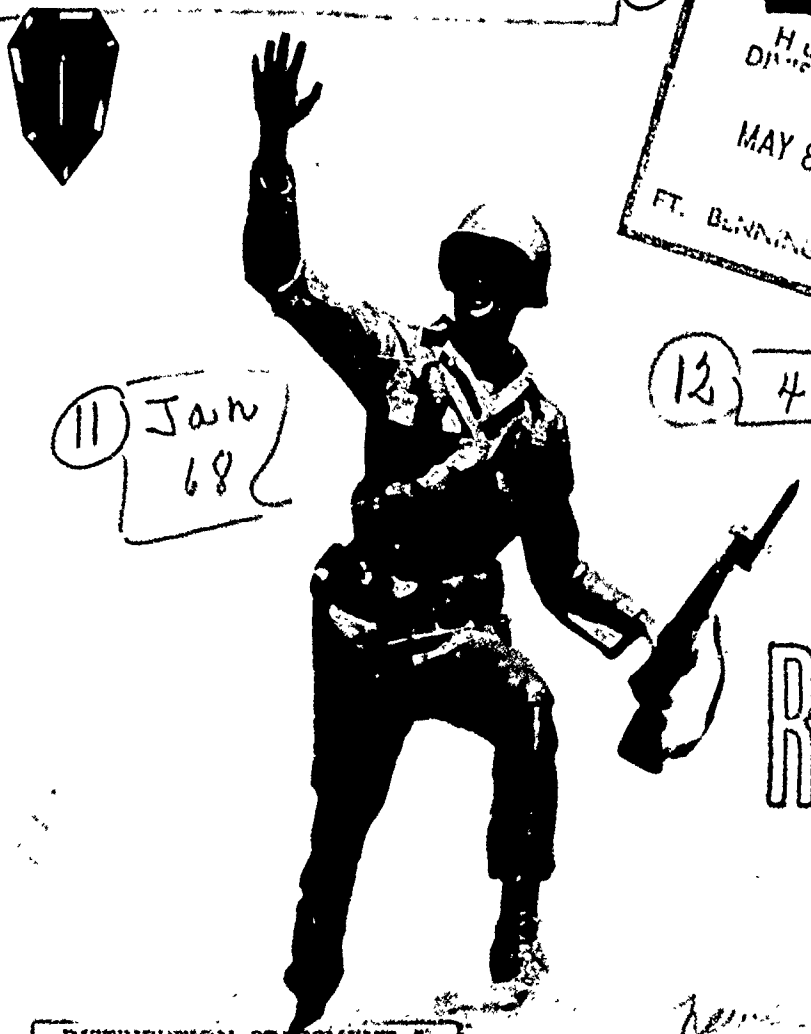
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The equipment portrayed herein conforms to the final TOE's, for Infantry, Mechanized and Airborne Divisions.

The systems included herein provide a guide for the employment of the authorized equipment within units. All nets shown should be considered as type nets only and may be altered as required to fit the needs of any given tactical situation to support the accomplishment of the mission of the unit.

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PER CARR (M-113) 

3/4 T TRUCK 

COMD RECON VEH (M-114) 

2 1/2 T TRUCK 

CARR COMD POST (M-577) 

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FOR THE CHIEF:

ALEXANDER NICOLINI
Major, Infantry
R&D Coordinator

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# CHAPTER 1

# GLOSSARY OF COMMUNICATION TERMS

## GLOSSARY OF COMMUNICATION TERMS

1-1. PURPOSE: To list and define the more common communication terms used throughout the courses of instruction presented by this department.

1-2. GLOSSARY:

a. All terms are listed in alphabetical order (based on the primary word in the term) irrespective of subject, to facilitate easy reference.

b. Spaces have been left between each term to facilitate pen and ink insertion of additional terms and definitions as required by appropriate changes in instructional material or by the desire of the student to supplement terms in his copy.

A

ACOUSTIC FEEDBACK - The feedback of sound waves from a unit of an audio amplifying system (usually a loudspeaker) to a preceding part of the system (usually a microphone) causing, when excessive, a howling sound in the speaker.

ADJACENT CHANNEL - The channel immediately above or below the assigned channel.

ALTERNATING CURRENT - (Abbr: AC) An electric current that is constantly changing in amplitude and periodically changing in direction.

AMPLIFICATION - The process of increasing the electrical strength of a signal.

AMPLITUDE - The highest value a varying quantity (such as alternating current) reaches as it starts from a reference value (such as zero) and increases in value in one direction.

AMPLITUDE MODULATION - (Abbr: AM) A method of modulating a carrier wave to cause it to vary in amplitude corresponding to the amplitude of the original signal. This resultant amplitude- modulated waveform contains the original carrier and the intelligence in the form of sideband frequencies. The frequency of an amplitude - modulated signal does not change.

ANTENNA - (Abbr. ANT) The portion, usually wires or rods, of a radio transmitting or receiving station, for radiating waves into space or receiving them from space. Also called Aerial.

ANTENNA - (Omni-Directional) An antenna which radiates equal power in all directions in a horizontal plane.

ANTENNA - (Uni-Directional) An antenna which radiates most of its power in one direction.

AREA COMMUNICATION SYSTEM - A system of dispersed communication centers providing communication service to widely dispersed units.

ATTENUATE - To lessen or weaken in value.

AUDIO - A Latin word meaning "I hear". Normally relates to frequencies capable of being heard.

AUDIO FREQUENCY - (Abbr. AF) A frequency corresponding to a normally audible sound wave; about 20 to 20,000 hertz per second.

AUTHENICATION - A security measure designed to protect a communication system against fraudulent transmissions.

AUTHENICATION TEST ELEMENT - An element on which the authetication of a message or transmission is based.

AUTHENTICATOR - A letter, numeral, or groups of letters or numerals, composed in a prearranged manner for the purpose of attesting to the authenticity of a message or transmission.

AUTOMATIC RETRANSMISSION - The receiving of a signal and automatic relay of that signal on a different frequency between two different stations..

AXIS OF COMMAND POST DISPLACEMENT - The route along which the Command Post will move.

B

BAND - Used as applying to a group of radio channels assigned to a particular type of radio service.

BEAM - A directed flow of energy into space. A radio signal directed on a definite path from one fixed station antenna to another.

BEAT FREQUENCY - A frequency resulting from a combination of two signals of different frequency. It may be the sum or the difference of the signal frequencies.

BEAT-FREQUENCY OSCILLATOR - A device in which a desired frequency is produced by combining two other frequencies from separate circuits. Normally used to produce an audible signal in communication receivers and to test radio receivers, amplifiers, and loudspeakers.

C

CALIBRATION - The process of comparing an instrument or device with a standard to determine its accuracy.

CALIBRATION, RADIO - The process of correcting the radio dial electrically and mechanically to insure that the dial setting is aligned properly when tuned to an operating frequency.

CARRIER - A wave which may be marked or modulated either by changing its amplitude, frequency, or phase so that it may "carry" intelligence.

CHALLENGE - A process carried out by one unit with the object of ascertaining the friendly or hostile character, or the individuality of another unit.

CHALLENGE AND REPLY - In authentication, a procedure by means of a prearranged system whereby one transmitter requests authentication of another transmitter (the challenge) and the latter by a proper reply establishes its authenticity (the reply).

CHANNEL - That portion of the frequency spectrum assigned to a transmitter. The frequency assignment is usually designated by the center frequency of the channel.

CHARGE - The electrical energy stored in a capacitor or battery or held on an insulated object.

CIPHER - Any cryptosystem in which arbitrary symbols or groups of symbols represent units of plain text or code of regular length (usually single characters), or in which units of plain text are rearranged, or both, in accordance with certain predetermined rules.

COAXIAL CABLE - A cable in which one conductor is accurately centered inside another. Used primarily for the transmission of telephone, radio and television signals.

CODE - In communications, a system of signaling utilizing dot-dash-space, mark-space or other methods where each letter or figure is represented by prearranged combinations.

CODE - (1) Any system of communication in which arbitrary groups or symbols represent units of plain text of varying length. Codes may be used for brevity or for security.
(2) A code book (or document) arranged in systematic form, containing a list of letters, syllables, words, phrases or sentences each accompanied by one or more arbitrary groups of symbols used as equivalents in cryptograms.

CODE BREVITY - A code which has as its sole purpose the shortening of messages rather than the concealment of their content.

CODE GROUP - A fixed arbitrary combination of permutation of symbols assigned to represent a plain text element in a code book.

COMMON BATTERY - Usually refers to a telephone system where one central battery is used rather than a local battery at each telephone.

COMMUNICATION CENTER - An installation providing various communication facilities for a supported unit.

COMMUNICATION SECURITY - The protection resulting from all measures designed to deny to unauthorized persons information of value which might be derived from a study of communications.

COMPROMISE (PHYSICAL) - The availability of material to unauthorized persons through lose, theft, capture, recovery by salvage, defection of individuals, unauthorized viewing or any other physical means.

CONDUCTOR - A material capable of carrying an electric current, usually a wire.

CONTINUOUS WAVE (Abbr: CW) - Radio waves having a constant amplitude and a constant frequency. See CODE.

CONVERTER-1) - A device, or section of a radio receiver, that changes the incoming radio frequency to a different or intermediate frequency. 2) An electronic or rotating device changing electrical energy from one form to another, as alternating current to direct, or vice versa.

COUNTERPOISE - A conductor used as a substitute for ground in an antenna system.

CRYSTAL (Abbr: Xtal) A material, usually natural quartz, which vibrates at a fixed frequency, depending on the size to which it has been ground. It is used in radio transmitters to maintain accurate frequency and stability.

## D

DATE-TIME-GROUP (Abbr: DTG) - The date and time, expressed in digits and zone suffix, at which the message was prepared for transmission. (Expressed as six digits followed by zone suffix; first pair of digits denoting the date, second pair the hours, third pair the minutes).

DEMODULATION - The process of extracting the signal intelligence from a modulated carrier wave. Also called detection.

DETENT TUNING - A method of tuning a radio set that is equipped with a stop or checking device (such as a pin or lever on a ratchet wheel) which holds the frequency controls firmly in place.

DIFFRACTION - The effect produced when waves (light, sound or radio) encounter a barrier and bend around it.

DIRECT CURRENT - (Abbr: DC) Electric current that is constant in amplitude and direction.

DOUBLE SIDE BAND - The intelligence is transmitted at frequencies above and below the base (carrier) frequency.

DUPLEX - A method of operation of a communication circuit where each end can simultaneously transmit and receive. Ordinary telephones are duplex. When used on a radio circuit duplex operation requires two frequencies.

DYNAMOTOR - A rotating device used to change one DC voltage to a different DC voltage.

E

ELECTRICITY - A fundamental quantity in nature consisting of elementary particles: electrons (negative), and protons (positive).

ELECTROLYTE - The liquid, chemical paste, or similar material which forms a conducting medium between the electrodes of a dry cell, storage cell, or electrolytic capacitor.

ELECTROMAGNETIC FIELD - A magnetic field resulting from the flow of electricity.

ELECTRON - The elementary unit of a negative electrical charge. Electrons are emitted by the cathode of an electron tube.

F

FACSIMILE - A system of radio or wire communication by which illustrations or printed pages are transmitted and received.

FADING - Variation in the intensity of a received radio signal, usually caused by interference of received waves passing over different transmissions paths.

FILTER - A network of reactive elements so arranged as to exhibit frequency discriminating characteristics.

FREQUENCY - The repetition rate of a periodically recurring wave form, commonly stated in hertz, kilohertz or megahertz per second.

FREQUENCY MODULATION - (Abbr: FM) A method of modulating a radio-frequency carrier wave by causing the frequency to vary in accordance with the amplitude and frequency of an audio signal. The amplitude of a frequency-modulated signal does not change.

FREQUENCY SHIFT KEYING - (Abbr: FSK) A method of transmitting the mark and space elements of a telegraph code by shifting the carrier frequency a small amount. (System employed with radioteletypewriter equipment.)

G

GROUND WAVE - A radio wave which reaches the receiver by propagation along the earth's surface rather than through the earth's upper atmosphere.

## H

HARMONIC - A sound wave or electomagnetic wave with a frequency the exact multiple of the fundamental frequency. Harmonics of 60 hertz are 120 hertz, 180 hertz, 240 hertz, etc. Similar to overtones in music.

HETERODYNE FREQUENCY - A frequency which is produced by combining two other frequencies. This frequency may be the numerical sum or difference of the two frequencies.

HERTZ - A unit in a wave pattern that recurs at regular intervals. The number of hertz occurring in one second is the frequency.

## I

IMPEDANCE - That property of an electical circuit which opposes the flow of current. While a resistance is an impedance, the term is usually reserved for the opposition to current flow offered by inductors, capacitors or combinations of both.

IMPEDANCE MATCHING - A method of minimizing the adverse effects of junctions between dissimilar transmission lines as, for instance, cable and open wire, whereby a transformer is used to interconnect the two, or loading coils are used to modify the impedance characteristic of the cable so as to match the open wire.

INSULATION - Non-conducting material used to prevent the leakage of electricity from a conductor: to provide mechanical spacing or support; to protect against accidental contact.

INTERFERENCE - Disturbance in radio reception caused by undesired signals, stray currents from electrical apparatus, etc. A current from a foreign source or a second communication line which in some way produces derogatory performance. Interference is sometimes spoken of as the current or power which causes noise in the telephone.

## J

JACK - The stationary part of a circuit connector. With its counterpart, a plug, it is used to connect or disconnect electrical circuits.

JAMMING - Intentional transmission of radio signals in such a manner as to interfere with the reception of signals from another station.

JUMPER - A short length of conductor bridging two points in a circuit.

JUNCTION BOX - A box enclosing the terminals of wires or cables, in which the latter may be connected as desired.

## K

KILO - A prefix meaning one thousand. Example: A kilowatt is 1,000 watts.

KILOHERTZ - (Abbr: KHz) - A frequency of one thousand hertz per second.

## L

LIGHTNING ARRESTER - A device, usually containing spark gaps, which allows currents induced by lightning to flow to earth without damaging electrical equipment.

LINE BALANCE - The degree of similarity of the two conductors of a transmission line. Improved accuracy of balance reduces pickup of extraneous disturbance of all kinds including crosstalk.

LINE OF SIGHT - The unobstructed or optical path between two points. Also used to describe a radio propagation characteristic.

LINK (RADIO) - A transmitter-receiver system connecting two locations.

LISTENING SILENCE - A radio operating condition wherein the radio receiver is operating and the transmitter is not employed.

LOCAL CIRCUIT - A wire circuit connecting a telephone to a switchboard.

M

MARK - In telegraphic communications refers to the closed circuit condition or the signal causing the closed or printing condition. (opposite: Space).

MASTER OSCILLATOR (MO) - An oscillator which establishes the carrier frequency of a more powerful amplifier. An oscillator which provides or controls modulator drive frequencies for a number of channels or groups of channels.

MATCHING - Coupling two circuits so that energy can be transferred from one to the other with minimum loss.

MEGAHERTZ - (Abbr: MHz) One million hertz.

MESSAGE - Any thought or idea expressed in brief form in plain or secret language and prepared in a form suitable for transmission by any means of communication.

MODULATION - A process by which some form of intelligence such as voice, codes, and music is combined with a carrier wave. The intelligence varies the amplitude of the radio-frequency carrier in amplitude modulation (AM), the frequency of the radio-frequency carrier in frequency modulation (FM), and the phase of the radio-frequency carrier in phase modulation.

MODULATED CONTINUOUS WAVE (Abbr: MCW) - A wave in which the carrier is modulated by a constant audio frequency. See CODE.

MONITOR - To listen to transmissions.

N

NCS - (Net Control Station) has technical control of a radio net.

NET - An organization of stations capable of direct communications on a common channel/frequency.

NOISE - Any unintelligible signals in a communication system which tends to interfere with proper reception of the desired signals or speech. More loosely, noise is sometimes used as synonymous with the power which causes noise.

NULL - A minimum or zero value of current in an electrical circuit.

O

OHM - Basic unit of electrical resistance, equivalent to that resistance in which a current of one ampere can be maintained by a potential of one volt.

OPEN CIRCUIT - An electrical circuit that is broken or interrupted.

ORGANIC STATION - A part of a communication system which belongs to the unit which the system supports.

ORIGINATOR - The command by whose authority a message is sent. The originator is responsible for the functions of the drafter and releasing officer.

OUT-OF-PHASE - A condition of an electrical circuit possessing waveforms that are of the same frequency but whose components do not pass through corresponding values at the same instant.

P

PHANTOM - As in telephone practice, a circuit derived by employing two two-wire pairs to derive a third circuit.

PRECEDENCE - A designation assigned to a message by the originator to indicate to communication personnel the relative order of handling and to the addressee the order in which the message is to be noted.

PRECEDENCE DESIGNATIONS - Precedence Designations, from highest to lowest, are as follows:

a. Flash
b. Immediate
c. Priority
d. Routine

Q

QUARTER-WAVE ANTENNA - An antenna whose electrical length is one-quarter the wavelength of the signal to be transmitted or received.

R

RADIATOR - That part of an antenna system from which radio waves are emitted.

RADIO - Communication by electromagnetic waves transmitted through space.

RADIO CHANNEL - A frequency officially allotted to a radio net for radio communication or broadcasting purposes.

RADIO FREQUENCY - (Abbr: RF) A frequency higher in the spectrum than audible frequencies but lower than light or heat frequencies.

RADIO SPECTRUM - The frequencies which may be used for the transmission and reception of radio energy.

RADIO SILENCE - A condition during which all or certain designated radio stations are maintained with both reciever and transmitter turned off.

RADIOTELEGRAPHY - Radio communication by dot-dash code.

RADIOTELEPHONY - Radio communication by voice.

RADIO WAVE - An eletromagnetic wave produced by rapid reversals of current in a conductor. Such a wave travels through space at approximately the speed of light.

RADIO/WIRE INTEGRATION - A communication technique combining radio channels and wire circuits that terminate in a switching central and are capable of being switched with each other.

RANGE - The approximate distance over which a radio or telephone transmitter is useful.

REMOTE CONTROL - The control of a function, as a radio, from a distant point by electrical means.

RETRANSMISSION (RADIO) - A radio installation between any two or more terminal radios that automatically relays the transmitted messages. Also called Radio Relay.

## S

SIDEBANDS - The frequencies above and below the carrier frequency which are produced by modulation.

SIDE CIRCUIT - One (either) of the two circuits employed for the derivation of a phantom circuit.

SIDETONE - The signal which reaches a telephone receiver from the associated transmitter of the same subscriber's set by way of a local path within that set itself.

SIGNAL - The intelligence, message, or effect conveyed in communications and other electronic applications.

SIMPLEX - A method of operation of a communication circuit where each end can only receive or transmit, not both simultaneously. The usual "push to talk" operation. A radio circuit must always be simplex when only a single carrier frequency is used.

SINGLE SIDEBAND (Abbr: SSB) - A method of transmission whereby one of the two sidebands (upper or lower) of an amplitude-modulated (AM) radio frequency signal is completely suppressed and the remaining sideband is utilized in transmitting the desired intelligence. The radio-frequency carrier may be utilized or suppressed to conserve power.

SOUND-POWERED TELEPHONE - A telephone energized by the sound waves of the voice, with no external power supply. The current impulses are generated in the circuit by the sound waves on the microphone.

SPACE - In telegraphic communications refers to the open circuit condition or the signal causing the open condition. (Opposite: Mark)

SQUELCH CIRCUIT - A radio circuit which reduces background noise in the absence of signals.

STATIC - Noise, heard in a radio receiver caused by electrical disturbances in the atmosphere, such as lightning, northern lights, etc.

SUBORDINATE STATION - Lower ranking station in a communication system.

SYSTEMS - An organization of stations that are in communication with each other.

## T

TELEGRAPHY - The transmission of messages by means of code characters representing letters and numbers.

TELEPRINTER - A device which prints the letters of a message when actuated by a signal of the proper coding.

TELETYPEWRITER - A teleprinter which prints the messages in page form and can also be used to transmit messages by standard typing methods.

TRANSCEIVER - A radio transmitter and receiver combined in one unit and sometimes contains common components which are switched between the transmitter and receiver. Generally portable or mobile.

TRANSISTOR - An electronic device utilizing properties of semiconductors, such as germanium, as detectors, amplifiers and oscillators of electric currents.

TRANSMISSION SECURITY - That component of communication security which results from all measures designed to protect transmissions from interception and traffic analysis.

TRANSMITTER - Equipment for generating and sending radio signals.

TUNED - Adjusted to resonate at a specified frequency.

TUNING - Adjustment of all the circuits of a radio transmitter or receiver for optimum performance at any frequency to which it may be tuned.

TWISTED PAIR - Two insulated conductors twisted together without a common covering.

V

VOLUME CONTROL - A variable resistor used to vary the loudness of a radio receiver or public-address amplifier.

W

WATT - (Abbr: W) The unit of electrical power.

WAVE - A single hertz of a periodic disturbance, such as in radio or sound.

WAVELENGTH - The distance in meters traveled by a wave during the time interval of one (1) complete hertz. It is equal to the velocity divided by the frequency.

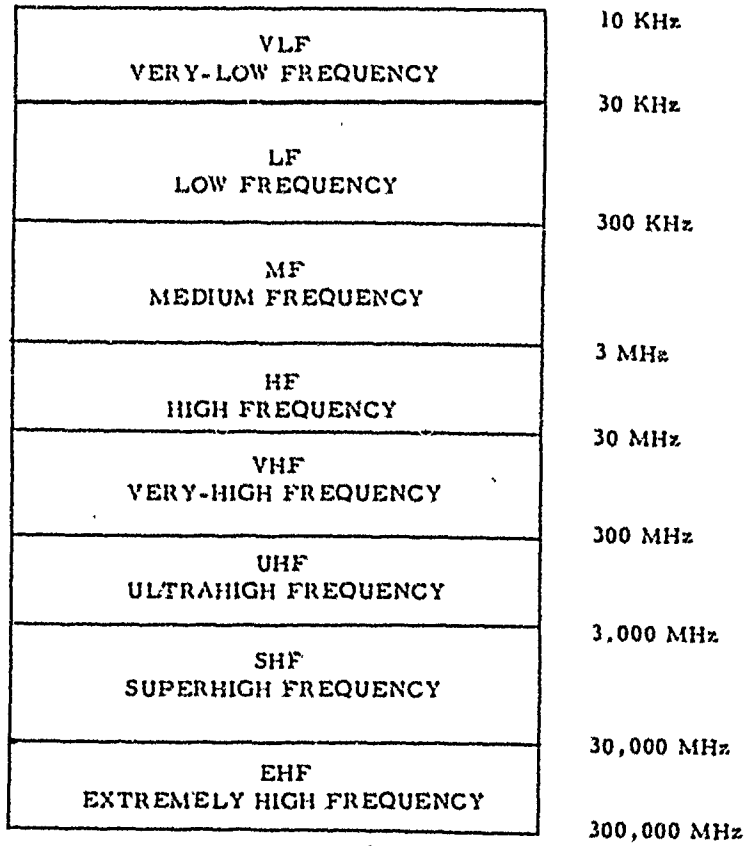
Z

ZERO-BEAT - A condition when two frequencies in a mixed circuit are exactly the same. It is produced in a radio requiring calibration by moving a tuning control to the exact point where the audible tone produced by the calibrating signal changes from a descending value to nearly or complete silence.

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# CHAPTER 2

# RADIO COMMUNICATION (GENERAL)




NOTE: KHz = 1,000 hertz per second
MHz = 1,000,000 hertz per second

Figure 2-1. Radio Frequency Spectrum.

## RADIO COMMUNICATION

2-1. GENERAL. Radio, a means of communication in tactical units, is used for control, fire control, passing of information, administrative purposes, and liaison between and within units whenever necessary. It is especially adapted to rapidly moving situations, amphibious operations, and air-ground communications, over impassable terrain or in large areas where wire or other means are impracticable.

2-2. ADVANTAGES OF RADIO.

a. The principal advantage of radio as a means of communication is the speed of installation. Portable and vehicular mounted radios may be made operational in a matter of seconds.

b. Radio is a flexible means of communication. No fixed circuits are required to be constructed, extended or maintained. Stations may be added to or deleted from a radio net as required. Communications by radio can be maintained while troops are mobile. It may be integrated with wire, used from ground to air or air to air. It provides communication across terrain over which it may be impractical to install wire.

2-3. DISADVANTAGES OF RADIO.

a. Radio, without speech security devices, is the least secure means of communication. It must be assumed that interception takes place every time a message is transmitted.

b. Radio communication is less vulnerable to enemy fire than wire, but it is subject to interference from static, jamming, and other radio stations.

c. The above disadvantages can be greatly reduced by improving the general technique of the operator; with particular emphasis on operating procedures, radio-telephone procedure and communication security.

2-4. PRINCIPAL CHARACTERISTICS OF RADIO SETS.

There are several principal characteristics that apply to all radio sets. These characteristics outline the capabilities and limitations of radio equipment. The six principal characteristics of radio sets, as they apply to the various divisions are:

a. Type of Set.

(1) Portable Sets: Those that can be carried by an individual and can be operated while being moved.

(2) Transportable Sets: Those that can be moved from one location to another, normally by a team of men; however, they cannot be operated while being moved.

(3) Vehicular Sets: Those normally installed in a vehicle and obtain their initial power from the vehicle electrical system.

(4) General Use. Those radios that may be vehicular mounted or employed in a portable or transportable use (ground mounted).

b. Type of Modulation. Although there are several types of modulation, the two commonly used in divisions are frequency modulation (commonly known as FM) and amplitude modulation (commonly known as AM).

(1) Because of technical differences, two radio sets cannot net unless both sets have the same type modulation.

(2) A principal advantage of FM is that it is less subject to static or atmospheric disturbances. The principal advantage of AM is its comparatively narrow band operation that provides more operating channels within a given frequency coverage.

c. Type of Emission.

(1) Voice. Division radio sets are capable of voice emission.

(2) Continuous Wave (CW) and Modulated Continuous Wave (MCW). These are used to transmit International Morse Code by means of a key.

(3) Frequency Shift Keying (FSK). Commonly known as radioteletype.

d. Frequency Coverage. The lowest to highest radio frequencies, expressed in megahertz, on which a particular radio will operate.

e. Operating Range. The rated range of the radio sets are planning figures. This is the range over which we can normally expect to communicate with a high degree of reliability.

f. Power Sources:

(1) Dry cell batteries.
(2) Vehicular batteries.
(3) Hand generators.
(4) Gas engine generators.
(5) Wet cell batteries.

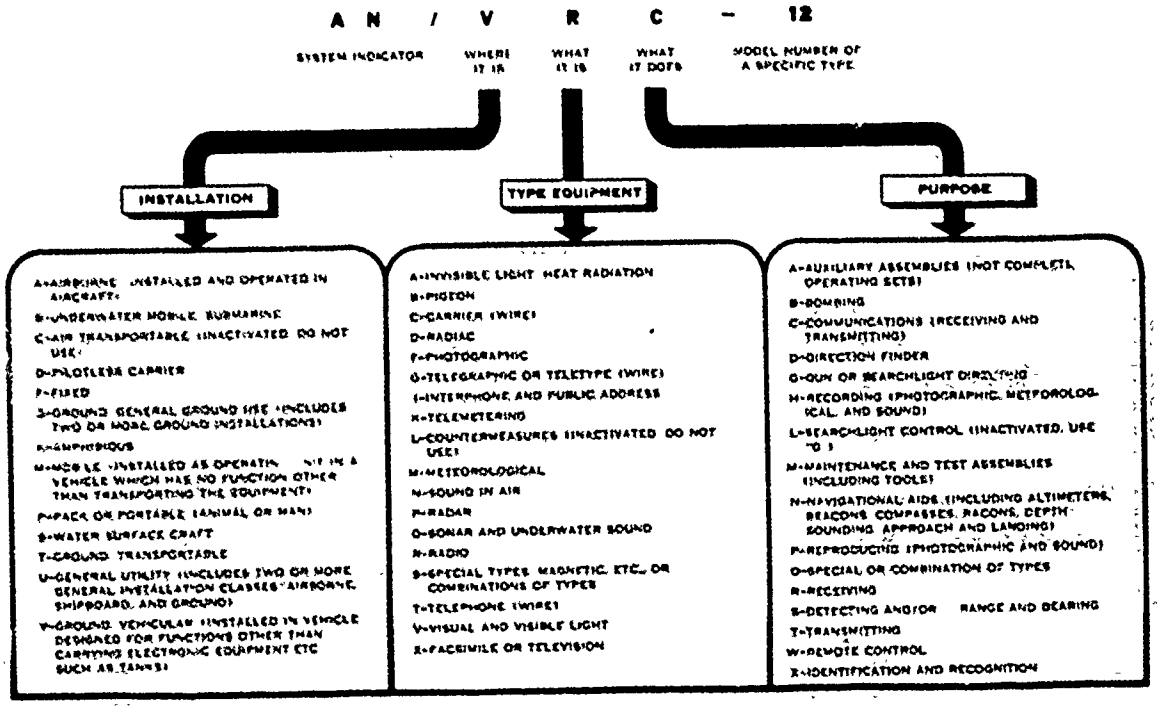
2-5. NETTING TWO RADIO SETS:

To net two radio sets in one net, the radios must:

a. be of the same modulation.
b. have at least one common frequency.
c. be within the range of the shorter range set.

2-6. JOINT NOMENCLATURE SYSTEM.

Army-Navy-Air Force and Marine Corps communications equipment may be identified using the Joint Nomenclature System Chart (Figure 2-2).




NOTE:

1. Sample of a component used with a particular set: C808/GRC26A (This component may only be used with that particular set.)
2. Sample of a component not used with a particular set: R442/VRC. (This component may be used with any set in the VRC-12 family.)

Figure 2-2. Interpretation of Joint Nomenclature System.

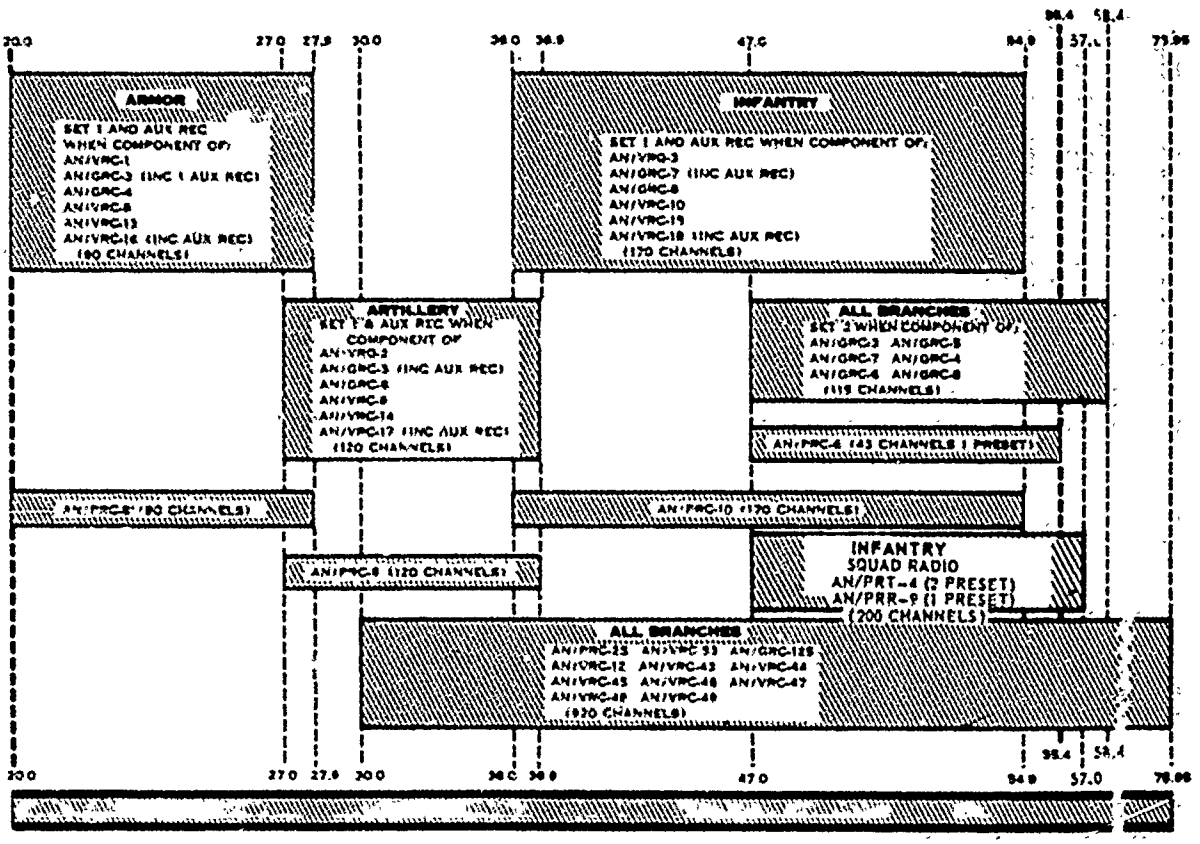
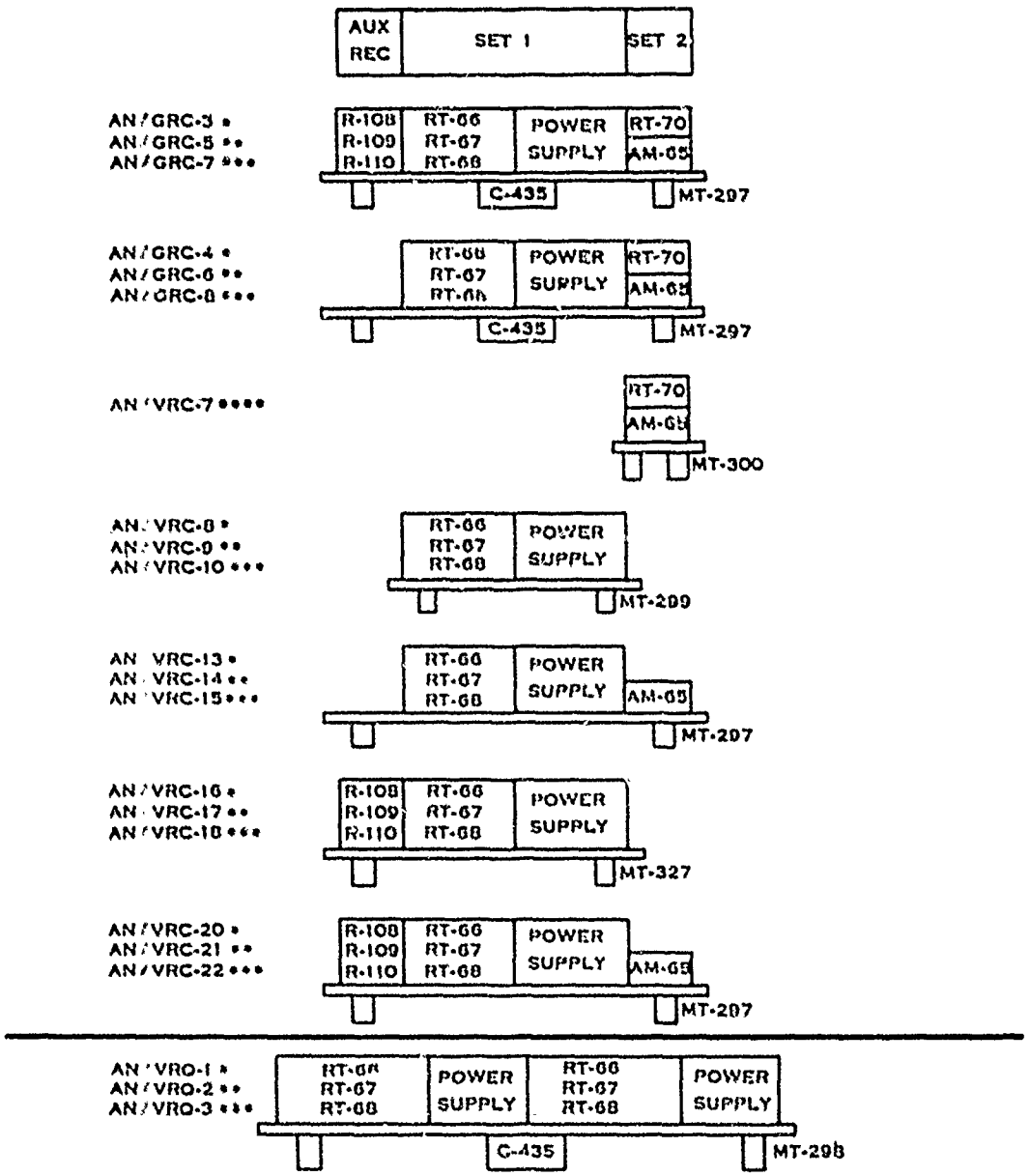



Figure 2-3. Frequency Allocation of FM Tactical Radio Sets.

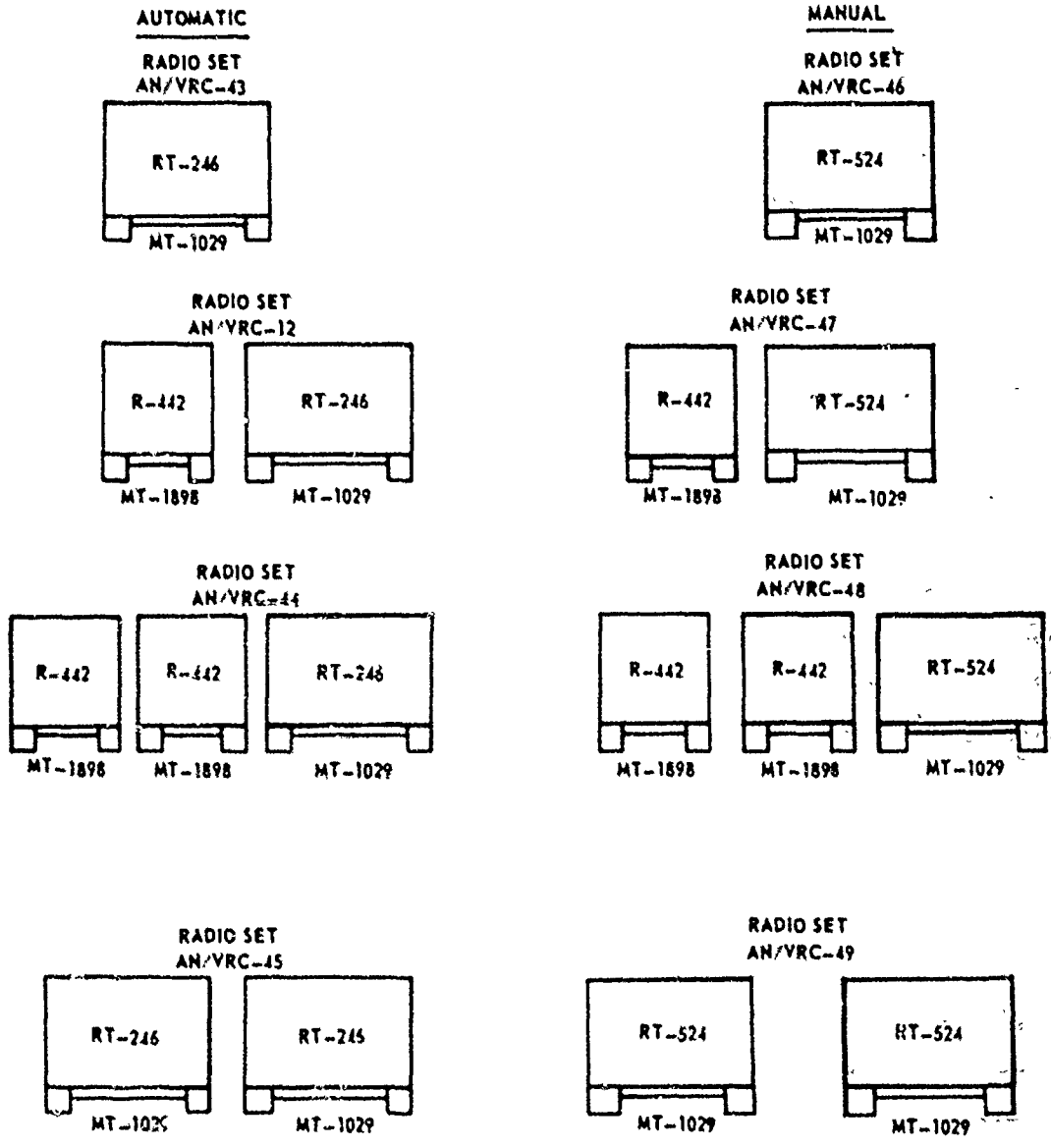
## NOTES




*ARMOR
**ARTILLERY
***INFANTRY
****COMMON TO ALL BRANCHES

LEGEND: RT-66, -67, -68—MEDIUM POWER RECEIVER - TRANSMITTERS.
PP-112—POWER SUPPLY.
R-108, -109, -110—AUXILIARY RECEIVER.
RT-70—LOW POWER RECEIVER-TRANSMITTER.
AM-65—INTERPHONE AMPLIFIER.

