CHAPTER 7

Communications

GENERAL

Communications are exchanges of information by two or more parties. The information must be transmitted and received/understood.

You must know how to communicate with your leaders and fellow soldiers. **You must be able to tell:**

- **What you see.**
- **What you are doing.**
- **What you have done.**
- **What you are going to do.**
- **What you need.**

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MEANS OF COMMUNICATION

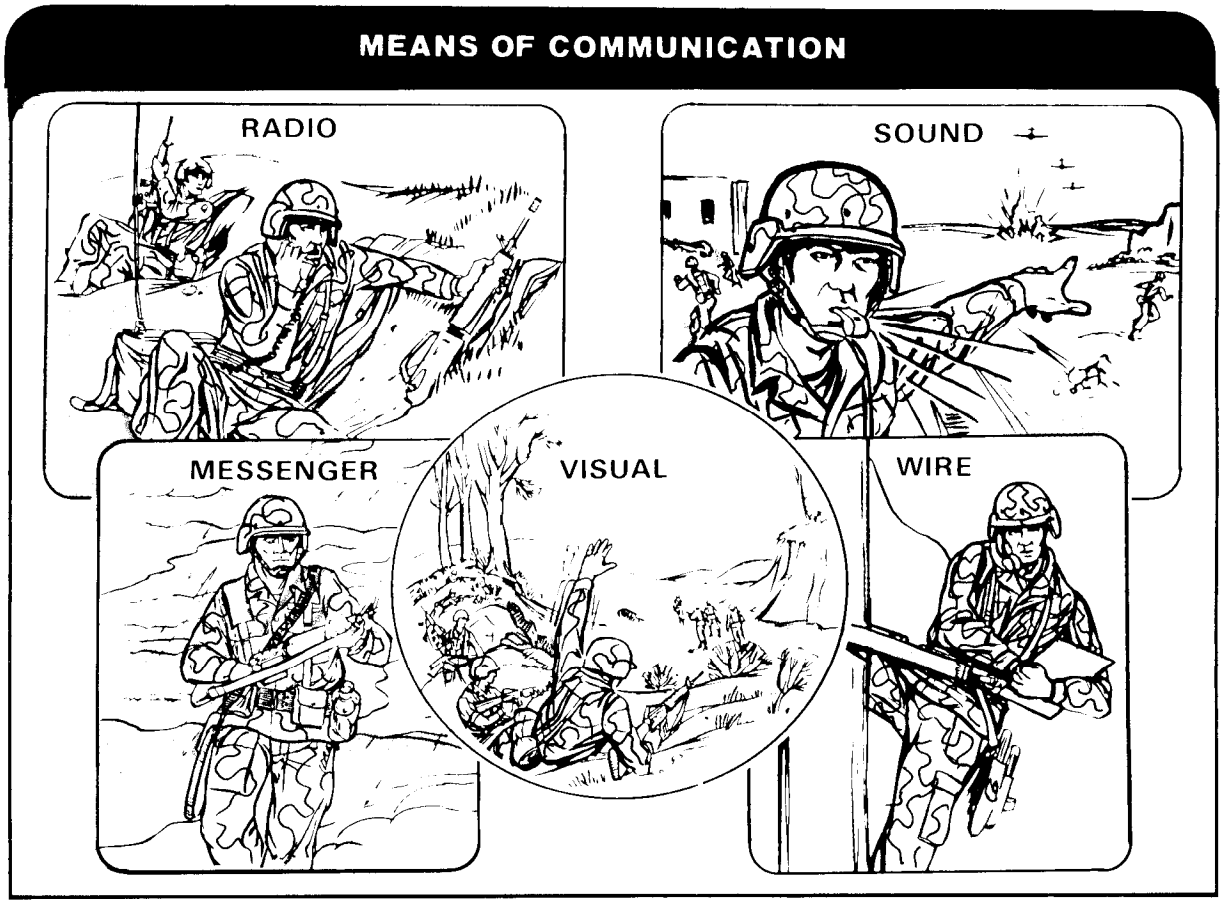
There are several means of communications. Each has its own capabilities, advantages, and disadvantages. Those you can use are described in this section.

RADIO COMMUNICATIONS

Radios are a frequently used means of communications. Radios are particularly suited for use when you are on the move and need a means of maintaining command and control. Small handheld or backpacked radios that communicate for only short distances are found at squad and platoon level. As the need grows to talk over greater distances and to more units, the size and complexity of radios are increased.

To put these radios to good use, you must first look at some of the things that affect radio communications. To communicate with each other, radios must have a common frequency. They must also be able to transmit and receive the same type signal. Most infantry radios are FM (frequency modulated) and will not communicate with AM (amplitude modulated) radios. Squelch settings on the radios must also be used correctly.

Factors that affect the range of radio equipment are weather, terrain, antenna, power, and the location of the radio. Trying to communicate near man-made objects such as bridges and buildings may also affect radio transmis-



sions. Interference in the form of static often occurs when you use radios near powerlines or electrical generators. Interference may also come from other radio stations, bad weather, or enemy jamming.

