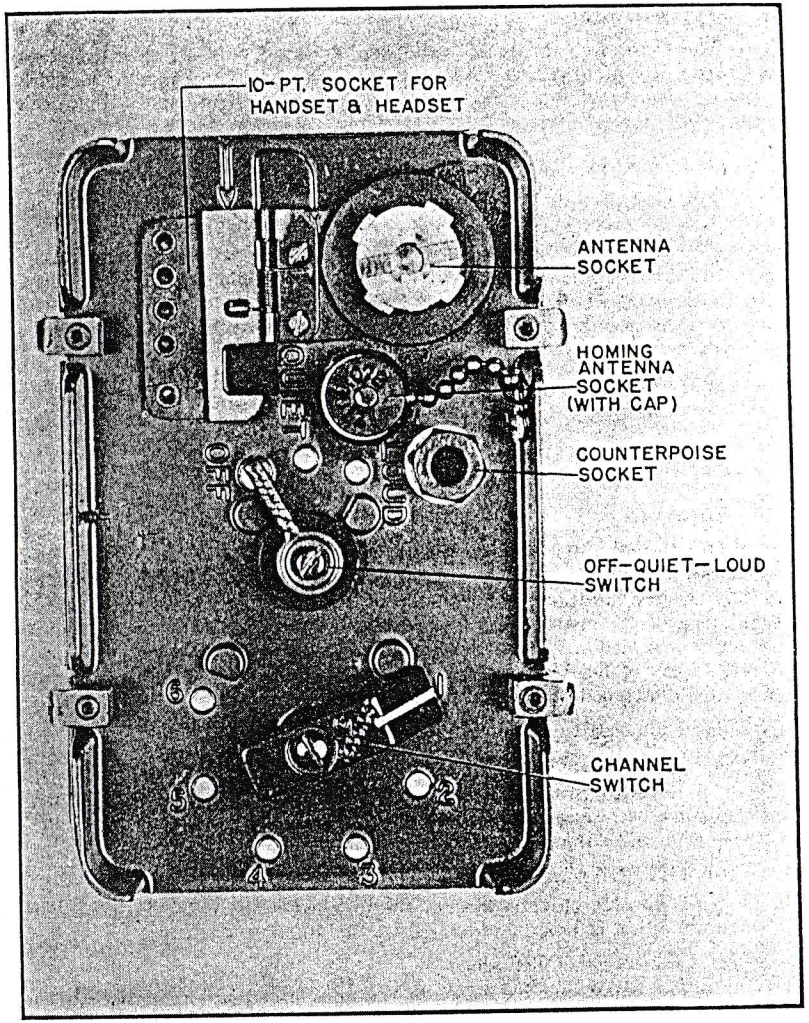

PLATE 3—Control Panel

1.3 Types of Set

There are four types of radio set, differing only in their frequency assignments. A suffix letter is used to identify each type and is indicated by means of a metal disc attached to the edge of the control panel. Frequency assignments for each type of set are shown in Table 3, p. 11.

1.4 Controls (*See* Plate 3)

Two controls only are provided to operate the set. These are:

(*a*) OFF-QUIET-LOUD Switch

This provides ON-OFF switching and a choice of two operating positions. The LOUD position is the NORMAL position. The QUIET position is only to be used when the voice level must be held very low (eg patrol work).

(*b*) CHANNEL Switch

This switch selects the desired operating channel. Channels are marked 1, 2, 3, 4, 5, 6, the actual frequency of each channel depending on the type of set.

1.5 Antennas

The normal antenna for the set is a 4-ft whip-type sectional rod fitted with a semi-flexible gooseneck base section which allows the rod to be tilted to any desired position. The antenna breaks down into five sections of equal length. A centre cord keeps the sections of the antenna together when disassembled and also assists in assembly. A spare antenna is included. A 4-ft length of flexible, insulated wire with a plug and plastic tab on the ends is used as a counterpoise or as an "invisible antenna".

Three alternative antenna systems may be used:

(*a*) ANTENNA alone

With this antenna system the nominal range is 1½ MILES. Transmission and reception beyond this range are somewhat directional, depending on the position of the set on the operator's body.

(*b*) ANTENNA with COUNTERPOISE

With this antenna system the nominal range is 2 MILES. This combination is less directional than the antenna alone.

(*c*) COUNTERPOISE alone

The counterpoise plugs into the antenna socket with the tab end tucked into the puttee or boot top, providing an "invisible" antenna. The operator is less conspicuous but the working range is reduced to about 1 MILE. The range can be further reduced, as desired, by rolling up the counterpoise onto the tab provided.

1.6 Audio Accessories

(*a*) HANDSET

This is normally used by the operator. It has a pressel switch for send-receive switching and plugs into either side of the 10-point socket. The handset may be attached to any convenient part of the clothing by means of the clip on the back.

(*b*) HEADSET

This is normally worn by the operator when on stand-by for long periods or for monitoring purposes if the handset is being used by an officer. It plugs into either side of the 10-point socket. The set will NOT function if the handset is not plugged in.

1.7 Power Supply

Power for the radio set is supplied by a dry battery pack (Battery, dry, BA-289/U) carried in the battery box which clamps to the bottom of the set case. The life of the battery under normal conditions is rated at 20 working hours.