Figure 2-4. Block Diagrams of AN/GRC-3 through 8 Series of FM Radio Set.




LEGEND:

RT-246 – MEDIUM POWER RECEIVER-TRANSMITTER, 10 PRE, SET AUTOMATICALLY TUNED CHANNELS.

RT-524 – MEDIUM POWER RECEIVER-TRANSMITTER, MANUALLY TUNED.

R-442 – AUXILIARY RECEIVER.

Figure 2-5. Block Diagram of AN/VRC-12 Family of Radio Sets.

## NOTES

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# CHAPTER 3

# PORTABLE FM RADIO EQUIPMENT

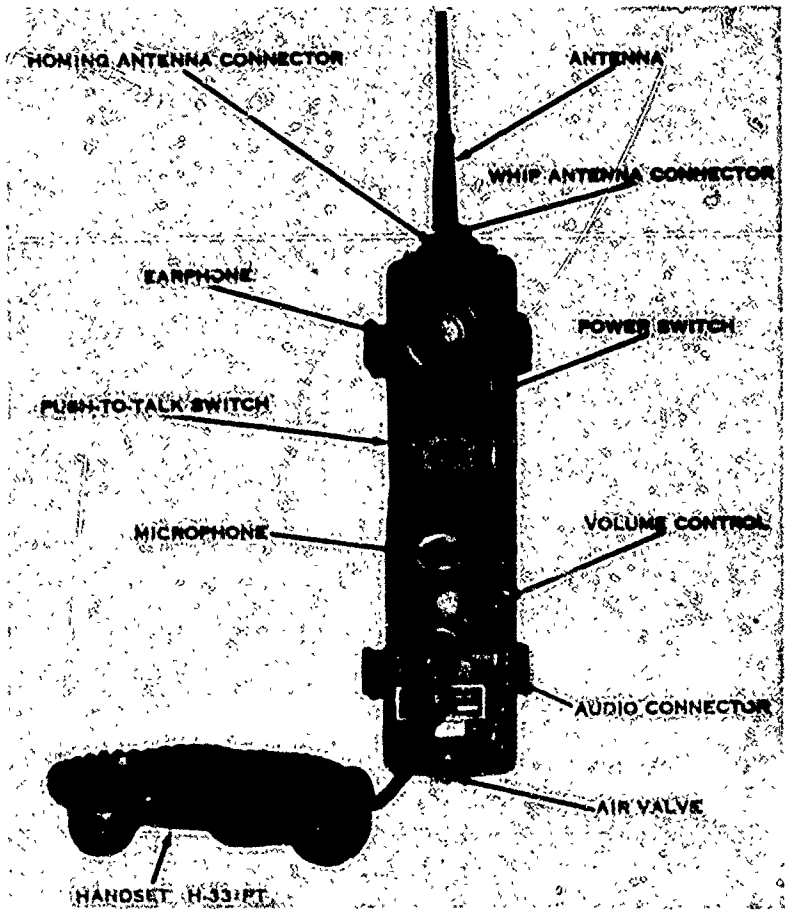



Figure 3-1. AN/PRC-6, Controls.

3-1. RADIO SET AN/PRC-6. (TM 11-296)

a. The Radio Set AN/PRC-6 is a light-weight, low-power, battery operated radio receiver-transmitter. It is portable and was designed primarily for foot combat troops.

b. Most frequency modulated radios in the Infantry Divisions will communicate with the radio set AN/PRC-6. It may be operated by means of the internal (built-in) earphone and microphone, or by using the external handset shown in figures 6 and 7. Radio set AN/PRC-6 may be used for homing purposes when used in conjunction with the homing antenna AT-249.

c. Radio Set AN/PRC-6 is organic in the type units as follows:

| | BATTALION | | | | | BRIGADE | | | | | SEP BDE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | AM | Mech | Inf | Lt Inf | Abn | AM | Mech | Inf | Abn | Mech |
| Hq & Hq Co | 0 | | 0 | | 0 | 6 | 8 | 6 | 0 | 6 | 7 | 8 | 10 |
| Rifle Co | 18 | 18 | 18 | 20 | 18 | | | | | | | | |
| Total | 54 | 54 | 54 | 60 | 54 | 6 | 8 | 6 | 0 | 6 | 7 | 8 | 10 |

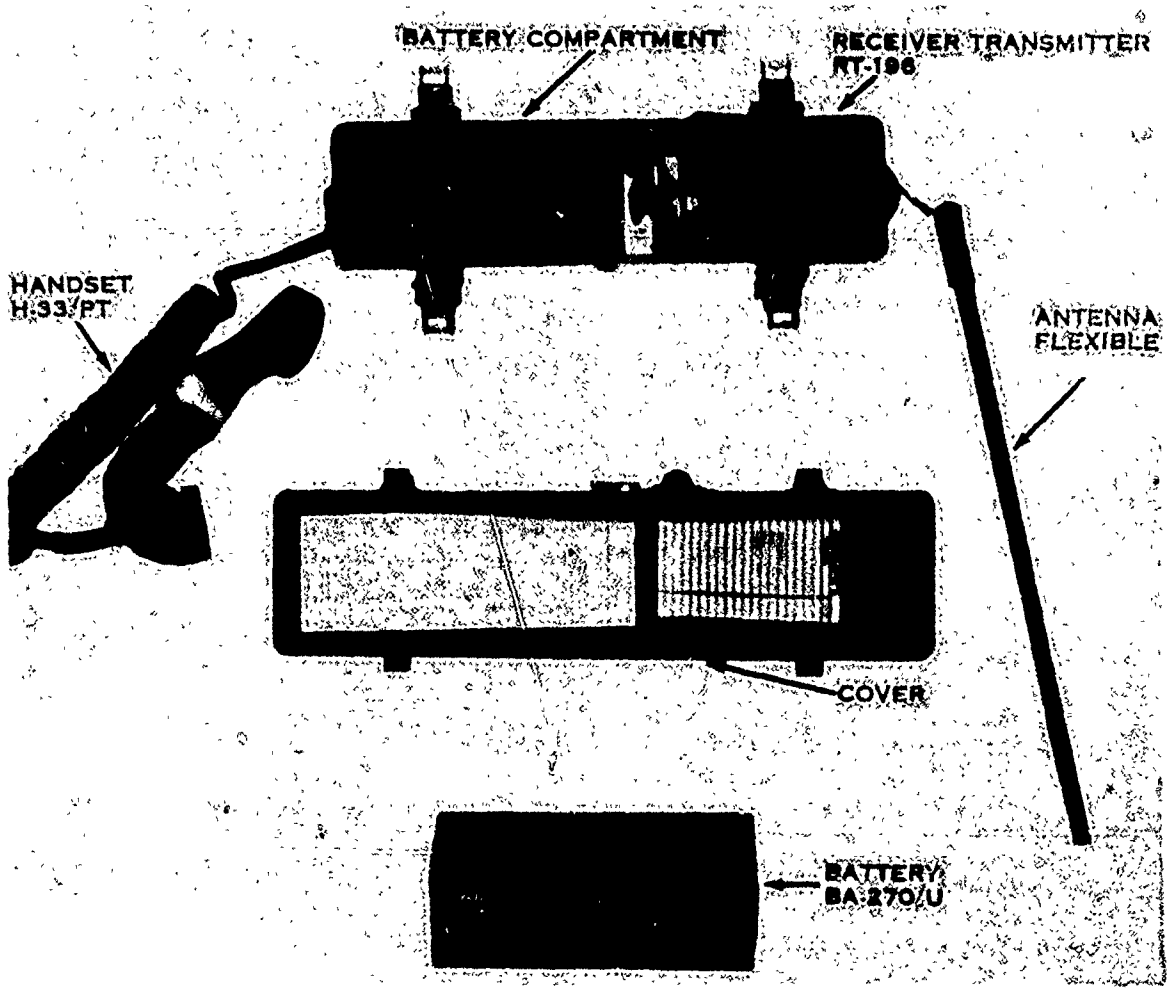



Figure 3-2. AN/PRC-6 (Disassembled).

## 3-2. CHARACTERISTICS OF THE AN/PRC-6.

| | |
|---|---|
| Type of set | portable |
| Type of modulation | FM |
| Type of emission | voice |
| Frequency coverage | 47 to 55.4 MHz |
| Number of channels | 43 |
| Tuning | 1 set channel |
| Channel spacing | 200 KHz |
| Operating range (for planning purposes) | 1600 meters |
| Power output | .25 watt |
| Power source | dry cell battery BA-270/U |
| Battery life | 20 hours (approximately) |
| Antenna | flexible steel tape |
| Weight | 7 1/2 pounds (w/battery) |

3-3. STEPS TO OPERATE THE AN/PRC-6.

a. Remove the ANTENNA from around the case and screw it to the WHIP ANTENNA CONNECTOR (top of the case).

b. Check the POWER switch to insure it is in the OFF position.

c. Release the four latches that hold the case together.

d. Remove the cover.

e. Swing the BATTERY CABLE GUARD out until it disengages the battery cable plug.

f. Insert the BATTERY into the battery compartment.

g. Connect the battery cable plug to the battery socket using the two widely separated pins as a guide.

h. Swing the BATTERY CABLE GUARD until it engages the battery cable plug.

i. Replace the cover and secure the four latches.

j. Open the AIR VALVE by turning 1/2 turn counterclockwise.

k. Operation by means of the built-in earphone and microphone:
(1) Turn the POWER SWITCH to the INT position.
(2) Hold the EARPHONE to the ear and listen for rushing noise.
(3) If no rushing noise is heard, turn the VOLUME control fully clockwise. (If no rushing noise is heard, open the case and check the battery connection. If a rushing noise is still not heard, replace the battery. If a rushing noise is not heard then, the set is inoperative.)
(4) To transmit, press the PUSH-TO-TALK SWITCH on the side of the case, pause for a moment, and then speak in a clear normal voice into the MICROPHONE. Release the PUSH-TO-TALK switch to listen.

l. Operation using external HANDSET.
(1) Connect the HANDSET to the AUDIO CONNECTOR.
(2) Turn the POWER SWITCH to the EXT position.
(3) Hold the HANDSET to the ear and listen for rushing noise.
(4) Same as step k(3) above.
(5) To transmit, press the PUSH-TO-TALK SWITCH on the side of the HANDSET, pause for a moment, and then speak in a clear normal voice into the MICROPHONE of the handset. Release the PUSH-TO-TALK SWITCH to listen.

m. To remove the set from operation, turn the POWER SWITCH to the OFF position and then reverse the procedures outlined above.

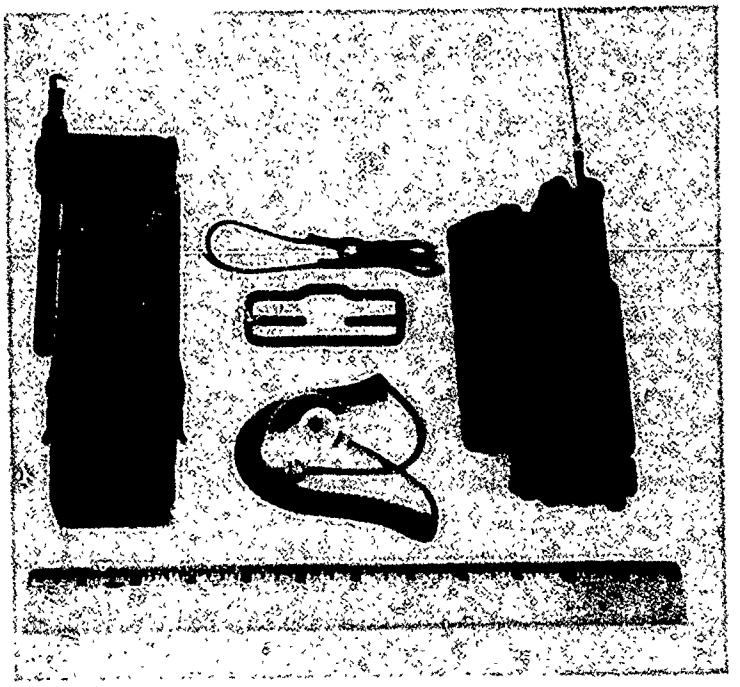


Figure 3-3. Radio Set AN/PRC-88.

3-4. RADIO SET AN/PRC-88. (AN/PRT-4 and AN/PRR-9) (TM 11-5820-549-12)

This radio set consists of a ten ounce helmet mountable receiver and an eighteen ounce, two channel transmitter, having a 1600 and a 500 meter range capability. Two channels are available to provide communications from the squad leader to selected members of the squad and to the platoon leader. This radio set has been type classified standard "A" and is replacing the radio set AN/PRC-6 on a one for one basis.

3-5. CHARACTERISTICS OF THE AN/PRC-88.

| | PRT-4 TRANSMITTER | PRR-9 RECEIVER |
|---|---|---|
| Type of set | Portable | Portable |
| Type of modulation | FM | FM |
| Type of Emission | Voice and Tone | |
| Frequency coverage | 47 to 57 MHz | 47 to 57 MHz |
| Number of channels | 200 | 200 |
| Tuning | 2 Preset | 1 Preset |
| Channel spacing | 50 KHz | 50 KHz |
| Operating range (for planning) CH-1 1600 meters CH-2 500 meters | | |
| Power source | Drycell BA-399 | Drycell BA-505 |
| Battery life | Approx 24 hours | Approx 24 hours |
| Antenna | Collapsible 24" whip | Flexible 18" whip |
| Weight with battery | 18 ounces | 10 ounces |
| Power output CH-1 450 MW at 12VDC CH-2 50 to 250 MW at 12VDC. | | |

3-6. STEPS TO OPERATE RADIO RECEIVER AN/PRR-9.

a. Check the power switch to insure it is in the OFF position.

b. Insert the battery BA-505/PRR-9 through the battery clip and into the mating connector of the receiver.

c. Clip the receiver to the helmet. (The receiver may be worn on the harness or in a shirt pocket.)

d. Loosen the antenna thumb screw and rotate the antenna upright.

e. Tighten the thumb screw.

f. For receiving with squelch, rotate the receiver control clockwise to its mid-position. Set to a comfortable listening level upon receipt of a voice or tone signal. If control is rotated to its maximum position, squelch will be deactivated. To reactivate squelch, turn control to off, then back on.

g. For receiving without squelch, rotate the receiver control fully clockwise. Rotate counterclockwise for a comfortable listening level. The range of the receiver is increased somewhat when used without squelch. Therefore, use the receiver without squelch when the received signals are intermittent or in terrain unfavorable for good reception.

3-7. STEPS TO OPERATE RADIO TRANSMITTER AN/PRT-4.

a. Insert the battery BA-399/PRT-4. Be sure battery is in place and battery retainer is securely clasped.

b. For maximum range, extend the collapsible antenna fully.

c. Place channel selector switch in proper position, CH-1 or CH-2. If both voice and tone communications are desired, the TONE-VOICE Lockout Tab (located directly below TONE-VOICE switch) should remain in center detent. By sliding this tab to either side, tone or voice operation is locked out. For voice transmission, press and hold TONE-VOICE switch in direction of VOICE arrow and talk directly into the microphone. Speak in a normal tone of voice with lips about 1" from the microphone. For tone operation, press and hold TONE-VOICE switch in direction of TONE arrow.

d. To turn off power to the transmitter, release the TONE-VOICE switch.

## NOTES

3-8. RADIO SET AN/PRC-10. TM 11-5820-292-10

a. Radio Set AN/PRC-10 is a light-weight, low-power, battery operated radio receiver-transmitter intended for portable communication in the Infantry. This set is capable of communicating with all other frequency modulated radio sets found in the Infantry, Airborne and Mechanized Divisions. It is normally carried strapped to the operator's back by means of a harness and suspenders.

b. Radio Sets AN/PRC-8 and AN/PRC-9 are similar to the AN/PRC-10 and are intended for portable communication in armor and artillery units respectively. The basic difference between these three radio sets is the frequency coverage. (Figure 2-3)

c. The Radio Set AN/PRC-10 may be operated in vehicles or in aircraft. The power source used for this type of operation is a 24-volt battery through the Amplifier AM-598 (See paragraph 3-9).

d. The Radio Set AN/PRC-10 may be issued to some organizations in place of the AN/PRC-25. (For a basis of issue see paragraph 3-11e.)

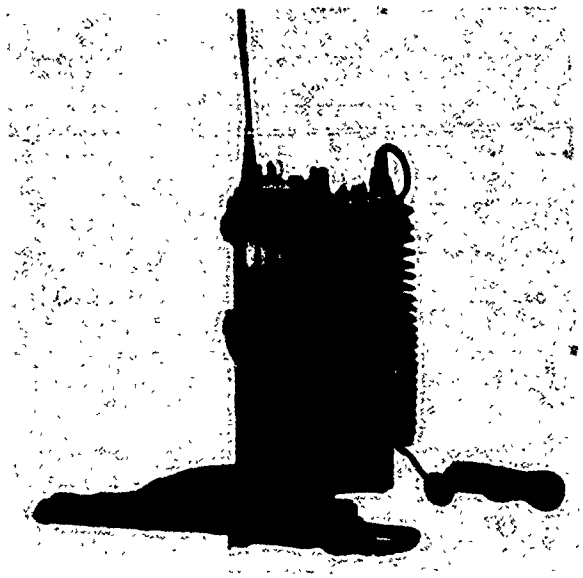


Figure 3-4. Radio Set AN/PRC-10.

3-9. CHARACTERISTICS OF THE AN/PRC-10.

| | |
|---|---|
| Type of set | portable |
| Type of modulation | FM |
| Type of emission | voice |
| Frequency coverage | 38 to 54.9 MHz |
| Number of channels | 170 |
| Tuning | continuous |
| Channel spacing | 100 KHz |
| Operating range | 5 to 8 km |
| Short Antenna (AT-272) (For Planning Purposes) | 5 km |
| Long Antenna (AT-271) (For Planning Purposes) | 8 km |
| Power output | .9 watt |
| Power source | dry cell battery BA-279/U |
| Battery life | 20 hours (approximately) |
| Antenna | |
| AT-272 | steel tape & flexible base |
| AT-271 | 7 section fishpole |
| Weight | 26 pounds (w/batt) |

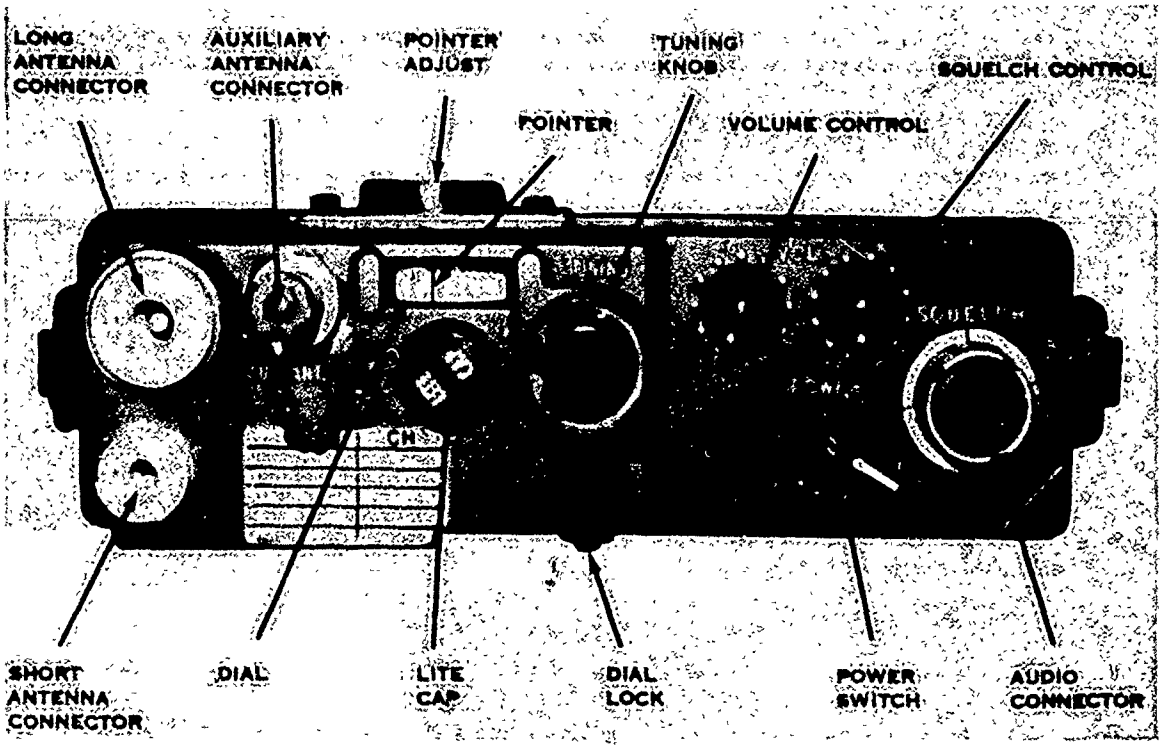



Figure 3-5. AN/PRC-10 Control Panel.

3-10. STEPS TO OPERATE THE AN/PRC-10.

a. Check the POWER switch to insure it is in the OFF position.

b. Disengage the two lower latches alongside the case and separate the receiver-transmitter from the battery compartment.

c. Insert the battery into the battery compartment. Insure female power socket is up.

d. Connect the power cable plug to the battery socket using the flat portion of the center lug as a guide. Keep the D-Ring above the plug.

e. Place the receiver-transmitter over the battery compartment and secure the two latches.

f. Assemble the short antenna and connect it to the short antenna connector.

g. Connect the HANDSET to the AUDIO CONNECTOR.

h. Unlock the dial by turning the DIAL LOCK counterclockwise.

i. Turn the POWER switch to the ON position.

j. Turn the TUNING KNOB until the whole megahertz (or red mark) nearest your operating frequency is in the center of the DIAL WINDOW. (AN/PRC-10 provides calibration points at every whole megahertz. AN/PRC-10A provides calibration points indicated by red marks on dial.)

k. Turn the VOLUME control fully clockwise.

l. Turn the SQUELCH CONTROL to OFF (rushing noise should be heard in the handset).

NOTE: If no rushing noise is heard, open the case and check the battery connection. If a rushing noise is not heard then, replace the battery and check handset. If a rushing noise is still not heard, the set is inoperative.

m. Hold the POWER switch in the CAL & DIAL LITE position and adjust the TUNING KNOB until zero beat is obtained.

n. Release the POWER switch and the tuning control.

o. If the POINTER is directly over the calibrate frequency, your dial is mechanically correct. If it is not, correct the dial mechanically by moving the POINTER over the calibrate frequency by means of the POINTER ADJUST.

p. Tune to the operating frequency by means of the tuning knob.

q. Lock the DIAL by turning the DIAL LOCK.

r. Attempt to contact the distant station. If no contact is established, remove the short antenna and install the long antenna. Call the distant station again.

s. When contact with the desired station(s) is established, adjust the VOLUME control for the desired audio level.

NOTE: ADJUSTMENT OF THE SQUELCH CONTROL.

(1) The SQUELCH control will eliminate the rushing noise heard on the handset. The proper way to adjust this control is by turning it clockwise until the rushing noise disappears. Do not continue to advance the knob beyond that point, as it will decrease the sensitivity of the set needlessly. It is possible to receive transmissions from a distant station when the SQUELCH is OFF, and not be able to receive the same station after the rushing noise is eliminated.

(2) Before eliminating the rushing noise, insure that you are able to receive transmission from all stations in the net, then adjust the SQUELCH control if required. If you are unable to receive all the stations in the net after eliminating the rushing noise, turn the SQUELCH control OFF and keep it OFF.

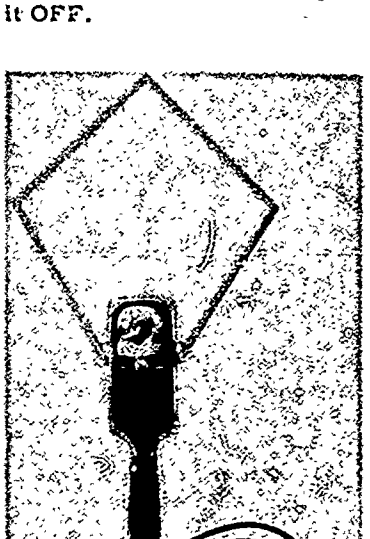


Figure 3-6. Antenna AT-339/PRC.

3-11. ANTENNA AT-339/PRC. (TM 11-5058)

a. Antenna AT-339, when connected to Radio Set AN/PRC-10, comprises an effective homing device which permits the operator to find the direction of a radio transmitter tuned to his frequency and proceed toward it. This antenna (for receiving only) is not issued as a component of the AN/PRC-10.

b. The Antenna AT-339 is replaced by the AT-784/PRC for use with the AN/PRC-25. For basis of issue see paragraph 25b.

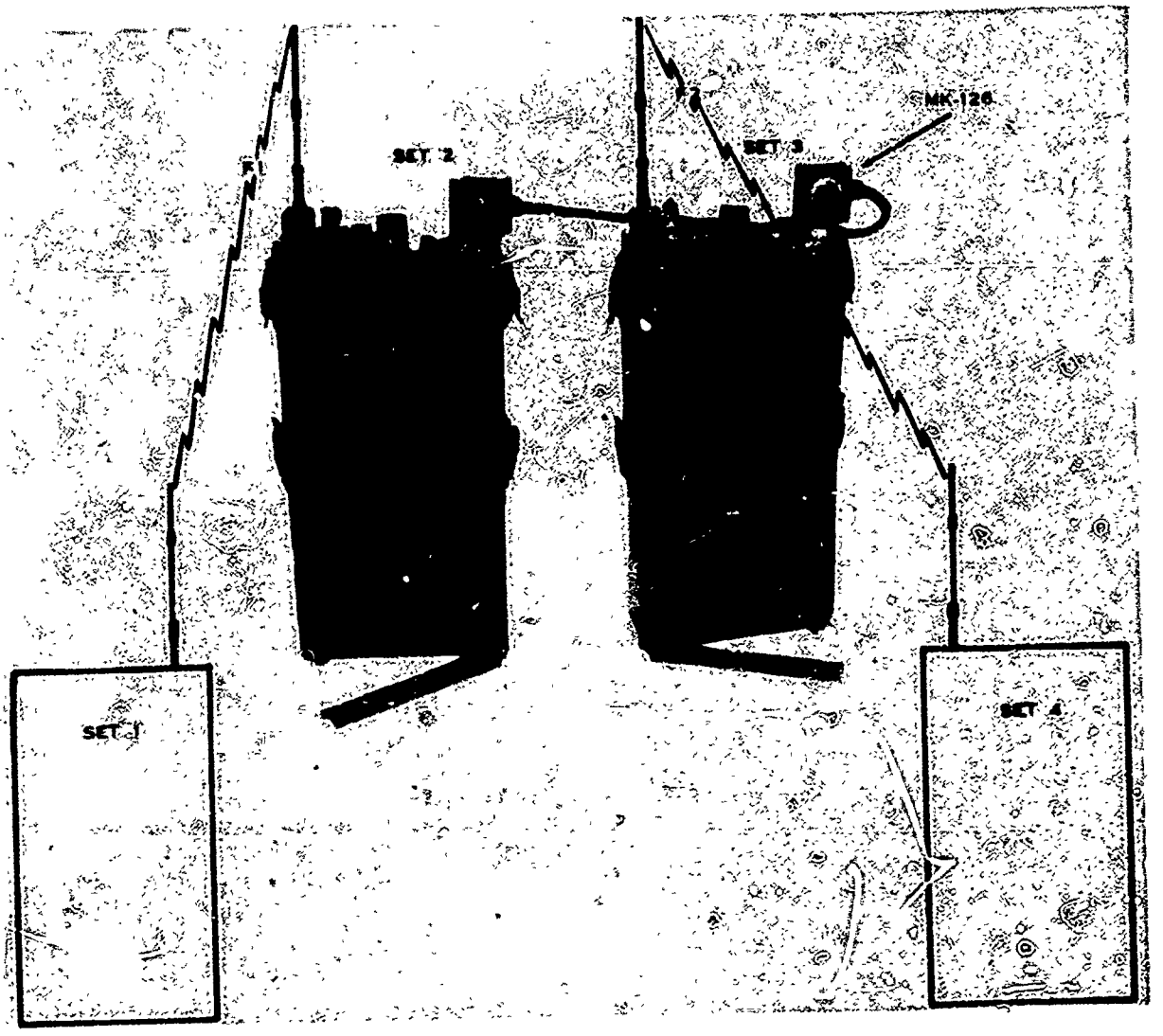



Figure 3-7. Retransmission Cable Kit MK-126.

3-12. RETRANSMISSION CABLE KIT MK-126. (TM 11-5820-292-10)

a. The Retransmission Cable Kit MK-126 (not a component of the set) is used to connect two AN/PRC-10 radios for automatic relay operation. The kit consists of a 4.5 meter cable terminated at both ends in junction boxes and a canvas carrying bag.

b. The two radio sets at the relay station must be tuned to two different frequencies. These two frequencies should be at least 3 MHz apart to prevent interference between the two radios. The rushing sound of the two sets must be eliminated, otherwise the signal emitted by one set will be fed through the cable and activate the transmitter of the other set, thereby rendering the relay operation inoperative. For best results, the cable should be fully extended.

c. The Retransmission Cable Kit MK-126 is replaced by the MK-456/G for use with the AN/PRC-25. (See paragraph 12-5.)

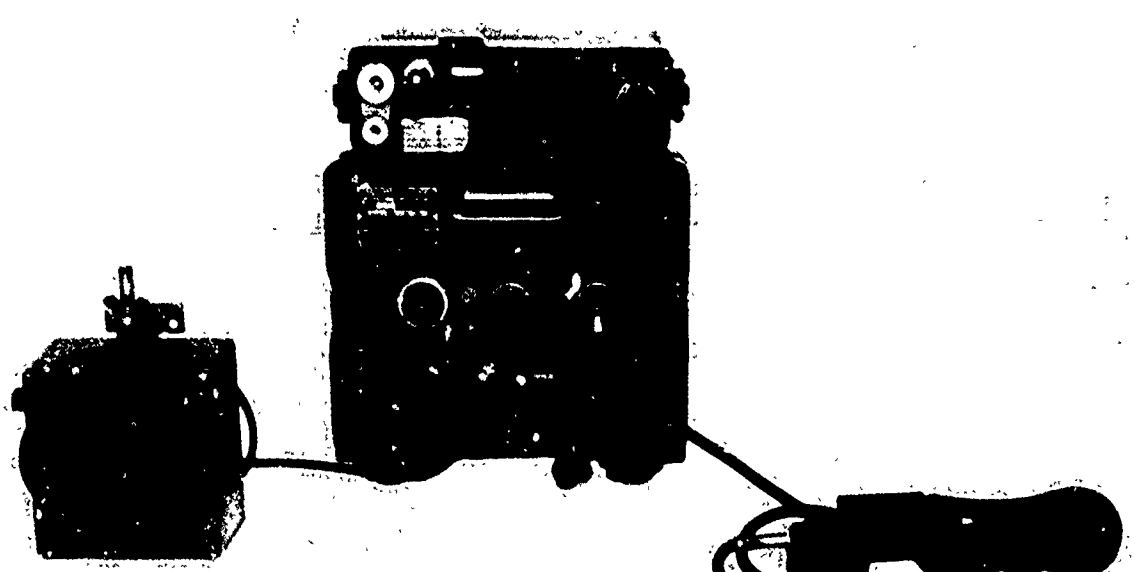


Figure 3-8. Amplifier Power Supply AM-598.

3-13. AMPLIFIER POWER SUPPLY AM-598. (TM 11-5055)

For vehicular operation of Radio Set AN/PRC-10, the set can be installed in a vehicle which has a 24-volt electrical system by using the Amplifier Power Supply AM-598 (not a component of the radio). The AM-598 provides two audio connectors to which a loudspeaker and a handset or microphone may be connected.

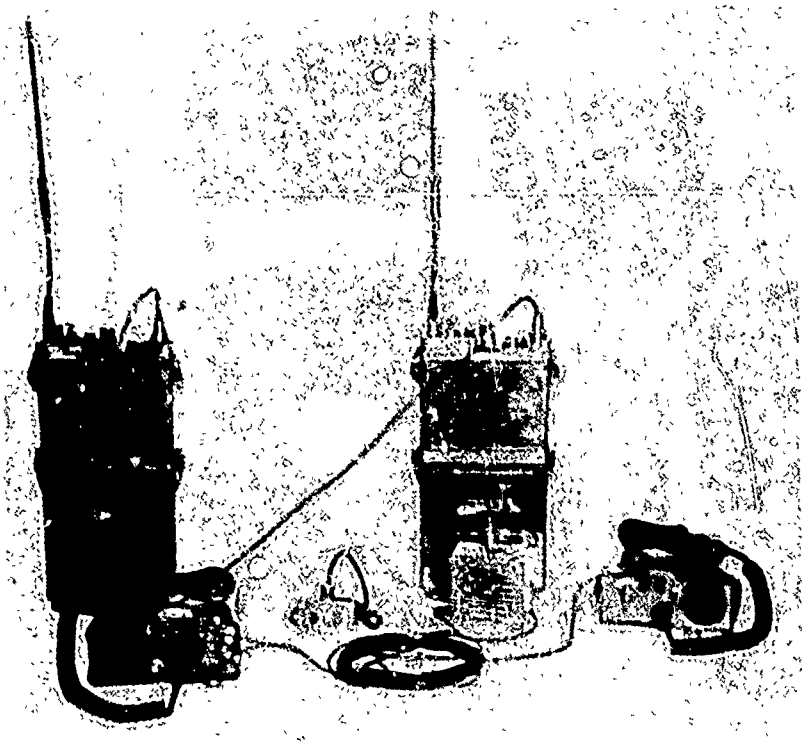


Figure 3-9. Control Radio Set AN/GRA-6 Used with the AN/PRC-10.

3-14. CONTROL RADIO SET AN/GRA-6. Used with AN/PRC-10. (TM 11-5820-292-10)

a. The Control AN/GRA-6 consists of a local control unit C-434/GRC, a remote control unit C-433/GRC, a handset H-33/PT, a loudspeaker LS-166/U, interconnecting box J-654 and a carrying bag.

b. The Control Set AN/GRA-6 may be used with Radio Sets AN/PRC-8, 9 and 10, and with the AN/GRC-3 through 8 series of radios. The local control unit remains at the radio site and the remote control unit may be located up to 3 km away from the radio site. These two units are interconnected by field wire.

c. The facilities provided by the control when used with radio set AN/PRC-10 are as follows:

(1) With two AN/PRC-10 connected to the local control unit as shown above:
   (a) Telephone communication between the local and remote units.
   (b) Monitoring of both radio sets at the local and the remote control units audio connectors.
   (c) Transmission over either set from the local and the remote control units at the selection of the operator.

(2) With one AN/PRC-10 connected to the local control unit:
   (a) Telephone communication between the local and remote control units.
   (b) Monitoring of the radio set at both the local and remote control units audio connectors.
   (c) Transmission over the radio set from both the local and remote control units.
   (d) Control of power to the set from the remote control unit.

d. The Control AN/GRA-6 is replaced by the AN/GRA-39 for use with the AN/PRC-25. (See paragraph 6-11.)

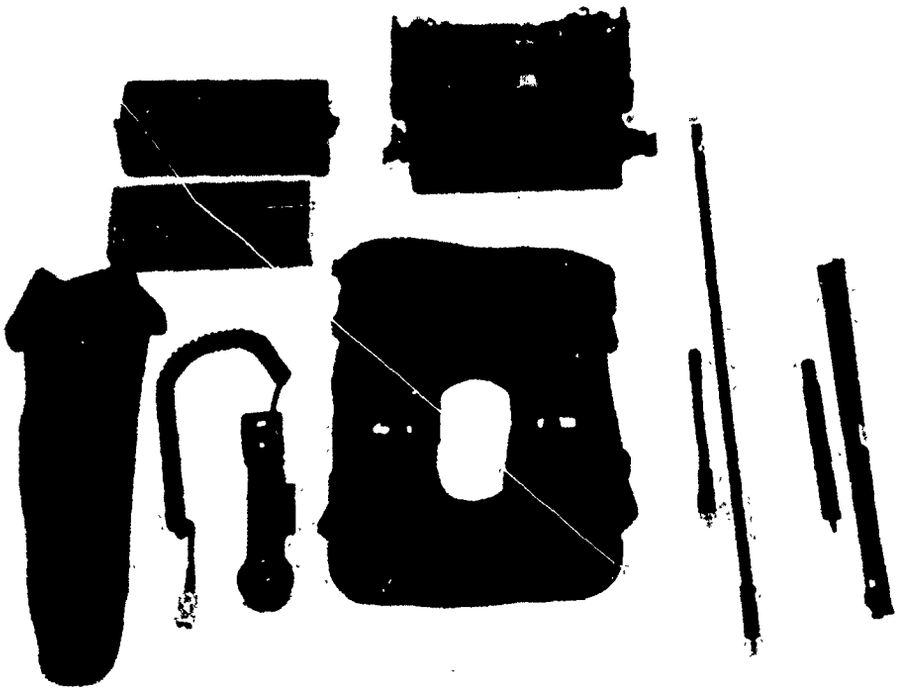


Figure 3-10. Radio Set AN/PRC-25.

3-15. RADIO SET AN/PRC-25. (TM 11-5820-398-10).

a. The radio set AN/PRC-25 is a short-range, man-pack portable, frequency modulated (FM) receiver-transmitter used to provide two-way voice communication. This set is capable of netting with all other Infantry and Artillery frequency modulated radio sets on common frequencies.

b. This radio set is replacing the AN/PRC-8, 9 and 10 and is common to all combat arms.

c. Basic Components:
Receiver - Transmitter RT-505/PRC
Handset H-138
Antenna AT-892 (short)
Antenna AT-271A (long)
Antenna support AB-591
Cotton Duck bag CW-503
Electrical Equipment Harness ST-138

d. Operational capabilities:
Receive or transmit on one channel
Automatic relay with retransmission cable MK-456
Operation by remote control with Radio Set Control Group AN/GRA-39

e. The Radio Set AN/PRC -25 is organic in the type units as follows:

| | BATTALION | | | | | BRIGADE | | | | | SEP BDE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | AM | Mech | Inf | Lt Inf | Abn | AM | Mech | Inf | Abn | Mech |
| Hq & Hq Co | 16 | 16 | 16 | 16 | 10 | 5 | 4 | 4 | 21 | 5 | 0 | 4 | 0 |
| Rifle Co | 10 | 12 | 13 | 14 | 12 | | | | | | | | |
| CS | | 16 | | 16 | | | | | | | | | |
| Total | 46 | 68 | 55 | 74 | 46 | 5 | 4 | 4 | 21 | 5 | 0 | 4. | 0 |

## 3-16. CHARACTERISTICS OF THE AN/PRC-25

| | |
|---|---|
| Type of set | portable |
| Type of modulation | FM |
| Type of emission | voice |
| Frequency coverage: | |
| Low band | 30 to 52.95 MHz |
| High band | 53 to 75.95 MHz |
| Number of channels | 920 |
| Channel spacing | 50 KHz |
| Tuning | Detent (automatic calibration) |
| Preset facilities | 2 channels |
| Operating range | 5 km short antenna AT-892<br>8 km (Long antenna AT-271A) |

NOTE: USE SHORT ANTENNA WHEN REDUCED RANGE IS ACCEPTABLE.

| | |
|---|---|
| Power output | 1.5 to 2.0 watts |
| Power source | dry cell battery (BA-386) |
| Battery life | 20 hrs (approximately) |
| Antenna | |
| AT-892 (short) | steel tape & flexible base |
| AT-271A (long) | 7 section (fish pole) |
| Weight | 24.7 pounds (w/batt) |

NOTES: a. All audio accessories issued with the AN/VRC-12 family of vehicular radios will operate with the AN/PRC-25 except the Loudspeaker LS-454/U. Audio accessories issued for the AN/PRC-6, AN/PRC-10 or AN/GRC-3 through 8 series of radios will not operate with this equipment because of a difference in the audio connectors.

b. When using all sets with serial numbers below 8000, a setting above 8 on the VOLUME control will introduce a ringing tone into the set during transmission.