Many of the things that may cause poor radio communications can be corrected by using common sense. Such things as making sure that you are not trying to communicate from under a steel bridge or near generators and powerlines, using the best available antenna for your needs, and selecting the best site for your radio help insure more reliable communications. You can also reduce the effects of enemy jamming by employing antijamming techniques.

Radio is one of the least secure means of communicating. Each time you talk over a radio, the sound of your voice travels in all directions. The enemy can listen to your radio transmissions while you are communicating with other friendly radio stations. You must always assume that the enemy is listening to get information about you and your unit, or to locate your position to destroy you with artillery fire. Everyone who uses radios must know the defensive techniques available to prevent the enemy from getting information.

VISUAL COMMUNICATIONS

The enemy's ability to interfere with your radio signals is causing more emphasis to be placed on visual communications for command and control. Visual signals include arm-and-hand signals, pyrotechnics, smoke, flashing lights, panel markers, and aircraft maneuvers.

The effectiveness of any visual signal depends on a set of prearranged meanings. You assign prearranged meanings to visual signals to the soldier sending the signal and the soldier seeing the signal so both have the same understanding of what that particular signal means. Your commander will set prearranged meanings for pyrotechnics, smoke, and flashing lights. Generally, a listing of prearranged messages using these signals is contained in your unit SOP or communications-electronics operation instructions (CEOI).

Panel markers are a series of cloth panels that you spread on the ground to communicate with aircraft. They are useful when you do not have radio contact with friendly aircraft, when ground units and/or aircraft are on radio listening silence, when your radio equipment has been damaged or destroyed, or when enemy jamming makes radio communications difficult or impossible. When standard cloth panels are not available, you can use field expedients such as clothing, branches, rocks, or snow.

Panel codes, as well as arm-and-hand signals, have standard prearranged meanings. The prearranged meaning of arm-and-hand signals may be found in FM 21-60. Information is usually taken from those publications and placed in unit CEOIs and SOPs.

Visual signals have some shortcomings that limit their use. For example, visual signals can be easily misunderstood. Some visual signals are restricted during poor visibility such as at night or in dense terrain. Of course, at other times, they can be intercepted by the enemy who may, in turn, use similar visual signals to create confusion.

SOUND COMMUNICATIONS

Sound signals, like visual signals, depend upon a set of prearranged meanings. Sound signals include the use of the voice, whistles, horns, weapons, and other noise-making devices to transmit simple messages over short distances. Also, like visual signals, sound signals

are vulnerable to enemy interception and use. Battle noise can obviously reduce the effective use of sound signals. They have their greatest application as command post warning alarms. The prearranged meanings for sound signals are usually established by local commanders, and a listing of such meanings is commonly found in unit SOPS and the CEOIs. Sound signals, like visual signals, can be easily misunderstood.

WIRE COMMUNICATIONS

Wire is another type of communications used in infantry units. Although installing a wire network takes more time than installing a radio, wire lines are usually more secure than radio. When you talk over wire lines, your voice travels through the wire lines from one telephone to another and is generally not sent through the air. Wire lines will give better communications in most cases because they are less subject to interference from weather, terrain, and man-made obstacles. Wire lines also protect you from enemy electronic warfare actions such as jamming.

Wire lines are subject to breakage by enemy artillery and air strikes and by friendly forces who accidentally cut the lines when driving over them with tracked and wheeled vehicles. It is important, therefore, to install wire lines properly to reduce the possibility of breakage. When laying wire lines, first consider the tactical situation. In a fast-moving situation, the use of wire may be impractical. In a static situation, you have more time to install wire lines.

Consideration must be given to the enemy's ability to jam radios and to locate positions through direction finding when you communicate by radio. If the enemy has displayed such capabilities, wire should be considered as an alternative to radio. The terrain will also influence use of wire communications. Wire laying may be difficult in dense vegetation, in swampy areas, or in mountainous terrain. Rain, snow, and temperature extremes may also influence wire laying. Men and equipment to lay wire lines should be available.

MESSENGER COMMUNICATIONS

Unlike other infantry communications, messengers are a means of transmitting large maps, documents, and bulk material, as well as oral or written messages. Message centers serve as a central point for receiving and distributing message-type information. They are located at battalion or higher level headquarters. Messenger service may be limited, however, because messengers are subject to enemy action, require more time than radio or wire communications, and do not afford real time writer-to-reader exchanges.

RADIOTELEPHONE PROCEDURE

Radiotelephone procedure is a set procedure for using a radio or telephone. It speeds the exchange of messages and helps avoid errors. The rules listed below will help you use transmission times efficiently and avoid violations of communications security.

1. Transmit clear, complete, and concise messages. When possible, write them out beforehand.

2. Speak clearly, slowly, and in natural phrases. Enunciate each word. If a receiving operator must write the message, allow time for him to do so.