1.8 Component List

The complete Component List, Auxiliary Equipment and Test Equipment are shown in Table 2, p 6.

1.9 Auxiliary Equipment

(*a*) HOMING ANTENNA

A socket is provided on the panel of the set for a loop type antenna. The antenna is NOT supplied with the radio set.

(*b*) REMOTE BATTERY CABLE (Cable Assembly, special purpose, electrical, CCX-5/CPRC-26) (*See* Plate 5).

This is a 3-ft cable for use in low temperature operations where it is necessary to carry the battery inside the operator's clothing.

TABLE 2—COMPONENT LIST—RADIO SET CPRC-26

Cat. No	Designation	Total
	Component List	
	Section 1Y	
1Y 1001108	HANDSET, H-5001/PRC (or).....	1
1Y 1003825	HANDSET, H-5001A/PRC.....	
1Y 1001197	HEADSET, electrical, H-5002/PRC.....	1
	Section 1Z	
1Z 1001097	ANTENNA, counterpoise, CAT-3.....	1
1Z 1002571	ANTENNA, AT-5001/PRC (1 spare).....	2
1Z 1001121	BAG, radio set, CCW-1/CPRC-26.....	1
1Z 1001086	PLATE, instruction, radio set CPRC-26.....	1
	RECEIVER-TRANSMITTER, radio, CRT-1/CPRC-26	1
1Z 1001122A	Type A (or)	
1Z 1001122D	Type D (or)	
1Z 1001122E	Type E (or)	
1Z 1001122F	Type F (or other types)	
	Section 3Y	
3Y 1001058	BATTERY, dry 90/45/3/1·5V, BA-289/U.....	1
	Auxiliary Equipment	
	The following item is not provided with Radio Set CPRC-26 but is supplied separately as required.	
1Z 1001156	CABLE ASSEMBLY, special purpose, electrical, CCX-5/CPRC-26 ("Remote Battery Cable")	
	Test Equipment	
	The following special test equipment is available for use with Radio Set CPRC-26	
4Z 1001200	TEST SET, radio, CTS-3/PRC	
4Z 1001567	TEST SET, battery, CTS-4/PRC	

CHAPTER 2

OPERATING INSTRUCTIONS

NOTE: (i) KEEP ACCESSORIES AND SPARES IN POCKETS OF BAG WHEN NOT IN USE. *See* Plate 1 for stowage of set in bag.

(ii) KEEP PROTECTIVE CAP ON HOMING ANTENNA SOCKET WHEN NOT IN USE.

2.1 Methods of Wear

Plate 4 shows the bag and which fasteners to use when wearing the set in any of the following positions:

(*a*) ON THE CHEST

In this position with the set in place of the basic pouch, fasteners 1, 7 and 8 are used. To prevent slipping of the bag on the web strap through fastener 1, the web strap is threaded through all three slots of the fastener.

(*b*) ON THE HIP

In this position with the set slung on the hip, fasteners 2 and 6 are used.

(*c*) ON THE BACK

In this position with the set carried horizontally in place of the small pack, fasteners 2, 3, 4 and 5 are used.

NOTE: For cold weather operation refer to Section 2·6, p 11.

2.2 Connecting Up

(*a*) Make sure the battery box contains a serviceable battery. To test battery refer to Section 3·1, p 14.

(*b*) Pull out the long web strap fastened to the inside of the bag and place the set in the bag. The antenna socket should be at the front directly under the hole in the top flap of the bag.

(*c*) Pass the handset plug through the loop on the side of the bag and insert it into the uncovered side of the 10-point socket on the control panel. This ensures that the uncovered side is protected when the headset is not used. If the headset is used, pass the headset plug through the loop, lift the flap on the 10-point socket and insert the plug. THE SET WILL NOT FUNCTION UNLESS THE HANDSET IS PLUGGED IN.