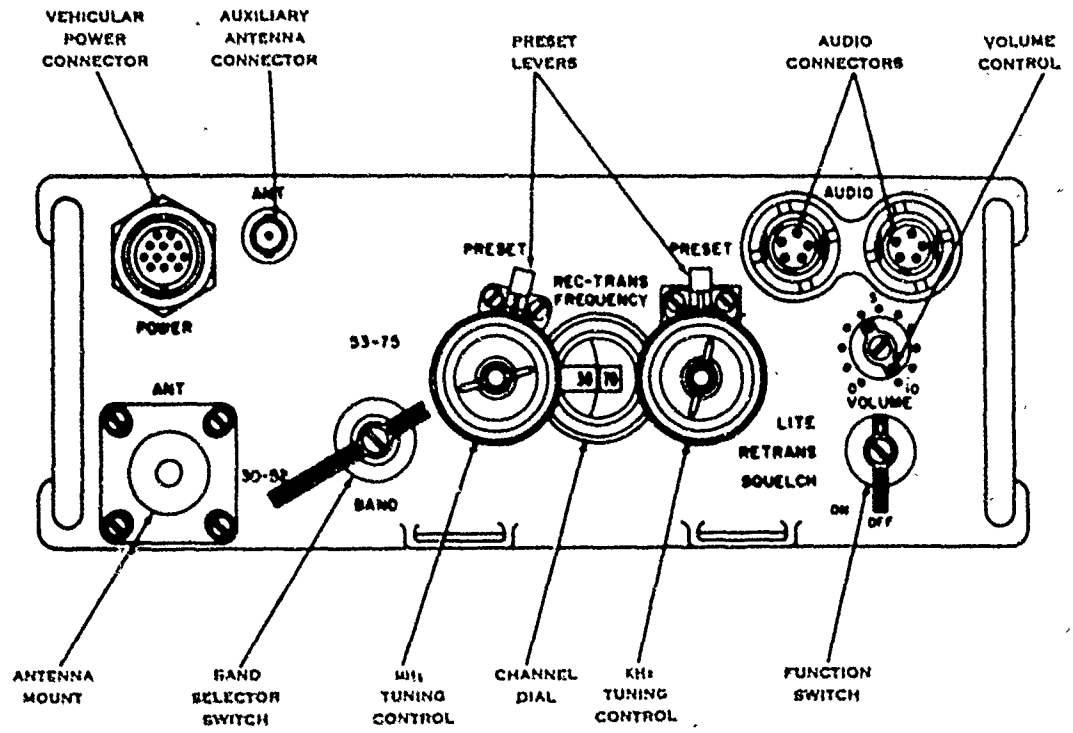



Figure 3-11. Radio Set AN/PRC-25 Control Panel.

3-17. STEPS TO OPERATE THE AN/PRC-25.

a. Check the POWER switch and insure it is in the OFF position.

b. Stand the set so that its front panel faces downward and release the two clamps by pulling the topmost part of each clamp up and away from the receiver-transmitter case. Lift the battery case away from the receiver-transmitter.

c. Connect the battery to the receiver-transmitter by aligning the connector and pressing down.

d. Place the battery case back over the battery and refasten the two clamps.

e. Assemble the short antenna and connect it to the antenna mount.

f. Connect the handset to the audio connector.

g. Turn FUNCTION switch to the ON position. (Rushing noise should be heard in handset.)

h. Set the BAND switch at 30-52 or 53-75, depending on the channel used.

i. Turn the MEGAHERTZ tuning control and the KILOHERTZ tuning control so that the desired channel shows in the CHANNEL DIAL.

j. Set the VOLUME control at 4 and attempt to contact distant station. If contact is not established, remove the short antenna and install the long antenna.

k. When contact with the desired station is established, adjust the VOLUME control for the desired audio level.

l. To eliminate the rushing noise when no signal is being received, turn the FUNCTION switch to the SQUELCH position.

NOTE: Do not speak into both elements of the handset H-138/U. It has two microphone elements for noise cancellation and speaking into both elements simultaneously will cancel out transmission.

m. Presetting channels on MEGAHERTZ tuning control.

(1) If both preset frequencies are in same band, preset MEGAHERTZ tuning controls as follows:

(a) Set the BAND switch at 30-52 or 53-75, depending on the band used. Set the MEGAHERTZ tuning control so that the lower frequency appears in the CHANNEL DIAL.

(b) Loosen the wingnut on the megahertz tuning control.

(c) Position the PRESET lever forward (toward the tuning control).

(d) Lift the lower and upper sections of the megahertz tuning control and turn them counterclockwise until the stop of the lower section strikes the preset lever.

(e) Tighten the wing nut and position the PRESET lever away from the megahertz tuning control.

(f) Turn the MEGAHERTZ control until the first two digits of the higher frequency appears in the CHANNEL DIAL.

(g) Reposition the PRESET lever forward and loosen the wing nut.

(h) Lift the upper section of the megahertz tuning control and turn clockwise until the stop strikes the PRESET lever.

NOTE: Do not lift or move the lower section.

(i) Keeping the stop aligned with the edge of the preset lever, push down the upper section and tighten wing nut.

(2) If preset frequencies are in different bands, there are three distinct procedures to follow depending upon frequency spacing.

(a) If the difference between the two megahertz tuning numbers is more than 23 follow the procedure in m(1) above, except turn the BAND switch to 30-52 when presetting the lower frequency and to 53-75 when presetting the higher frequency.

(b) If the difference between the two MEGAHERTZ tuning numbers is less than 23, proceed as follows:

1. Set BAND switch at 53-75. Set the MEGAHERTZ tuning control so that the first two digits of the upper frequency appear in the CHANNEL DIAL.
2. Loosen the wing nut on the megahertz tuning control and position the PRESET lever forward (against the tuning control).
3. Lift the lower and upper sections of the tuning control and turn them counterclockwise until the stop of the lower section strikes the PRESET lever.
4. Tighten the wing nut and position the PRESET lever away from the tuning control.
5. Set the BAND switch at 30-52. Turn the MEGAHERTZ tuning control until the first two digits of the lower frequency appear in the CHANNEL DIAL.
6. Position the PRESET lever forward (against the tuning control) and loosen the wing nut.
7. Lift the upper section of the MEGAHERTZ tuning control and turn it clockwise until the stop is aligned with the PRESET lever.

NOTE: Do not lift or move the lower section.

8. Keeping the stop aligned with the PRESET lever, push down the upper section and tighten the wing nut.

(c) If the difference between the two MEGAHERTZ tuning numbers is exactly 23, proceed as follows:

1. Set the BAND switch on the proper band and turn the MEGAHERTZ, tuning control so that the first two digits appear in the CHANNEL DIAL.
2. Loosen the wing nut of the MEGAHERTZ tuning control and position the PRESET lever forward (against the tuning control).
3. Lift the lower and upper section of the tuning control and turn them counterclockwise until the stop of the lower section strikes the PRESET lever. Push it down.
4. Lift the upper section and turn it clockwise until the stop is aligned with the PRESET lever.
5. Keeping the stops aligned with the PRESET lever, push down the upper section and tighten the wing nut.

n. Preset channels on KILOHERTZ tuning control as follows:

(1) Set the KILOHERTZ tuning control so that the last two numbers of the frequency having the lower digits appear in the CHANNEL DIAL.

(2) Loosen the wing nut on the KILOHERTZ tuning control and move PRESET lever forward (against tuning control).

(3) Lift the lower and upper sections of the tuning control and turn them counterclockwise until the stop of the lower section strikes the PRESET lever. Then tighten the wing nut.

(4) Position the PRESET lever away from the tuning control and turn the control until the last two numbers of the frequency having the higher two digits appear in CHANNEL DIAL.

(5) Position the PRESET lever forward and loosen the wing nut.

(6) Lift the upper section of the KILOHERTZ tuning control and turn it clockwise until the stop is aligned with the edge of the PRESET lever.

NOTE: Do not lift or move the lower section of the tuning control.

(7) Keeping the stop aligned with the edge of the PRESET lever, push down the upper section and tighten the wing nut.

NOTE: When presets are not being used the PRESET levers are positioned away from the tuning controls.

NOTES

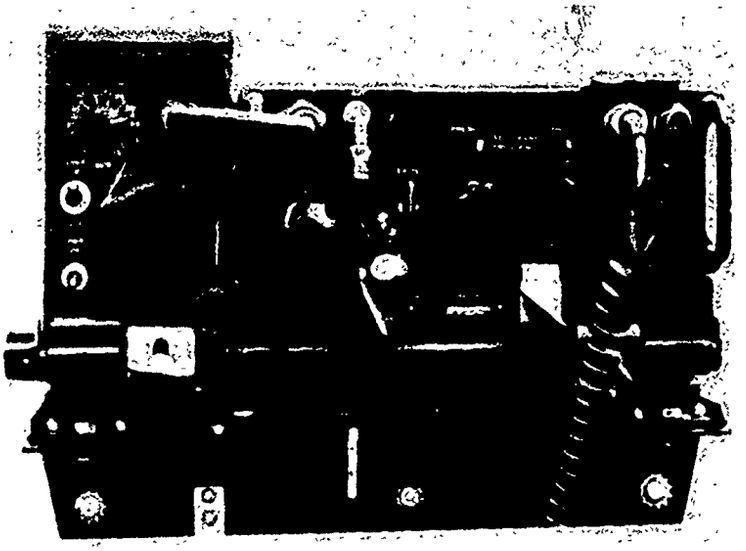


Figure 3-12. RADIO SET AN/VRC-53.

3-18. RADIO SET AN/VRC-53. (TM 11-5820-498-10)

a. The AN/VRC-53 is the vehicular model of the AN/PRC-25. It is to be used in vehicles where one channel communication of limited range such as has been provided by the AN/VRC-7 or Set 2 of the AN/GRC-7 is required. Operation of the set is the same as the AN/PRC-25 except for the manual tuning of the antenna.

b. Basic components:
- Receiver-Transmitter RT-505/PRC-25
- Amplifier Power Supply Group OA-3633
- Mount MT-1029/VRC
- Antenna AS-1729/VRC
- Handset H-138/U
- Installation Kit (for vehicle) containing:
  - Audio and power cables
  - Mounting brackets

c. Operational capabilities: (See paragraph 3-15d).

d. The Radio Set AN/VRC-53 is organic in the type units as follows:

| | BATTALION | | | | | BRIGADE | | | | | SEP BDE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | AM | Mech | Inf | Lt Inf | Abn | AM | Mech | Inf | Abn | Mech |
| Hq & Hq Co | 3 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 4 |
| Rifle Co | 0 | 0 | 0 | 0 | 10 | | | | | | | | |
| Total | 3 | 0 | 0 | 0 | 34 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 4 |

3-19. CHARACTERISTICS OF THE AN/VRC-53.

Type of set . . . . . Vehicular
Type of modulation . . . . . FM
Type of emission . . . . . Voice
Frequency coverage:

Low Band . . . . . 30 to 52.95 MHz
High Band . . . . . 53 to 75.95 MHz

| | |
|---|---|
| Number of channels | 920 |
| Channel Spacing | 50 KHz |
| Tuning | Detent (automatic calibration) |
| Preset Facilities | 2 channels |
| Operating range | 12 km |
| Power output | 1.5 to 2.0 watts |
| Power source | 24 volt vehicle battery |
| Antenna | AT-912 |
| Weight | Approximately 73 pounds |

3-20. RADIO SET AN/GRC-125. (TM 11-5820-498-10)

a. The AN/GRC-125 is commonly called the "On-Off vehicle set." This set incorporates the components, operational facilities and characteristics of the Portable Radio Set AN/PRC-25 Figure 3-10, and the Vehicular Radio Set AN/VRC-53 Figure 3-12 and can be operated as either a portable or vehicular radio. It weighs approximately 84 pounds, and has two operating ranges: 5-8 kms in the dismounted role and 10-12 kms in the mounted role.

NOTE: 1. When removing this radio from a vehicle to use it as a portable set, insure that the cap to the power connector (on the receiver-transmitter) is in place. The power from the battery BA-386 must pass through this cap to power the receiver-transmitter.

b. The Radio Set AN/GRC-125 is organic in the type units as follows:

| | BATTALIONS | | | | | BRIGADES | | | | | SEPARATE BDE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | AM | Mech | Inf | Lt Inf | Abn | AM | Mech | Inf | Abn | Mech |
| Hq & Hq Co | 6 | 0 | 19 | 0 | 14 | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 1 |
| Rifle Co | 3 | 1 | 2 | 0 | 4 | | | | | | | | |
| CS | | 9 | | 9 | | | | | | | | | |
| | 15 | 12 | 25 | 9 | 26 | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 1 |

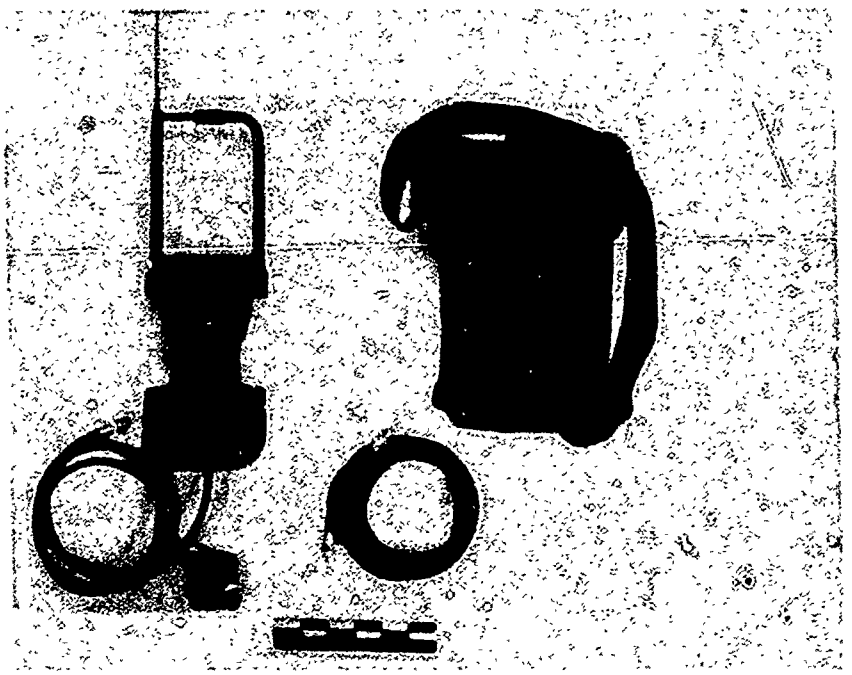


Figure 3-13. Antenna AT-784/PRC.

3-21. ANTENNA AT-784/PRC. (TM 11-5820-496-20)

a. The Antenna AT-784 is a lightweight, compact, homing device employed with the Portable Radio Set AN/PRC-25. When attached to the radio it is an effective homing device which permits the operator to find the direction of a radio transmitter tuned to his frequency. It is not issued as a component of any radio set.

b. The Antenna AT-784/PRC is organic to the following type units:

| | BATTALION | | | | | BRIGADE | | | | | SEP BDE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | AM | Mech | Inf | Lt Inf | Abn | AM | Mech | Inf | Abn | Mech |
| Hq & Hq Co | 3 | | 6 | | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rifle Co | 2 | 1 | 2 | 1 | 0 | | | | | | | | |
| CS | | | | | | | | | | | | | |
| Total | 9 | 3 | 12 | 3 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |



Figure 3-14. Antenna AT-984/G.

3-22. ANTENNA AT-984/G.

a. The Antenna AT-984/G is a 150 foot, end fed, directional antenna that is used to extend the range of low-power tactical radio sets. It is intended for use with radio sets that operate on frequencies between 30 and 76 megahertz. The range is greatest when both radio sets are equipped with this antenna. To employ this antenna the long antenna base must be used in conjunction with ring on AT-984/G.

b. Components of the AT-984/G:

1 - 150 foot antenna wire
1 - Connector
1 - Carrying bag
1 - Reel

c. The Antenna AT-984/G is organic to the following units:

| | BATTALION | | | | | BRIGADE | | | | | SEP BDE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | AM | Mech | Inf | Lt Inf | Abn | AM | Mech | Inf | Abn | Mech |
| Hq & Hq Co | 4 | 1 | 0 | 1 | 3 | 1 | 0 | 0 | 0 | 4 | 0 | 0 | 0 |
| Rifle Co | 1 | 2 | 0 | 2 | 1 | | | | | | | | |
| CS | | 0 | | 0 | | | | | | | | | |
| Total | 7 | 7 | 0 | 7 | 6 | 1 | 0 | 0 | 0 | 4 | 0 | 0 | 0 |

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# CHAPTER 4

# VEHICULAR FM RADIOS

# AN/GRC-3 THROUGH 8 SERIES

4-1. INTRODUCTION TO THE AN/GRC-3 THROUGH 8 SERIES. (TM 11-284)

a. The AN/GRC-3 through 8 series is a system of radio sets designed for the Infantry, Armor and Artillery. The system employs sub-units common to all three branches, and differing only in the frequency band assigned to each branch. These common sub-units are as follows:

(1) Set 1 ( a 16 km range receiver-transmitter and a power supply)
(2) Set 2 ( a 1.5 km range receiver-transmitter)
(3) Auxiliary receiver
(4) Interphone amplifier (Part of Set 2)
(5) Mount.

b. Radio Set AN/GRC-3 is the ARMOR combination of a SET 1, a SET 2 and an AUXILLARY RECEIVER. If the auxiliary receiver is removed, the radio set becomes an AN/GRC-4.

c. Radio Set AN/GRC-5 is the ARTILLERY combination of a SET 1, a SET 2 and an AUXILIARY RECEIVER. If the auxiliary receiver is removed, the radio set becomes an AN/GRC-6.

d. Radio Set AN/GRC-7 is the INFANTRY combination of a SET 1, a SET 2 and an AUXILIARY RECEIVER. If the auxiliary receiver is removed, the radio set becomes an AN/GRC-8.

e. It can readily be seen that the Armor branch uses the AN/GRC-3 and 4, the Artillery branch the AN/GRC-5 and 6, and the Infantry branch the AN/GRC-7 and 8, thus the name 3 through 8 series.

f. Subsequent to the assignment of nomenclature as outlined above, it was determined that other combinations of these same basic components would prove useful and highly desirable. The operation of the basic components and the various combinations are discussed in the succeeding pages.

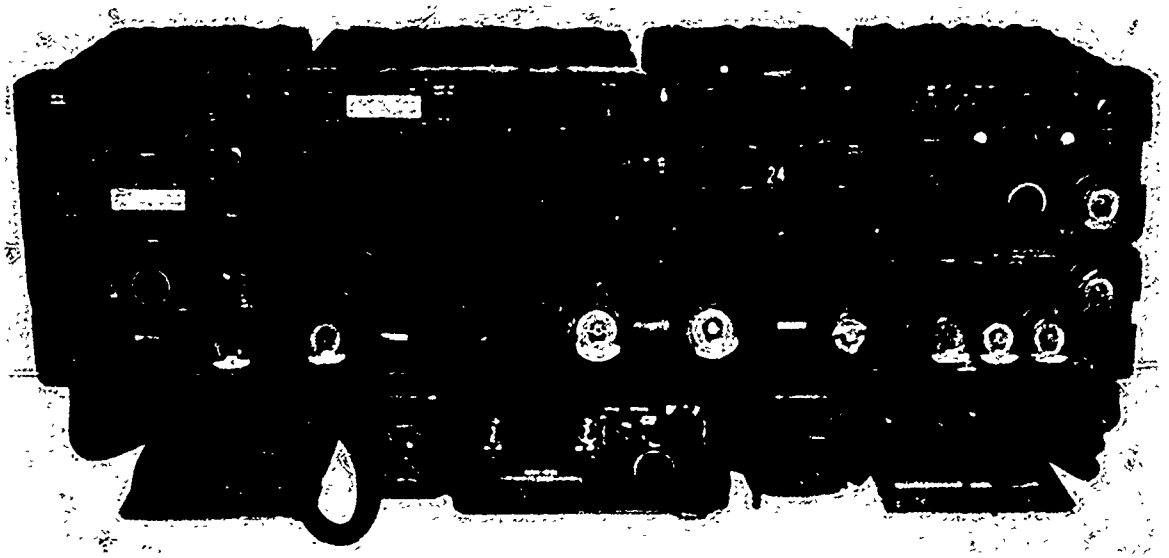


Figure 4-1. Radio Set AN/GRC-7.

4-2. RADIO SET AN/GRC-7.

a. Radio Set AN/GRC-7 consists of a Set 1, a Set 2 and an auxiliary receiver. It is capable of communicating with all other frequency modulated radio sets found in the Infantry, Airborne and Mechanized Divisions.

b. Radio SETS AN/GRC-3 and AN/GRC-5 are similar to the AN/GRC-7 and are intended for communication in armor and artillery units respectively. The basic difference between these three radio sets is the frequency coverage of some of the components (Fig. 2-3).

c. OPERATIONAL CAPABILITIES:

Monitor three different nets simultaneously.
Transmission over two different nets.
Interphone facilities.
Automatic retransmission.
Duplex operation.
Operation by remote control.

4-3. CHARACTERISTICS OF THE AN/GRC-7.

| | |
|---|---|
| Type of set | vehicular |
| Type of modulation | FM |
| Type of emission | voice |
| Frequency coverage: | |
| Set 1 and auxiliary receiver | 38 to 54.9 MHz |
| Set 2 | 47 to 58.4 MHz |
| Number of channels: | |
| Set 1 and auxiliary receiver | 170 |
| Set 2 | 115 |
| Tuning (all components) | continuous |
| Channel spacing (all components) | 100 KHz |
| Preset facilities: | |
| Set 1 | 2 |
| Set 2 | 2 |
| Auxiliary receiver | 3 |
| Operating range: | |
| Set 1 | 16 km |
| Set 2 | 1 1/2 km |
| Power output | |
| Set 1 | high - - 16 watts |
| | low - - 2 watts |
| Set 2 | .5 watt |
| Power source | vehicular battery |
| | 12 or 24 volts |
| Antenna: | |
| Set 1 (MS-117 & AB-24) | 1.5 meter whip |
| Set 2 (AB-22 & AB-24) | 1 meter whip |
| Auxiliary receiver | (shares Set 1) |
| Weight | 215 pounds |

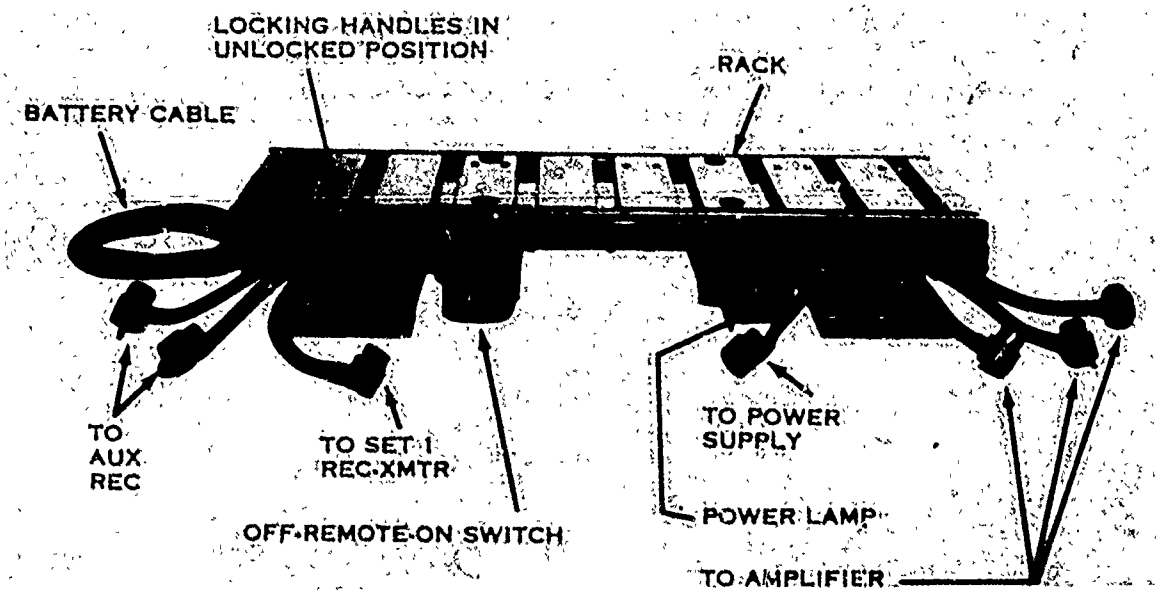



Figure 4-2. Mount MT-297/GR.

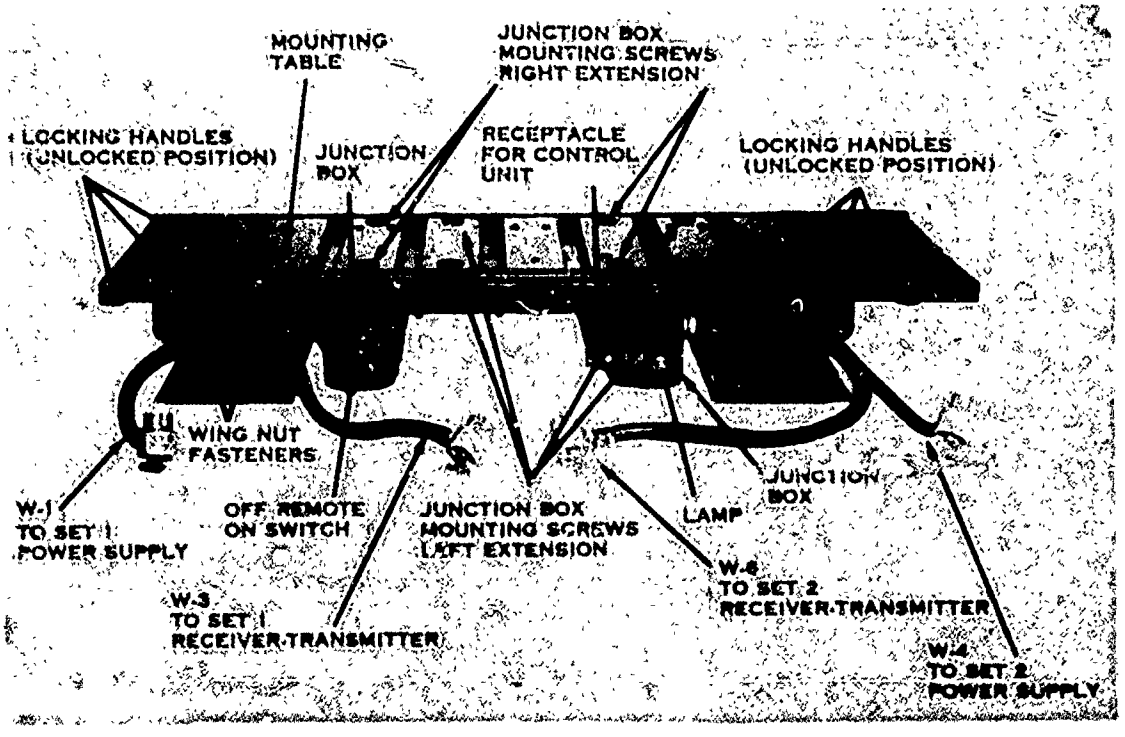



Figure 4-3. Mount MT-298/GR.

4-4. MOUNTS.

a. The MOUNT of the AN/GRC-3 through 8 series of radios is a major component of each set. It is absolutely necessary for the vehicular installation of the sets.

b. Several different MOUNTS are used for the various sets. They are:

(1) MT-297/GR (AN/GRC-7, AN/GRC-8 and AN/VRC-15. (Figure 4-2)

(2) MT-298/GR (AN/VRQ-3). (Figure 4-3)

(3) MT-299/GR (AN/VRC-10). (Figure 4-4)

(4) MT-300/GR (AN/VRC-7). (Figure 4-5)

(5) MT-327/GR (AN/VRC-18). (Figure 4-6)

c. These MOUNTS perform three basic functions on the sets as follows:

(1) Serve as a platform for the other major components of the sets.

(2) Act as a distribution unit for power.

(3) Act as a distribution unit for audio signals.

d. Operation.

(1) The MOUNTS MT-297/GR and MT-298/GR have a MAIN POWER switch. This switch is similar to a master switch, in that it makes power available to the components on top of the mount or cuts the power off at the mount.

(2) The MAIN POWER switch has three positions; their functions are as follows:

(a) OFF--power is cut off at the mount.

(b) REMOTE--used in conjunction with the Remote Control Group AN/GRA-6 (see paragraph 4-31).

(c) ON--power is available to the components on top of the mount.

(3) The MOUNTS (MT-299/GR, MT-300/GR and MT-327/GR do not have a main power switch, therefore the various components are turned on and off at the proper switches on the control panel of the actual components.

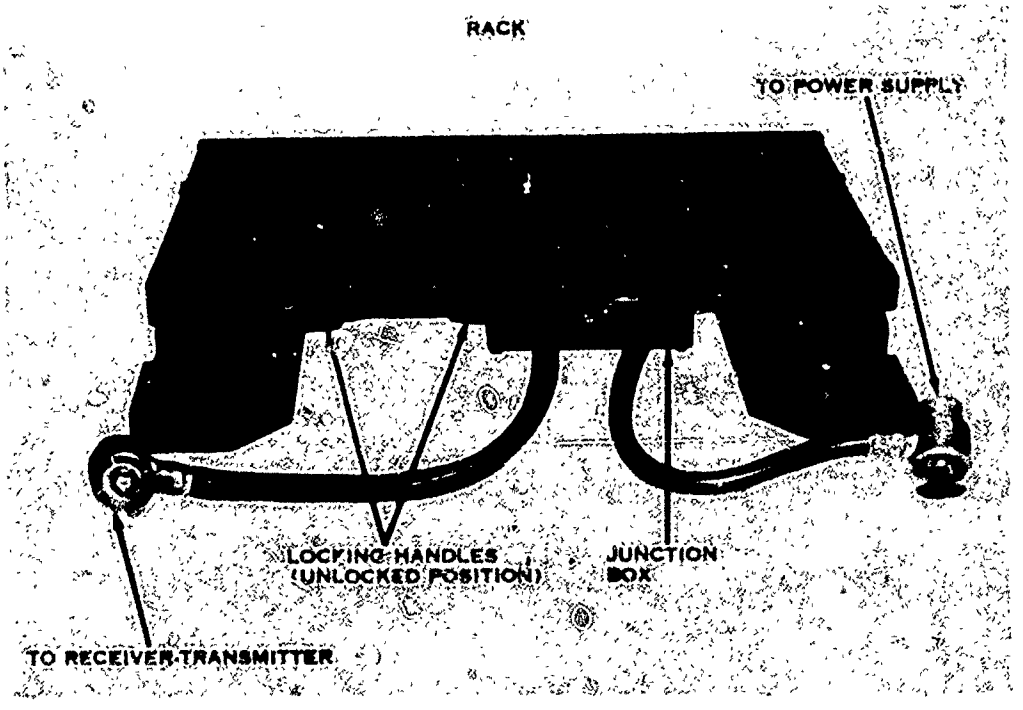



Figure 4-4. Mount MT-299/GR.

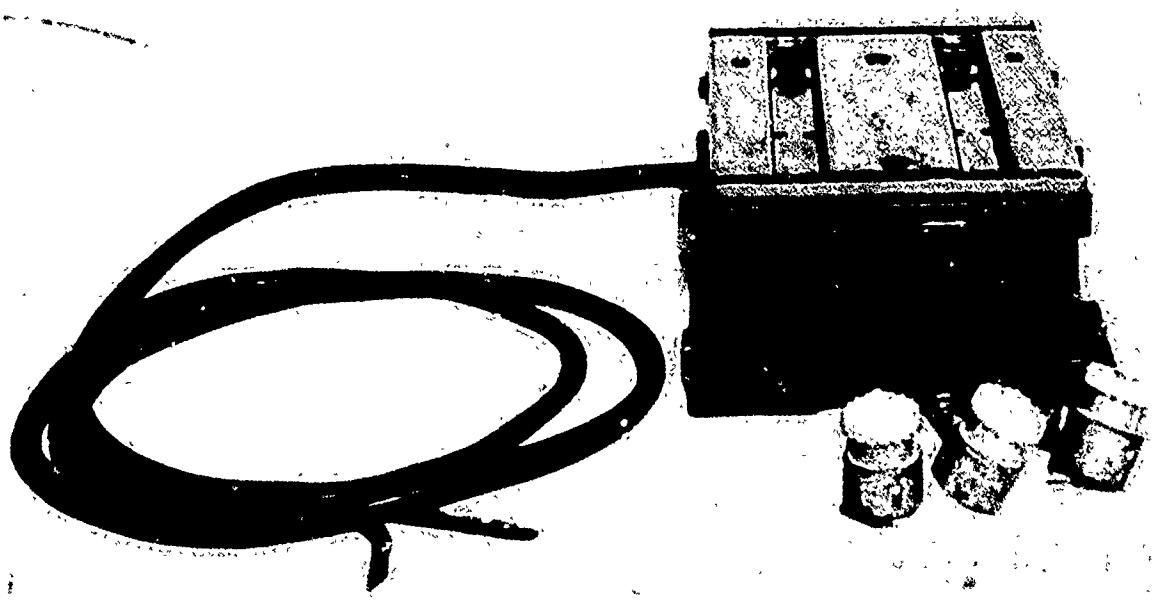


Figure 4-5. Mount MT-300/GR.

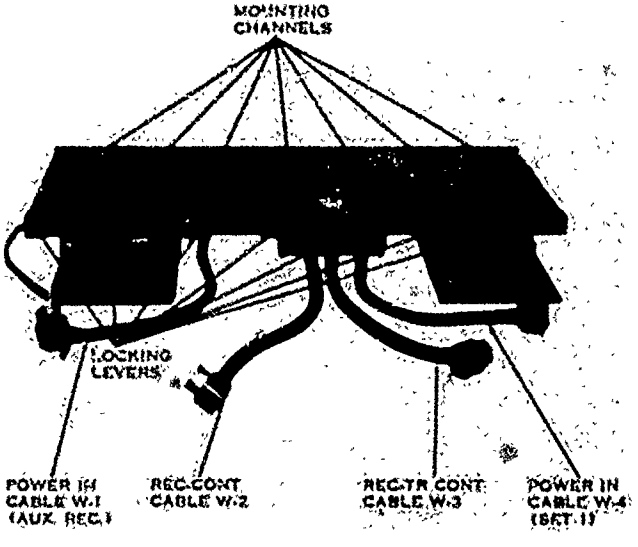



Figure 4-6. Mount MT-327/GR.

4-5. SET 1.

a. Set 1 consists of the receiver-transmitter RT-68/GRC and a power supply. Set 1 is a component of Radio Sets AN/GRC-7, AN/GRC-8, AN/VRC-10, AN/VRC-15, AN/VRC-18 and AN/VRQ-3.

b. Set 1 is the most powerful component of the AN/GRC-3 through 8 series.

c. Two different power supplies are used for Set 1, for a 12-volt installation Power, Supply PP-109/GR is used and a 24-volt Power Supply PP-112/GR is used. The purpose of the power supply is to convert the power delivered through the mount to usable voltage for the RT-68/GRC.

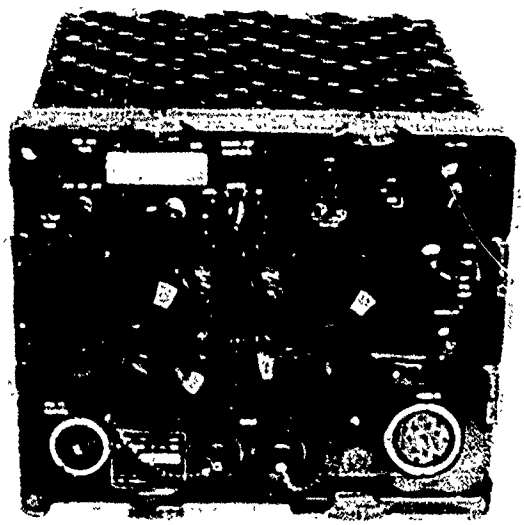


Figure 4-7. Receiver-Transmitter RT-68/GRC.

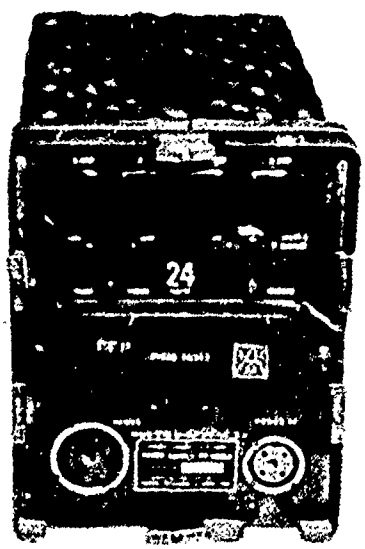



Figure 4-8. Power Supply PP-112/GR.

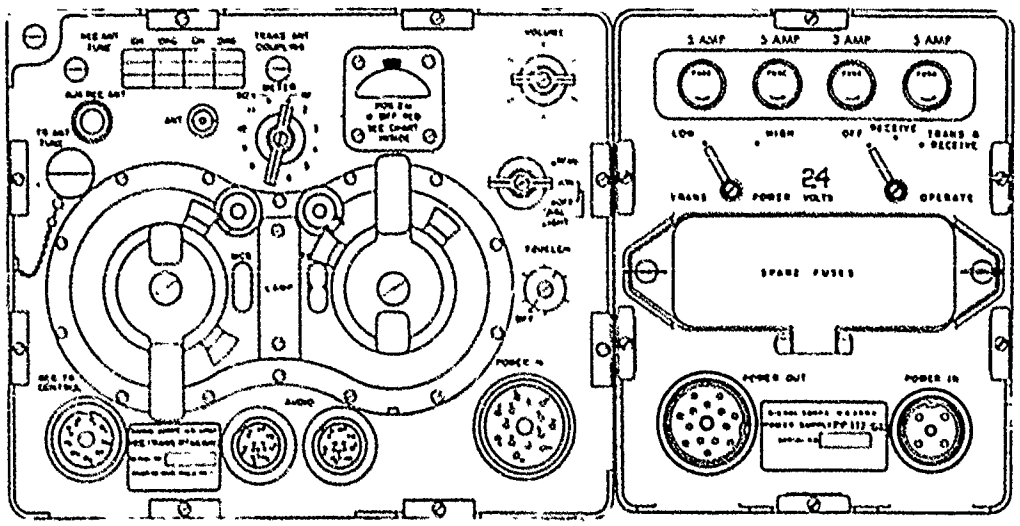



Figure 4-9. Set 1, Control Panel.

4-6. OPERATION OF SET 1.

a. When operating Set 1 as part of Radio Sets AN/GRC-7, AN/GRC-8, AN/VRC-15, or AN/VRQ-3 or their counterparts in the Armor and Artillery, turn the MAIN POWER switch on the MOUNT to the ON position. (This step is not necessary when operating Set 1 as part of Radio Sets AN/VRC-10 or AN/VRC-18 or their counterparts in the Armor or the Artillery since their mounts have no MAIN POWER switch.)

b. Turn the OPERATE switch to the TRANS & RECEIVE position.

c. Turn the TRANS POWER switch to the LOW position.

d. Turn the MCS control and the TENTH OF MCS control until the desired frequency appears in the dial windows. If the STOPS limit the movement of the TUNING control, pull the STOPS out and turn them up. (Set 1 requires no calibration.)

e. Turn the VOLUME control fully clockwise.

f. Turn the SQUELCH control OFF.

g. Insure that the METER switch is in the RF position.

h. Connect a handset to either AUDIO connector.

i. Press the PUSH-TO-TALK switch on the HANDSET, pause for a moment, and then attempt to contact the distant station; release the PUSH-TO-TALK switch to listen.

j. If no contact is established, turn the TRANS POWER switch to the HIGH position and repeat step i above.

NOTE: The MCS and TENTH OF MCS controls have a detented effect. This effect may be eliminated on the TENTH OF MCS control and thus attain continuous tuning. In order to eliminate the detented effect, turn the TENTH OF MCS control all the way counterclockwise and apply slight pressure outward. This will free the detented effect and the tuning on an incoming signal may be refined easily by adjusting this control slightly until the best reception is obtained. To restore the detented effect, turn the TENTH OF MCS control all the way clockwise and apply slight pressure outward.

k. After contact is made with the desired station(s) adjust the VOLUME control for the desired audio level.

l. For adjustment of the SQUELCH control see paragraph 3-10 NOTE.

4-7. PRESETTING OF SET 1.

a. Two frequencies may be preset on Set 1 by means of the preset levers and the stops. Presetting is obtained by stops which limit the rotation of the tuning controls. The stops can be swung into place for presetting or removed when presetting is not desired by adjusting the knobs. When in place for presetting the stops, engage the green and red levers on the tuning controls as the controls are rotated. The positions of the green and red lever can be changed so that the stops will function for any desired frequency.

b. Figure 28 illustrates an example of the preselection of two channels. In illustrating this procedure the green preset levers have been used for the higher frequency and the red ones for the lower frequency. The opposite is equally suitable.