3. Listen before transmitting, to avoid interfering with other transmissions.

4. ALWAYS ASSUME THE ENEMY IS LISTENING.

PHONETIC ALPHABET

To help identify spoken letters, a set of easily understood words has been selected. Those words help to avoid confusion. BRAVO, for example, is the phonetic word of the letter B, and DELTA is the phonetic word for the letter D. BRAVO and DELTA are less likely to be confused in a radio message than B and D.
Use the phonetic alphabet to:

- **Transmit isolated letters.**
- **Transmit each letter of an abbreviation.**
- **Spell out unusual or difficult words.**

PRONUNCIATION OF WORDS

LETTER	WORD	SPOKEN AS	LETTER	WORD	SPOKEN AS
A	ALPHA	**AL** FAH	N	NOVEMBER	NO **VEM** BER
B	BRAVO	**BRAH** VOH	O	OSCAR	**OSS** CAH
C	CHARLIE	**CHAR** LEE/ **SHAR** LEE	P	PAPA	PAH **PAH**
			Q	QUEBEC	KEH **BECK**
D	DELTA	**DELL** TAH	R	ROMEO	**ROW** ME OH
E	ECHO	**ECK** OH	S	SIERRA	SEE **AIR** RAH
F	FOXTROT	**FOKS** TROT	T	TANGO	**TANG** GO
G	GOLF	GOLF	U	UNIFORM	**YOU** NEE FORM/ **OO NEE FORM**
H	HOTEL	HOH **TELL**			
I	INDIA	**IN** DEE AH	V	VICTOR	**VIK** TAH
J	JULIETT	JEW LEE **ETT**	W	WHISKEY	**WISS** KEY
K	KILO	**KEY** LOH	X	X-RAY	**ECKS** RAY
L	LIMA	**LEE** MAH	Y	YANKEE	**YANG** KEY
M	MIKE	MIKE	Z	ZULU	**ZOO** LOO

(NOTE: Syllables in bold print carry the accent). When you must spell out a difficult word in the text of a message, precede it by the proword "I SPELL." If you can pronounce the word, do so before and after spelling it.

Example: The word MANEUVER must be transmitted and can be pronounced. "MANEUVER – I SPELL - Mike-Alpha-November-Echo -Uniform-Victor- Echo-Romeo – MANEUVER."

If you cannot pronounce the word, do not attempt to pronounce it. Instead, precede the word with the proword "I SPELL."

Example The word EVACUATE must be transmitted and cannot be pronounced. "I SPELL - Echo-Victor-Alpha-Charlie-Uniform-Alpha-Tango-Echo."

PRONUNCIATION OF NUMBERS

NUMERAL	SPOKEN AS
0	ZE·RO
1	WUN
2	TOO
3	TREE
4	FOW·ER
5	FIFE
6	SIX
7	SEV·EN
8	AIT
9	NIN·ER

Transmit multiple digit numbers digit by digit. Two exceptions to this are when transmitting exact multiples of thousands and when identifying a specific code group in a coded message. When calling for or adjusting field artillery or mortar fire, it is necessary to transmit, when applicable, exact multiples of hundreds and thousands using the appropriate noun.

MULTIPLE DIGIT NUMBERS

NUMBER	SPOKEN AS
44	FOW-ER FOW-ER
90	NIN-ER ZE-RO
136	WUN TREE SIX
500	FIFE ZE-RO ZE-RO
1,200	WUN TOO ZE-RO ZE-RO
1,478	WUN FOW-ER SEV-EN AIT
7,000	SEV-EN TOU-SAND
16,000	WUN SIX TOU-SAND
812,681	AIT WUN TOO SIX AIT WUN

PROWORDS

Certain procedural words (prowords) which have distinct meaning should be used to shorten transmissions and avoid confusion.

PROWORDS AND THEIR EXPLANATIONS

PROWORDS	EXPLANATION
ALL AFTER	The part of the message to which I refer is all of that which follows.
ALL BEFORE	The part of the message to which I refer is all of that which precedes.
AUTHENTICATE	The station called is to reply to the challenge which follows.
AUTHENTICATION IS	The transmission authentication of this message is _____.
BREAK	I hereby indicate the separation of the text from other parts of the message.
CORRECT	You are correct, or what you have transmitted is correct.

PROWORD	EXPLANATION
CORRECTION	An error has been made in this transmission. Transmission will continue with the last word correctly transmitted. An error has been made in this transmission (or message indicated). The correct version is _____. That which follows is a corrected version in answer to your request for verification.
FLASH	Flash precedence is reserved for alerts, warnings, or other emergency actions having immediate bearing on national, command, or area security (e.g., presidential use; announcement of an alert; opening of hostilitie; land, air, or sea catastrophles; intelligence reports on matters leading to enemy attack; potential or actual nuclear accident or incident; implementation of services unilateral emergency actions procedures).
FROM	The originator of this massage is indicated by the address designator immediately following.
GROUPS	This message contains the number of groups indicated by the numeral following.
I AUTHENTICATE	The group that follows is the reply to your challenge to authenticate.
IMMEDIATE	Immediate precedence is reserved for vital corn. munications that (1) have an immediate operational effect on tactical operations, (2) directly concern safety or rescue operations, (3) affect the intelligence community operational role (e.g., initial vital reports of damage due to enemy action; land, sea, or air reports that must be completed from vehicles in motion such as operational mission aircraft; intelligence reports on vital actions in progress; natural disaster or widespread damage; emergency weather reports having an immediate bearing on mission in progress; emergency use for circuit restoration; use by tactical command posts for passing immediate operational traffic).
I READ BACK	The following is my response to your instructions to read back.