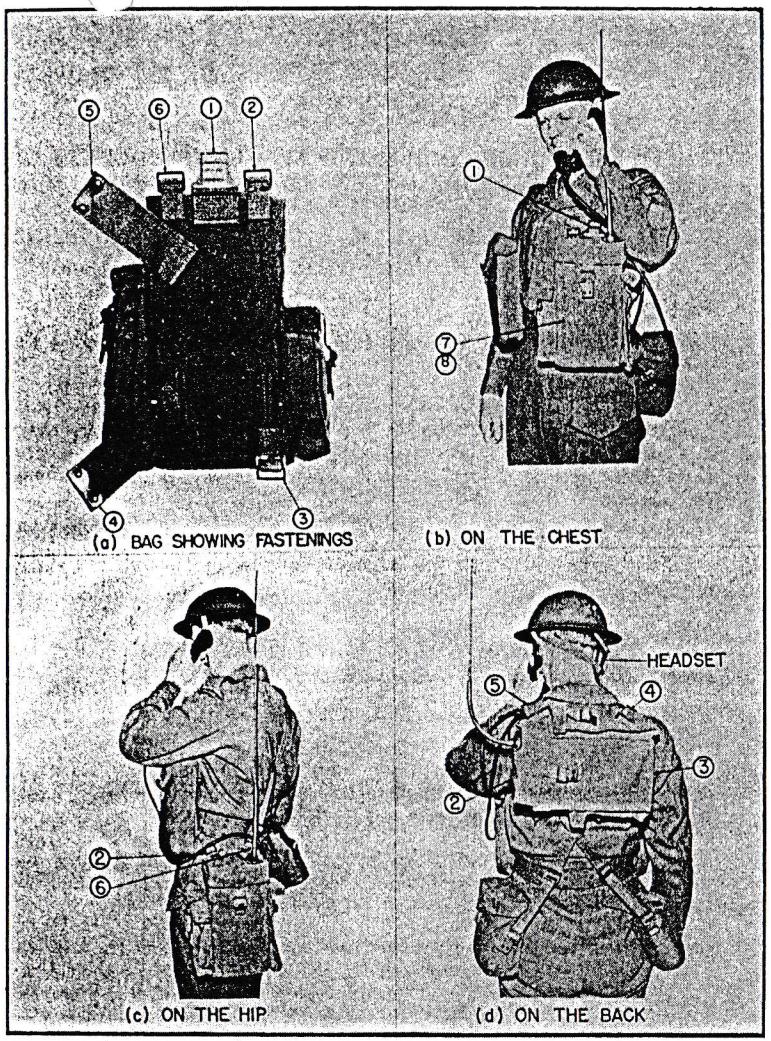

PLATE 4—Methods of Wear

(*d*) Strap the set down in the bag by passing the long web strap across the top of the set and fastening it to the stud located inside the antenna pocket. Close the top and two side flaps of the bag.

(*e*) Three different antenna arrangements are available as follows:

(1) Antenna alone. Connect the antenna to the antenna socket (*See* Section 2.2 (*f*) below).

(2) Antenna and counterpoise in their respective sockets. This should only be used when it is essential to increase the range or overcome poor transmission caused by unavoidable bad siting. Because of the increased range, interference is likely with other sets on the same frequency.

(3) Counterpoise in antenna socket. This is the "invisible antenna" and should be used at any time the working range is less than about 1 mile.

(*f*) Connect the antenna by gripping the base of the antenna by the KNURLED COLLAR (NOT by GOOSENECK) and place base on antenna socket with lugs and slots matching. Force the antenna home HARD and lock by twisting.

(*g*) Disconnect the antenna by gripping the base of the antenna by the GOOSENECK (NOT by KNURLED COLLAR). Pull up HARD until it gives slightly, then twist.

2.3 Operating

(*a*) Set the CHANNEL switch to the authorized operating channel (1, 2, 3, 4, 5, or 6).

DO NOT USE AN UNAUTHORIZED CHANNEL.

(*b*) Turn the OFF-QUIET-LOUD switch to LOUD. The LOUD position is the NORMAL position. Do NOT use the QUIET position unless the voice level must be kept very low (*eg* patrol work).

(*c*) To send, depress the switch on the handset and speak clearly and distinctly with the lips about one inch from the microphone. When switched to the QUIET position, speak softly but distinctly.

(*d*) The directional effect of the antenna may cause weak reception. The operator should turn his body until it is between the distant station and his own antenna. This normally will be found to give the best results.

(*e*) Switch the set OFF when not in use to conserve the battery supply. Use the instruction plate to keep track of the number of hours the battery has been used. The normal life of the battery is at least 20 working hours.

IMPORTANT

Do not leave the battery in the battery box for long periods when the set is not in use. If the set is to be idle for more than one day, remove the battery and store it in a cool, dry place. If the battery is left in its box, internal action may cause it to swell and burst, resulting in damage to the battery box.

2.4 Siting

Because of the characteristics of the radio waves in the frequency band used by this radio set, the position of the set with relation to surrounding objects greatly affects the operating range.

Normally, a line-of-sight range can be expected. That is, if the other station can be seen, satisfactory operation is probable. However, an intervening hill or tall building may hamper or prevent contact with the other station. This applies particularly when the obstacle is close to either station. Valleys, depressions, densely wooded areas and low places are poor sites. Avoid screening by keeping well away from power lines, bridge structures, underpasses and the like. Location on a hill top or tower increases the line-of-sight distance, thereby increasing the range. Flat terrain is good. As a general rule, transmission over water is better than over land.

Objects such as cliffs and buildings which are not directly in the transmission path will sometimes produce helpful reflections which may increase the distance range or make transmission possible around obstructions under poor conditions. For example, it is often possible to operate satisfactorily along a twisting gully or between streets in a built-up area by means of reflections.

Operation from a moving vehicle may not be satisfactory when the ignition system of the vehicle is improperly shielded to prevent radio interference. Where these conditions exist, the vehicle engine will have to be stopped to prevent interference while operating.

2.5 Interworking Between Different Types of Set

Frequency assignments have been arranged to provide certain communication channels which may be used for interworking between different types of Radio Set CPRC-26. Channel 1 frequency is common to all four types (A, D, E and F). Thus any set can work to any other set, regardless of type, if both are on Channel 1. Table 3 shows the channel frequencies for the different types of set.