4-8. TESTING OF SET 1.

a. By means of the METER and the METER switch it is possible to test SET 1 to find out whether it is working properly or not. The normal position of the METER switch is the RF position. This position is not a test position; it simply gives us a relative indication of the amount of power delivered to the antenna system when the set is transmitting.

b. Positions 2 through 6 are testing positions for the transmitter of Set 1, and positions 7 through 11 are testing positions for the receiver of Set 1. The last position which may be 90 or 85 volts tests the DC supply for the set.

c. In order to test the set, follow the steps outlined in paragraph 4-6a through 4-6h and then perform the following steps.

d. Turn the METER switch to position 2 and press the PUSH-TO-TALK switch on the handset. The needle on the METER should deflect into the red or the vicinity of the red. Release the PUSH-TO-TALK switch. If the needle does not move or if it gives a full scale deflection, it is indicative of a defective stage and the set should be checked by a repairman.

e. Turn the METER switch to position 3 and perform the same operation as d above. Follow the same procedure for positions 4, 5, and 6. This completes the testing of the transmitter. In all five positions (2, 3, 4, 5, and 6), the needle should deflect into the red or the vicinity of the red.

f. Turn the METER switch to position 7 and the needle should deflect into the red or the vicinity of the red.

g. Repeat step f above for positions 8, 9, 10, and 11. This completes the testing of the receiver.

h. Turn the METER switch to the 90 V (85 V) position and the needle should deflect into the red or the vicinity of the red.

i. Possible deficiencies and corrections are outlined below:

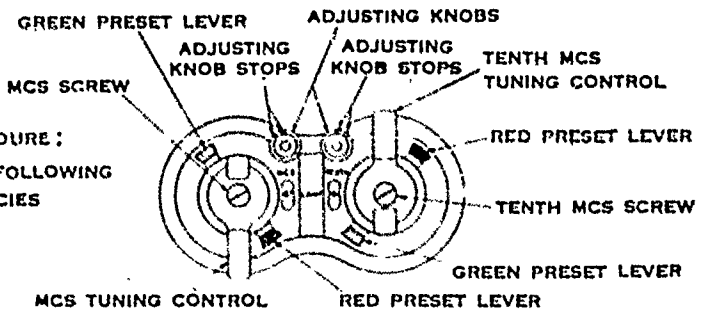
NOTE: There are four fuzes on the power supply. These fuses are safety devices to protect the equipment. They are numbered F1, F2, F3, and F4 from right to left as you face the panel of the set.

(1) No reading or a low reading in the RF position. Turn the TRANS POWER switch to the HIGH position. The reading should increase. If there is no change on the reading, replace F4. If the reading is still low, retune the antenna system (para 4-18).

(2) No readings on positions 2 through 6, but good readings on positions 7 through 90V, replace F3.

(3) Good readings on positions 2 through 11, but no deflection on 90V, replace F2.

(4) No deflection on positions 2 through 11, but a good reading on 90V, replace F1.




EXAMPLE PROCEDURE:

PRESET THE FOLLOWING TWO FREQUENCIES

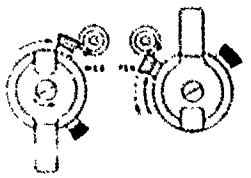
1 47.6

2 41.2

1. SET THE HIGHER OF THE TWO FREQUENCIES ON THE MCS AND TENTH MCS TUNING DIALS.



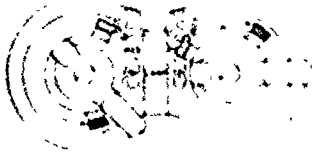
2. PULL OUT AND TURN THE TWO STOP ADJUSTING KNOBS SO THAT THE STOPS WILL BE POSITIONED TO ENGAGE THE GREEN AND RED PRESET LEVERS. THESE KNOBS SHOULD LOCK IN POSITION.



3. LOOSEN MCS SCREW AND TURN GREEN LEVER CLOCKWISE UNTIL IT STRIKES STOP. HOLD LEVER IN THAT POSITION AND TIGHTEN THE MCS SCREW.

4. LOOSEN TENTH MCS SCREW. TURN GREEN LEVER CLOCKWISE* UNTIL IT STRIKES STOP. HOLD LEVER IN THAT POSITION AND TIGHTEN THE TENTH MCS SCREW.

*IF TENTH PORTION OF HIGHER FREQUENCY IS LOWER THAN THE TENTHS PORTION OF LOWER FREQUENCY THEN THE TENTH MCS PRESET LEVERS SHOULD BE TURNED IN AN OPPOSITE DIRECTION.



5. SET 41.2 ON THE MCS AND TENTH MCS DIALS. HOLD THE FIRST GREEN PRESET LEVER IN PLACE AND LOOSEN THE MCS SCREW. TURN THE RED PRESET LEVER COUNTERCLOCKWISE UNTIL IT STRIKES STOP. HOLD BOTH LEVERS IN POSITION AND RETIGHTEN MCS SCREW.

6. HOLD GREEN PRESET LEVER IN PLACE AND LOOSEN THE TENTH MCS SCREW. TURN THE RED PRESET LEVER COUNTERCLOCKWISE* UNTIL IT STRIKES STOP. HOLD BOTH LEVERS IN POSITION AND RETIGHTEN TENTH MCS SCREW.

Figure 4-10. Presetting of Set 1 Frequencies.

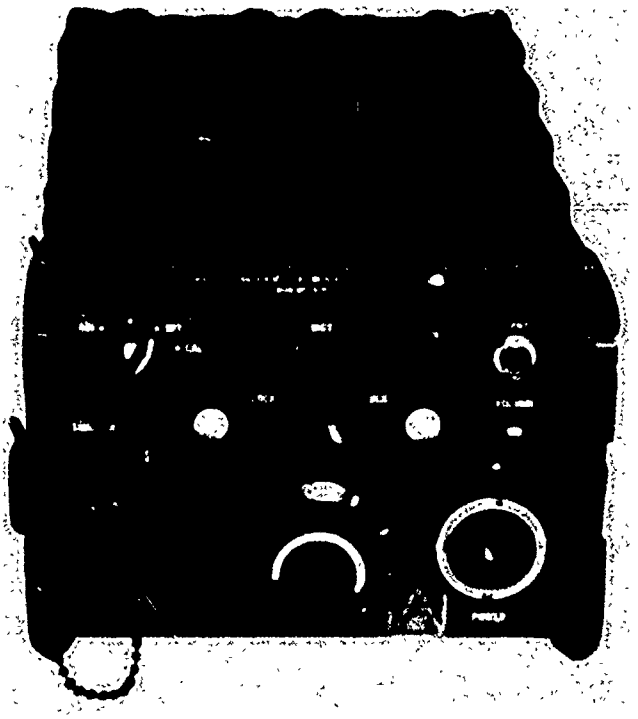


Figure 4-11. Receiver-Transmitter RT-70/GRC.

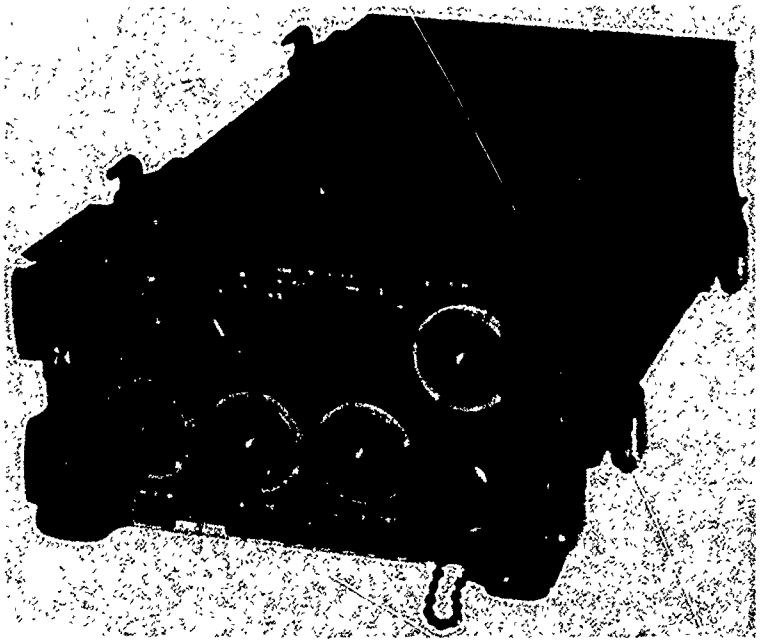


Figure 4-12. AF Amplifier AM-65/GRC.

4-9. SET 2.

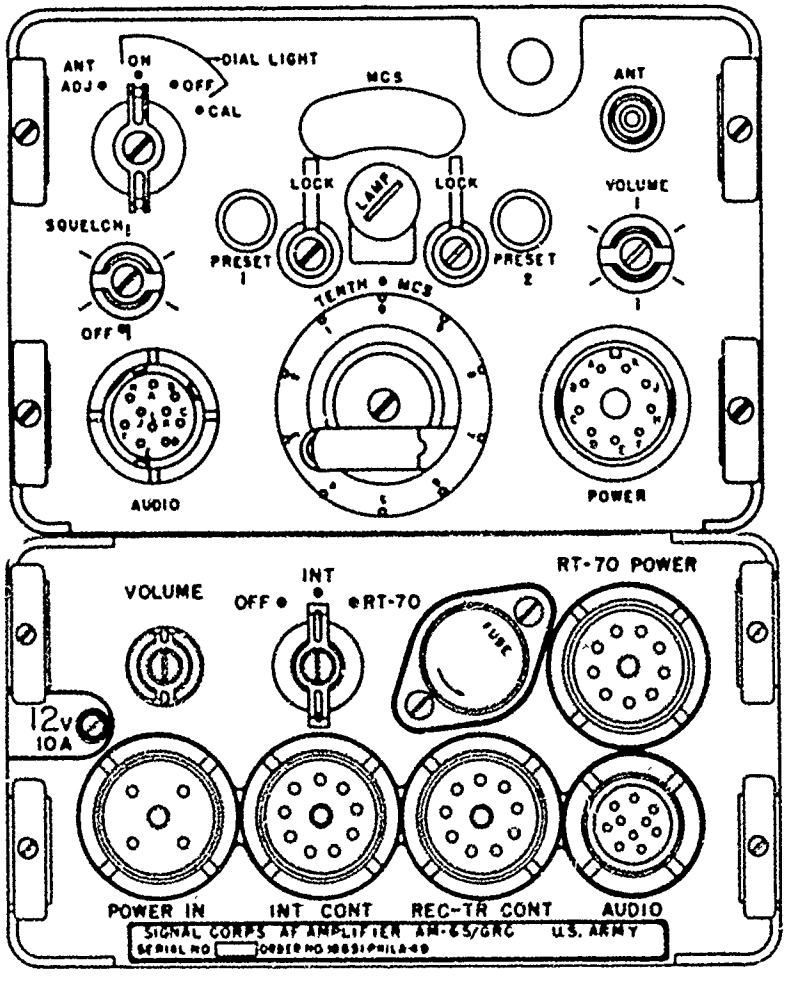
a. Set 2 consists of the receiver-transmitter RT-70/GRC and the AF Amplifier AM-65/GRC. Set 2 is a component of Radio Sets AN/GRC-7, AN/GRC-8 and their counterparts in the Armor and the Artillery. (The AF Amplifier AM-65/GRC is a component of Radio Set AN/VRC-15 and its counterpart in the Armor and the Artillery.)

b. Audio Frequency Amplifier AM-65/GRC. This amplifier is designed to provide interphone communication and radio monitoring in vehicular installations that require communication between crew members such as a tank. It is also used to furnish usable power to the receiver-transmitter RT-70/GRC in such installations as the AN/VRC-7 and AN/GRC-7 and 8. This amplifier performs three basic functions:

(1) Furnishes power to the receiver-transmitter RT-70/GRC. The amplifier has an internal power supply designed to convert the power delivered through the mount to usable voltage for the RT-70/GRC. The internal Power Supply used is the PP-281/GRC for 12 volt operation or the PP-282/GRC for 24 volt operation (Fig. 4-14).

(2) Amplification of audio signals. Signals received by the various receivers are fed through the mount to the amplifier where they are amplified. At the AUDIO connector on the amplifier all incoming signals to the set may be monitored.

(3) Provides interphone facilities such as the one required by the members of the crew of an armored vehicle.



4-10. OPERATION OF SET 2.

a. Turn the MAIN POWER switch on the MOUNT to the ON position.

b. Turn the OFF-INT-RT 70 switch to the INT position and then to the RT-70 position.

*

CAUTION: When operating radio set AN/VRC-15 DO NOT turn this switch to the RT-70 position inasmuch as it may damage the amplifier.

c. Turn the VOLUME control on the AMPLIFIER fully clockwise.

d. Turn the VOLUME control on the RT-70/GRC fully clockwise.

e. Turn the SQUELCH control OFF.

f. Turn the TENTH MCS TUNING control to the closest whole megahertz to the operating frequency. (Set 2 provides calibration points at every whole megahertz.)

g. Connect a HANDSET to the AUDIO connector on the RT-70/GRC or the AMPLIFIER.

h. Hold the ANT ADJ-DIAL LIGHT-CAL switch in the CAL position and adjust the TUNING control for a zero beat in the HANDSET. Release the ANT ADJ-DIAL LIGHT-CAL switch and the TENTH MCS TUNING control.

i. If the zero on the circular dial is directly below the white dot, the set is properly calibrated. If it is not directly below, the dial must be corrected mechanically. To correct the dial mechanically, hold the TENTH MCS TUNING control firmly, press the circular dial in against the panel of the set and rotate it until the zero is directly below the white dot. Release the circular dial.

j. Tune the set to the operating frequency by moving the TENTH MCS TUNING control until the whole megahertz is in the vicinity of the hairline in the DIAL window and the desired tenth of megahertz on the circular dial is directly below the white dot.

k. When operating Set 2 the handset must be connected to the AUDIO connector on the RT-70/GRC (Set 2). To transmit, press the PUSH-TO-TALK switch, pause momentarily, and then start the transmission. Release the PUSH-TO-TALK switch to listen. (Location of the handset for other radios in which Set 2 is a component are discussed elsewhere in this publication.) NO TRANSMISSION OVER THE AIR IS POSSIBLE FROM THE AUDIO connector ON THE AMPLIFIER.

l. As soon as contact is established with the desired station(s), adjust the VOLUME control(s) for the desired audio level.

m. For adjustment of SQUELCH control see paragraph 3-10 NOTE.

4-11. PRESETTING OF SET 2.

a. There are provisions to preset any two frequencies on Set 2. The two locking levers labeled PRESET 1 and PRESET 2 are used to preset these frequencies. When the frequencies have been preset, they may be selected rapidly by turning the TENTH MCS TUNING control until the desired preset is engaged. To preset any two frequencies, perform the steps outlined below:

(1) Release the two PRESET levers by turning each of them to the horizontal position.

(2) Turn the TENTH MCS TUNING control to each end of its range (47.0 mc and 58.4 mc) and apply slight pressure outwards in each direction.

(3) Calibrate and tune to one of the desired frequencies.

(4) Turn one of the PRESET levers to the vertical (LOCK) position. Mark the preset frequency on the label next to the lever.

(5) Calibrate and tune to the other desired frequency.

(6) Turn the other PRESET lever to the vertical (LOCK) position. Mark the preset frequency on the label next to the lever.

NOTE: Unless the preset frequencies are labeled, it is impossible to tell which lever controls which preset frequency.

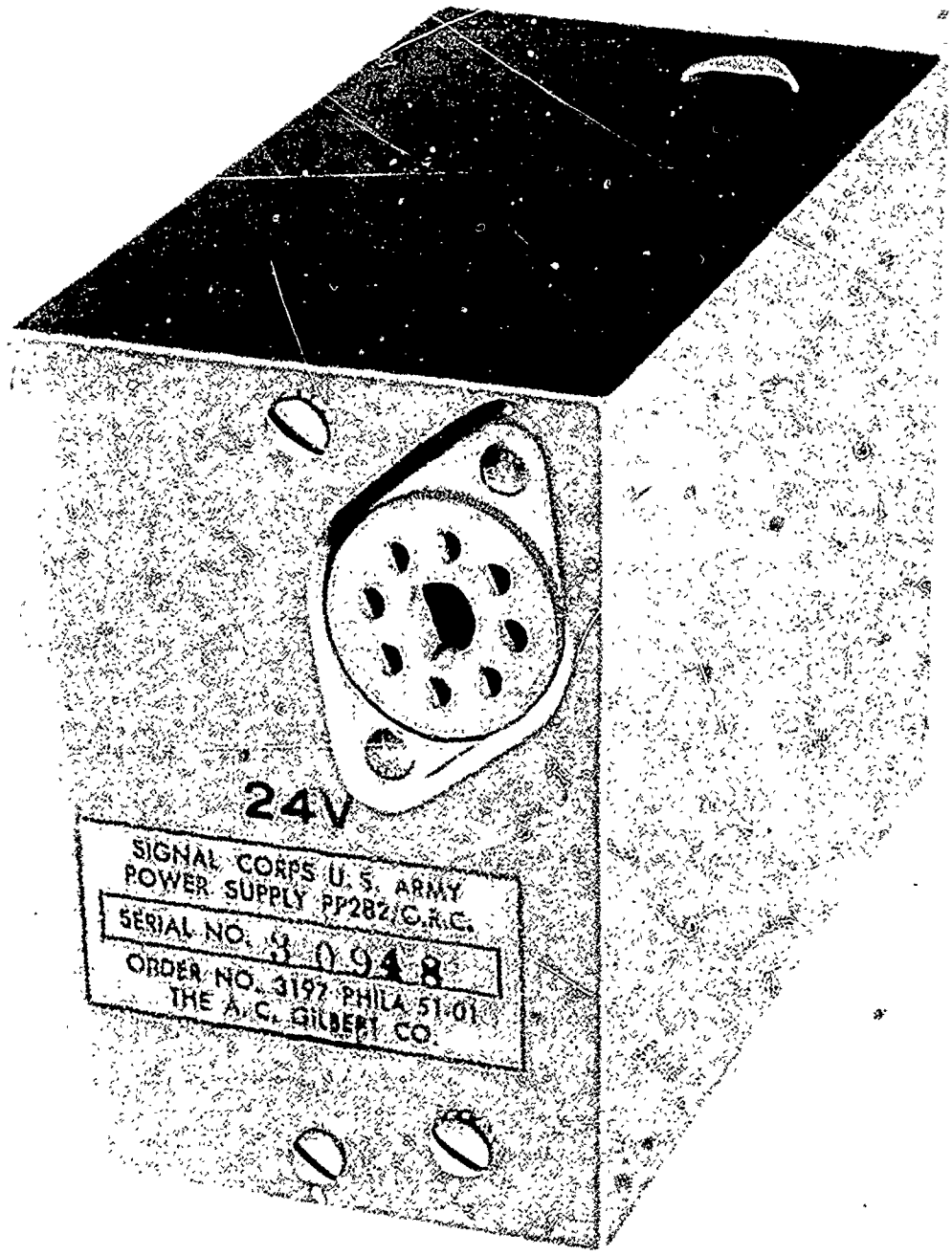



Figure 4-14. Power Supply PP-282/GRC.

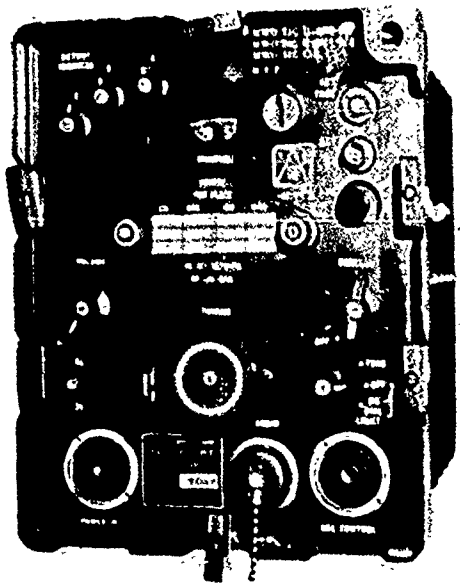


Figure 4-15. Radio Receiver R-110/GRC.

4-12. RADIO RECEIVER R-110/GRC.

a. The receiver R-110/GRC commonly known as the AUXILIARY RECEIVER, allows the monitoring of an additional net.

b. This receiver is a component of Infantry Radio Sets AN/GRC-7, AN/VRC-18 and AN/VRC-22. The Receiver R-108/GRC and R-109/GRC are similar to the R-110/GRC and are used in the Armor and Artillery respectively.

c. This receiver has an internal power supply similar to the one found in the Amplifier AM-65/GRC (para 4-9b(1)).

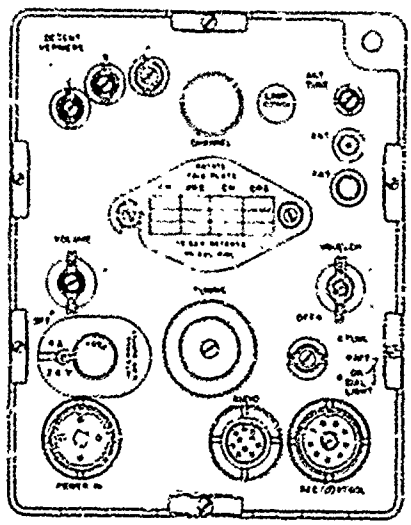


Figure 4-16. Radio Receiver R-110/GRC, Control Panel.

NOTES

4-13. OPERATION OF THE AUXILIARY RECEIVER.

To tune the auxiliary receiver to a desired operating frequency, it must first be calibrated to the nearest calibration check point, by performing the following steps.

a. If operating the auxiliary receiver as a component of the AN/GRC-7, turn the MAIN POWER switch on the mount to the ON position. This step is not necessary when operating the auxiliary receiver as a component of the AN/VRC-18 since the mount of that set has no main power switch.

b. Turn the OFF-VOLUME control fully clockwise.

c. Turn the SQUELCH control to the OFF position.

d. Turn the TUNING control to the desired frequency, then turn the TUNING control to the closest calibration check point to that frequency. (The calibration check points appear on the dial in the form of red dots.) There are four calibration points (red dots) located at 38.7 MHz, 43.0 MHz, 47.3 MHz, and 51.6 MHz. They are spaced 4.3MHz apart.

e. Hold the DIAL LIGHT OFF-ON TUNE switch in the TUNE position and adjust the TUNING control slightly until the zero beat is obtained. The zero beat is an indication that the receiver is tuned to the calibrate frequency. Release the TUNING control and the DIAL LIGHT OFF-ON TUNE switch. If the red dot and the hairline coincide, calibration has been completed. If they do not coincide, the dial must be corrected mechanically.

f. To correct the dial mechanically, loosen both thumbscrews on the diamond shape plate. Swing the plate out of the way in a clockwise direction, and then tighten the right thumbscrew so that the plate will stay out of the way. Now exposed to view within this compartment are nine screws (Fig. 4-17).

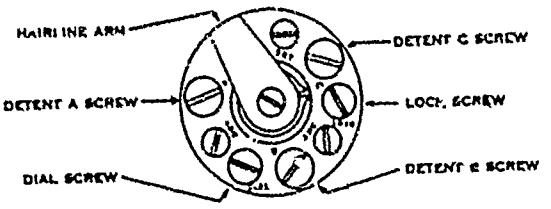
g. Loosen the LOCK screw approximately 1/2 turn counterclockwise, then turn the DIAL screw in the desired direction until the hairline and the red dot coincide. Tighten the LOCK screw approximately 1/2 turn clockwise.

h. Turn the TUNING control to the operating frequency.

i. When transmissions are received, adjust the OFF-VOLUME control for the desired audio level.

j. For adjustment of the SQUELCH control, see paragraph 3-10 NOTE.

NOTE: If the Mount of the radio set is a modified one, not only the output of the auxiliary receiver will be heard at its AUDIO connector but also the output of Set 1 will be heard as well.




CAUTION: 1. DO NOT ATTEMPT TO ADJUST THE CENTER SCREW OR THE THREE SMALL SCREWS DIRECTLY ABOVE THE WORD "DET."
2. ANY TIME YOU ADJUST ANY OTHER SCREW, HOLD THE TUNING CONTROL FIRMLY TO PREVENT THE DIAL FROM MOVING FREELY.

Figure 4-17. Auxiliary Receiver, Screws.

4-14. PRESETTING OF THE AUXILIARY RECEIVER.

There are provisions to preset any three channels on the auxiliary receiver. The presets are normally referred to as "A," "B," and "C." When it is desired to preset any three channels perform the following steps:

a. Determine the center frequency of the three presets. For example, if you were to preset 44.0 MHz, 46.0 MHz and 50.0 MHz, the center frequency, based on the two extreme frequencies would be 47.0 MHz. Using 47.0 MHz as your operating frequency, calibrate the receiver following the steps outlined in paragraph 4-10a through h above. As soon as you complete calibrating the receiver at center frequency continue as outlined below from b through i.

b. There are three flags bearing the letter "A," "B," and "C" that play a part in presetting. These flags will normally be found locked to old presets, however, if they are not locked, they will be found at either extreme of the dial (38.0 MHz or 55.0 MHz). To find these flags turn the TUNING control through its entire range, as you come to an old preset, one of the flags will drop on the DIAL WINDOW, to release this flag, turn the corresponding screw behind the diamond shape plate (DET A, DET B or DET C) approximately 1/2 turn counterclockwise. The DETENT screws are the recessed screws between the word DET and the letter A, B, or C. Continue the same procedure until all three flags are released and visible at the WINDOW.

c. Place the three DETENT VERNIERS knobs A, B, and C so that they will have approximately equal travel in both directions clockwise and counterclockwise.

d. Turn the tuning control to both ends of the dial to insure all detents are cleared.

e. You are now ready to lock the flags to the new frequencies. Turn the dial to the first frequency (44.0 MHz), then tighten the DET A screw approximately 1/2 turn clockwise. As you move the DIAL away from 44.0 MHz the "A" flag will disappear from the window, as you come back to 44.0 MHz the "A" flag will drop on the window indicating to you that you are on your "A" preset.

f. Turn the DIAL to your second frequency (46.0 MHz), then tighten the DET B screw approximately 1/2 turn clockwise.

g. Turn the DIAL to your third frequency (50.0 MHz), then tighten the DET C screw approximately 1/2 turn clockwise.

h. At this time you have completed presetting three channels on the auxiliary receiver.

i. If at any time you are receiving a transmission on any one of the presets and it sounds distorted, you will be able to refine your tuning of that particular preset by adjusting the corresponding DETENT VERNIER.

NOTES: 1. For the purpose of simplicity this explanation describes the presetting procedure in phases, however the operation of unlocking a flag and relocking it to a new frequency is completely independent of the other two flags. Therefore it can be done to each individual flag without having to unlock the other two.

2. In the example used for this explanation, flags A, B, and C were locked to frequencies in ascending order, however they may be locked in any order the operator desires.

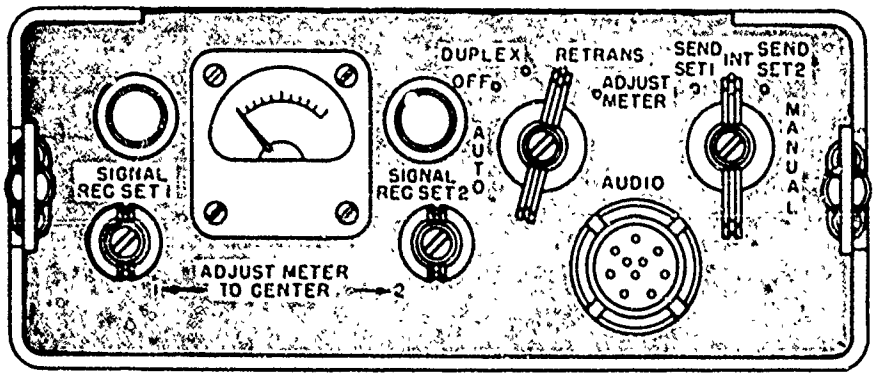



Figure 4-18. Control C-435/GRC Control Panel.

4-15. CONTROL C-435/GRC.

a. The Control Unit is a component of Radio Sets AN/GRC-7, AN/GRC-8, AN/VRQ-3, and their counterparts in the Armor and the Artillery. It is installed into the mounts of these radios and the entire set is normally operated from this unit.

b. The Control Unit provides three operational facilities, which are MANUAL OPERATION of the entire set, DUPLEX OPERATION and AUTOMATIC RETRANSMISSION.

c. MANUAL OPERATION--From the AUDIO connector of the control unit it is possible to utilize the interphone capability and to monitor all incoming signals into the set and to transmit over Set 1 or Set 2 at the selection of the operator. To operate from the control unit perform the following steps:

(1) Connect a HANDSET to the AUDIO connector.

(2) Insure that the AUTO switch is in the OFF position.

(3) All signals received by Set 1, Set 2, and the Auxiliary Receiver (if any) will be heard at the Control Unit.

(4) To transmit over Set 1, hold the MANUAL switch in the SEND SET 1 position, press the PUSH-TO-TALK switch on the handset, and talk into the microphone. Release them to listen.

(5) To transmit over Set 2, hold the MANUAL switch in the SEND SET 2 position, press the PUSH-TO-TALK switch on the handset, and talk into the microphone. Release them to listen.

NOTE: It is possible to hear signals received by Set 1 and/or the Auxiliary Receiver while transmitting over Set 2. Conversely, it is possible to hear signals received by Set 2 while transmitting over Set 1.

d. DUPLEX OPERATION--Duplex or break-in operation is the ability to transmit and receive simultaneously between two stations. No single component of the AN/GRC-3 through 8 family of radios is capable of this type of operation. Duplex is obtained by combining the use of two components. Normal Duplex Operation is the type in which Set 1 and Set 2 are used simultaneously, both stations use Set 1 for transmitting and Set 2 for receiving, therefore while the operator is transmitting over Set 1 he is able to receive transmissions from the distant station over Set 2.

(1) For Normal Duplex Operation the two stations must transmit on different frequencies (Fig. 4-19).

(2) Both stations must turn the AUTO switch to the DUPLEX positions.

CAUTION: Whenever the AUTO switch is turned to the DUPLEX position it will activate the transmitter of Set 1. Duplex Operation should not exceed 15 minutes in duration inasmuch as the power supply of Set 1 will get extremely hot and it may be damaged.

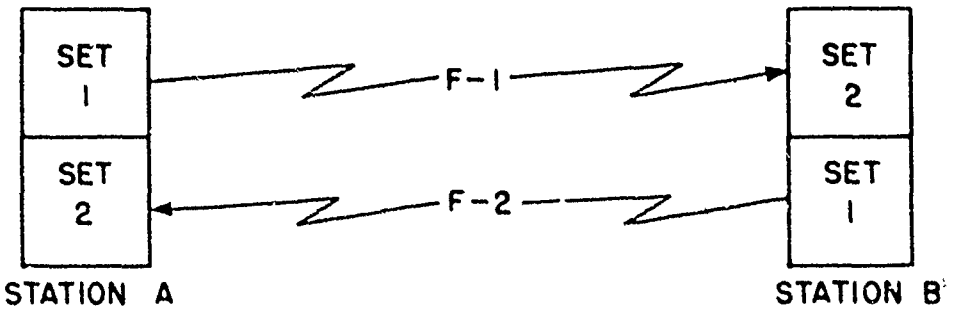



Figure 4-19. Duplex Operation.

(3) Duplex operation may also be employed using Set 1 and the Auxiliary Receiver. This procedure is the same as in par (2) above except that the Auxiliary Receiver is employed in place of Set 2. When using the Auxiliary Receiver for Duplex Operation a separate antenna is used for Set 1 and the Auxiliary Receiver.

(4) Duplex operation can be employed without using the Control Unit C-435 in any radio installation where a separate receiver and transmitter is available. These combinations can be two transceivers (Set 1 and 2, two Set 1's, two Set 2's), one transceiver and one Auxiliary Receiver (Set 1 + Aux Rec, Set 2 + Aux Rec) or any single transmitter and receiver that are not electrically joined as in the AN/GRC-19 (para 7-4).

c. AUTOMATIC RETRANSMISSION--Retransmission facilities provide a radio link between two sets which are too widely separated to permit direct communication, or which cannot be tuned to the same frequency. It may also be used where, because of unfavorable terrain and due to "Line of Sight" characteristics, an intermediate station is necessary.

(1) Radio Sets AN/GRC-7, AN/GRC-8 and AN/VRQ-3 (and their counterparts as used in the Armor and the Artiller ) are capable of automatic retransmission, in that signals received by one set (Set 1) are retransmitted by the other set (Set 2) on a different frequency, and vice versa.

(2) Retransmission is normally initiated by a push-to-talk contact from one station to another station that is to act as the relay terminal. When this type of operation is desired, refer to the block diagram (Figure 4-20) and the control panel of the C-435 (Figure 4-18). Follow the steps outlined below:

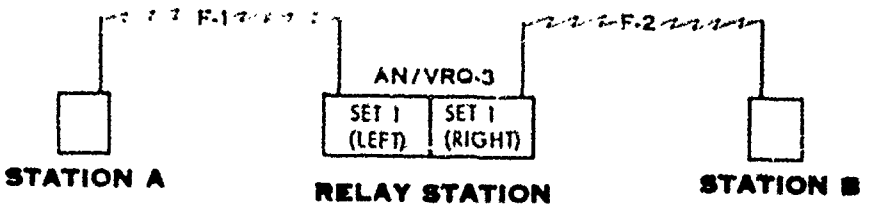



Figure 4-20. Block Diagram, Retransmission.

(a) You are the operator at the relay site. Upon receiving a request for relay operation from distant STATION A on a frequency (F-1) for communication with distant STATION B; set the MANUAL switch to the SEND SET 1 (left) position, acknowledge the request, and direct that station to stand by. Release the MANUAL switch.

(b) Tune Set 1 (right) to the operating frequency of STATION B (F-2), set the MANUAL switch to the SEND SET 2 position, contact STATION B, inform him of STATION A's request, and direct that station to call in (preferably a 5 second ringing signal). Release the MANUAL switch.

(c) When the signal is received, turn and hold the AUTO switch to the ADJUST METER position, (the incoming signal will cause the SIGNAL REC SET 1 (right) lamp to light), turn the ADJUST METER TO CENTER CONTROL 2 to obtain approximately a center scale deflection (red line) on the meter. When the level of adjustment has been obtained, turn the AUTO switch to the OFF position. Turn the MANUAL switch to SEND SET 2 position, and request STATION B to stand by. Release the MANUAL switch.

(d) Turn the MANUAL switch to SEND SET 1 position, contact STATION A and direct that station to call in (preferably a 5 second ringing signal). Release the MANUAL switch.

(e) When the signal is received, turn and hold the AUTO switch to the ADJUST METER position, (the incoming signal will cause the SIGNAL REC SET 1 lamp to light), turn the ADJUST METER TO CENTER CONTROL 1 to obtain approximately a center scale deflection (red line) on the meter. When the level of adjustment has been obtained, turn the AUTO switch to the OFF position. Turn the MANUAL switch to SEND SET 1 position and inform STATION A that retransmission has been established, and that he may proceed to contact STATION B. Immediately release the MANUAL switch and turn the AUTO switch to the RETRANS position.

NOTES: 1. The selection of frequencies for this type of operation is critical. These frequencies (F-1 and F-2) should be at least 5 megahertz apart. For best results consult Interference Charts which appear in pertinent technical manuals.

2. The squelch control of Set 1 (left), and Set 1 (right) of the relay set must be properly adjusted, inasmuch as any signal produced by either set will activate the other, thus rendering retransmission inoperative.

4-16. AUDIO ACCESSORIES--Figures Number 4-21 through 4-27 illustrate the various audio accessories used with the AN/GRC-3 through 8 series of radio sets.

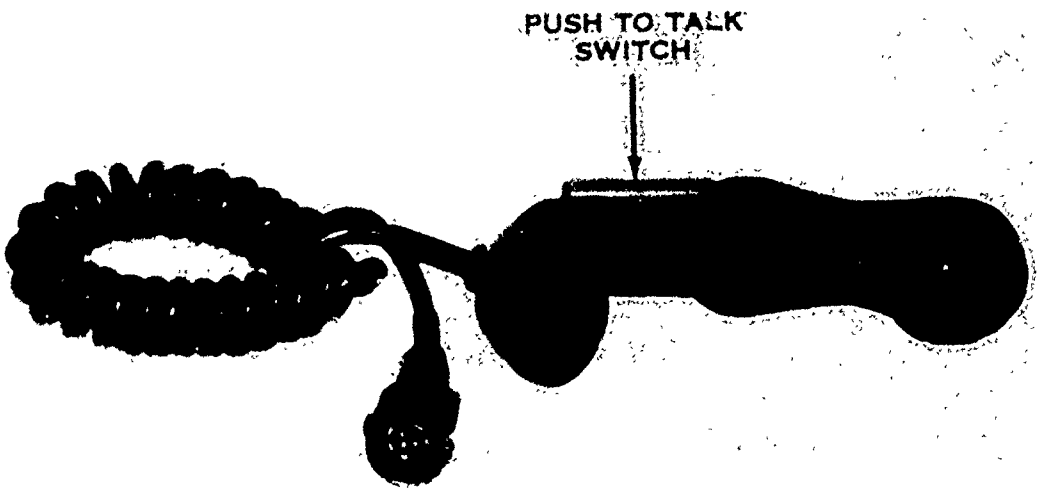



Figure 4-21. Handset H-33/PT.

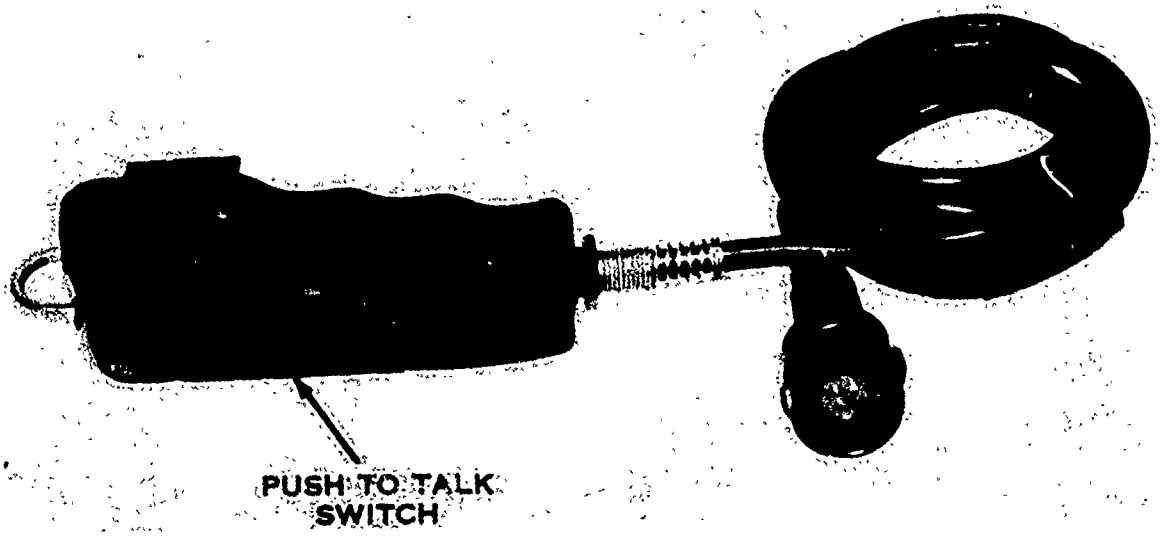



Figure 4-22. Microphone M-29/U.

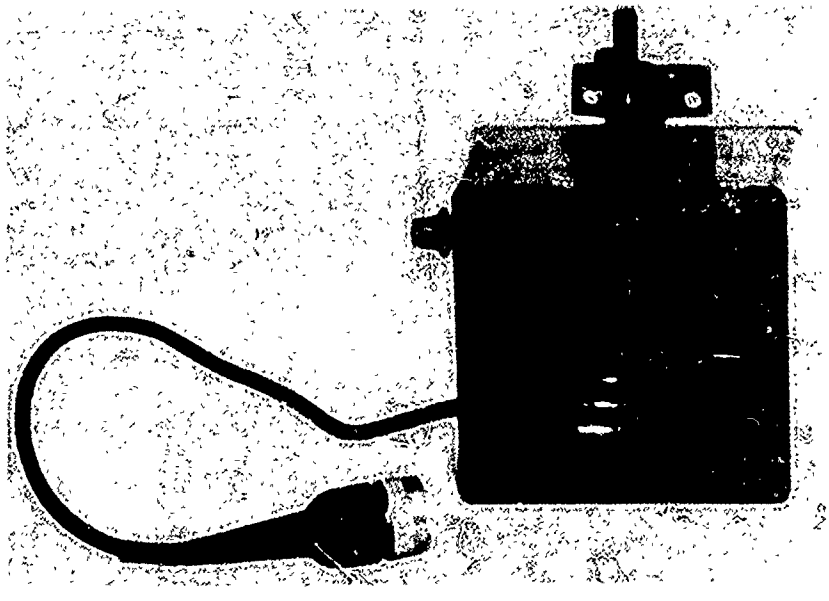


Figure 4-23. Loudspeaker LS-166/U.