PROWORD	EXPLANATION
I SAY AGAIN	I am repeating transmission or part indicated.
I SPELL	I shall spell the next word phonetically.
MESSAGE	A message which requires recording is about to follow. Transmitted immediately after the call. (This proword is not used on nets primarily employed for conveying messages. H is intended for use when messages are passed on tactical or reporting nets.)
MORE TO FOLLOW	Transmitting station has additional traffic for the receiving station.
OUT	This is the end of my transmission to you and no answer is required.
OVER	This is the end of my transmission to you and a response is necessary. Go ahead: transmit.
PRIORITY	Priority precedence is reserved for calls that require prompt completion for national defense and security, the successful conduct of war, or to safeguard life or property, and do not require higher precedence (e.g., reports of priority land, sea, or air movement; administrative, intelligence, operational or logistic activity calls requiring priority action; calls that would have serious impact on military, administrative, intelligence, operational, or logistic activities if handled as a ROUTINE call). Normally, PRIORITY will be the highest precedence that may be assigned to administrative matters for which speed of handling is of paramount importance.
RADIO CHECK	What is my signal strength and readability. In other words, how do you read (hear) me?
READ BACK	Repeat this entire transmission back to me exactly as received.
RELAY	Transmit this message to all addressees immediately following this proword.
ROGER	I have received your last transmission satisfactorily, and loud and clear.

PROWORD	EXPLANATION
ROUTINE	Routine precedence is reserved for all official communications that do not require flash, immediate, or priority precedence.
SAY AGAIN	Repeat your last transmission or the part indicated
SILENCE	Cease transmissions on this net immediately.
(Repeated three or more times.)	Silence will be maintained until lifted. (When an authentication system is in force, the transmission imposing silence is to be authenticated.)
SILENCE LIFTED	Silence is lifted. (When an authentication system is in force, the transmission lifting silence is to be authenticated.)
SPEAK SLOWER	You are transmitting too fast. Slow down.
THIS IS	This transmission is from the station whose designation immediately follows.
TIME	That which immediately follows is the time or date-time group of the message.
TO	The addressees immediately following are addressed for action.
UNKNOWN STATION	The identity of the station with whom I am attempting to communicate is unknown.
WAIT	I must pause for a few seconds.
WAIT-OUT	I must pause longer than a few seconds.
WILCOX	I have received your signal, understand It, and will comply. To be used only by the addressee. As the meaning of ROGER is included in that of WILCO, the two prowords are never used together.

COMMUNICATIONS SECURITY

Communications security keeps unauthorized persons from gaining information of value from radio and telephone transmissions. It includes:

- **Using authentication to make sure that the other communicating station is a friendly one.**
- **Using only approved codes.**
- **Designating periods when all radios are turned off.**
- **Restricting the use of radio transmitters and monitoring radio receivers.**
- **Operating radios on low power.**

- **Enforcing net discipline and radiotelephone procedure (all stations must use authorized prosigns and prowords, and must transmit official traffic only).**
- **Using radio sites with hills or other shields between them and the enemy.**
- **Using directional antennas when feasible.**

RADIO EQUIPMENT

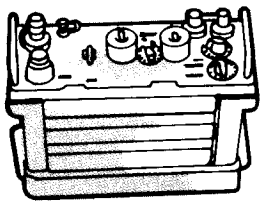
soldier should be familiar with the **AN/PRC-77 radio** and the two types of squad radios. One type of squad radio is the **AN/PRC-68 Small Unit Transceiver (SUT).** The other comes in two parts the **AN/PRT-4 (transmitter)** and the **AN/PRR-9 (receiver).**

To operate the **AN/PRC-77 radio:**

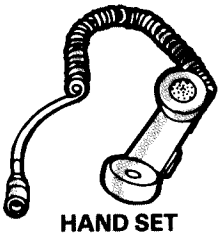
- **Install the battery.**
- **Replace the battery compartment and close both latches at the same time.**
- **Select the antenna (plus antenna base) and tighten it down.**
- **Connect the handset.**
- **Select the frequency band.**
- **Set the frequency using the tuning control knobs.**
- **Turn the function switch to ON.**
- **Turn the volume control knob about half a turn.**
- **Depress the push-to-talk switch on the handset to talk and release it to listen.**
- **Adjust the volume control to the desired level.**

RADIO AN/PRC-77

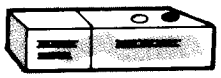
The **AN/PRC-77 RADIO** set has a planning range of 5 to 8 km and weighs 12 kg **(24.7 lb)** with batteries. The battery life is 60 hours with BA-4386.