TABLE 3—CHANNEL FREQUENCIES FOR DIFFERENT TYPES OF SET

CHANNEL	SET TYPE			
	A	D	E	F
	mc	mc	mc	mc
1	50.0	50.0	50.0	50.0
2	50.2	50.2	52.4	53.4
3	51.6	50.4	52.6	53.6
4	51.8	50.6	52.8	53.8
5	52.0	50.8	53.0	54.0
6	52.2	51.0	53.2	54.2
Role	Medium Mortar Pls	Inf Coys and Attached Tps	MMG Bns	Recce Regts and Armour

2.6 Cold Weather Operation

When using the set in cold weather (below 0°F) the battery must be kept warm to prevent loss of power. A remote battery cable (Cable Assembly, special purpose, electrical) is provided so that the battery can be separated from the set and kept warm inside the operator's clothing.

To Connect Up (*See* Plate 5)

(*a*) Remove the battery box with battery from the bottom of set by releasing the clamps on the sides of the set.

(*b*) Using the end fastener on the long web strap (*See* Section 2.2(*b*)), fasten the strap to the stud on the inside of the antenna pocket so that it forms a loop hanging down inside the bag.

(*c*) Connect one end of the remote battery cable to the battery plug on the bottom of the set and feed the other end through the open top of the bag and out the slot in the bottom. Replace the set in the bag so that it rests on the strap loop.

(*d*) Pull the cable slack out of the bottom of the bag and connect the cable to the battery. Place battery and battery box inside the clothing.

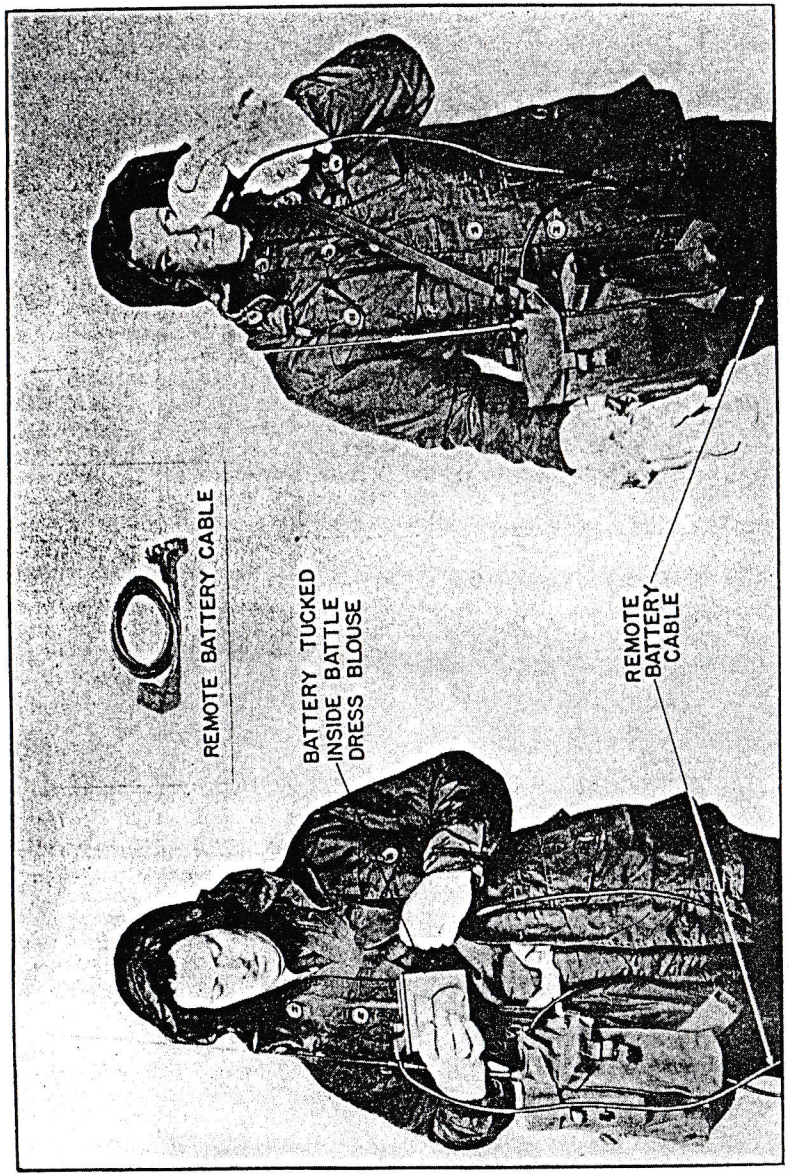

PLATE 5—Method of Wear for Cold Weather Operation

2.7 Testing

(*a*) Check the condition of the battery with Test Set, battery CTS-4/PRC (*See* Section 3.1 (*e*), p. 14).

(*b*) With handset and headset connected but with antenna and counterpoise disconnected, turn the OFF-QUIET-LOUD switch to QUIET. A rushing noise will be heard in both receivers if the set is operating correctly. Turn the switch to LOUD. The background noise should increase. Remove the headset, insert the handset plug into the other half of the 10-point socket and repeat the test on the handset only. This is to check that both halves of the 10-point socket are functioning properly.

(*c*) Squeeze the pressel switch on the handset, speak into the microphone and listen over the handset and headset to make sure both are working properly.

(*d*) Turn the CHANNEL switch to each channel in turn and repeat (*c*) on each channel.