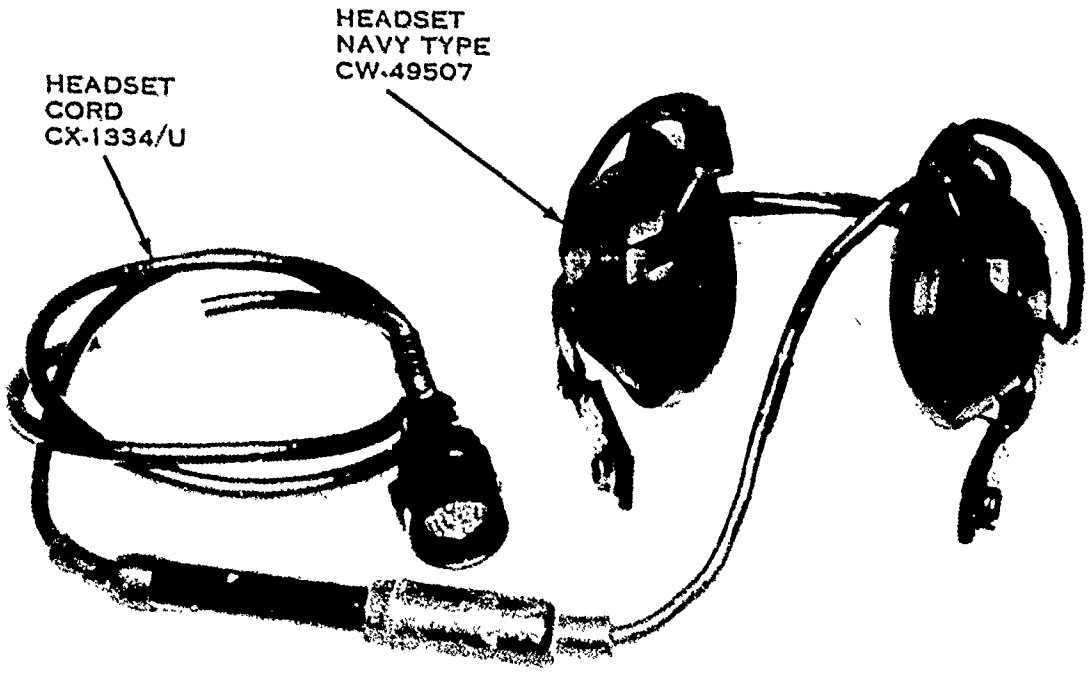



Figure 4-24. Headset Navy Type CW-49507 and Headset Cord CX-1334/U.

a. Chest Set Group AN/GSA-6 (Fig 4-26) in conjunction with Headset-Microphone H-63/U (Fig 4-25) is the audio accessory most commonly used with radio sets in tracked vehicles. It is used to interconnect interphone and radio circuits with microphone and headset circuits. Two plugs provided on the switch box will mate with plugs on the H-63/U. The assembly consists of two switch sections. When the INTERPHONE and RADIO switches are not pressed (off position), radio and interphone signals will be heard in the headset. To talk over the interphone system, press the INTERPHONE switch while speaking. For long communications turn the switch while holding it in. The switch will stay in the on position. To talk over the radio system, press the RADIO switch while speaking. To talk over both the interphone and radio systems press both systems.

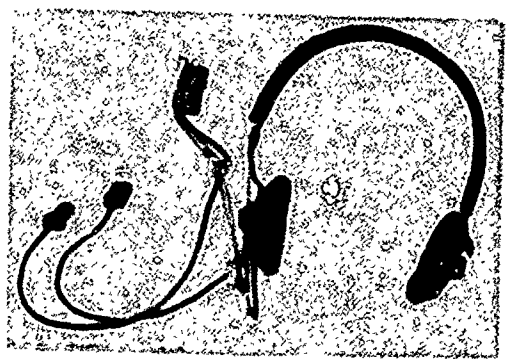


Figure 4-25. Headset-Microphone H-63/U.

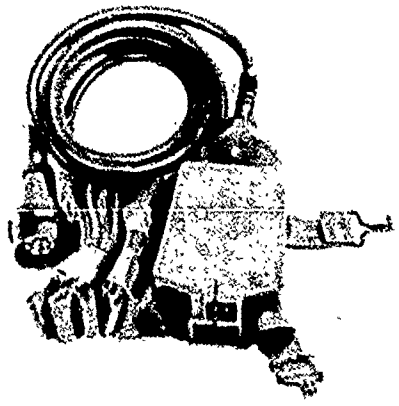


Figure 4-26. Chest Set Group AN/GSA-6.

4-17. CONTROL BOX C-375/VRC.

a. One or more control boxes are used in every installation of the AN/GRC-3 through 8 series. One unit is normally supplied with the basic radio set and additional boxes may be supplied with the installation kits.

b. The control box has two AUDIO connectors on the sides, therefore two persons can connect their audio accessory. From the control box it is possible to monitor all the components of the radio, transmission over Set 1 or Set 2 at the selection of the operator, and talking and listening over the interphone system (if available).

c. The control box(es) are wired to the mount of the set.

d. The connectors on the bottom of the control box also permit the use of other audio accessories -ex. T-17 microphone, H-16/U or HS-30 headsets.

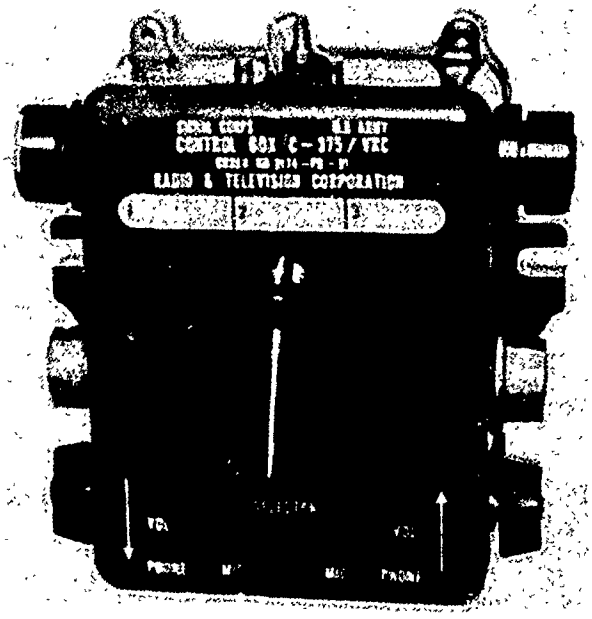



Figure 4-27. Control Box C-375/VRC.

4-18. ANTENNA TUNING.

a. The components of the AN/GRC-3 through 8 series are shipped completely aligned, however, the antenna circuits must be tuned when connected to a particular antenna system. Once the antenna circuits are adjusted for a particular antenna system, it is not necessary to readjust them during normal operations.

b. To tune the antenna of the various components, follow the steps outlined below:

(1) Receiver-Transmitter RT-70/GRC.

(a) Calibrate the RT-70/GRC at the highest calibration check point (58.0 MHz).

(b) Remove the cap that covers the ANTENNA TUNING control on top of the RT-70/GRC.

(c) Insert an insulated screwdriver or alignment tool through the opening in the case and engage the screwdriver slot on the ANTENNA TUNING control. Insure that the SQUELCH control is OFF, and hold the ANT ADJ-DIAL LIGHT-CAL switch in the ANT ADJ position. Adjust the ANTENNA TUNING control for minimum noise level in the handset. If the point of adjustment for minimum noise level is too broad, detune slightly below 58.0 MHz until the noise level increases, and then retune the antenna for minimum noise level. If the antenna adjustment is still too broad, further detune the TUNING control below 58.0 MHz until a very sharp and definite quieting point is obtained by adjustment of the ANTENNA TUNING control. (Figure 4-28).

## NOTES

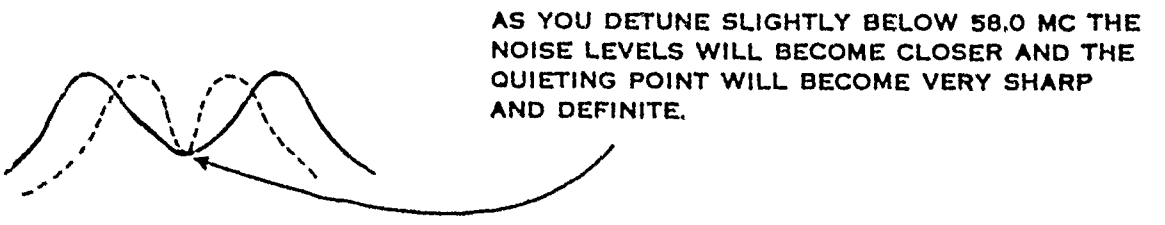



Figure 4-28. Antenna Tuning, Set 2.

(2) Auxiliary Receiver R-110/GRC.

(a) Calibrate the R-110/GRC at the highest calibration check point (51.6 MHz).

(b) Tune Set 1 at least 4 MHz below the R-110/GRC during this operation.

(c) Hold the DIAL LIGHT-TUNE switch in the TUNE position, and tune off the calibrate frequency until the beat note can no longer be heard, but so that the quieting effect of the tuning signal is still apparent (Fig. 4-29).

(d) With the DIAL LIGHT-TUNE switch still in the TUNE position, use an ordinary screwdriver to adjust the ANT TUNE for maximum quietness in the handset.

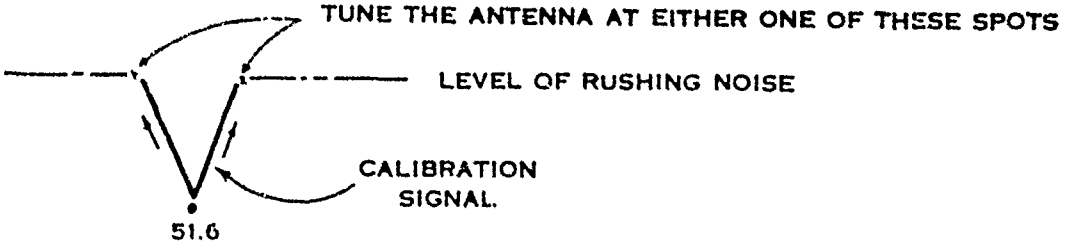



Figure 4-29. Antenna Tuning, Auxiliary Receiver.

(3) Receiver-Transmitter RT-68/GRC.

(a) Receiver Tuning.

1. Tune for a signal in the top 900 KHz of the tuning range. If practicable, arrange for this signal to be supplied by another radio set. If another set is not available, radiate the output of an FM signal generator (tuned to the top 900 KHz of Set 1 tuning range) to the Set 1 receiver. The signal must be weak to avoid overloading the receiver. During this operation tune the R-110/GRC at least 4 MHz below Set 1.
2. Using a screwdriver, adjust the REC ANT TUNE control for maximum noise quieting and maximum signal strength in the handset. Reduce the RF input signal strength as the strength of the AF signal increases. Repeat the adjustment.

(b) Transmitter Tuning.

1. Tune the RT-68/GRC to the center of its frequency coverage (approximately 46.4 MHz or 46.5 MHz).
2. Turn the set on by turning the MAIN POWER switch on the MOUNT to the ON position, and the OPERATE switch to TRANS & RECEIVE.
3. Press the push-to-talk switch on the handset and turn the TRANS ANT COUPLING control counterclockwise until the needle on the meter comes to rest. This is to obtain minimum coupling.

4. Tune the RT-68/GRC to the extreme low end of its band 38.0 MHz.

CAUTION: DO NOT TURN THE MCS OR TENTH MCS CONTROLS WHILE TR ANT TUNE CONTROL IS BEING ADJUSTED. SERIOUS DAMAGE TO THE TUNING MECHANISM CAN RESULT.

5. Remove the cap that covers the TR ANT TUNE control. Engage the control by pressing in on it with a screwdriver. While pressing the push-to-talk switch, adjust the control for maximum reading on the panel meter. If it is impossible to obtain a reading, advance the setting of the TRANS ANT COUPLING control slightly and repeat the procedure. Keep the coupling as low as possible while adjusting the TR ANT TUNE control for maximum RF reading. When the maximum reading is obtained, release the push-to-talk switch and remove the screwdriver from the TR ANT TUNE control.
6. Repeat step 5 above for each whole megacycle 38.0 thru 54.0 MHz and for the highest detented frequency 54.9 MHz.
7. When the adjustments are completed for each of the above settings, tune the RT-68 to the center of its frequency coverage (46.5 MHz), press the push-to-talk switch and adjust the TRANS ANT COUPLING for maximum RF reading to obtain maximum coupling.
8. Repeat the steps outlined in 4 thru 6 above.

## NOTES

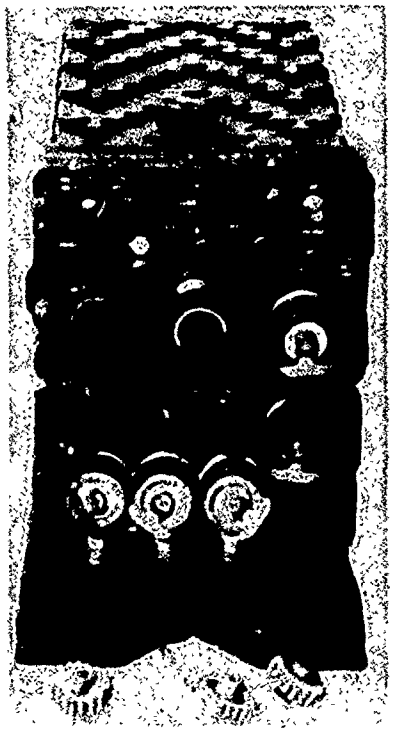


Figure 4-30. Radio Set AN/VRC-7.

4-19. RADIO SET AN/VRC-7. (TM 11-285)

a. Radio set AN/VRC-7 consists of a Set 2 on a special mount.
Receiver Transmitter RT-70/GRC
Audio Frequency Amplifier AM-65/GRC
Mount MT-300/GR

b. OPERATIONAL CAPABILITIES:
Transmission and reception on one frequency
Interphone facilities
Operation of radio by remote control

4-20. CHARACTERISTICS OF THE AN/VRC-7.

| | |
|---|---|
| Type of Set | Vehicular. |
| Type of Modulation | FM |
| Type of Emission | Voice |
| Frequency Coverage | 47.0 - 58.4 MHz |
| Number of channels | 115 |
| Channel Spacing | 100 KHz |
| Preset Facilities | 2 |
| Operating Range | 1.5 km |
| Power output | .5 watt |
| Power source | Vehicular Battery 12 or 24 volts |
| Antenna (AB-22 and AB-24) | 1 Meter Whip |
| Weight | 57 pounds |

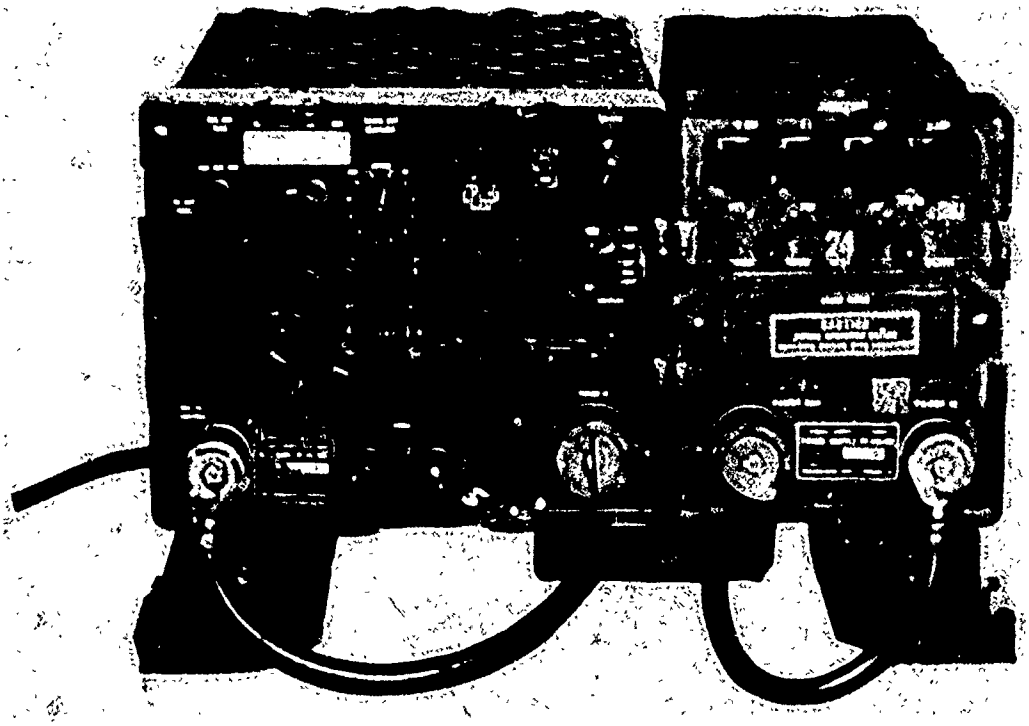


Figure 4-31. Radio Set AN/VRC-10.

4-21. RADIO SET AN/VRC 10. (TM 11-286)

a. Radio Set AN/VRC-10 consists of a Set 1. It is capable of communicating with other frequency modulated radio sets found in the Infantry, Airborne and Mechanized Divisions.

b. Radio Sets AN/VRC-8, AN/VRC-9 and AN/VRC-10 are replaced by the AN/VRC-43 or AN/VRC-46. For a basis of issue see para 5-20d.

c. Radio Sets AN/VRC-8 and AN/VRC-9 are similar to the AN/VRC-10 and are for communication in Armor and Artillery units respectively. The basic difference between these radio sets is the frequency coverage (Fig. 2-3).

d. OPERATIONAL CAPABILITIES:

Transmission or reception on one frequency.
Operation by remote control

4-22. CHARACTERISTICS OF THE AN/VRC-10:

| | | | |
|---|---|---|---|
| Type of set | vehicular | Operating range | 16 km |
| Type of modulation | FM | Power output | high--16 watts |
| Type of emission | voice | | low--2 watts |
| Frequency coverage | 38 to 54.9 MHz | Power Source | vehicular battery |
| Number of Channels | 170 | | 12 or 24 volts |
| Tuning | continuous | Antenna (MS-117&AB-24) | 1.5 meter whip |
| Channel spacing | 100 KHz | Weight | 115 pounds |
| Preset facilities | 2 | | |

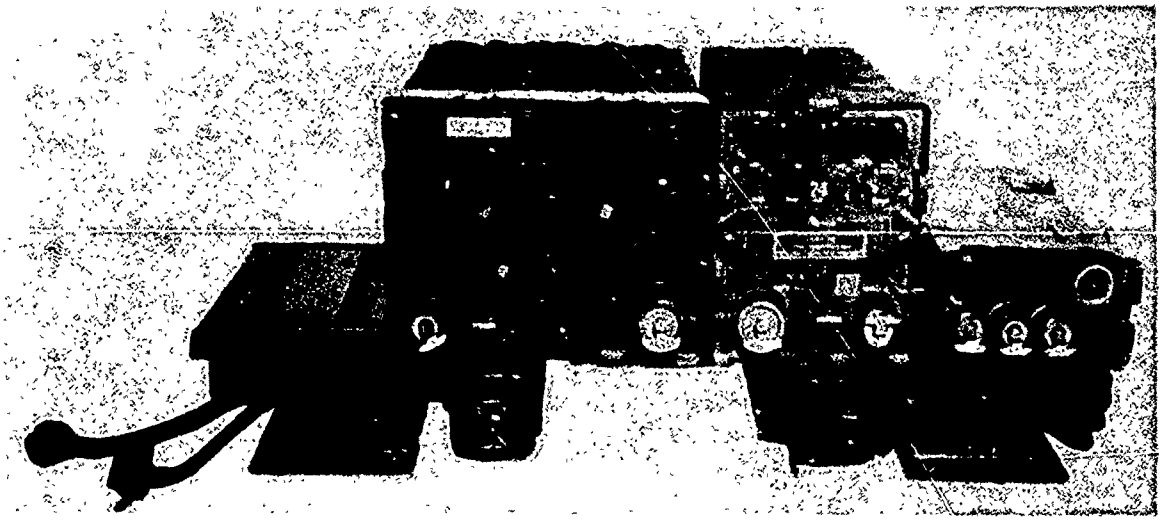


Figure 4-32. Radio Set AN/VRC-15.

4-23. RADIO SET AN/VRC-15. (TM 11-611)

a. Radio Set AN/VRC-15 consists of a Set 1 and the interphone amplifier. This set is capable of communicating with all other frequency modulated radio sets found in the Infantry, Airborne, and Mechanized Divisions.

b. Radio Sets AN/VRC-13 and AN/VRC-14 are similar to the AN/VRC-15 and are intended for communication in Armor and Artillery units respectively. The basic difference between these three radio sets is the frequency coverage (Fig. 2-3).

c. OPERATIONAL CAPABILITIES:

Transmission or reception on one frequency
Operation by remote control
Interphone facilities

4-24. CHARACTERISTICS OF THE AN/VRC-15:

| | | | |
|---|---|---|---|
| Type of set . . . . . | vehicular | Operating range . . . . . | 16 km |
| Type of modulation . . | FM | Power output . . . . . | high-16 watts |
| Type of emission . . . | voice | | low-2 watts |
| Frequency coverage. . | 38 to 54.9 MHz | Power source. . . . . | vehicular btry |
| Number of channels . | 170 | | 12 or 24 volts |
| Tuning . . . . . | continuous | Antenna(MS-117 & AB-24) | 1.5 meter whip |
| Channel spacing . . . | 100 KHz | Weight . . . . . | 170 pounds |
| Preset facilities . . . | 2 | | |

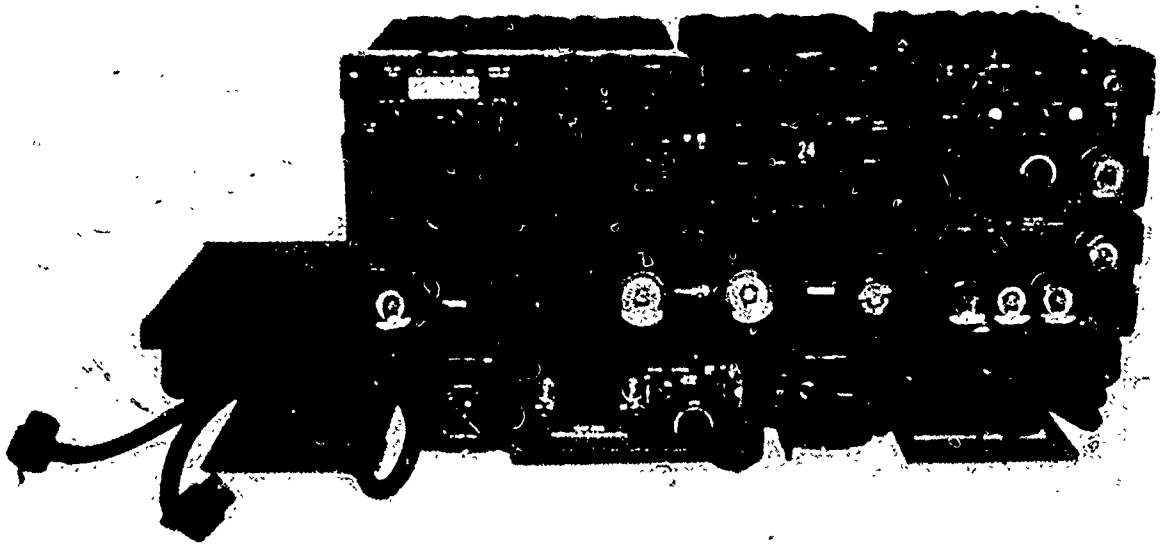


Figure 4-33. Radio Set AN/GRC-8.

4-25. RADIO SET AN/GRC-8. (TM 11-284)

a. Radio Set AN/GRC-8 is identical to the AN/GRC-7 less the auxiliary receiver. It is capable of communicating with all other frequency modulated radio sets found in the Infantry, Airborne and Mechanized Divisions.

b. Radio Sets AN/GRC-4 and AN/GRC-6 are similar to the AN/GRC-8 and are intended for communication in Armor and Artillery units respectively. The basic difference between these three radio sets is the frequency coverage of some of the components (Set 1). (Fig. 2-3).

c. OPERATIONAL CAPABILITIES:

Monitor two different radio nets simultaneously
Transmission over two different nets
Interphone facilities
Automatic retransmission
Duplex operation
Operation by remote control

4-26. CHARACTERISTICS OF THE AN/GRC-8:

Type of set . . . . . vehicular
Type of modulation . . . FM
Type of emission . . . . voice
Frequency coverage
Set 1 . . . . . 38 to 54.9 MHz
Set 2 . . . . . 47 to 58.4 MHz
Number of channels
Set 1 . . . . . 170
Set 2 . . . . . 115
Tuning (all components) continuous tuning
Channel spacing (all components) . . . . . 100 KHz
Preset facilities
Set 1 . . . . . 2
Set 2 . . . . . 2

Operating range
Set 1 . . . . . 16 km
Set 2 . . . . . 1 1/2 km
Power output
Set 1 . . . . . high--16 watts
low--2 watts
Set 2 . . . . . .5 watt
Power source . . . . . vehicular battery 12 or 24 volts

Antenna
Set 1 (MS-117 & AB-24) . . . . . 1.5 meter whip
Set 2 (AB-22 & AB-24) . . . . . 1 meter whip

Weight . . . . . 190 lbs

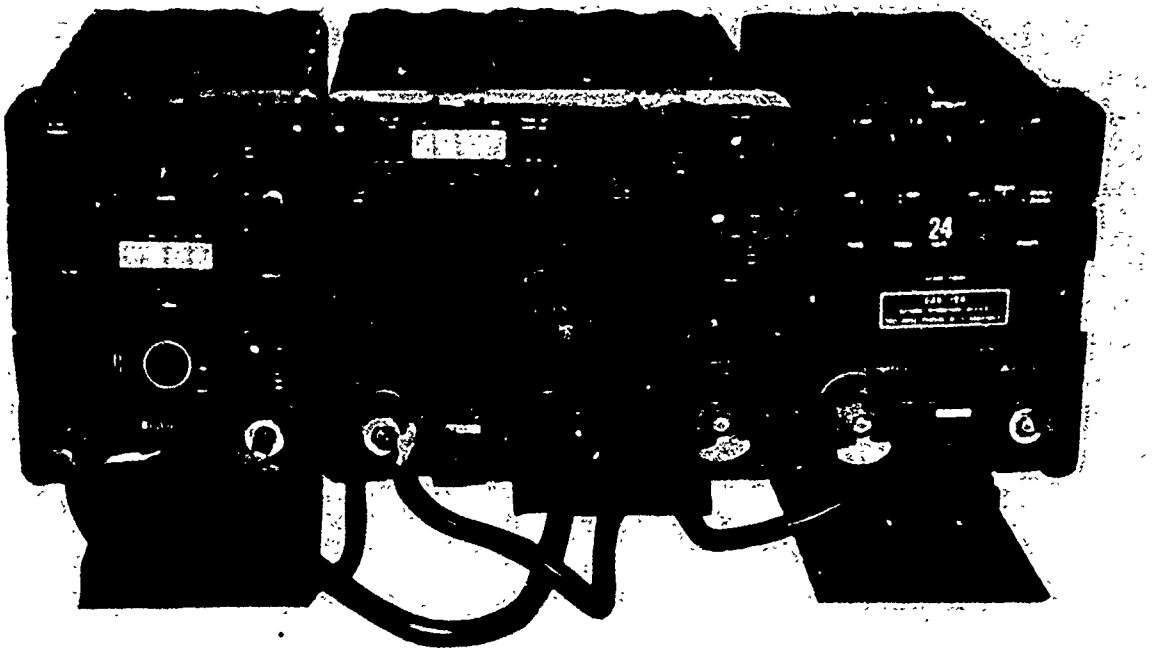


Figure 4-34. Radio Set AN/VRC-18.

4-27. RADIO SET AN/VRC-18. (TM11-611)

a. Radio Set AN/VRC-18 consists of a Set 1 and the auxiliary receiver. It is capable of communicating with all other frequency modulated radio sets in the Infantry, Airborne and Mechanized Divisions.

b. Radio Set AN/VRC-18 is replaced by the AN/VRC-12 and/or AN/VRC-47. For basis of issue see paragraph 5-16 and 5-21.

c. Radio Sets AN/VRC-16 and AN/VRC-17 are similar to the AN/VRC-18 and are intended for communication in Armor and Artillery units respectively. The basic difference between these three radio sets is the frequency coverage of all the components. (Fig. 2-3).

d. OPERATIONAL CAPABILITIES:

Monitor two different nets simultaneously
Transmission on one frequency
Operation by remote control

4-28. CHARACTERISTICS OF THE AN/VRC-18:

| | |
|---|---|
| Type of set | vehicular |
| Type of modulation | FM |
| Type of emission | voice |
| *Frequency coverage | 38 to 54.9 MHz |
| Number of channels | 170 |
| Tuning | continuous |
| Channel spacing | 100 KHz |
| Preset facilities | |
| Set 1 | 2 |
| Aux receiver | 3 |

| | |
|---|---|
| Operating range | |
| Set 1 | 16 km |
| Power output | |
| Set 1 | high--16 watts<br>low--2 watts |
| Power source | vehicular battery<br>12 or 24 volts |
| Antenna | |
| Set 1 (MS-117 & AB-24) | 1.5 meter whip |
| Aux receiver | shares Set 1 |
| Weight | 150 pounds |

*All components

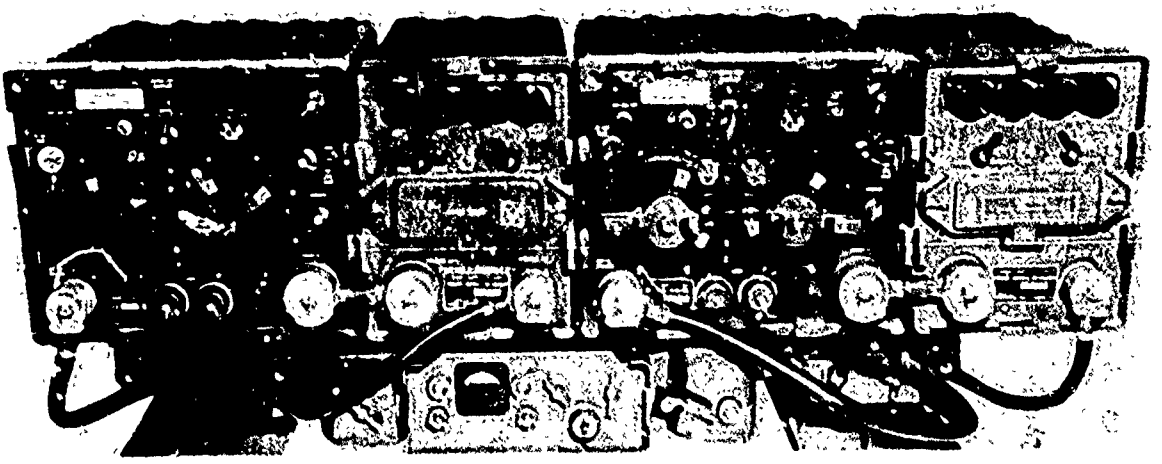


Figure 4-35. Radio Set AN/VRQ-3.

4-29. RADIO SET AN/VRQ-3. (TM 11-287)

a. Radio Set AN/VRQ-3 consists of two (2) Set I's. This set is capable of communicating with all other frequency modulated radio sets found in the Infantry, Airborne, and Mechanized Divisions.

b. Radio Set AN/VRQ-3 is replaced by the AN/VRC-45 and/or AN/VRC-49. For basis of issue see paragraph 5-2 d.

c. Radio Sets AN/VRQ-1 and AN/VRQ-2 are similar to the AN/VRQ-3 and are intended for communication in Armor and Artillery units respectively. The basic difference between these three radio sets is the frequency coverage (Fig. 2-3).

d. OPERATIONAL CAPABILITIES:

| | |
|---|---|
| Monitor two different radio nets simultaneously | Duplex operation |
| Transmission over two different nets | Operation by remote control |
| Automatic retransmission | |

4-30. CHARACTERISTICS OF THE AN/VRQ-3:

| | | |
|---|---|---|
| Type of set | | vehicular |
| Type of modulation | | FM |
| Type of emission | | voice |
| Frequency coverage | (all components) | 38 to 54.9 MHz |
| Number of channels | (all components) | 170 |
| Tuning | (all components) | continuous |
| Channel spacing | (all components) | 100 KHz |
| Preset facilities | (on each set) | 2 |
| Operating range | (on each set) | 16 km |
| Power output | (on each set) | high--16 watts |
| | | low--2 watts |
| Power source | | vehicular battery |
| | | 12 or 24 volts |
| Antenna | | |
| Set I (on each)(MS-117 & AB-24) | | 1.5 meter whip |
| Weight | | 230 pounds |

4-31. USE OF THE RADIO CONTROL GROUP AN/GRA-6 WITH THE AN/GRC-3 THRU 8 SERIES.

a. General: The Control AN/GRA-6 is auxiliary equipment designed to extend the application of the radio sets. It is a major item of signal equipment and it is not issued as a component of any set. This equipment provides for remote operation of the set(s) from a distance of up to 3 km.

b. Components: The Control AN/GRA-6 consists of a handset H-33/PT, the local control unit (Control C-434/GRC), the remote control unit (Control C-433/GRC), a carrying bag, a loudspeaker LS-166/U, and an interconnecting box J-654. It weighs approximately 20 lbs.

c. Preparation for Installation: The LOCAL CONTROL unit requires two batteries (BA-30), and the REMOTE CONTROL unit requires three batteries (two BA-30 and one BA-414). To connect these batteries, the units must be removed from their case. When the units are taken out of their case, the internal BELL-LAMP switch should be placed in the desired position.

d. Installation: The LOCAL CONTROL unit may be installed into the MOUNTS MT-297/GR or 298/GR in the place normally occupied by the RETRANSMISSION unit (Control C-435/GRC). If DUPLEX and RETRANSMISSION facilities are desired simultaneously with REMOTE OPERATION, the RETRANSMISSION unit is installed into the mount and the LOCAL CONTROL unit is connected to the audio connector on the panel of the set(s) by means of the two cables in the rear compartment of the unit. Several of the sets in the family of FM radios use mounts which will not receive the LOCAL CONTROL unit, in which case the local control unit is connected to the audio connector on the panel of the set(s) using the cable(s) on the rear of the local control unit. Examples of this type of installation would be the AN/VRC-10 and AN/VRC-18.

Regardless of the type of installation of the local control unit to the radio, a wire line is connected to its line terminals and laid to the desired location from which the set is to be operated. The length of this wire line may vary from a few meters up to 3 km. The end of this wire line is connected to the line terminals on the remote control unit. Audio connectors are provided on the local and remote units. The handset issued with the retransmission unit is connected to the remote control unit.

e. Operational Capabilities: Depending on the type of installation, there are as many as three operational capabilities. The first of these is two way telephone communication between the local and remote operators. The second operational capability is simultaneous monitoring of all receivers and transmission out of either set at the selection of the remote operator. The third operational capability is remote power control to the radio set, however, this third operational facility is only possible for sets that use a mount that will receive the LOCAL CONTROL unit (excluding the AN/PRC-10).

f. Application. This equipment permits the set(s) to be placed in the most advantageous location and their remote operation from the desired site.

g. For the operational capabilities and controls see figure 4-28.

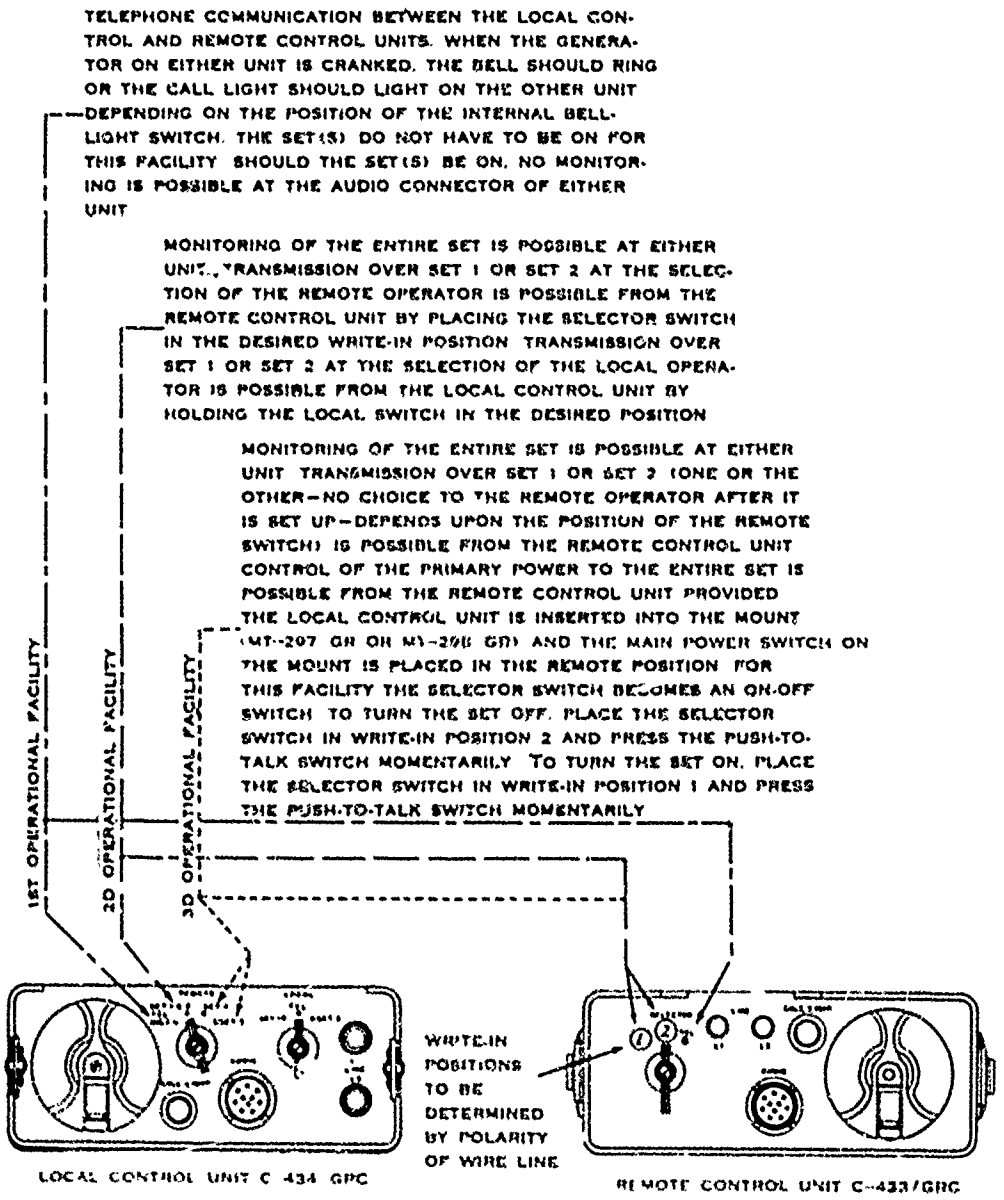



Figure 4-36. AN/GRA-6, Operational Capabilities and Controls.

4-32. MODIFICATION KIT MX-898/GR. (TM 11-5820-275-12P).

a. The Modification Kit MX-898/GR is auxiliary equipment to extend the application of the AN/GRC-3 through 8 series of frequency modulated radio sets, however, it is not a component of any basic radio set.

b. The modification kit consists basically of a battery case (CY-590), a hand generator (G-8), antenna sections, antenna mounting, and two power cables.

c. The modification kit as shown in figure 4-37 is used to provide temporary field operation of Set 1 when it is removed from the vehicle.

d. Types of operation provided by the modification kit.

(1) Field operation of Set 1 with the battery case and the hand generator. The batteries contained in the battery case (one BA-419 and five BA-403) provide the power required for the receiver portion of Set 1. To transmit, the hand generator must be turned during the entire transmission.

(2) Field operation of Set 1 with the hand generator. This type of operation requires that the hand generator be turned at all times when receiving or transmitting.

(3) Field operation of Set 2 with the battery case. The batteries contained in the battery case provide sufficient power for both receiving and transmitting. The hand generator is never used to power Set 2.