RECEIVER/TRANSMITTER

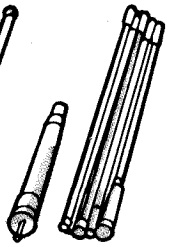


HAND SET

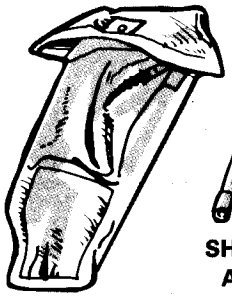


MAGNESIUM BATTERY (BA-4386)

SHORT WHIP ANTENNA



LONGER 10-FOOT WHIP ANTENNA

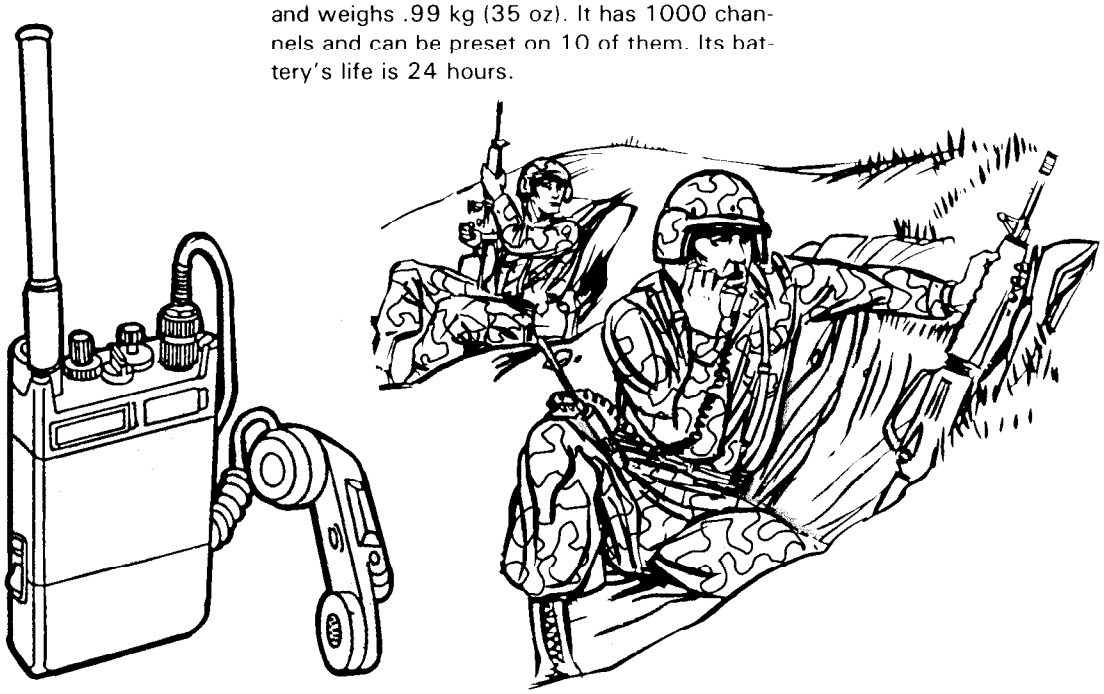


ANTENNA CARRY POUCH

CARRY HARNESS

RADIO AN/PRC-68

The **AN/PRC-68 RADIO (Small Unit Transceiver [SUT])** has a planning range of 1 to 3 km and weighs .99 kg (35 oz). It has 1000 channels and can be preset on 10 of them. Its battery's life is 24 hours.



The battalion communications platoon presets the channels.