(*e*) If the set does not operate properly, try

(1) A new battery

(2) Another handset

(*f*) If operation is still unsatisfactory, report trouble at once and have the radio set replaced.

(*g*) See Operator's Fault Finding Chart, Table 4, p 15.

CHAPTER 3

OPERATOR'S MAINTENANCE

NOTE: THIS SET IS SEALED AND MUST NOT BE REMOVED FROM ITS METAL CASE EXCEPT BY AUTHORIZED TRADESMEN WITH SPECIAL EQUIPMENT.

3.1 Daily Tasks

The following tasks must be carried out daily/and/or on completion of an operation.

(*a*) Remove dirt and dampness from the exterior of the set and accessories with a dry cloth.

(*b*) Examine all external connections, checking for frayed connectors and dirty contacts.

(*c*) Check component list and report any missing items or damage noted.

(*d*) Check the battery box to ensure it is clean and free of corrosion. This is important, for if corrosion continues for any length of time difficulty may be experienced in removing old batteries and permanent damage to the case may result. If the set is to be stored for more than a day, remove the battery from the battery box and store it in a cool, dry place.

(*e*) Check the battery, using Test Set, battery CTS-4/PRC as follows:

(1) Release the two clamps located on the sides of the case. This will separate the battery box from the set case.

(2) Plug the test set into the battery.

(3) Set the switch on the test set to each of the four positions in turn and check the readings on the meter.

(4) If the meter reading indicates the battery is low at any switch position, replace the battery immediately.

NOTE: Temperatures of 0°F or lower will cause battery voltages to appear low. DO NOT TEST BATTERY IF IT IS TOO COLD (0°F or LOWER), AS READINGS ON THE METER WILL BE OF NO VALUE.

3.2 Operator's Fault Finding

TABLE 4—FAULT FINDING

SYMPTOM	PROBABLE FAULT	ACTION TO BE TAKEN
Set Dead	Battery run down.	Replace.
	Faulty earphones, cords or plugs.	Check, clean or replace as required.
	Internal fault.	Report fault at once.
Weak Signal	Battery low.	Replace.
	Poor aerial connections.	Check, clean or tighten as required.
	Internal fault.	Report fault at once.
No Sidetone	Faulty microphone. Faulty pressel switch.	Replace handset.
	Dirty or faulty microphone leads or connections.	Clean or replace as required.
	Dirty contacts at battery or handset plug.	Clean as required.
	Internal fault.	Report fault at once.

CHAPTER 4

TECHNICAL DESCRIPTION

4.1 General (*See* Figs 1 and 2)

Radio Set CPRC-26 is a thirteen tube FM receiver-transmitter operating in the 47·0 to 55·4 mc range of the VHF band. A choice of six operating channels is provided.

4.2 Receiver

The receiver is of the single conversion superheterodyne type, using a crystal-controlled oscillator and employing an IF of 4·3 mc. The receiver consists of one stage of RF amplification, a broad-band crystal oscillator, a mixer, four identical stages of IF amplification, one stage of limiting, an audio discriminator and an audio amplifier supplying sufficient power for earphones.

4.3 Transmitter

The transmitter is of the master oscillator-power amplifier type, frequency modulated at the carrier frequency. The automatic frequency control (AFC) circuit consists of the crystal oscillator, mixer, AFC amplifier, AFC discriminator and modulator. This circuit refers the master oscillator frequency back to the crystal oscillator frequency. Sidetone is provided by feeding the demodulated output of the AFC discriminator to the audio amplifier. When the set is switched to send, the receiver RF amplifier, IF amplifier and limiter are switched off.

4.4 Crystal Oscillator

The crystal oscillator is a special bridge type for broad-band operation. By means of the channel switch, any one of the six different crystals may be switched into the oscillator circuit as needed for the required signal frequency. No tuning is required. The oscillator operates on a frequency of 4·3 mc below the signal frequency. For operation of the radio set on Channel 1 (50 mc), the frequency of the crystal would be 45.7 mc. The crystals (CR-23/U) are of the overmode or harmonic type.

4.5 General Construction (*See* Plate 6)

Radio Set CPRC-26 is designed to make full use of the unitized and plug-in principles. Seven subassemblies (*ie* Control Panel, Main Chassis, Trimmer Deck, Plug-In Units, Crystal Bank, Set Case and Battery Box) make up the receiver-transmitter. The control panel, main chassis and trimmer deck bolt together to form a rigid assembly. The plug-in units are