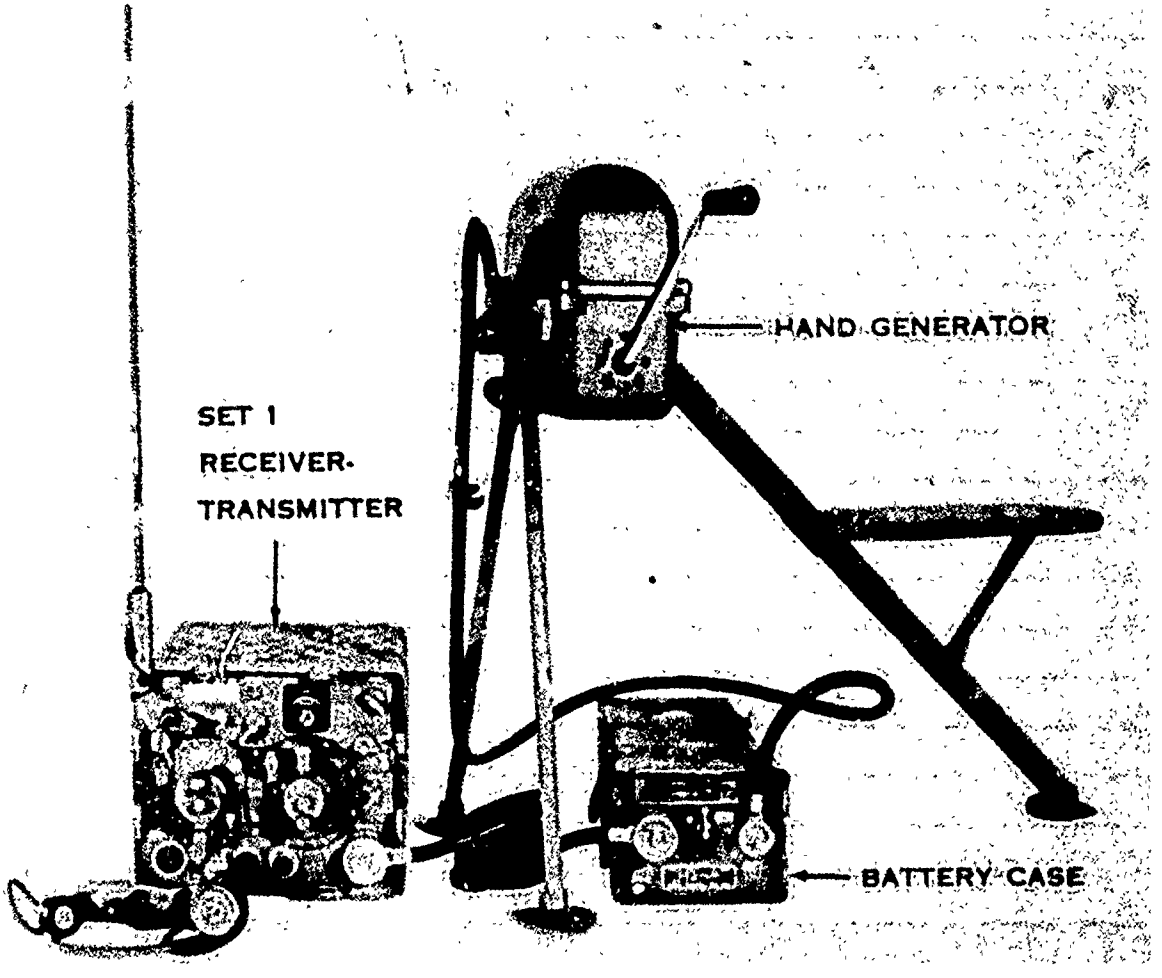



Figure 4-37. Field Operation of Set 1 with Modification Kit, MX-898/GR.

## NOTES

TAB
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# CHAPTER 5

## VEHICULAR FM RADIOS

## AN/VRC-12 FAMILY

NOTE: All authorized configurations of the components of this series of radios are shown and described in this chapter. Only those configurations found in Infantry, Airborne, and Mechanized Brigades are followed by an authorized issue chart.

## NOTES

5-1. INTRODUCTION TO THE AN/VRC-12 FAMILY OF RADIOS. (TM 11-5820-401-10)

a. The AN/VRC-12 family of radios is designed for vehicular operation and will replace the current AN/GRC-3 through 8 series in all combat arms. Eight different set configurations are possible by combining sub-units of the radio. These common sub-units are as follows:

(1) Receiver-transmitter, Radio RT-246/VRC.
(2) Receiver-transmitter, Radio RT-524/VRC.
(3) Receiver, Radio R-442/VRC (Auxiliary receiver).
(4) Mounts MT-1029/VRC and MT-1898/VRC.
(5) Antenna AS-1729/VRC.
(6) Installation kits for vehicular installation and intercommunications.

b. Comparison of the AN/VRC-12 Family to the AN/GRC-3 through 8 Series. (See figure 2-4)

(1) Lighter weight and smaller size.
(2) Common frequency spectrum for all combat arms.
(3) Accept speech security device.
(4) Automatic squelch control.
(5) Visual incoming signal (call light).
(6) Increased transmitting range.
(7) Automatically tuned antenna.
(8) Module construction for ease of maintenance.
(9) Compatible with AN/GRC-3 through 8 series, except (20-29.9 KHz).
(10) Increased channels - 920.

c. The operation and characteristics of the basic components and the configurations of the radio sets are discussed in the succeeding paragraphs.

5-2. RECEIVER-TRANSMITTER RT-246/VRC. (TM 11-5820-401-10)

a. The receiver-transmitter RT-246/VRC is pushbutton controlled, lightweight, rugged, waterproof and compact. All operating controls are accessible on the front panel. The hinged cover over the pushbutton assembly can be dropped by releasing the two captive screws to provide access to the presetting adjustments by maintenance personnel. A connector at the rear mates with a junction box on the mount to provide necessary power and to distribute audio signals. A blower system inside the case aids in cooling the set during transmission.

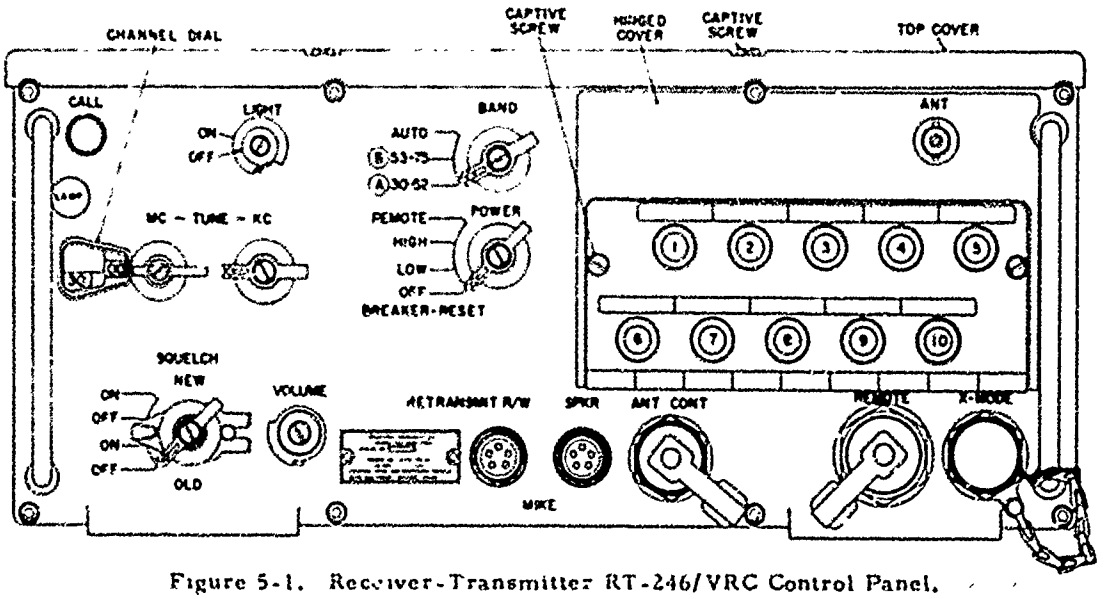



Figure 5-1. Receiver-Transmitter RT-246/VRC Control Panel.

b. This receiver-transmitter was designed to be employed within tracked vehicles where the control panel would be generally inaccessible to the operator.

5-3. CHARACTERISTICS OF THE RECEIVER-TRANSMITTER RT-246/VRC.

| | |
|---|---|
| Type of set | Vehicular |
| Type of modulation | FM |
| Type of emission | Voice |
| Type of squelch | Noise and tone |
| Frequency coverage | |
| Band A | 30 to 52.95 MHz |
| Band B | 53 to 75.95 MHz |
| Frequency spacing | 50 KHz |
| Number of channels | 920 |
| Tuning | Detent (automatic calibration) |
| Preset facilities | 10 |
| Operating range | |
| Stationary | 32 km |
| Moving | 25 km |
| Power output | |
| High | 35 watts (minimum) |
| Low | 1 to 3 watts |
| Power source | 24 volt vehicle battery |
| Antenna | 10 ft center fed whip with Antenna Matching Unit (MX-2799/VRC) |
| Weight | Approximately 60 pounds |

5-4. OPERATING PROCEDURE FOR THE RECEIVER-TRANSMITTER RT-246/VRC.

a. Place the receiver-transmitter on the mounting (MT-1029/VRC) using the guide pins to prevent damage to the connector pins. Tighten clamps on the front of the mount to secure the set.

b. Attach the antenna matching unit power cable, antenna cable and required audio accessories. (If speech security device is used, connect cable to the X-MODE connector.)

c. Turn SQUELCH switch to OFF.

NOTE: The SQUELCH control for all receivers of this family of radios is divided into two sections, NEW SQUELCH and OLD SQUELCH. For this family of radios to net with the AN/GRC-3 through 8, AN/PRC-10 or AN/PRC-6, the SQUELCH control must be operated in the OLD SQUELCH section. When operating entirely with the new family of radios, the NEW SQUELCH section may be used. A latch is provided to lock the control in one or the other section. It is a 2d echelon maintenance responsibility to set this latch.

d. Turn LIGHT switch ON when operating under normal conditions; if operating under blackout conditions turn LIGHT switch OFF.

e. Turn the POWER switch to the LOW position. Allow the set to warm up for approximately one minute.

f. Adjust VOLUME control until background (rushing) noise is heard.

g. If SQUELCH is to be used (no rushing noise heard), turn the SQUELCH control to ON.

h. If manual tuning is to be used:

(1) Turn the BAND switch to A or B, depending on the channel desired.

(2) Turn the MC-TUNE and KC-TUNE knobs until the desired channel appears on the channel dial.

If PUSHBUTTON (automatic) tuning is used:

(1) Turn the BAND switch to AUTO.

(2) Push the PUSHBUTTON for the desired channel.

(3) After the equipment has had time to tune (about 3 seconds), check to be sure that the channel which appears on the channel dial is correct. If it is correct continue as outlined in j-n below. If the channel is wrong or a red mark appears:

(a) Turn the BAND switch to B.

(b) Turn the MC-TUNE and KC-TUNE knobs several clicks.

(c) Turn the BAND switch back to AUTO.

(d) After the equipment has been returned (about 3 seconds), check to insure that the correct channel appears in the channel dial. If an incorrect channel or the red mark appears in the channel dial, higher echelon maintenance is required and the correct channel will have to be tuned manually as outlined in h above.

j. If the LIGHT and SQUELCH switches are ON, observe the CALL indicator for a visual indication of an incoming signal.

k. Adjust the VOLUME control for the desired receiver volume.

l. To transmit, press the PUSH-TO-TALK switch on the microphone and speak into it.

m. Turn the POWER switch to the HIGH position when greater transmitter power output is required.

n. A complete loss of power may result in the set from a tripped circuit breaker. To reset the circuit breaker, turn the POWER switch to OFF BREAKER-RESET and then to LOW or HIGH.

CAUTION: If circuit breaker trips again, do not reset. Maintenance is required.

5-5. RECEIVER-TRANSMITTER RT-524/VRC. (TM 11-5820-401-40)

The receiver-transmitter RT-524/VRC is similar to the RT-246/VRC except that it has a self-contained loudspeaker instead of a pushbutton assembly on the front panel. The channels must be selected manually. It was designed for use within vehicles where the control panel can be easily reached and is predominant in infantry units.

5-6. CHARACTERISTICS OF THE RECEIVER-TRANSMITTER RT-524/VRC.

| | |
|---|---|
| Type of set | Vehicular |
| Type of modulation | FM |
| Type of emission | Voice |
| Type of squelch | Noise and tone |
| Frequency coverage | |
| Band A | 30 to 52.95 MHz |
| Band B | 53 to 75.95 MHz |
| Frequency spacing | 50 KHz |
| Number of channels | 920 |
| Tuning | Detent (automatic calibration) |
| Preset facilities | None |
| Operating Range | |
| Stationary | 32 km |
| Moving | 25 km |
| Power output | |
| High | 35 watts (minimum) |
| Low | 1 to 3 watts |
| Power source | 24 volt vehicle battery |
| Antenna | 10 ft center-fed whip w/antenna matching unit (MX-2799/VRC) |
| Weight | Approx 55 pounds |

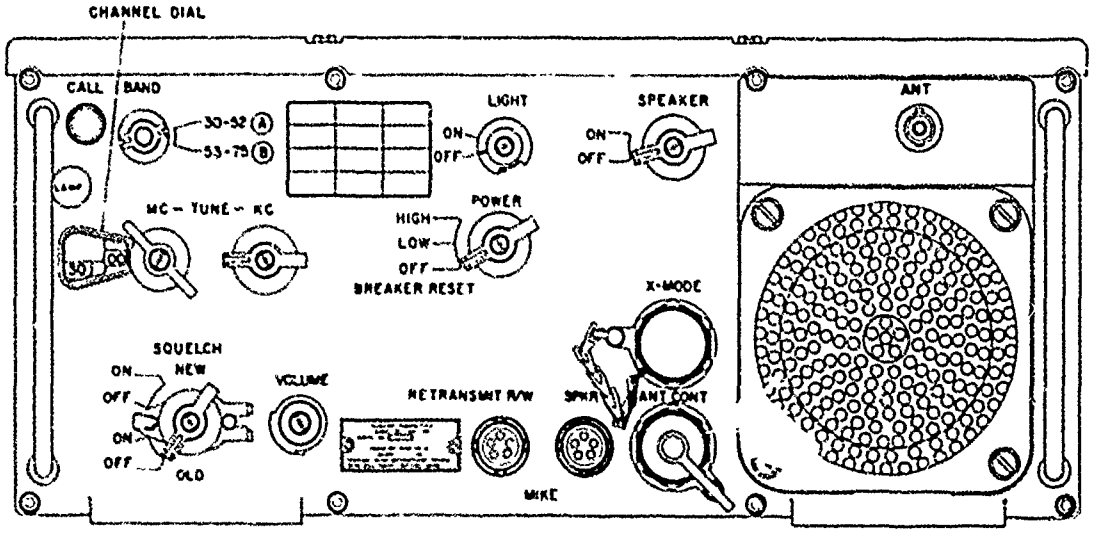



Figure 5-2. Receiver-Transmitter RT-524/VRC Control Panel.

5-7. OPERATING PROCEDURE FOR RECEIVER-TRANSMITTER RT-524/VRC.

a. Place the receiver-transmitter onto the mounting (MT-1029/VRC) using the guide pins located on the mount to prevent damage to the connector pins. Tighten clamps on the front of the mount to secure the set.

b. Attach the antenna matching unit cable, antenna cable and required audio accessories. (If speech security device is used, connect cable to X-MODE connector.)

c. Turn the SQUELCH switch to the OFF position. (See Note for Squelch operation under RT-246/VRC, paragraph 5-4c.)

d. Turn LIGHT switch ON when operating under normal conditions, if operating under blackout conditions turn LIGHT switch to OFF.

e. Turn the POWER switch to LOW. Allow the set to warm up for about 1 minute before transmitting.

f. Turn the speaker switch to ON. If an external loudspeaker (LS-454/U) is used, turn the SPEAKER switch to OFF.

g. Adjust the VOLUME control until background noise is heard.

h. If SQUELCH is to be used (no rushing voice heard), turn the SQUELCH control to ON.

i. Tune the set to the desired channel as follows:

(1) Turn the BAND selector to A or B, depending on the channel desired.

(2) Turn the MC-TUNE and KC-TUNE knobs so the desired channel appears on the channel dial.

j. If the LIGHT and SQUELCH switches are ON, observe the CALL indicator for a visual indication of an incoming signal.

k. Adjust the VOLUME control for the desired receiver volume.

l. To transmit, press the PUSH-TO-TALK switch on the microphone and speak into it.

m. Turn the POWER switch to the HIGH position when greater transmitter power is required.

n. A complete loss of power in the set may result from a tripped circuit breaker. To reset the circuit breaker, turn the POWER switch to OFF BREAKER-RESET and then to LOW or HIGH.

CAUTION: If circuit breaker trips again, do not reset. Maintenance is required.

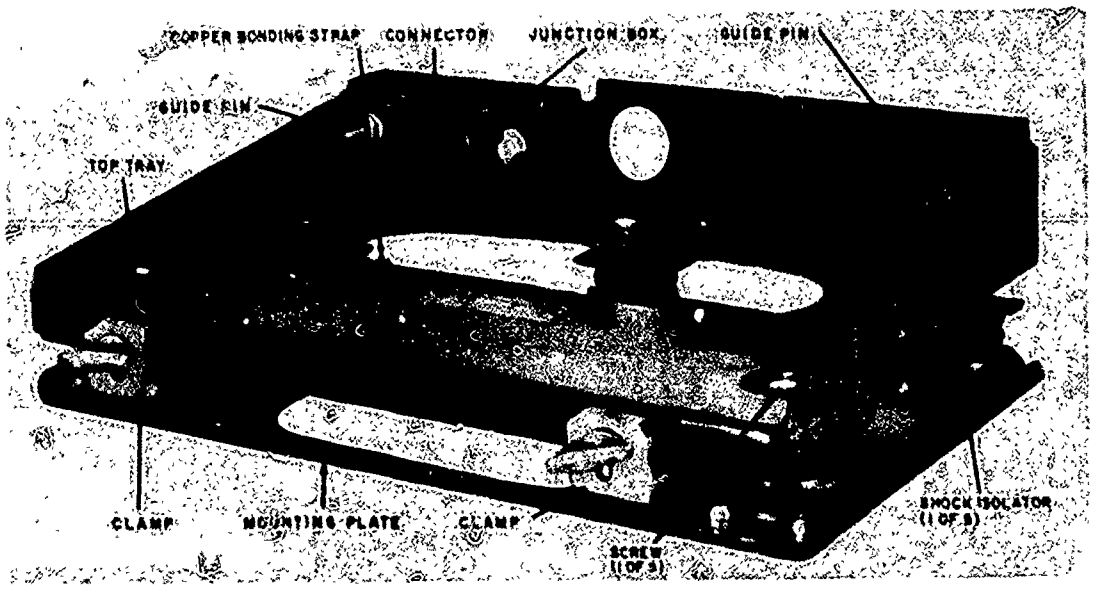



Figure 5-3. Mount MT-1029/VRC.

5-8. MOUNT MT-1029/VRC.

a. The Mount MT-1029/VRC is used for mounting the receiver-transmitters RT-246/VRC or RT-524/VRC and is a major component of radio sets using these receiver-transmitters. It performs three main functions in the operation of the radio set. Weight approximately 18 pounds.

(1) Mount for the receiver-transmitter.

(2) Distributes power, control and signal voltages.

(3) Acts as ground for the receiver-transmitter.

b. Two guide pins are on the rear of the mount to assist in installing the receiver-transmitter onto the mount and aid in holding it in position. The mount contains a gasket-sealed junction box which distributes power control and signal voltages between the receiver-transmitter and other equipment in the radio set.

5-9. RECEIVER R-442/VRC. (TM 11-5820-401-10)

a. The Receiver, R-442/VRC is a rugged, lightweight, compact receiver housed in a watertight case. All operating controls are located on the front panel. A connector at the rear mates with the junction box on the mount to provide power and to distribute audio signals.

b. This receiver is common to all configurations of the AN/VRC-12 family of radios, both automatic and manual, having an auxiliary receiver as a component.

5-10. CHARACTERISTICS OF THE RECEIVER R-442/VRC:

| | |
|---|---|
| Type of set | Vehicular |
| Type of modulation | FM |
| Type of signal received | Voice |
| Type of squelch | Noise and tone |
| Frequency coverage | |
| Band A | 30 to 52.95 MHz |
| Band B | 53 to 75.95 MHz |
| Frequency spacing | 50 KHz |
| Number of channels | 920 |
| Tuning | Detent (automatic calibration) |
| Preset facilities | None |
| Power source | 24 volt vehicular battery |
| Antenna | Three Section whip (1-MS-116A, 1-MS-117A, 1-MS-118A) |
| Weight | 19.5 pounds |

5-11. OPERATING PROCEDURE FOR RECEIVER R-442/VRC.

a. Place the receiver on the mounting (MT-1898/VRC) using the guide pins to prevent damage to the connector pins. Tighten clamps on the front of the mount to secure the set.

b. Attach the antenna cable and necessary audio accessories.

c. Turn the SQUELCH switch OFF (see note for SQUELCH operation under RT-246/VRC, para 5-4c).

d. Turn LIGHT switch ON when operating under normal conditions; if operating under blackout conditions turn LIGHT switch to OFF.

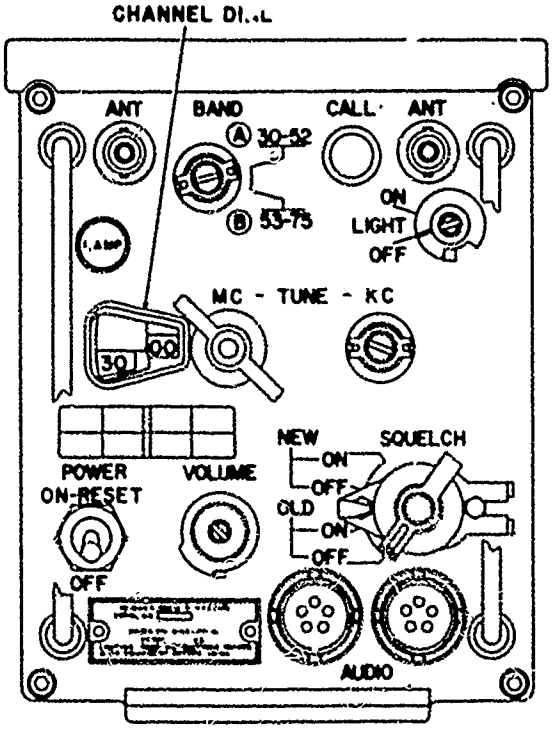



Figure 5-4. Receiver R-442/VRC Control Panel.

e. Set the POWER switch to ON-RESET.

f. Adjust the VOLUME control until background noise is heard.

g. If squelch is to be used, turn the SQUELCH switch to ON.

h. Tune the set to the desired channel as follows:

(1) Turn the BAND switch to A or B depending on the channel desired.

(2) Turn the MC-TUNE and KC-TUNE knobs until the desired channel appears on the channel dial.

i. If the LIGHT and SQUELCH switches are ON, observe the CALL indicator for a visual indication of an incoming signal.

j. Adjust the VOLUME control for the desired receiver volume.

k. If the POWER switch moves by itself to OFF, an overload is present. To reset, set the POWER switch to ON-RESET.

CAUTION: If the POWER switch moves to OFF again after being reset, do not reset it again. Maintenance is required.

5-12. MOUNT MT-1898/VRC.

The MT-1898/VRC is the mounting for the Receiver R-442/VRC and is a major component of radio sets using this receiver. The mounting performs the same three functions as the mounting for the receiver-transmitter component of the radio. Weight approximately 10 pounds

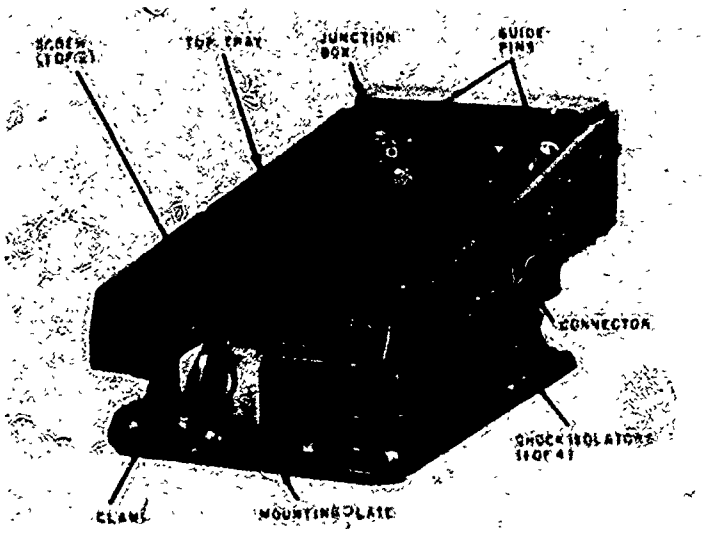



Figure 5-5. Mount MT-1898/VRC.

5-13. ANTENNA AT-912/VRC.

a. The Antenna AT-912 is used with the receiver transmitters RT-246/VRC and RT-524/VRC. It consists of a base, antenna elements AT-1096 and AT-1095, and Antenna Matching Unit (MX-2799/VRC). The antenna is about 10 feet in length and weighs approximately 20 pounds. The spring mount and base spring permit the antenna to bend without breaking when it strikes an obstruction.

b. The antenna matching elements mounts on the outside of wheeled vehicles and performs two functions:

(1) Mount for antenna mast sections.
(2) Matches the antenna length to the frequency of the transmitter.

NOTE: Do not tie antenna down to front of vehicle at any time because it will reduce transmitting range, weaken the springs and mast sections, and bend antenna elements AT-1096 and AT-1095.

c. When installing this antenna two cables are required. The cable assembly (CX-4722/U) is used to connect the antenna matching unit to the receiver-transmitter at the ANT CONT plug. The second cable (CG-1773/U) connects the antenna to the receiver-transmitter at the ANT connector.

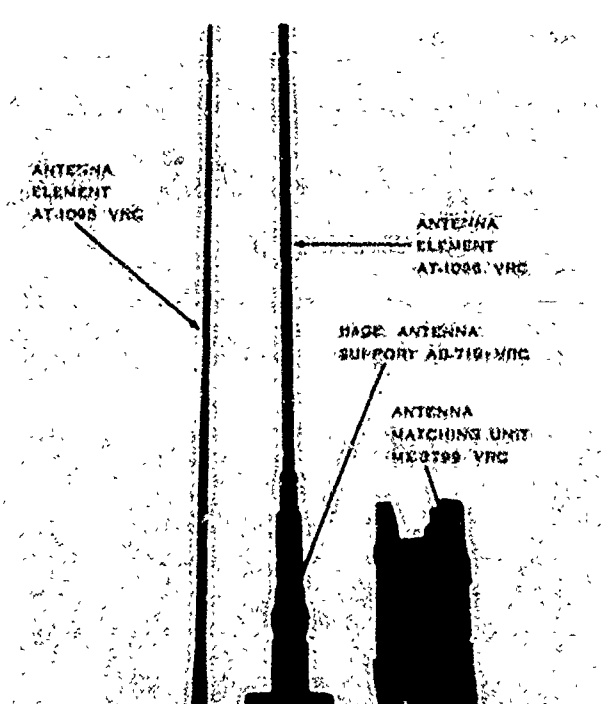



Figure 5-6. Antenna AT-912/VRC.

NOTE: Both sections of the antenna MUST be used with the receiver-transmitter to prevent burning out of the antenna matching unit or transmitter.

5-14. ANTENNA AS-1729/VRC.

a. The AS-1729/VRC is used with the receiver-transmitters RT-246/VRC and RT-524/VRC. It consists of two antenna elements, AT-1095/VRC and AS-1730/VRC, and one matching unit base, antenna MX-6707/VRC.

b. The matching unit base, antenna MX-6707/VRC is an automatic or manually operated switching unit. This unit has 10 bands and will operate from 30 to 75.95 mhz.

c. This antenna replaces the AT-912/VRC.

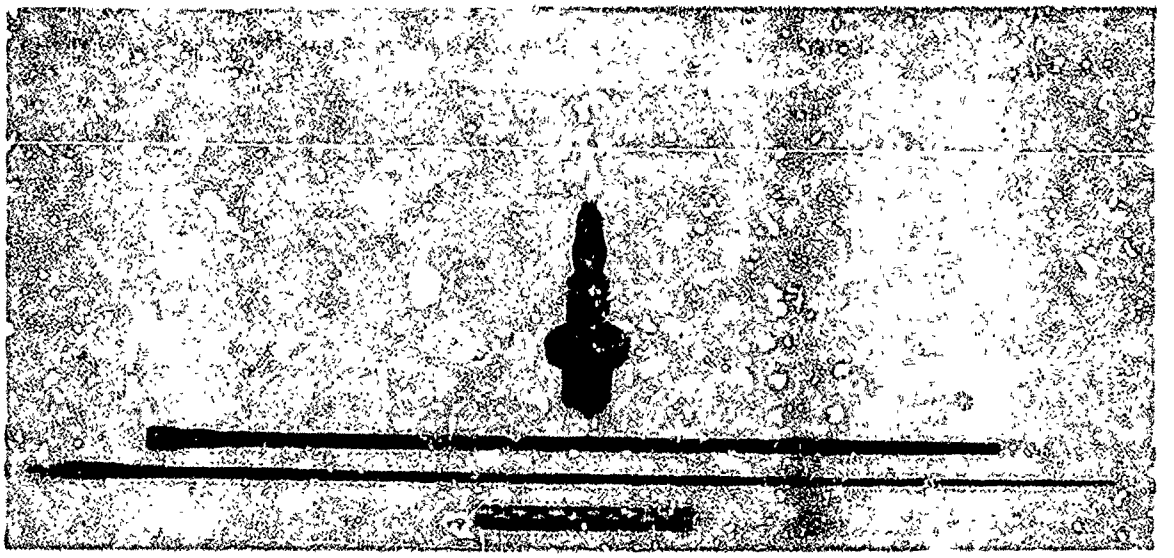


Figure 5-7. Antenna AS-1729( )/VRC with modified matching unit base.

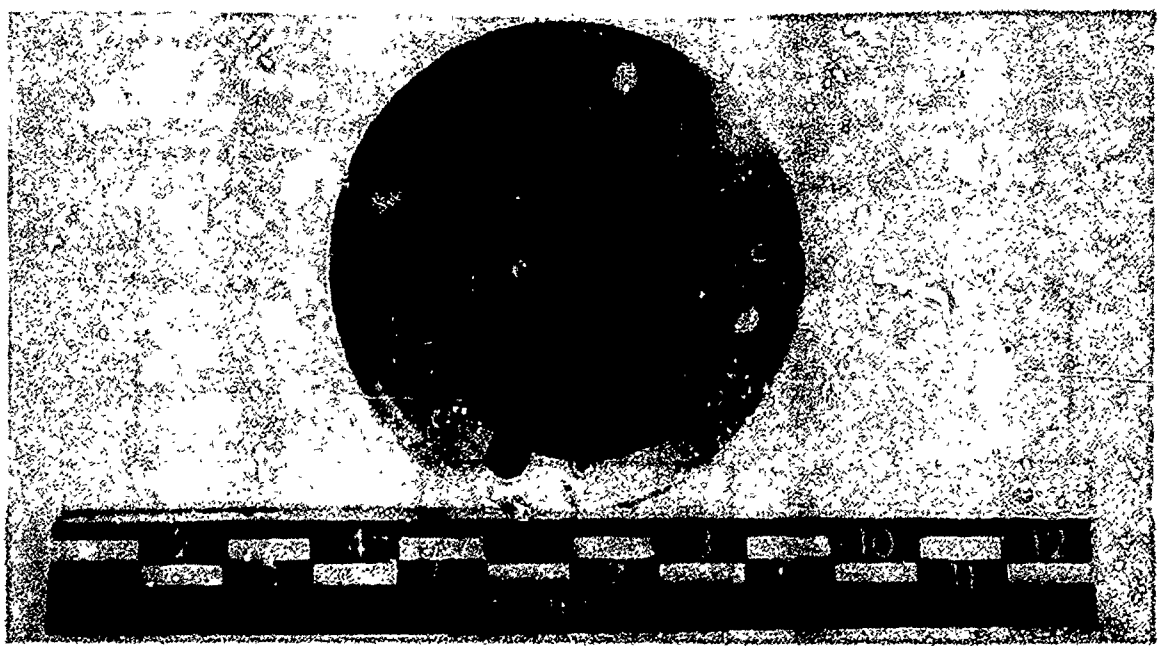


Figure 5-8. Antenna AS-1729( )/VRC with modified matching unit base bottom view.

5-15. RECEIVER ANTENNA.

The antenna for the Reciver R-442/VRC is one of the antenna used with the AN/GRC-3 through 6 series of radios. It consists of a base and three mast sections. The overall length is approximately 11 feet. One cable is used to connect the antenna to the receiver at the ANT plug. The cable assembly CX-1127/U may be used to interconnect two receivers R-442 to one common antenna by plugging it into one of the antenna connectors of each set. It weighs approximately 6 pounds.

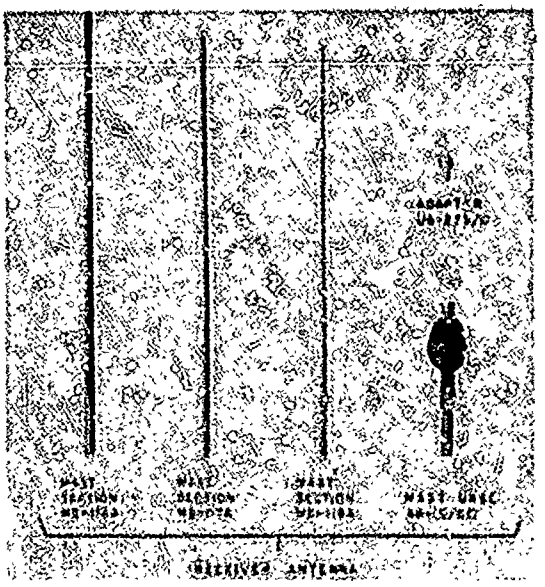


Figure 5-9. Receiver Antenna.

5-16. SELECTION OF OPERATING FREQUENCIES FOR RETRANSMISSION.

The Radio sets AN/VRC-45 or AN/VRC-49 may be used to retransmit automatically the signals of two other radio sets that are too far apart to communicate directly with each other. When channels to be used for retransmission are planned, the two frequencies must be at least 10 megahertz (MHz) apart and must be such that the transmitter of neither receiver-transmitter will interfere with the receiver of the other as shown on retransmission interference chart in TM 11-5820-401-10.

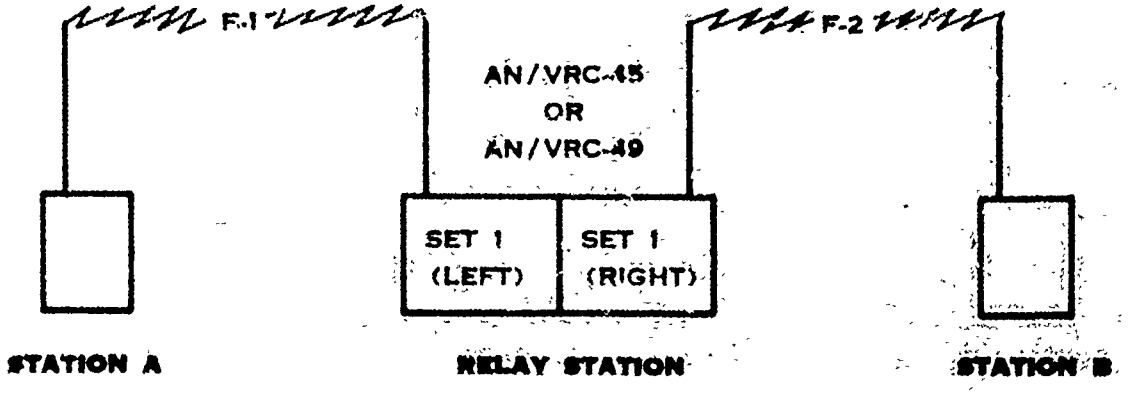



Figure 5-10. Diagram of Retransmission - AN/VRC-45 or AN/VRC-49.



Figure 5-11. Radio Set AN/VRC-12.

5-17. RADIO SET AN/VRC-12. (TM 11-5820-401-10)

a. The AN/VRC-12 is the basic radio of the automatic tuning configuration of this series of radios. The radio is designed for use within Armored vehicles in which the operator cannot readily get to the controls and has a requirement to monitor two channels. It weighs approximately 140 pounds.

b. Basic components:

Receiver R-442/VRC.
Receiver Mount MT-1898/VRC.
Receiver-Transmitter RT-246/VRC.
Receiver-Transmitter Mount MT-1029/VRC.
Receiver Antenna.
Antenna AS-1729/VRC.
Installation Kit (for vehicle) containing:
  Power and audio cables
  Audio accessories and controls
  Mounting brackets

c. Operational capabilities:

Monitor two channels simultaneously.
Monitor one channel and transmit on second channel.
Automatic selection of any one of ten preset channels by PUSHBUTTON tuning on the receiver-transmitter or Frequency Selector Control (C-2742/VRC).
Intercommunication between crew members (when Audio Frequency Amplifier is employed as part of the system).
Operation by remote control.

d. The Radio Set AN/VRC-12 is organic to the type units as follows:

| | Battalion | | | | | Brigade | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | LtInf | Abn | AM | Mech | Inf | LtInf | Abn | AM | Mech | Inf | Abn | Mech |
| Hq & Hq Co | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 4 | 0 | 0 | 3 |
| Rifle Co | 0 | 0 | 0 | 0 | 0 | | | | | | | | |
| Total | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 4 | 0 | 0 | 3 |



Figure 5-12. Radio Set AN/VRC-43.

5-18. RADIO SET AN/VRC-43. (TM 11-5820-401-10)

a. The AN/VRC-43 is a configuration of the VRC-12 radio family using automatic tuning capabilities. It is designed for use within Armored vehicles in which the operator cannot readily get to the controls and has a requirement to monitor and transmit on one channel. It weighs approximately 110 pounds.

b. Basic components:

Receiver-Transmitter RT-246/VRC
Receiver-Transmitter Mount MT-1029/VRC
Antenna AS-1729/VRC
Installation Kit (for vehicle) containing:
  Power and Audio Cables
  Audio accessories and controls
  Mounting brackets

c. Operational capabilities:

Monitor or transmit on one channel
Automatic selecton of any one of ten preset channels by PUSHBUTTON tuning on the receiver-transmitter or frequency selector control (C-2742/VRC).
Intercommunication between crew members (when Audio Frequency Amplifier is employed as part of system)
Operation by remote control

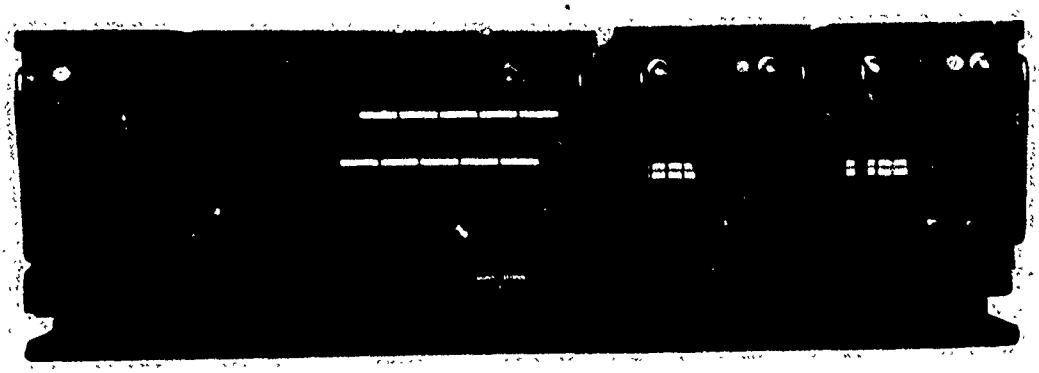


Figure 5-13. Radio Set AN/VRC-44.

5-19. RADIO SET AN/VRC-44. (TM 11-5820-401-10)

a. The AN/VRC-44 is a configuration of the AN/VRC-12 radio family using automatic tuning capabilities. It is designed for use in Armored vehicles in which the operator cannot readily get to the controls and has a requirement to monitor three channels. It weighs approximately 170 pounds.

b. Basic Components:

Two Receivers R-442/VRC
Two Receiver Mounts MT-1898/VRC
Receiver-Transmitter RT-246/VRC
Receiver-Transmitter Mount MT-1029/VRC
Receiver Antenna
Antenna AS-1729/VRC
Installation Kit (for vehicle) containing:
  Power and Audio cables
  Audio accessories and controls
  Mounting brackets

c. Operational capabilities:

Monitor three channels simultaneously
Monitor two channels and transmit on third channel
Automatic selection of any one of ten channels by PUSHBUTTON tuning on the receiver-transmitter or frequency selector control (C-2742/VRC).
Operation by remote control.