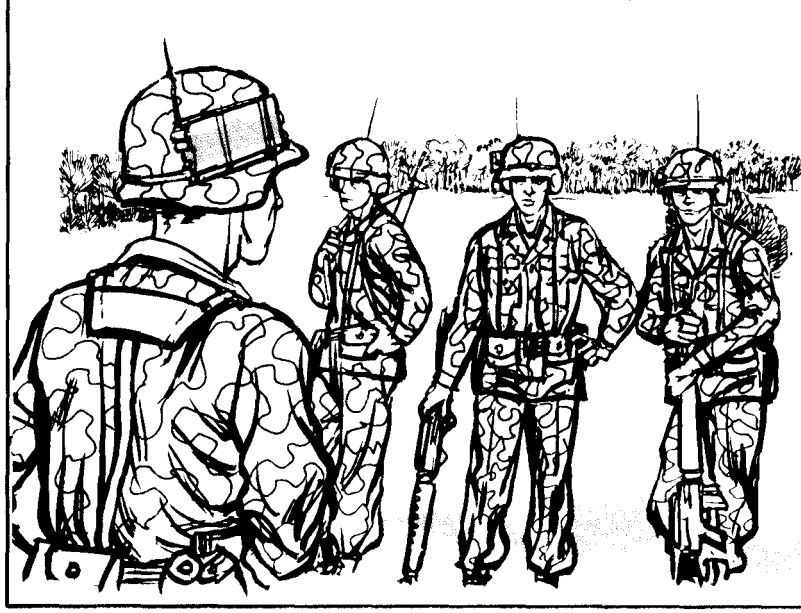
To operate the **AN/PRC-68 radio**

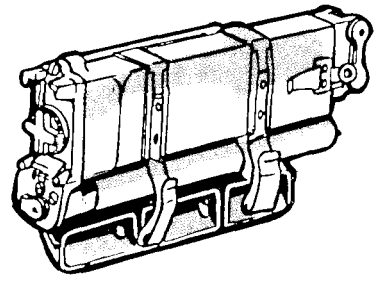
- **Install the battery.**
- **Set the channel position (O through 9) (your leader will tell you which channel to use).**
- **Connect the handset.**
- **Connect the antenna.**
- **Turn the PWR OFF/ON/SQUELCH switch to ON.**
- **Turn the PWR OFF/ON/SQUELCH switch to SQUELCH (this switch is spring-loaded and will return to ON when disengaged).**
- **Turn the volume knob to adjust loudness of received signal.**
- **Depress the push-to-talk switch on the handset or the back of the radio to transmit and release it to listen.**

NOTE: Handset is not a part of AN / PRC-68 (H-189 and H-250 handset).

RADIO AN/PRR-9

The receiver **(AN/PRR-9)** will receive Channel 1 and Channel 2, but not both at the same time. It is also battery-powered. Two types of batteries can be used in the receiver. The dry-cell battery **(BA-505/U)** has a life of about 14 hours. The magnesium battery **(BA-4504/U)** has a life of about 28 hours.





To operate the **AN/PRR-9 radio**

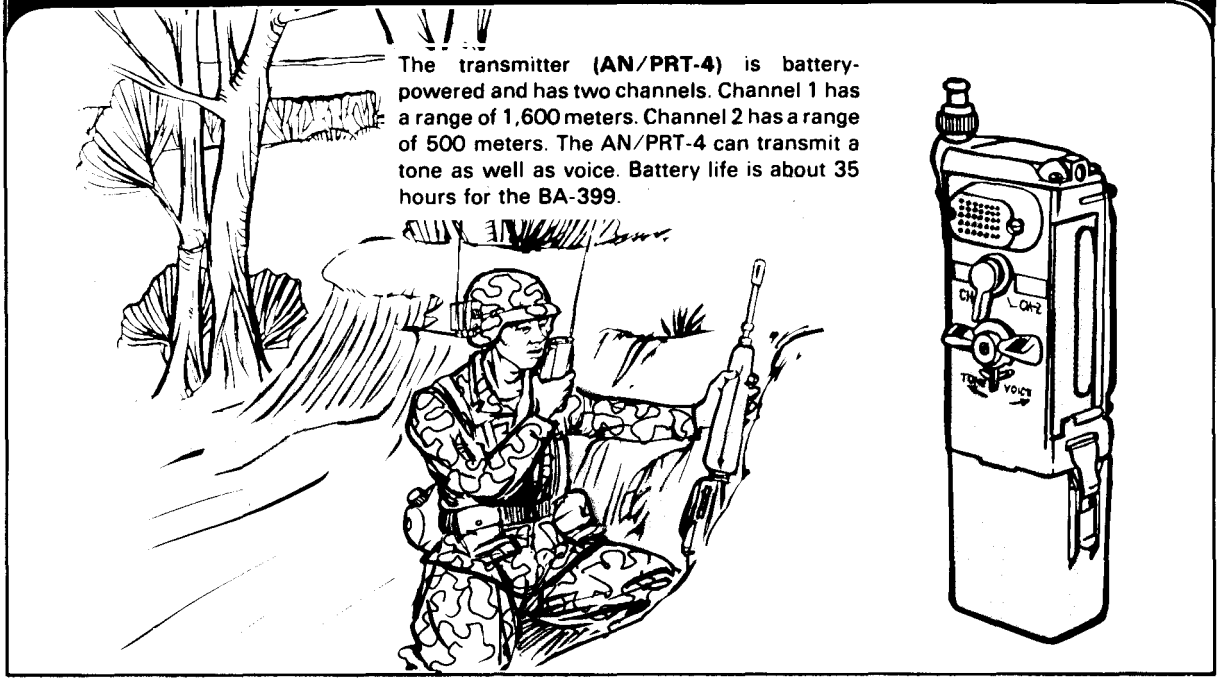
- **Insert the tubular BA-505/U battery through the battery clip and into the mating connector of the receiver.**
- **Clip the receiver to your helmet.**
- **Loosen the antenna retaining screw and rotate the antenna upright (re-tighten retaining screw).**
- **Set the receiver control.**

For receiving with squelch, turn the receiver control knob clockwise from its OFF position. Set it to a comfortable listening level when voice or tone is heard. If the control knob is turned clockwise to its last position, the squelch is turned off (background noise will start). To reactivate the squelch, turn the control knob to OFF, then back about halfway toward ON.

For receiving without squelch, turn the receiver control knob fully clockwise from its OFF position. Turn it counterclockwise to a comfortable listening level. Do not use squelch when signals are weak or in terrain unfavorable for good reception.

Wear the receiver either on your combat suspenders or clipped to your pocket, belt, or helmet. Use a lanyard to tie the receiver down.