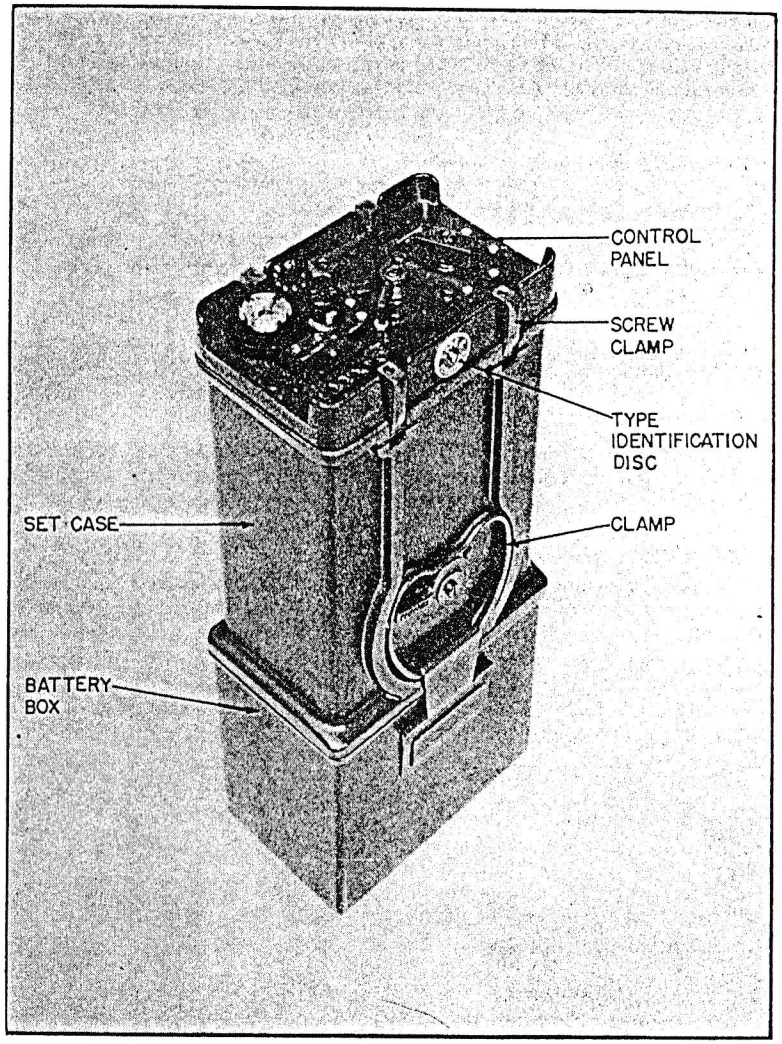

PLATE 6—Receiver-Transmitter

inserted into sockets in the main chassis and are held in place by a unit retainer. The crystal bank plugs into the crystal socket at the rear of the trimmer deck. The set assembly is mounted in a magnesium case and held by four screw clamps. Six screws hold the bottom of the chassis to the bottom of the set case, exerting pressure between the case and rubber battery connector to form a watertight seal. The battery box is attached to the bottom of the set case by two clamps.

4.6 Plug-In Units (*See* Plate 7)

The plug-in units contain most of the electrical wiring and components of the set. The type of unit is marked on each and in addition a colour code is used.

A desiccator absorbs any water vapour which may be trapped inside the set when sealed, or which may leak in during use. The desiccant is contained in a plug-in unit type of can which plugs into the test socket.

4.7 Humidity Indicator

A humidity indicator card is located on the inside face of the set case at the open end. Examination of the card immediately upon opening the set will show whether or not an excessive amount of moisture is present.

4.8 Sealing

The set case and battery box are sealed by rubber gaskets against the entry of dust and moisture. In reassembling the set, care must be taken to redry the set and reseal the outer case. Whenever the set is opened a dry desiccator should be inserted immediately before the set is resealed.