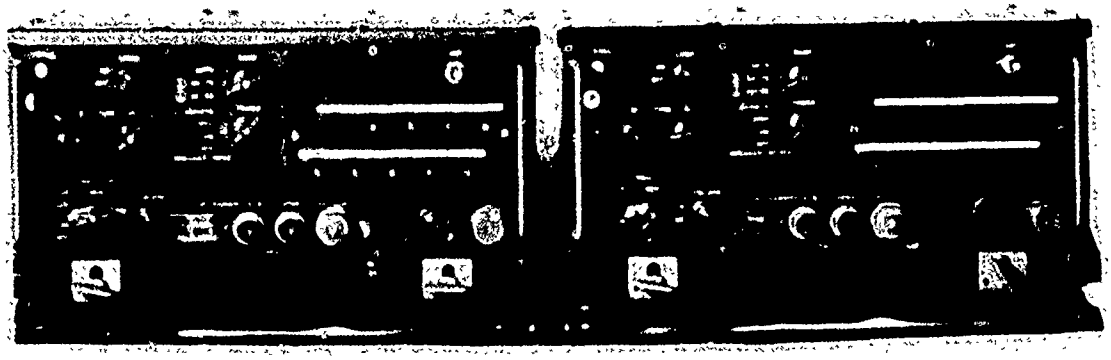


Figure 5-14. Radio Set AN/VRC-45.

5-20. RADIO SET AN/VRC-45. (TM 11-5820-401-10)

a. The AN/VRC-45 is a configuration of the AN/VRC-12 family of radios using automatic tuning capabilities on two receiver-transmitters. The radio is designed for use within Armored vehicles in which the operator cannot readily get to the controls and has a requirement to transmit on two channels simultaneously or establish automatic retransmission. It weighs approximately 225 pounds.

b. Basic components:

Two receiver-transmitters RT-246/VRC
Two receiver-transmitter Mounts MT-1029/VRC
Two Antennas AS-1729/VRC
Radio Control Set C-2299/VRC
Installation Kit (for vehicle) containing:
  Power and audio cables
  Audio accessories and controls
  Mounting brackets

c. Operational capabilities:

Monitor two channels simultaneously
Transmit on two channels
Monitor one channel and transmit on second channel
Automatic selection of any one of ten preset channels on either receiver-transmitter by PUSHBUTTON tuning at the receiver-transmitter or Frequency Selector Control (C-2742/VRC).
Intercommunication between crew members (when Audio Frequency Amplifier is employed as part of system).
Operation by remote control.
Automatic retransmission.

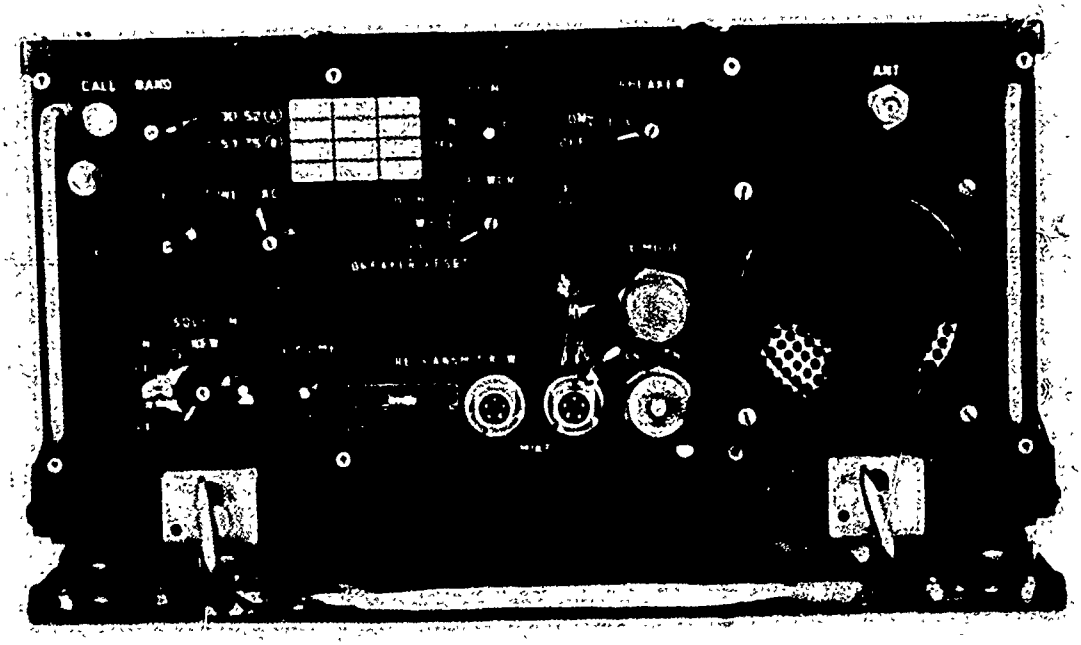



Figure 5-15. Radio Set AN/VRC-46.

5-21. RADIO SET AN/VRC-46. (TM 11-5820-401-10)

a. The AN/VRC-46 is a configuration of the AN/VRC-12 radio family using manual tuning. It is designed for use in vehicles in which operator can readily get all controls and has a requirement to monitor and transmit on one frequency. It weighs approximately 105 pounds.

b. Basic components:

Receiver-Transmitter RT-524/VRC
Receiver-Transmitter Mount MT-1029/VRC
Antenna AS-1729/VRC
Installation Kit (for vehicle) containing:
  Power and audio cables
  Audio accessories and controls
  Mounting brackets

c. Operational capabilities:

Monitor or transmit on one channel
Intercommunications between crew members (when Audio Frequency Amplifier is used as part of system).
Operation by remote control.

Operation by remote control

d. The Radio Set AN/VRC-46 is organic to the type units as follows:

| | Battalion | | | | | Brigade | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | LtInf | Abn | AM | Mech | Inf | LtInf | Abn | AM | Mech | Inf | Abn | Mech |
| Hq & Hq Co | 14 | 1 | 14 | 1 | 15 | 11 | 21 | 10 | 6 | 12 | 25 | 22 | 25 |
| Rifle Co | 0 | | 2 | | 2 | | | | | | | | |
| Total | 14 | 1 | 20 | 1 | 21 | 11 | 21 | 10 | 6 | 12 | 25 | 22 | 25 |

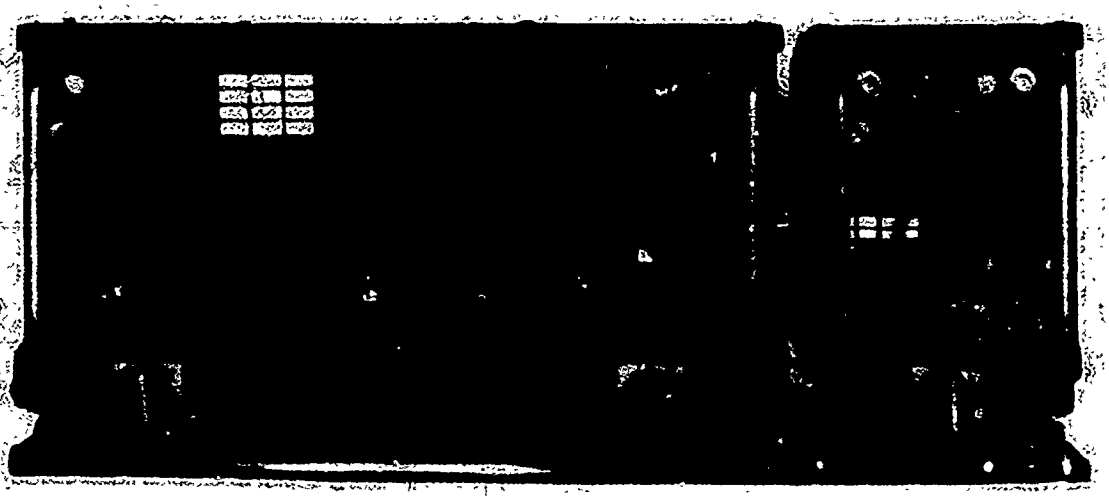


Figure 5-16. Radio Set AN/VRC-47.

5-22. RADIO SET AN/VRC-47. (TM 11-5820-401-10)

a. The AN/VRC-47 is a manually tuned configuration of the AN/VRC-12 family which is used when a requirement exists to monitor two channels. It weighs approximately 135 pounds.

b. Basic components:

Receiver R-442/VRC
Receiver Mount MT-1898/VRC
Receiver-Transmitter RT-524/VRC
Receiver-Transmitter Mount MT-1029/VRC
Receiver Antenna
Antenna AS-1729/VRC
Installation Kit (for vehicle) containing:
  Power and audio cables
  Audio accessories and controls
  Mounting brackets

c. Operational capabilities:

Monitor two channels simultaneously
Monitor one channel and transmit over second channel
Intercommunication between crew members (when Audio Frequency Amplifier is used as part of system)
Operation by remote control

d. The Radio Set AN/VRC-47 is organic to the following type units:

| | Battalion | | | | | Brigade | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | LtInf | Abn | AM | Mech | Inf | LtInf | Abn | AM | Mech | Inf | Abn | Mech |
| Hq & Hq Co | 19 | 0 | 2 | 0 | 13 | 7 | 4 | 2 | 2 | 7 | 6 | 6 | 12 |
| Rifle Co | 2 | | 0 | | 7 | | | | | | | | |
| Total | 25 | 0 | 2 | 0 | 34 | 7 | 4 | 2 | 2 | 7 | 6 | 6 | 12 |

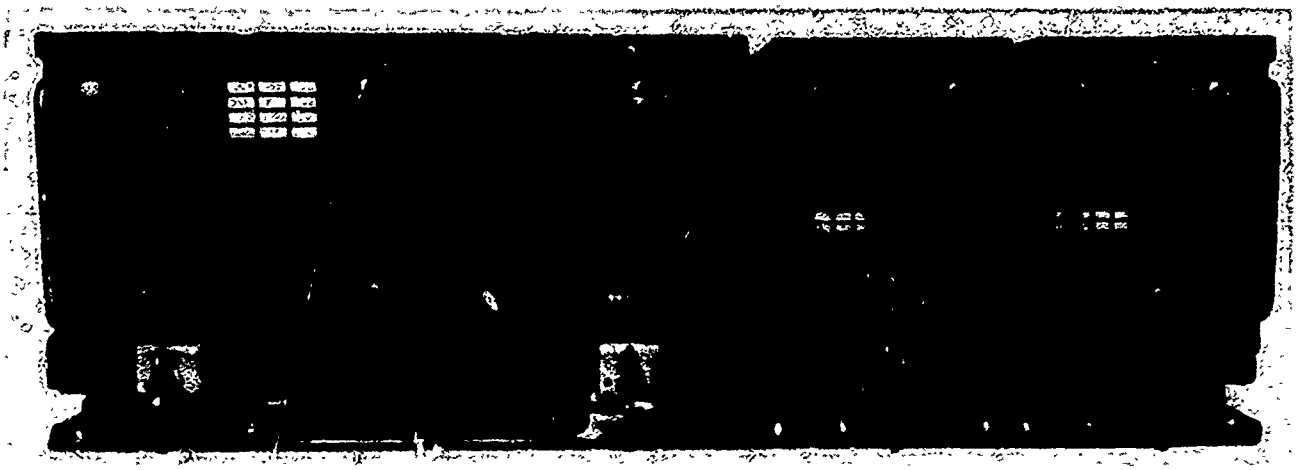


Figure 5-17. Radio Set AN/VRC-48.

5-23. RADIO SET AN/VRC-48. (TM 11-5820-401-10)

a. The AN/VRC-48 is a manual tuned vehicular radio set which is employed where there is a requirement to monitor three channels. It weighs approximately 165 pounds.

b. Basic components:

Two receivers R-442/VRC
Two receiver mounts MT-1898/VRC
Receiver-transmitter RT-524/VRC
Receiver-transmitter mount MT-1029/VRC
Receiver antenna
Antenna AS-1729/VRC
Installation Kit (for vehicle) containing:
  Power and audio cables
  Audio accessories and controls
  Mounting bracket

c. Operation capabilities:

Monitor three channels simultaneously
Monitor two channels and transmit on a third channel
Intercommunication between crew members when Audio Frequency Amplifier is employed as part of system
Operation by remote control

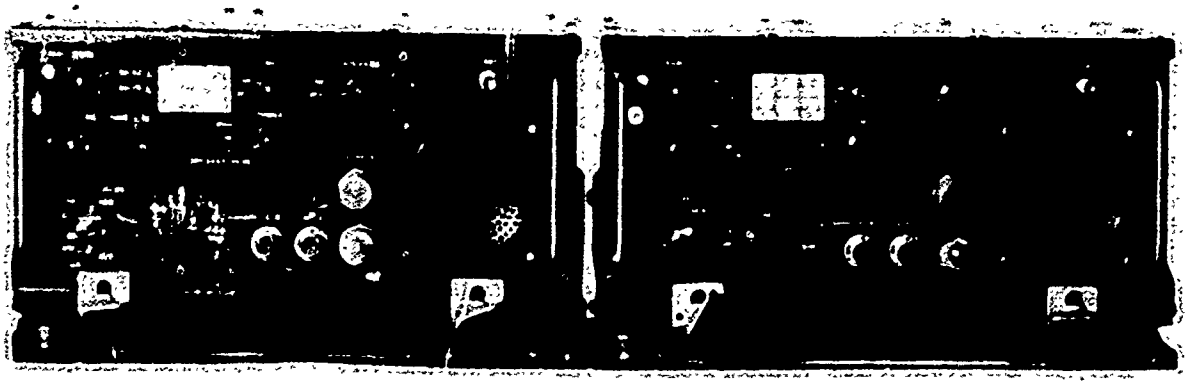


Figure 5-18. Radio Set AN/VRC-49.

5-24. RADIO SET AN/VRC-49. (TM 11-5820-401-10)

a. The AN/VRC-49 is a manual configuration of the AN/VRC-12 family which is used when a requirement exists to transmit on two channels simultaneously or establish automatic retransmission. It weighs approximately 220 pounds.

b. Basic components:

Two Receiver-Transmitters RT-524/VRC
Two Receiver-Transmitter Mounts MT-1029/VRC
Two Antennas AS-1729/VRC
Radio Control Set C-2299/VRC
Installation Kit (for vehicles) containing:
  Power and audio cables
  Audio accessories and controls
  Mounting brackets

c. Operational capabilities:

Monitor two channels simultaneously
Transmit on two channels simultaneously
Monitor one channel and transmit on second channel
Intercommunication between crew members (when Audio Frequency Amplifier is employed as a part of system)
Automatic retransmission
Operation by remote control

d. The AN/VRC-49 is organic to the following type units:

| | Battalion | | | | | Brigade | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | LtInf | Abn | AM | Mech | Inf | LtInf | Abn | AM | Mech | Inf | Abn | Mech |
| Hq & Hq Co | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 4 | 1 | 2 | 2 | 3 |
| Rifle Co | 0 | 0 | 0 | 0 | 0 | | | | | | | | |
| Total | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 4 | 1 | 2 | 2 | 3 |

TAB HERE

# CHAPTER 6

# AUXILIARY EQUIPMENT FOR THE AN/VRC-12 FAMILY

6-1. AUDIO ACCESSORIES OF THE AN/VRC-12 FAMILY.

Figure 6-1 through 6- 6 illustrate the various audio accessories which are a part of the installation kits for the AN/VRC-12 family of radios. Each type vehicle installation requires a kit and certain audio accessories for the radio system to operate.

NOTE: Audio accessories of the AN/PRC-6, AN/PRC-10 and AN/GRC-3 through 8 series of radios are NOT interchangeable with the AN/PRC-25 nor AN/VRC-12 family.

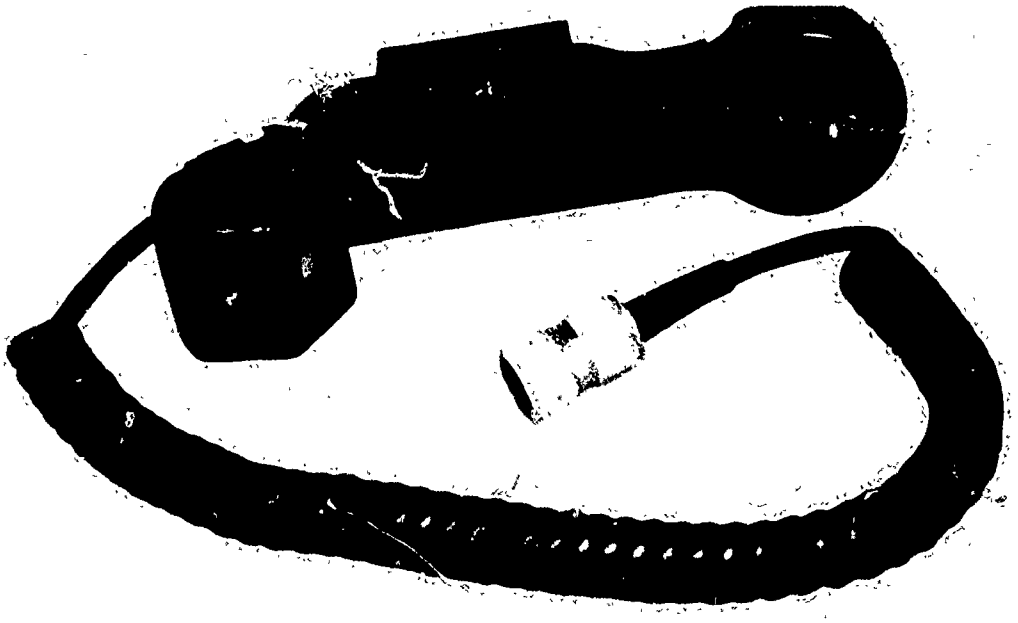


Figure 6-1. Handset H-138/U.

NOTES: a. This handset is a component part of AN/PRC-25 but can be used with the AN/VRC-12 vehicular radios.

b When using this handset, caution must be taken to avoid talking into both portions of the transmitter at the same time. If this occurs, cancellation of the transmission will occur.

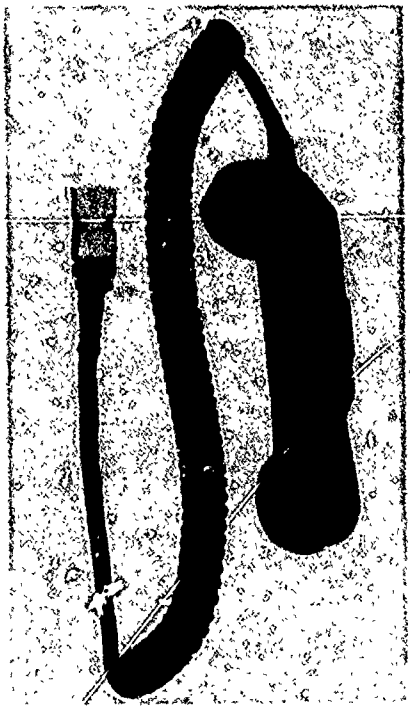


Figure 6-2. Handset H-189/GR.

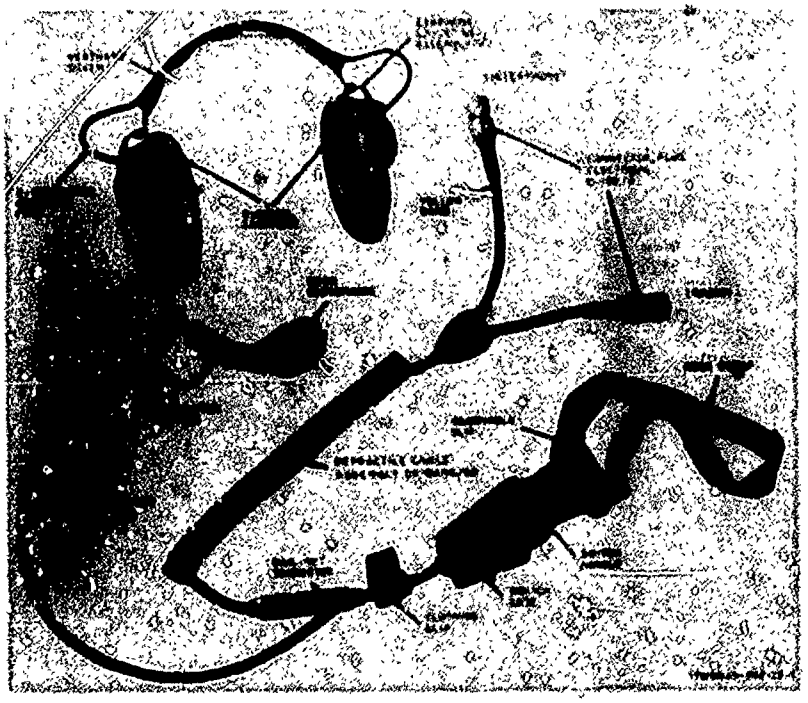


Figure 6-3. Headset Microphone H-161A/U.

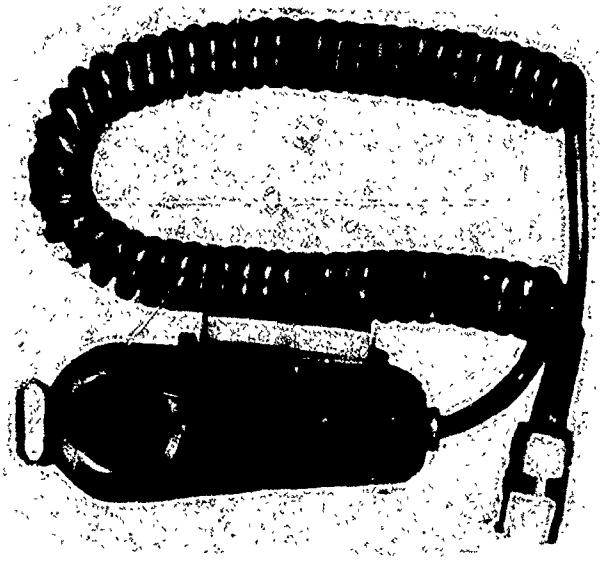


Figure 6-4. Microphone M-80/U.

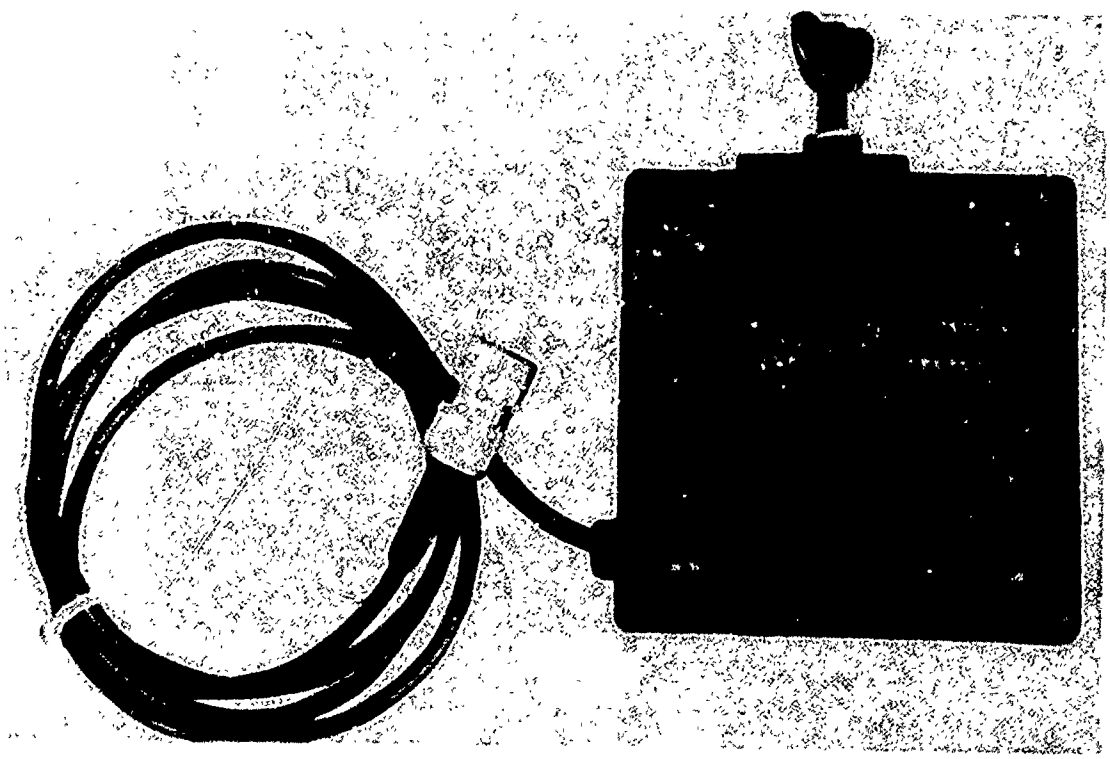


Figure 6-5. Loudspeaker LS-454/U.

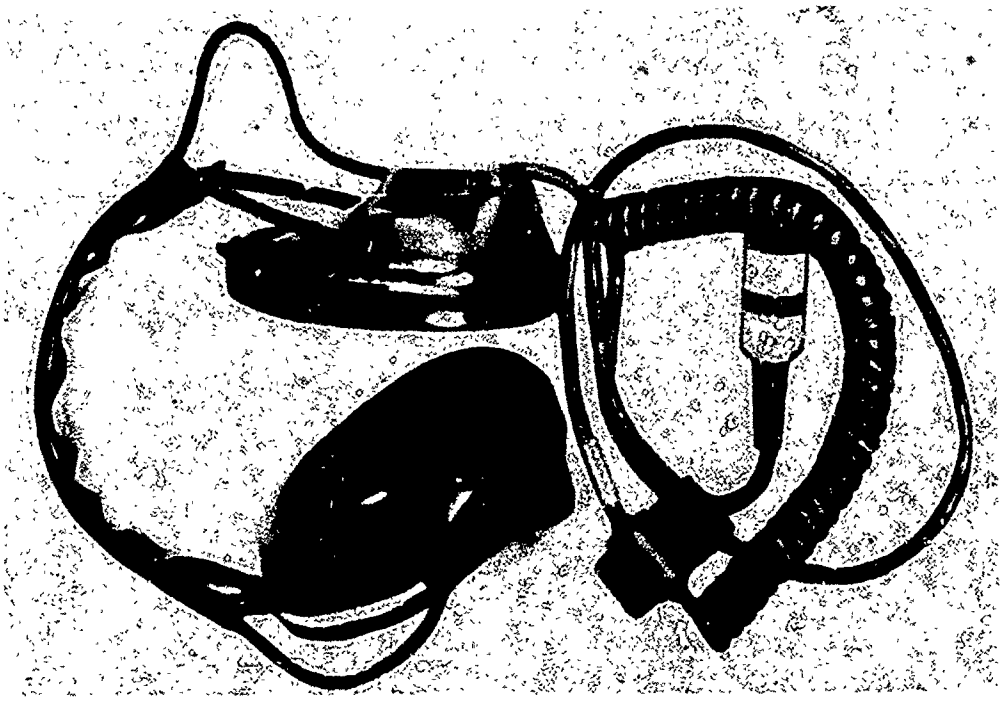


Figure 6-6. Electrical Headset H-140/GR.

## NOTES

6-2. AUDIO FREQUENCY AMPLIFIER AM-1780/VRC. (TM 11-5820-401-10)

The AM-1780/VRC is a component of installation kits for tracked vehicles. It amplifies the intercom and receiver outputs and is the main junction box for the components of the radio system. All operating controls are external. Ten connectors are located on it to provide connections for the crew member's audio outlets. Two sets of field wire binding posts are available to enable the use of a field telephone to control the radio or to contact the crew members.

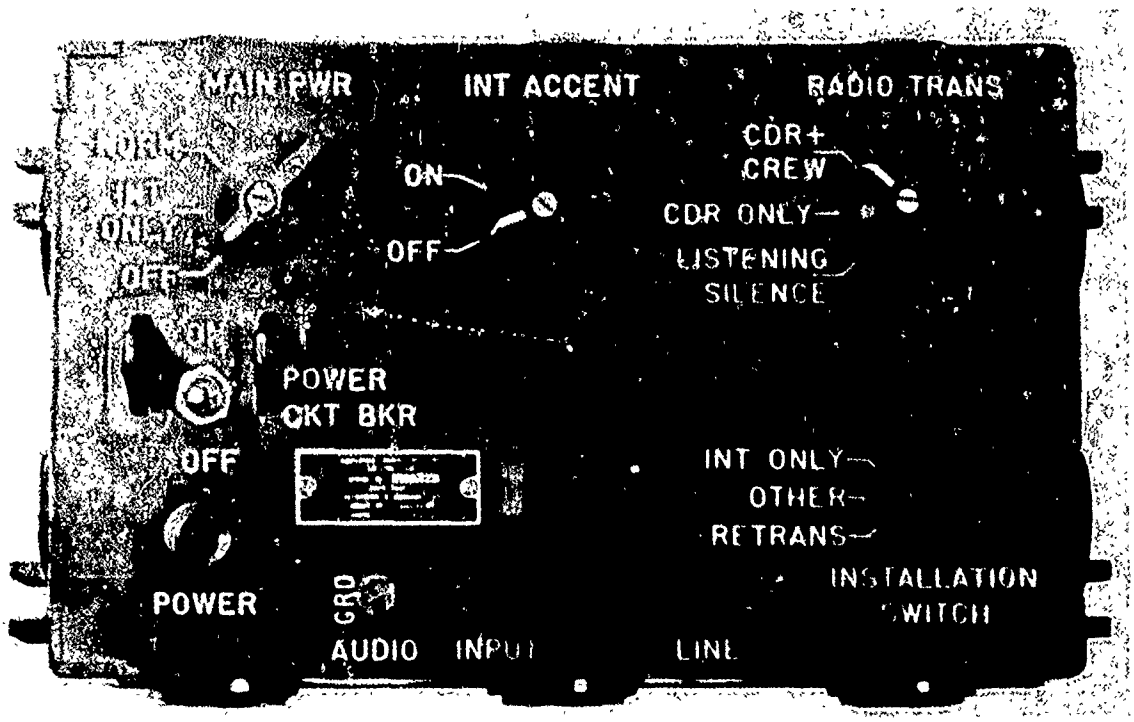



Figure 6-7. Audio Frequency Amplifier AM-1780/VRC Control Panel.

6-3. OPERATING PROCEDURE FOR AUDIO FREQUENCY AMPLIFIER AM-1780/VRC.

a. Turn on power to the radio set.

(1) Turn the MAIN POWER Switch from OFF to NORMAL or, when INSTALLATION Switch is in INT ONLY, turn the MAIN PWR Switch to INT ONLY.

(2) Set the POWER CKT BKR control to ON, observe the POWER indicator lights.

b. If it is desired that the intercommunication signals be louder than the radio signals, turn the INT ACCENT switch to ON, if it is desired that the intercommunication and radio signals should be of the same volume, turn the INT ACCENT switch to OFF.

c. To select the personnel who can operate the receiver-transmitters, set the RADIO TRANS Switch as follows:

(1) If all crew members are to operate the receiver-transmitter, turn the RADIO TRANS Switch to CDR + CREW.

(2) If only the commander is to operate the receiver-transmitter, turn the RADIO TRANS switch to CDR ONLY.

(3) To prevent the commander and crew members from operating the receiver-transmitters, turn the RADIO TRANS switch to LISTENING SILENCE.

d. If the POWER CKT BKR switch moves by itself, an overload is present. To reset the circuit breaker when it trips, set the POWER CKT BKR control to ON:

CAUTION: If the circuit breaker trips again after being reset, do not reset it. Maintenance is required.

e. Proceed with the appropriate operating procedures for the receivers, receiver-transmitters and control boxes used in the operation of the radio set.

6-4. INTERCOMMUNICATION CONTROL SET C-2296/VRC. (TM 11-5820-401-10)

The C-2296/VRC is a component of certain installation kits for armored vehicles. It provides communication between personnel inside the vehicle using the radio set and personnel outside of the vehicle. It has a Handset H-207/VRC attached at the right side and binding posts which allow field wire and a telephone to be connected to it.

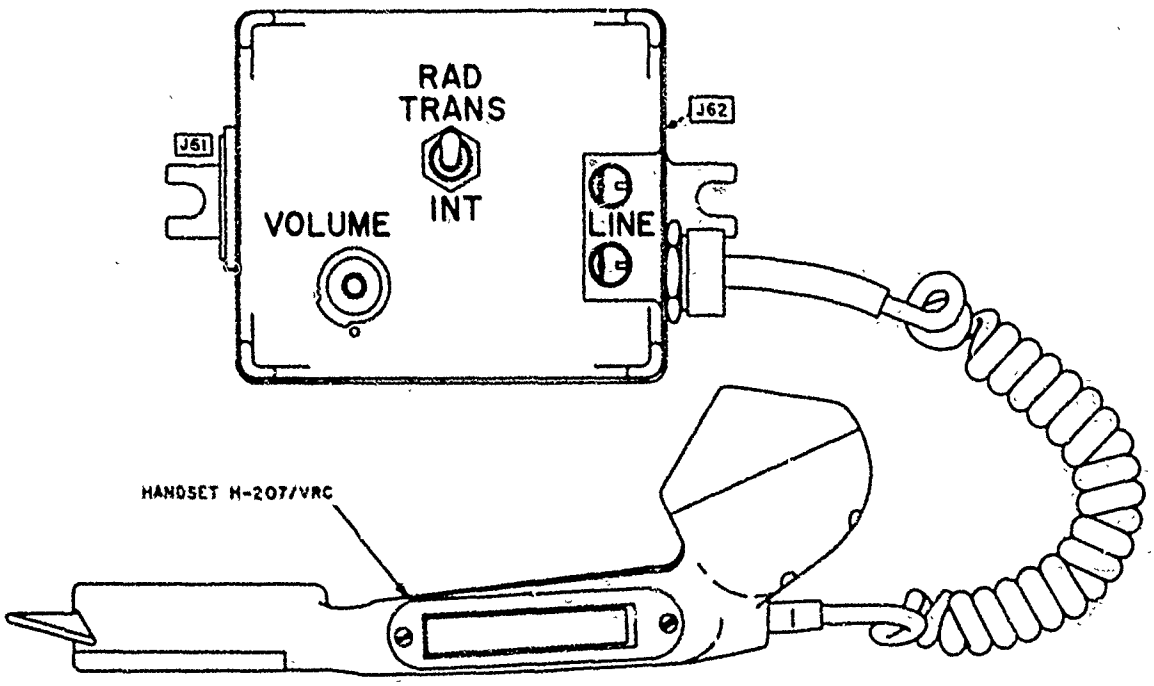



Figure 6-8. Intercommunication Control Set C-2296/VRC.

6-5. OPERATION FROM INTERCOMMUNICATION CONTROL SET C-2296/VRC.

a. To signal personnel inside the vehicle:

(1) Remove the handset (H-207/VRC) from its stored position.

(2) Press the PUSH-TO-TALK switch; note that the indicator lamp, connected to J62, will light.

NOTE: When the switch is pressed, the lamp will stay lighted until personnel inside the vehicle answer. It is not necessary to keep the switch pressed.

b. To talk to personnel inside the vehicle after the signal is answered:

(1) Press the PUSH-TO-TALK switch on the Handset H-207/VRC.

(2) Speak into microphone portion.

(3) Adjust VOLUME control to desired volume.

c. To transmit over the radio set proceed as follows:

(1) Press PUSH-TO-TALK switch.

(2) Hold the RAD TRANS-INT switch in the RAD TRANS position.

(3) Speak into the handset microphone.

(4) At the end of transmission release PUSH-TO-TALK switch and RAD TRANS-INT switch.

d. To communicate from a field telephone, after intercommunications have been established:

(1) Connect field wire between the LINE binding posts of the C-2296/VRC and the field telephone.

(2) Speak into telephone handset.

NOTE: When the indicator lights, personnel inside are trying to establish contact with personnel outside of vehicle.

## NOTES

6-6. INTERCOMMUNICATION CONTROL SET C-2297/VRC. (TM 11-5820-401-10)

The C-2297/VRC is a component of certain installation kits. It provides connections between the radio set and the audio accessories used by a crew member of a vehicle or to connect the intercommunication set (S-2296/VRC) mounted outside of vehicle. Audio connectors and VOLUME control are located on the bottom.

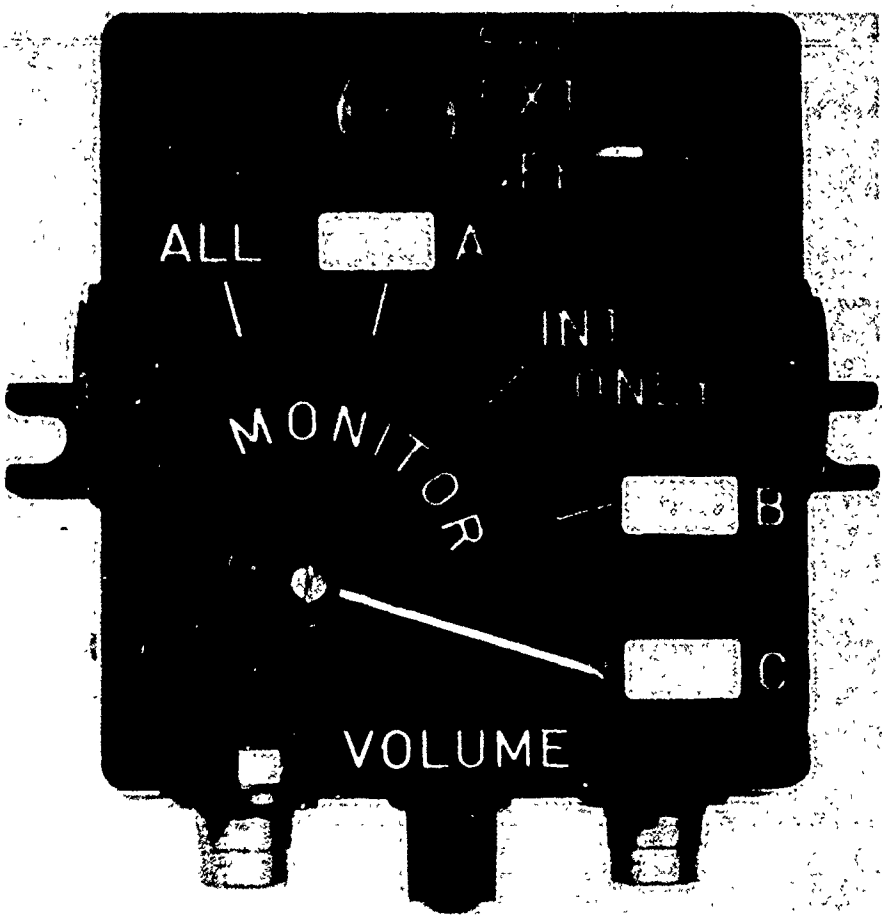



Figure 6-9. Intercommunication Control Set, C-2297/VRC Control Panel.

6-7. OPERATION FROM INTERCOMMUNICATION CONTROL SET, C-2297/VRC.

a. The following chart lists the MONITOR switch positions for listening to the outposts of the different components of the radio set.

| TO LISTEN TO | MONITOR SWITCH POSITION |
|---|---|
| All signals from R-442/VRC, Receiver-Transmitters and Intercom | ALL |
| Only First Receiver-Transmitter | A |
| Only the Receiver | B |
| Only Second Receiver-Transmitter (AN/VRC-45 or AN/VRC-49) OR: | C |
| Only Second Receiver (AN/VRC-44 or AN/VRC-48) | |
| Intercommunications Only | INT ONLY |

b. Adjust the VOLUME control for the desired volume in audio accessory.

c. To transmit on first receiver-transmitter:

(1) Turn the MONITOR switch to ALL, A or B.

(2) Press the PUSH-TO-TALK switch of the microphone connected to the audio connector on the bottom right of control box (J-902) and speak into the microphone.

d. To transmit on second receiver-transmitter:

(1) Turn the MONITOR switch to C.

(2) Press the PUSH-TO-TALK switch of the microphone connected to the audio connector on the bottom right of Control Box (J-902) and speak into the microphone.

e. To use intercom:

(1) When using a microphone connected to the audio connector on the bottom left of control box (J-903 marked yellow), press the PUSH-TO-TALK switch of microphone and speak into microphone.

(2) When using microphone connected to audio connector on bottom right side of control Box (J-902):

(a) Turn the MONITOR switch to INT ONLY.

(b) Press the PUSH-TO-TALK switch and speak into microphone.

f. To answer personnel outside of vehicles:

(1) After the EXT indicator lights, turn the SIG switch to EXT.

(2) Press the PUSH-TO-TALK switch and speak into the microphone connected to the audio connector on the bottom left (J-903) of the control box.

NOTE: The EXT Indicator lights as a reminder that the SIG switch is in the EXT Position.

g. To signal personnel outside the vehicle:

(1) Hold the SIG switch in the SIG position.

(2) After personnel outside the vehicle answer, release the SIG switch.