AN/PRT-4 RADIO



To operate the **AN/PRT-4 radio**:

- **Release both battery case clamps and remove the battery case.**
- **Insert a BA-399/U battery into the mating connector at the bottom of transmitter.**
- **Replace the battery case and secure the clamps.**
- **Raise the collapsible antenna to its full height.**
- **Set the upper selector switch in the CH-1 position for channel 1 or the CH-2 position for channel 2.**
- **Set the TONE-VOICE switch.**

For a tone signal, turn the tone-voice switch to the TONE position and hold it in that position for as long as the tone signal is needed. Release the switch at the end of that time.

For voice communications, turn the tone-voice switch to the VOICE position and hold it in that position while transmitting. Speak into the microphone located above the channel selector switch. Release the tone-voice switch at the end of the transmission.

To permit transmissions in only one mode, position the override spring on either VOICE or TONE, depending on which is needed.

Wear the transmitter clipped to your pocket, belt, or suspenders. To prevent loss of the transmitter, use a lanyard to tie it down.

WIRE AND TELEPHONE EQUIPMENT

When in the defense, units normally communicate by wire and messenger instead of by radio. Your leaders will often have you lay the wire and install and operate the field phones.

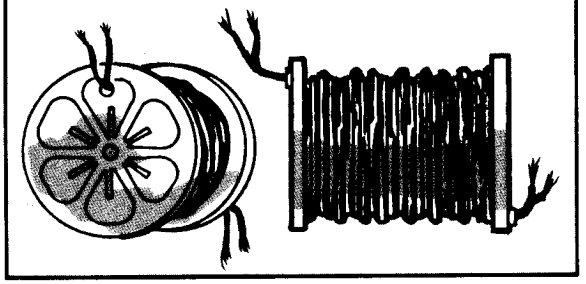
WIRE-LAYING TECHNIQUES

A surface line is field wire laid on the ground. Lay surface lines loosely with plenty of slack. Slack makes installation and maintenance easier. Surface lines take less time and fewer soldiers to install. When feasible, dig small trenches for the wire to protect it from shell fragments of artillery or mortar rounds. Conceal wire routes crossing open areas from enemy observation. Tag all wire lines at switchboards and at road, trail, and rail crossings to identify the lines and make repair easier if a line is cut.

An **overhead line** is field wire laid above the ground. Lay overhead lines near command posts, in assembly areas, and along roads where heavy vehicular traffic may drive off the road. Also, lay them at road crossings where trenches cannot be dug, if culverts or bridges are not available. Those lines are the least likely to be damaged by vehicles or weather.

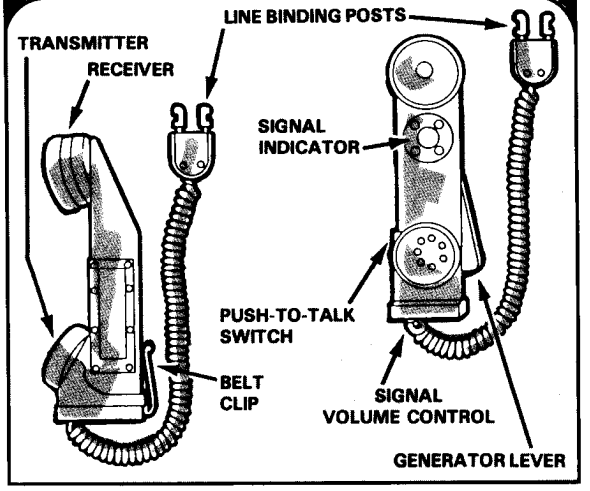
DR-8

The DR-8 holds 400 meters of field wire (WD-1). The wire is reusable and should be taken up if the situation permits.



The telephone set TA-1 is a sound-powered phone that has both a visual and an audible signal. It has a range of 6.4 km using WD-1 wire.

TA-1 TELEPHONE



To install the TA-1 telephone:

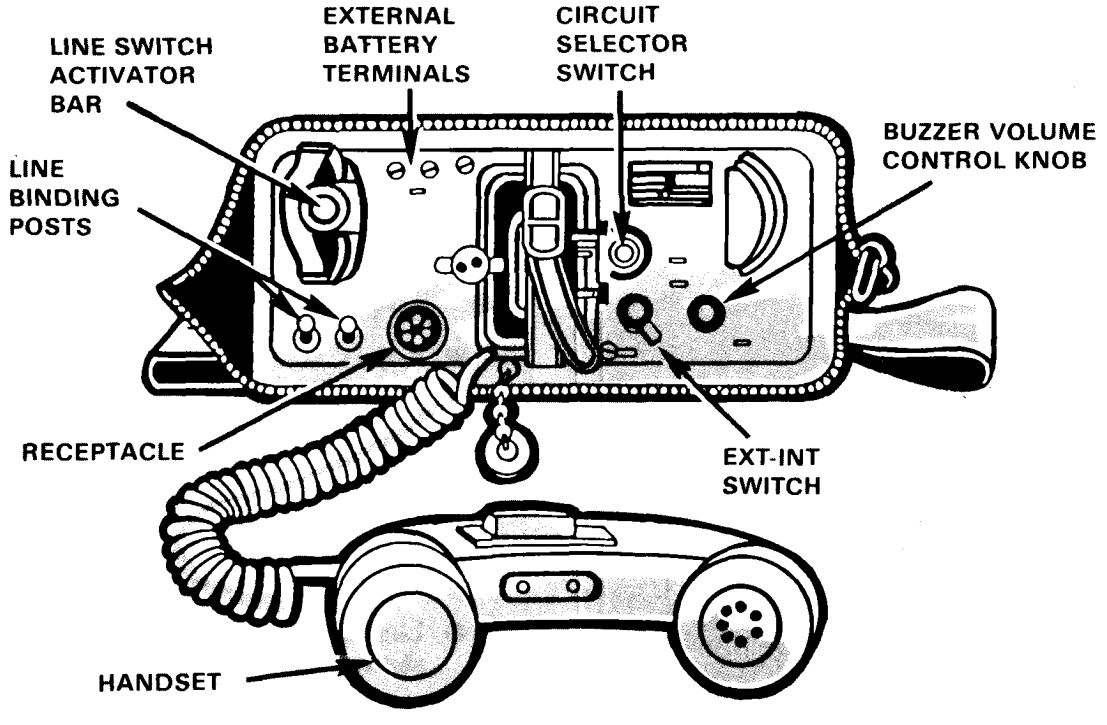
- **Strip away half an inch of insulation from each strand of the WD-1 wire line.**
- **Depress the spring-loaded line binding posts and insert one strand of the wire into each post.**
- **Adjust signal volume control knob to LOUD.**
- **Depress the generator lever several times to call the other operator and listen for buzzer sound.**
- **Turn the buzzer volume control knob until the wanted volume is obtained.**
- **Look at the visual indicator to see if it shows four white luminous markings.**
- **Depress the push-to-talk switch to reset the visual indicator.**

The telephone set TA-312 is a battery-powered phone. It has a range of 38 km using WD-1 wire.

To install the TA-312 telephone:

- **Strip away one-half inch of insulation from each strand of the WD-1 wire line.**
- **Depress the spring-loaded line binding posts and insert one strand of the wire into each post.**
- **Adjust buzzer volume control knob to LOUD.**
- **Turn the INT-EXT switch to INT.**
- **Turn the circuit selector switch to LB.**
- **Insert the two BA-30 batteries into the battery compartment (one up and one down).**
- **Seat the handset firmly in the retaining cradle.**
- **Turn the handcrank rapidly a few turns. Remove the handset from the retaining cradle and wait for the other operator to answer.**
- **Depress the push-to-talk switch to talk. Release the push-to-talk switch to listen.**

TA-312 TELEPHONE



REEL EQUIPMENT CE-11

The reel equipment CE -11 is a lightweight, portable unit used for laying and picking up short wire lines. **It has the following components:**

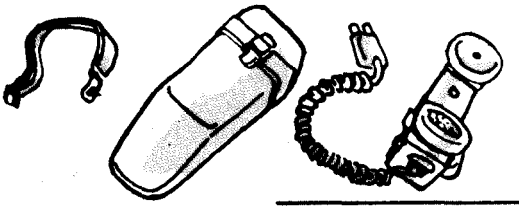
- **Reeling machine, cable, band, RL-39, with an axle and crank, carrying handles, and straps ST-34 and ST-35.**
- **Telephone set TA-1/PT.**
- **The RL-39 component mounts the reel cable DR-8 that will hold 400 meters of field wire WD-1/TT. The DR-8 and the wire are separate items and ARE NOT part of the CE-11 or the RL-39.**

The major parts of the CE -11 may also be authorized by TOE as separate items and not as a complete unit CE -11.

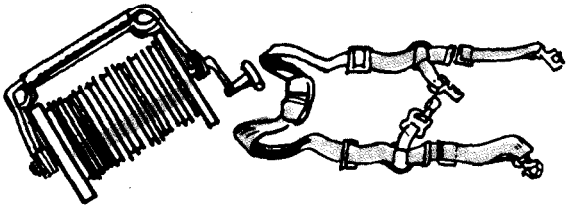
REEL EQUIPMENT, CE-11

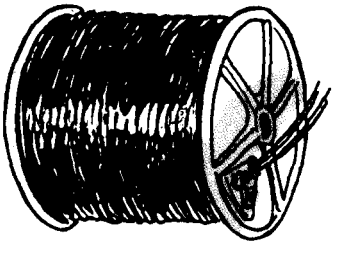
The **Reel Equipment CE-11** is a light, portable unit for laying and picking up short wire lines. **It has the following components:**

- **Telephone Set TA-1**



- **Reeling Machine Cable Hand RL-39** with an axle and crank, carrying handles and straps. It mounts the DR-8 reel cable **(below)** which is a separate item.





The DR-8 holds 400 meters of field wire **(WD-1)**. The wire is reusable and should be taken up if the situation permits.