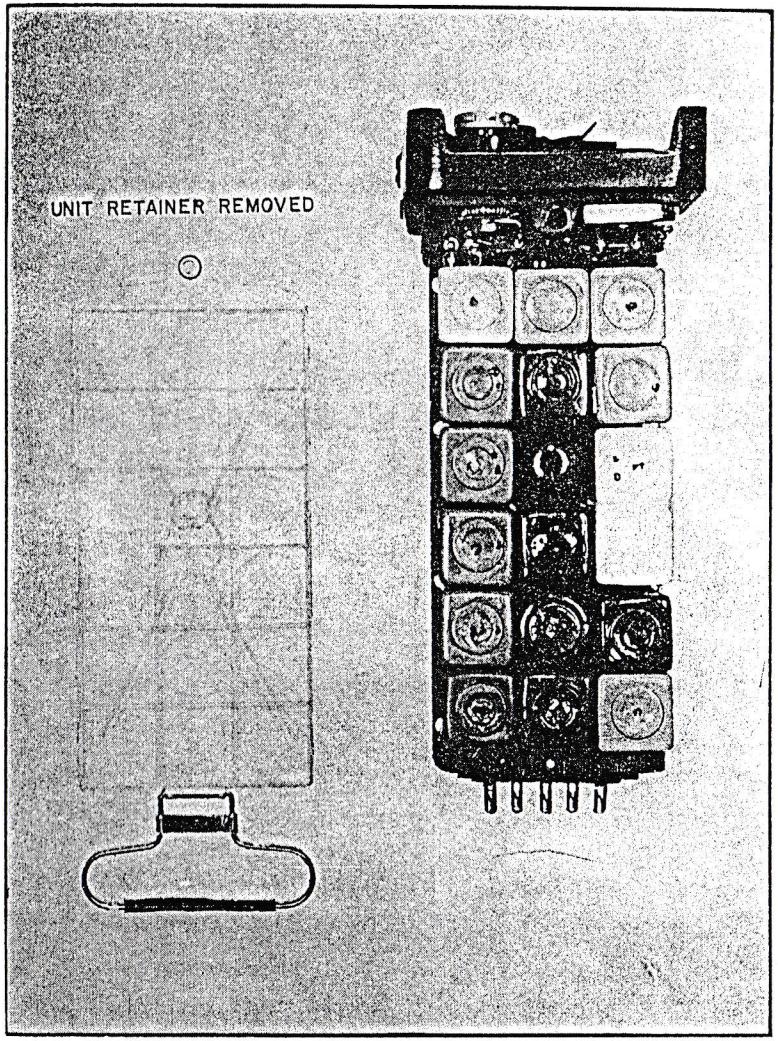

PLATE 7—Receiver-Transmitter Without Case

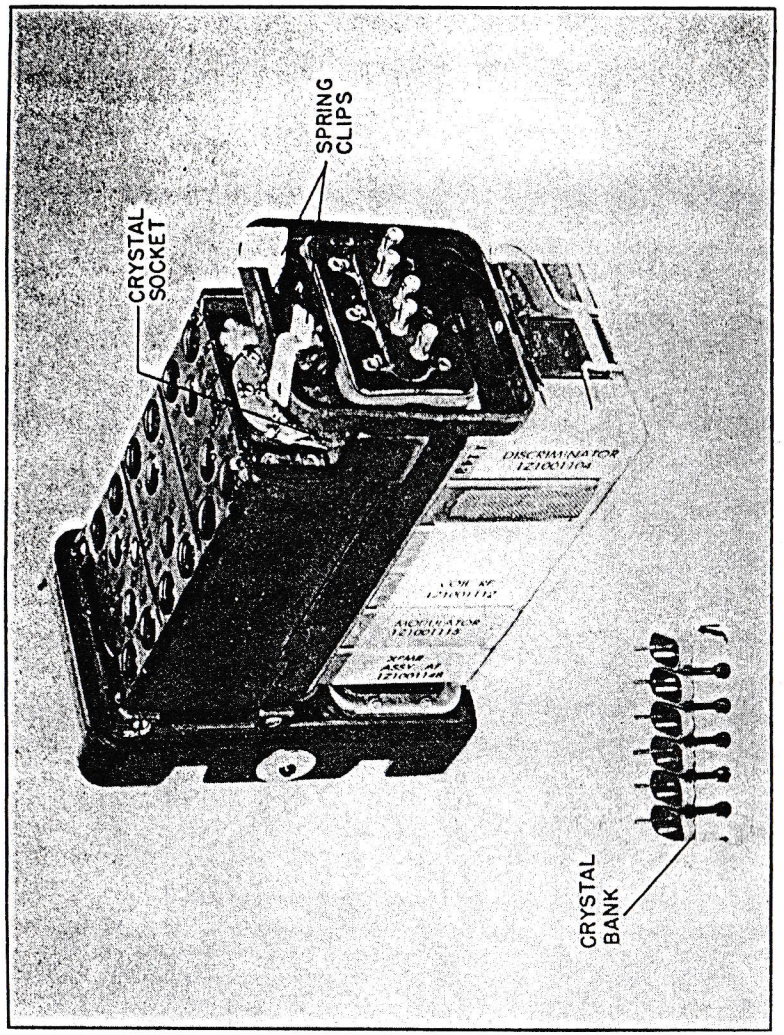

PLATE 8—Receiver-Transmitter Assembly with Crystal Bank Removed

CHAPTER 5

TEST EQUIPMENT

5.1 General

Special test equipment simplifies testing and aligning Radio Set CPRC-26 and determining the condition of the battery. Two test sets are provided to perform these functions. They are not supplied with Radio Set CPRC-26, but are issued separately.

5.2 Test Set, Radio, CTS-3/PRC

Test Set, radio CTS-3/PRC is a milliammeter/vacuum tube voltmeter with switching facilities to permit measurement of various circuit conditions. It is designed primarily for use with Radio Set CPRC-26. The set provides unit maintenance personnel with a convenient means of aligning Radio Set CPRC-26 and of testing the emission of the tubes, including those used in the sealed plug-in units.

5.3 Test Set, Battery, CTS-4/PRC

Test Set, battery CTS-4/PRC is a small, lightweight test set designed to determine the serviceability of Battery, dry, BA-289/U and Battery, dry BA-279/U. The BA-289/U battery is used with Radio Set CPRC-26 and Test Set, radio CTS-3/PRC, and the BA-279/U battery is used with Radio Set AN/PRC-510.

The test set plugs directly into the battery, the condition of each section being indicated by a meter. A four-position rotary switch is provided for selecting the individual battery sections for test. The test set incorporates loads which draw currents equivalent to those drawn by Radio Set CPRC-26 on transmit.

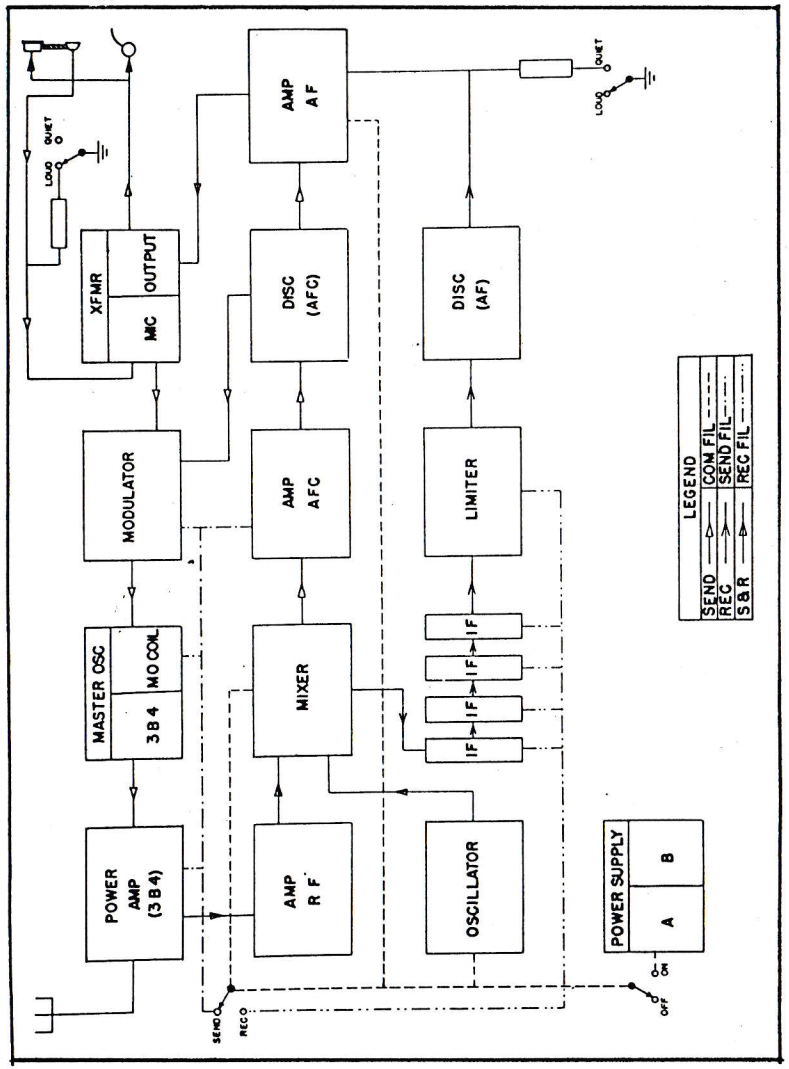

Fig 1—Block Diagram—Radio Set CPRC-26

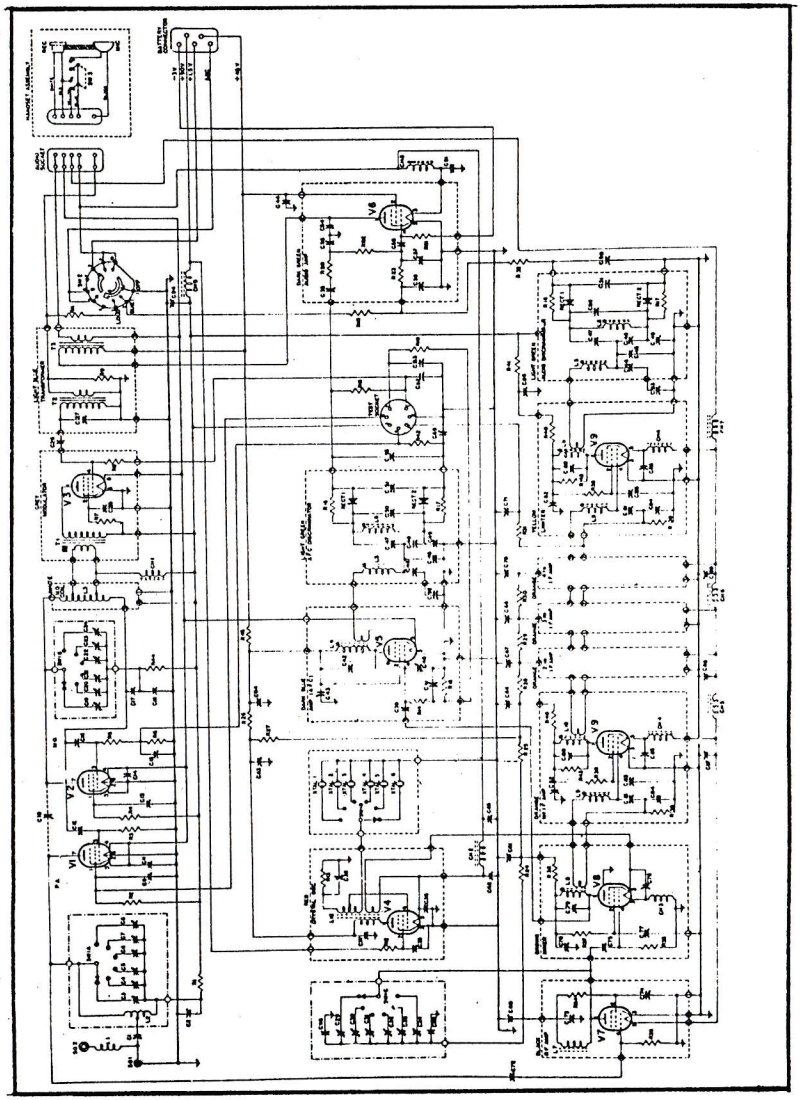

Fig 2—Schematic Diagram—Radio Set CPRC-26