6-8. INTERCOMMUNICATION CONTROL SET C-2298/VRC. (TM 11-5820-401-10)

The C-2298/VRC is a component of certain installation kits to provide connection between the radio set and the audio accessories used by crew members of vehicles. All operating controls and connectors are external. Audio connectors and a VOLUME control are located on the bottom of the set.

## NOTES

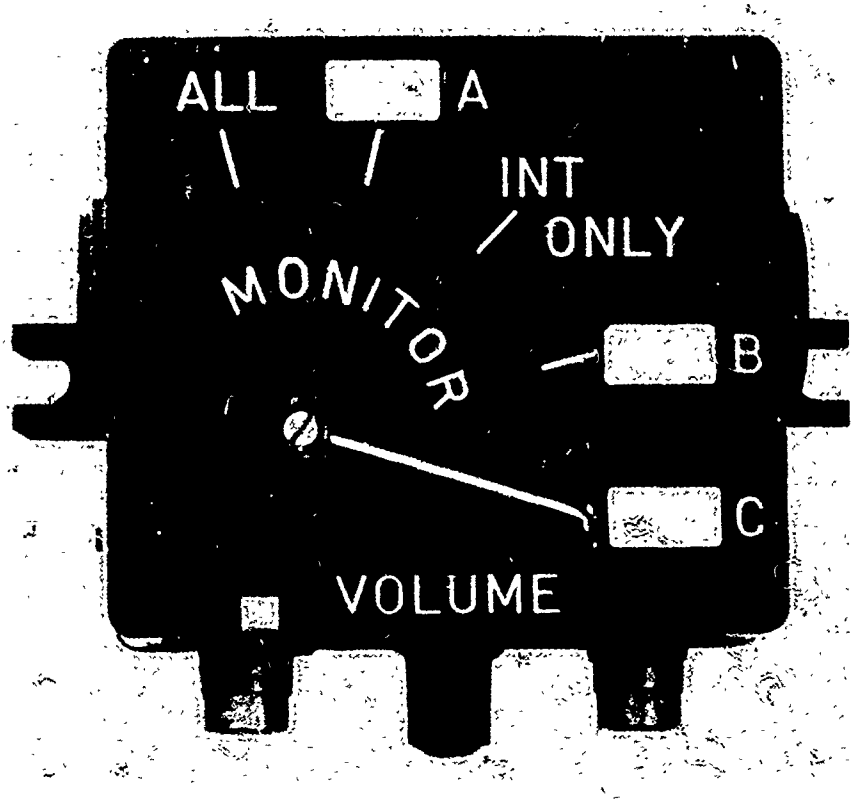



Figure 6-10. Intercommunication Control Set C-2298/VRC Control Panel.

6-9. OPERATION FROM INTERCOMMUNICATION CONTROL SET C-2298/VRC.

a. To monitor incoming signals of different components operate the MONITOR switch the same as shown on Chart for C-2297/VRC (para 6-7a).

b. Adjust the VOLUME control for desired volume in audio accessory.

NOTE. The adjustment of the VOLUME controls on the receiver and receiver-transmitters will affect the volume at the audio accessory when the MONITOR switch is in any position except ALL. Adjust the VOLUME controls on the receiver and receiver-transmitter for equal volume levels when in positions other than ALL.

c. To transmit on the first receiver-transmitter:

(1) Turn the MONITOR switch to ALL, A or B.

(2) Press the PUSH-TO-TALK switch of the microphone connected to the bottom right (J-802) of the control box and speak into microphone.

d. To transmit on second receiver-transmitter:

(1) Turn the MONITOR switch to C.

(2) Press PUSH-TO-TALK switch of microphone connected to bottom right (J-802) of control box and speak into microphone.

e. To use intercom:

(1) If using a microphone connected to bottom left (J-803 marked yellow), press the PUSH-TO-TALK switch and speak into microphone.

(2) If using microphone attached to bottom right (J-802):

(a) Turn the MONITOR switch to INT ONLY.

(b) Press the PUSH-TO-TALK switch and speak into microphone.

6-10. RADIO CONTROL SET C-2299/VRC. (TM 11-5820-1401-10).

The C-2299/VRC is a junction box which provides connections between two receiver-transmitters and the audio accessories of certain radios. It also controls automatic retransmission with these radio sets. All operating controls and connectors are external. Audio connectors and the VOLUME control are located on the bottom.

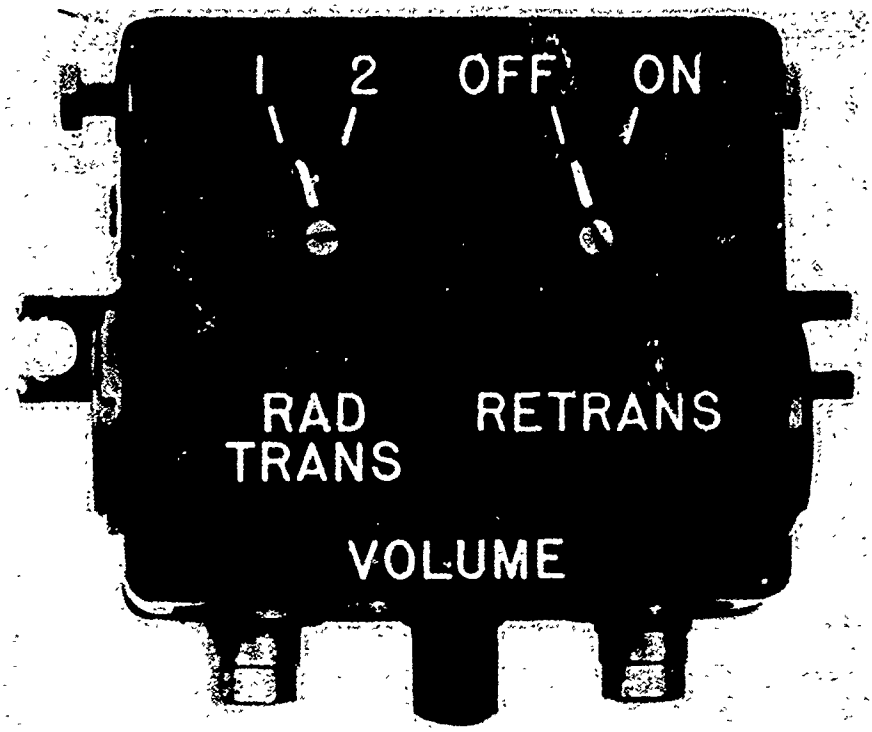



Figure 6-11. Radio Control Set C-2299/VRC Control Panel.

6-11. OPERATION FROM RADIO CONTROL SET C-2299/VRC.

a. To operate the radio set from the C-2299/VRC.
   (1) Turn the RETRANS swich to OFF.
   (2) To communicate using the first receiver-transmitter:
      (a) Turn the RAD TRANS switch to 1.
      (b) Adjust the VOLUME control for the desired volume in the audio accessory.
      (c) To transmit, press the PUSH-TO-TALK switch and speak into microphone.
   (3) To communicate using second receiver-transmitter:
      (a) Turn the RAD TRANS Switch to 2.
      (b) Adjust the VOLUME control for the desired volume in the audio accessory.
      (c) To transmit, press the PUSH-TO-TALK switch and speak into microphone.

b. To establish automatic retransmission between two distant stations:

NOTE: The frequencies used for retransmission must be at least 10 megahertz apart and must be such that the transmitter of either transmitter-receiver will not interfere with the receiver of the other (TM 11-5820-401-10). The SQUELCH switches of both receiver-transmitters must be ON.

(1) Contact each of the distant radio sets and notify that retransmission is being established.

(2) Turn the RETRANS switch to ON.

(3) Monitor the two channels being used through an audio accessory at either audio connector on the control box by tuning the RAD TRANS switch to 1 or 2.

(4) At the end of automatic retransmission, turn the RETRANS switch OFF.

6-12. FREQUENCY SELECTOR CONTROL C-2742/VRC. (TM 11-5820-401-10)

The C-2742/VRC is a component of certain installation kits using the automatic receiver-transmitter RT-246/VRC. It extends the control of power and selection of preset channels to a remote location within the vehicle. Selector switch is located on the face of the control. The PWR switch on the right allows control of power to the complete radio and selection of HIGH or LOWER transmitter output. The SW switch obtains control of the receiver-transmitter from another C-2742/VRC when more than one (C-2742/VRC) is connected to the same radio.

6-13. OPERATION OF FREQUENCY SELECTOR CONTROL C-2742/VRC.

a. Turn the POWER switch on the receiver-transmitter to the REMOTE position.

b. Lift the SW switch to obtain control of the receiver-transmitter; note the control indicator lights.

c. Select any one of the 10 preset channels by turning the CHANNEL SEL switch to the appropriate position as marked on the write-in surfaces of the control.

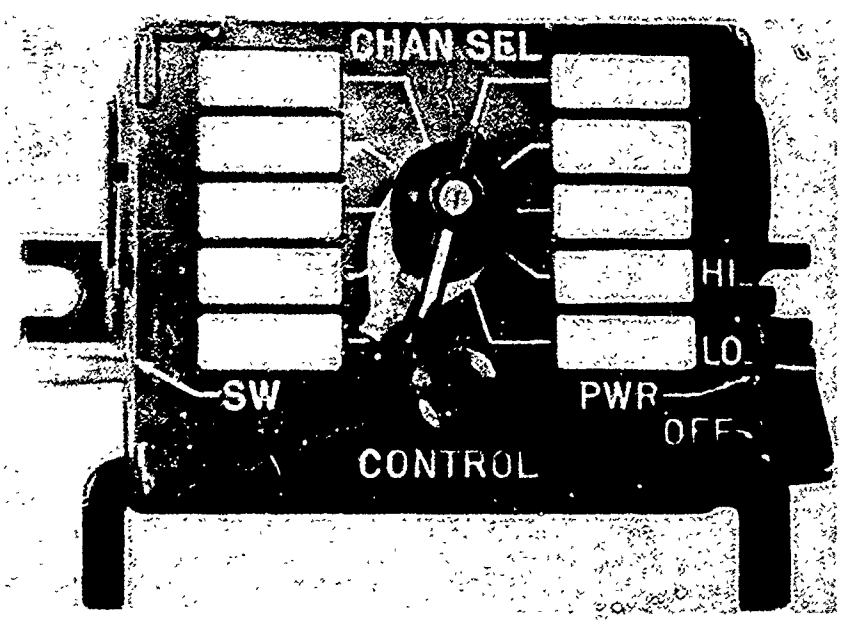


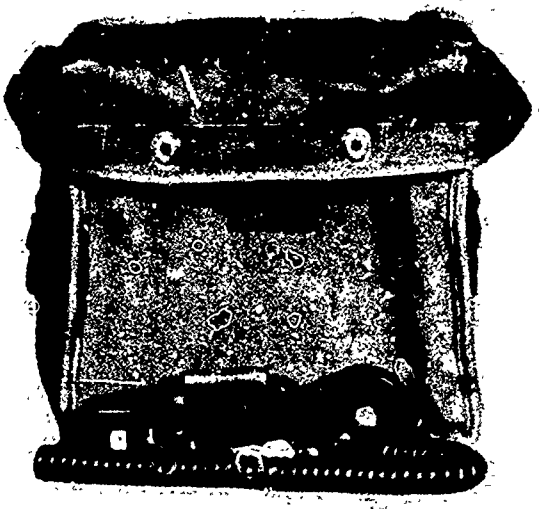

Figure 6-12. Frequency Selector Control C-2742/VRC Control Panel.

NOTE: The travel of the CHAN SEL switch may be limited by the catch lock provided. To set the catch, pull it away from the shaft, turn it to the desired position and place it back against the switch shaft.

d. Select low or high transmitter power output by turning the PWR switch to LO or HI.

e. If the CONTROL indicator light goes out, another frequency selector control in the radio system has obtained control of the receiver-transmitter. To regain control, lift the SW switch.

f. To turn off the power in the receiver-transmitter from the C-2742/VRC, turn the PWR switch to OFF.



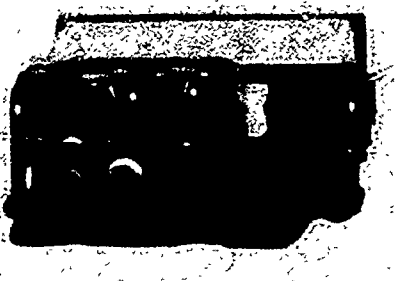
BAG, COTTON DUCK CW-598/GRA-39

HANDSET H-138/U



CONTROL, RADIO SET
C-2328/GRA-39

SLING, CARRYING,
BAG AND CASE



CONTROL, RADIO SET
C-2329/GRA-39

AUXILIARY SLING

Figure 6-13. Radio Set Control Group AN/GRA-39.

6-14. RADIO SET CONTROL GROUP AN/GRA-39. (TM 11-5280-477-12)

a. The AN/GRA-39 is a completely transistorized, battery operated, remote control system. The system consists of two Radio Set Controls, the C-2329/GRA-39 (local unit), the C-2328/GRA-39 (remote unit), a Handset H-138, a carrying bag, and carrying straps.

b. The AN/GRA-39 is designed to provide remote control operation of the AN/PRC-25 or AN/VRC-12 Family of Radios over a distance of 3 Km. The local unit remains at the radio site and is interconnected to the remote unit by field wire, directly or through a standard tactical switchboard. Each unit of the group uses six BA-30 (flashlight) batteries for power. The estimated battery life is approximately 72 hours for the local unit and approximately 24 hours for the remote unit. The complete unit (less batteries) weighs approximately 24 pounds.

c. Operational Capabilities:

(1) At Radio Control Set C-2329/GRA-39 (local unit) connected to a radio set:

(a) Local control and operation of one radio set.

(b) Telephone sound signalling to remote control unit.

(c) Duplex telephone operation with remote site.

(2) At Radio Set Control C-2328/GRA-39 (remote unit) connected to local unit by field wire (WD-1/TT).

(a) Remote PUSH-TO-TALK control and operation of one radio set.
(b) Telephone sound signalling to the local unit.
(c) Duplex telephone communication with local unit.
(d) Internal loud speaker operation.
(e) Headset or handset operation.

d. The AN/GRA-39 is organic to the following type units:

| | Battalion | | | | | | | Brigade | | | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inf | Lt Inf | Abn | Air Mob | | Mech | | Inf | Lt Inf | Abn | Air Mob | | Mech | | I | A | M |
| Hq & Hq Co | 17 | 6 | 6 | 6 | | 12 | | 5 | 9 | 8 | 11 | | 3 | | 8 | 11 | 10 |
| Rifle Co | 2 | 0 | 2 | 0 | | 6 | | | | | | | | | | | |
| | | 6 | | 6 | | | | | | | | | | | | | |
| | 23 | 6 | 12 | 6 | | 30 | | 5 | 9 | 8 | 11 | | 3 | | 8 | 11 | 10 |

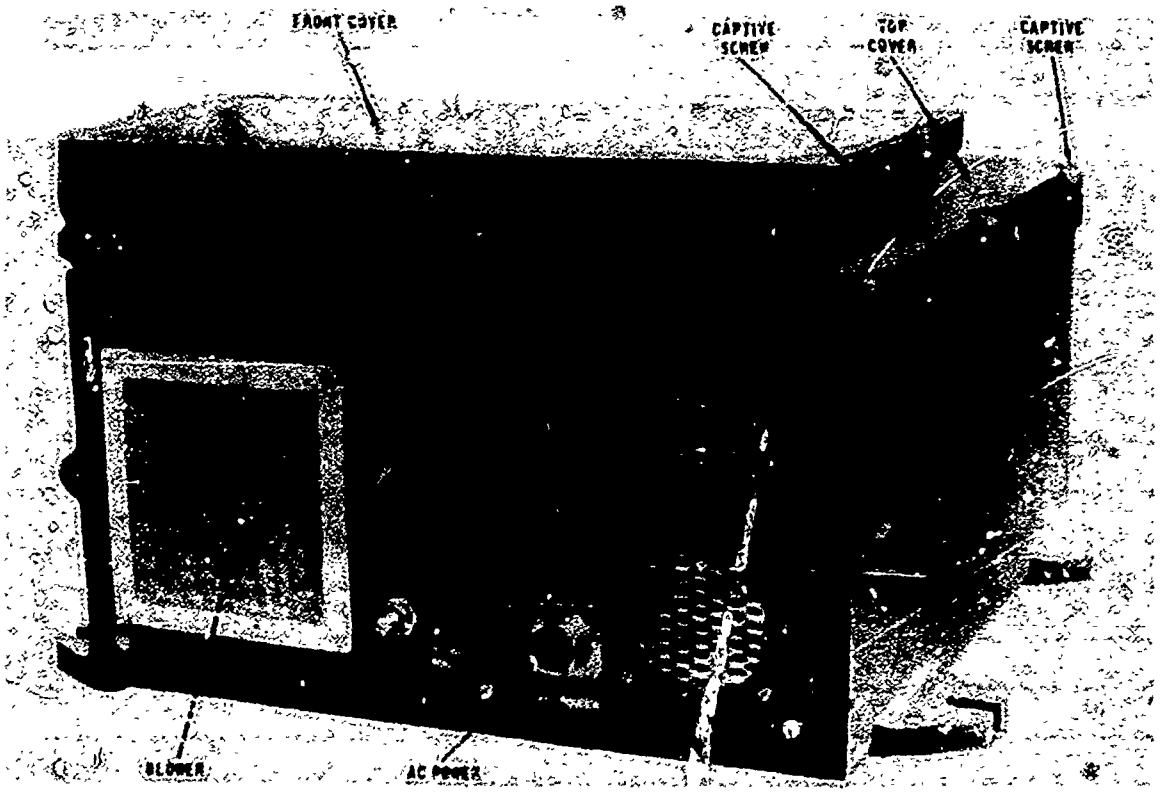



Figure 6-14. Power Supply PP-2953/U.

6-15. POWER SUPPLY PP-2953/U. (TM 11-6130-213-12)

The Power Supply PP-2953/U is used to provide a source of regulated 25.2 volts direct-current (dc) power when bench-testing Receiver-Transmitter, Radio RT-524/VRC or Receiver-Transmitter RT-246/VRC. The power supply can also be used to operate Receiver-Transmitter, Radio RT-524/VRC as fixed-station equipment when an alternating-current (ac) power source is available. The power supply is capable of operating from either a 115- or 230-volt ac, 50- to 60-hertz per second (Hzps), or 115- volt ac, 400-Hzps power source. The power supply can also power any other equipment requiring 25.2 volts dc at about 10 amperes.

## NOTES

TAB
HERE

# CHAPTER 7

# AM RADIO SETS

## 7-1. AMPLITUDE MODULATED RADIO SETS.

The standard series of frequency modulated (FM) radio sets operate in the high frequency and very high frequency band and at low power outputs. Therefore, they have a limited operating range, with organic antenna, up to approximately 32 km. Since highly mobile units frequently must operate beyond this range, particularly between battalions and higher headquarters, it is necessary to maintain control and coordination by using longer range high frequency and medium powered radios of the amplitude modulated (AM) type. Where FM radio sets use voice emission to transmit messages, the AM sets have the additional capability of employing interrupted continuous wave (CW) for transmission of messages by international morse code. The largest radio set, AN/GRC-46, has the additional capability of employing teletype signals to include simultaneous use of radioteletype and voice. These AM sets are normally installed in vehicles. The use of radiotelegraph and radioteletype requires trained specialists. The AM sets organic to the infantry battalions and brigades are discussed in the following paragraphs.

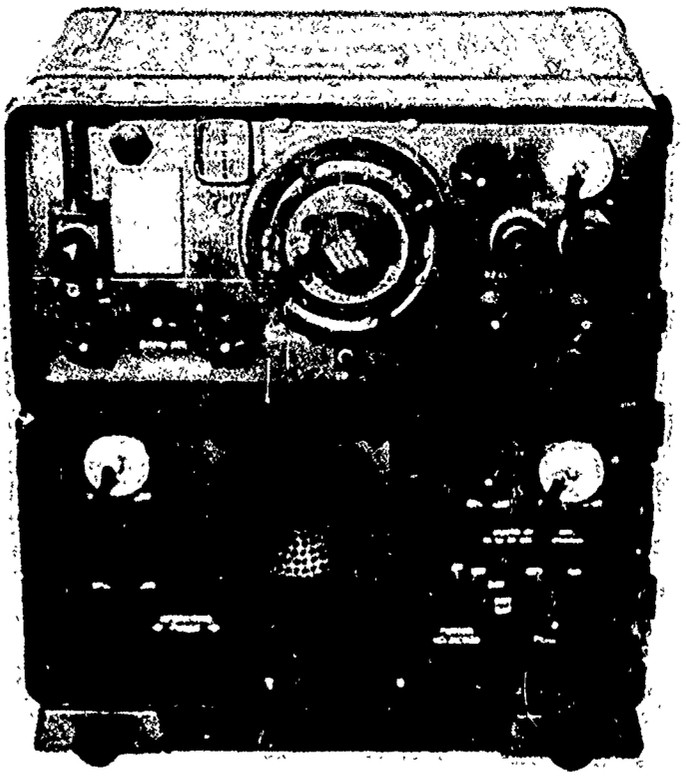


Figure 7-1. Radio Set AN/GRR-5.

7-2. RADIO SET AN/GRR-5. (TM 11-295)

a. Radio Set AN/GRR-5 is a radio receiver used for tactical purposes. This receiver is capable of being operated in a field installation, vehicular installation or as a fixed station.

b. The Radio Set AN/GRR-5 is organic to the following type units:

| | Battalion | | | | | Brigade | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | Air Mob | Mech | Inf | Lt Inf | Abn | Air Mob | Mech | I | A | M |
| Hq & Hq Co | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 1 | 0 | 2 | 2 | 1 | 3 |
| Rifle | 1 | | | | | | | | | | | | |
| CS | 1 | | | | | | | | | | | | |
| | 5 | | | | | | | | | | | | |

7-3. CHARACTERISTICS OF THE AN/GRR-5

| | |
|---|---|
| Type of set | general use |
| Type of modulation | AM |
| Type of signals which can be received | voice, CW and MCW |
| Frequency coverage (4 bands) | 1.5 to 18 MHz |
| Tuning | continuous |
| Preset facilities | 10 |
| Operating range | N/A |
| Power source | |
| Vehicular operation | vehicular battery 6, 12 or 24 volts |
| Fixed station | 115 volts AC 50 or 60 hertz |
| Field installation | dry cell batteries (2 BA-419 and 1 BA-405) |
| Antenna (2 MS-116, 1 MS-117 & 1 MS 118) | 4 meter whip |
| Weight | 76 pounds |

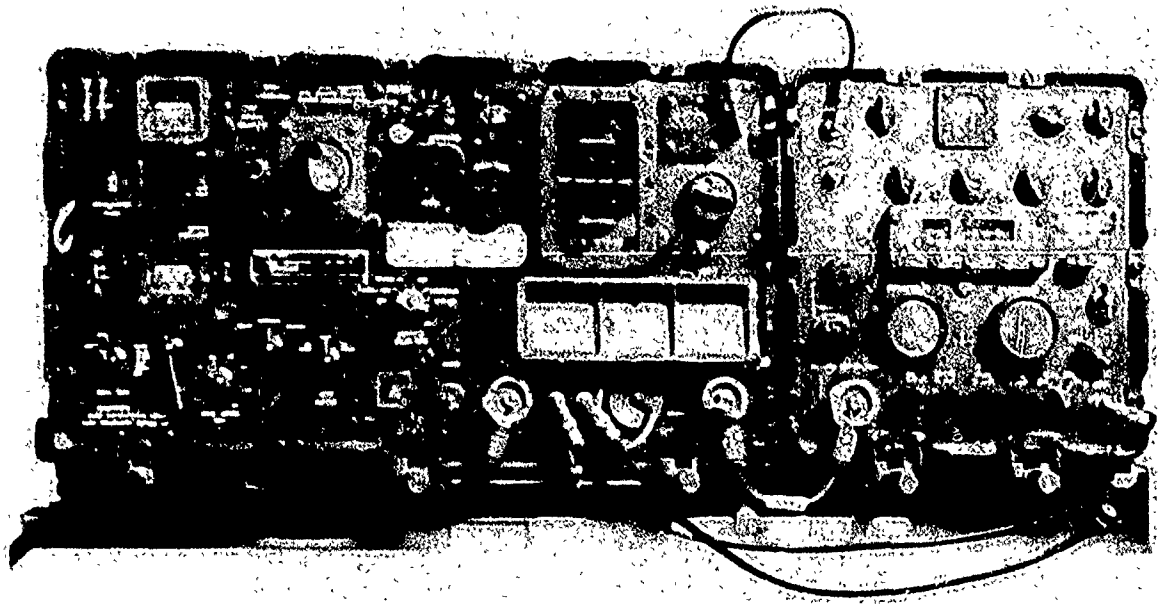


Figure 7-2. Radio Set AN/GRC-19.

7-4. RADIO SET AN/GRC-19. (TM 11-5820-295-10)

a. Radio Set AN/GRC-19 consists of the Transmitter T-195/GRC and the Receiver R-392/URR on a Mount MT-851, a 4.5 meter whip antenna, necessary audio accessories and interconnecting power and control cables. The transmitter is automatically controlled. The transmitter may be remotely controlled from a distance of up to 3 kilometers by means of the Radio Set Control Group OA-1754/URC in conjunction with the Control Group AN/GRA-6 (not supplied as a component of the basic set).

b. This set is capable of communicating with the AN/GRC-87, the AN/GRC-45, and the AN/GRR-5.

c. The Radio Set AN/GRC-19 is organic to the following type units (to be replaced by the Radio Set AN/GRC-106, see paragraph 7-13):

| | Battalion | | | | | Brigade | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | Air Mob | Mech | Inf | Lt Inf | Abn | Air Mob | Mech | I | A | M |
| Hq & Hq Co | 2 | 1 | 1 | 1 | 2 | 1 | 4 | 2 | 0 | 2 | 2 | 4 | 2 |

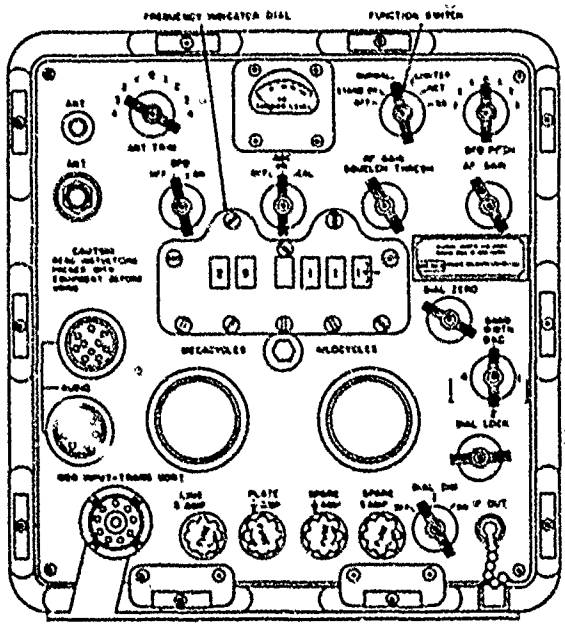
NOTE: When a unit is augmented with a FAC one additional AN/GRC-19 is authorized.

d. Operational capabilities:
Transmission or reception on one frequency; Duplex operation
Relay or retransmission operation; Operation by remote control

7-5. CHARACTERISTICS OF THE AN/GRC-19

| | | | |
|---|---|---|---|
| Type of set | vehicular | Operating range | |
| Type of modulation | AM | Voice | 80 km |
| Type of emission | voice and CW | CW | 120 km |
| Frequency coverage | | Power output (nominal) | 100 watts |
| Transmitter (10 bands) | 1.5 to 20 MHz | Power source | 22-30 volts* |
| Receiver (32 bands) | .5 to 32 MHz | Antenna (3 MS-116, 1 MS-117 & 1 MS-118) | 4.5 meter whip |
| Tuning | continuous | Weight | 254 pounds |
| Preset facilities | | | |
| Transmitter | 7 and 1 manual | | |

*NOTE: This requires that a special electrical system be installed in the vehicle. This system is known as the Leece-Neville electrical system and consists of a 110 amp AC generator and a rectification system. Operate generator at 28.5 volts for best results.



RADIO RECEIVER R-392/URR (FRONT PANEL)

Figure 7-3. Radio Set AN/GRC-19 (Cont).

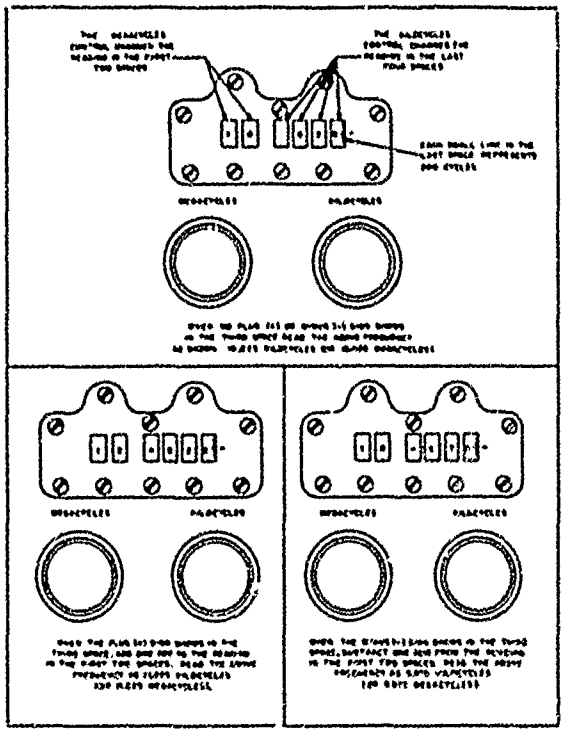


Figure 7-4. Radio Set AN/GRC-19 (Cont).

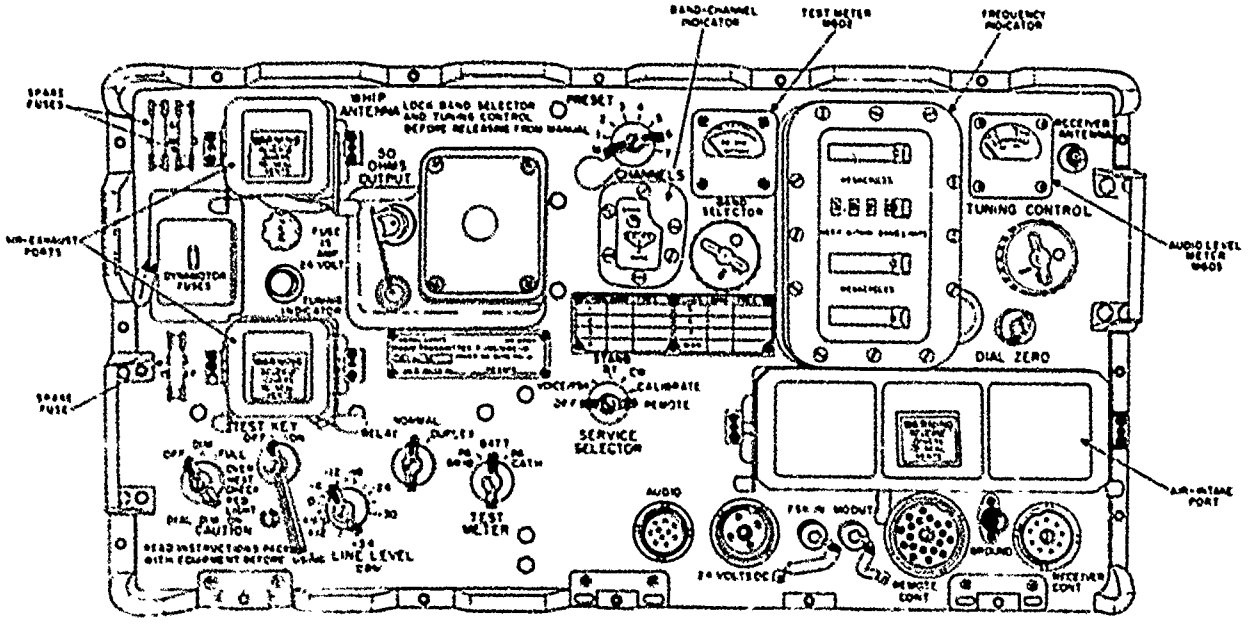



Figure 7-5. Radio Set AN/GRC-19 (Cont).

7-6. OPERATION OF THE AN/GRC-19.

a. Net Control Station Tuning--In order for all stations in a net to have adequate communication, the NET CONTROL STATION (NCS) will establish the operating frequency for the entire net. The Net Control Station will perform the following steps:

(1) Receiver calibration.

(a) Turn the FUNCTION switch to the NORMAL position.
(b) Turn the BAND WIDTH switch to the 2 KHz position.
(c) Turn the RF GAIN switch all the way clockwise.
(d) Turn the AF GAIN switch to the center of its range.
(e) Turn the BFO switch to the ON position.
(f) Turn the AGC switch to the CAL position.
(g) Turn the BFO PITCH to the ZERO position.
(h) Unlock the KILOCYCLES control by turning the DIAL LOCK all the way counterclockwise.
(i) Turn the MEGACYCLES control and the KILOCYCLES control to the nearest 100 KHz to the operating frequency. (The receiver provides calibration points at every 100 KHz.)
(j) Turn the DIAL ZERO control all the way clockwise.
(k) Adjust the KILOCYCLES control until zero beat is obtained in the headset.
(l) Turn the DIAL ZERO control all the way counterclockwise.
(m) Turn the KILOCYCLES control to the operating frequency.
(n) Lock the KILOCYCLES control by turning the DIAL LOCK all the way clockwise.
(o) Turn the AGC Switch to the ON position.

(2) Transmitter calibration.

(a) Unlock, turn to and relock the BAND SELECTOR control to the proper band.
(b) Unlock, and turn the TUNING CONTROL until the approximate operating frequency appears on the dial window.
(c) Turn the receiver FUNCTION switch to the NET position.
(d) Turn the SERVICE SELECTOR switch to the CALIBRATE position.
(e) Turn the RELAY-NORMAL-DUPLEX switch to the DUPLEX position.
(f) Adjust the TUNING CONTROL until zero beat is obtained in the headset.
(g) Lock the TUNING CONTROL.
(h) To correct the dial mechanically push in and turn the DIAL ZERO CONTROL until the operating frequency appears on the window.

(3) Tuning of the power amplifier and antenna stages.

(a) Turn the FUNCTION switch to the NORMAL position.
(b) Turn the RELAY-NORMAL-DUPLEX switch to the NORMAL position.
(c) Turn the SERVICE SELECTOR switch to the CW or VOICE/FSK position.
(d) Depress the PUSH-TO-TALK switch, hold the key down or hold the TEST KEY IN THE ON position and when the TUNING INDICATOR LAMP comes on the set is completely tuned ready for transmission. (The DIAL DIM switch must be in the DIM or FULL position in order for the TUNING INDICATOR LAMP to light.)

(4) Normal operation.

| Control | Voice | CW |
|---|---|---|
| SERVICE SELECTOR . . . . . | VOICE/FSK | CW |
| AGC . . . . . | ON | OFF |
| FUNCTION . . . . . | NORMAL or LIMITER or SQ | NORMAL |
| BAND WIDTH . . . . . | 8 KHz | 2 KHz |
| BFO . . . . . | OFF | ON |

In order to transmit on VOICE press the PUSH-TO-TALK switch, speak clearly into the microphone and hold it at such distance that the AUDIO LEVEL METER does not exceed a reading of 100.

(5) Standby.

To keep the set ready for instant operation when needed turn the SERVICE SELECTOR and the FUNCTION switches to the STANDBY position.

b. Secondary Station Tuning--To insure that all stations in a net have communication with each other the stations will tune their sets to the frequency established by the NET CONTROL STATION (NCS). This is accomplished by first tuning the receiver to the NCS signal and secondly, tuning the transmitter to the frequency obtained in the receiver. Perform the following steps:

(1) Receiver tuning:

(a) The NET CONTROL STATION will transmit a tuning signal in order for all secondary stations to tune their receiver to his frequency.

(b) The secondary stations will perform the following steps:

1. Turn the FUNCTION switch to the NORMAL position.
2. Turn the BFO switch to the ON position.
3. If the NCS is to transmit a CW signal, turn the AGC switch to the OFF position. If the NCS is to transmit a VOICE signal turn the AGC to the ON position.
4. Unlock the KILOCYCLES control by turning the DIAL LOCK all the way counterclockwise.
5. Turn the MEGACYCLES and KILOCYCLES controls until the approximate operating frequency appears on the dial window.
6. Zero beat the NCS signal on your receiver by means of the KILOCYCLES control.
7. Lock the dial by turning the DIAL LOCK all the way clockwise.
8. Turn the FUNCTION switch to the NET position.

(c) Tuning transmitter to the receiver:

1. Unlock, turn to and relock the BAND SELECTOR switch to the proper band.
2. Unlock and turn the TUNING CONTROL until the approximate operating frequency appears on the dial window.
3. Turn the SERVICE SELECTOR switch to the CALIBRATE position.
4. Turn the RELAY-NORMAL-DUPLEX switch to the DUPLEX position.
5. Turn the TUNING CONTROL for zero beat in the receiver.
6. Lock the TUNING CONTROL.

(d) Tuning of the power amplifier and antenna stages.

1. Turn the FUNCTION switch to the NORMAL position.
2. Turn the RELAY-NORMAL-DUPLEX switch to the NORMAL position.
3. Turn the SERVICE SELECTOR switch to the CW or VOICE/FSK position.
4. Depress the PUSH-TO-TALK switch, hold the key down or hold the TEST KEY in the ON position and when the TUNING INDICATOR LAMP comes on the set is completely tuned ready for transmission. (The DIAL DIM switch must be in the DIM or FULL position in order for the TUNING INDICATOR LAMP to light.)

(e) Normal operation.

| Control | Voice | CW |
|---|---|---|
| SERVICE SELECTOR . . . . . | VOICE/FSK | CW |
| AGC . . . . . | ON | OFF |
| FUNCTION . . . . . | NORMAL or LIMITER or SQ | NORMAL |
| BAND WIDTH . . . . . | 8 KHz | 2 KHz |
| BFO . . . . . | OFF | ON |

In order to transmit on VOICE press the PUSH-TO-TALK switch, speak clearly into the microphone and hold it at such distance that the AUDIO LEVEL METER does not exceed a reading of 100.

(f) Standby.

To keep the set ready for instant operation when needed turn the SERVICE SELECTOR and the FUNCTION switches to the STANDBY position.

## NOTES



Figure 7-6. Radio Teletypewriter Set AN/GRC-46 (Less Shelter).

7-7. RADIO TELETYPEWRITER SET AN/GRC-46. (TM 11-5815-204-10)

a. Radio Teletypewriter Set AN/GRC-46 is a 100-watt nominal output, mobile or fixed radio set designed to provide facilities for transmission and reception of voice, radiotelegraph and frequency shift radioteletype. Voice signals may be transmitted alone or simultaneously with teletypewriter operation. The transmitter and the receiver of this radio set is identical to the ones on Radio Set AN/GRC-19. The transmitter may be remotely controlled up to 3 kilometers by means of the Radio Set Control Group OA-1754/URC in conjunction with the Control Group AN/GRA-6 (not supplied as a component of the basic set).

b. The Radio Teletypewriter Set is organic in the following type units:

| | Battalion | | | | | | Brigade | | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | Air Mob | Mech | | Inf | Lt Inf | Abn | Air Mob | Mech | | I | A | M |
| Hq & Hq Co | 1 | 1 | 1* | 1 | 1** | | 5 | 0 | 1* | 0 | 5*** | | 2 | 2 | 2 |

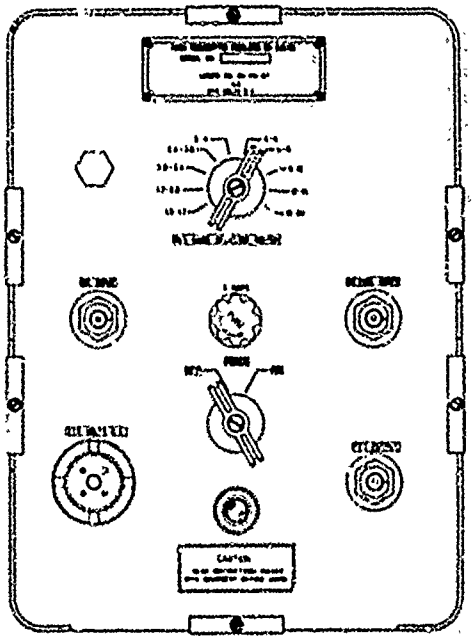
*Abn Bn has AN/VSC-2, a similar set mounted in 1/4-T Truck.
**Mech Bn has AN/VRC-29, a similar set mounted in Carrier, Command Post M-577.
***Mech Bde Hq has 3 AN/VRC-29, 2 AN/GRC-46.

c. Operational characteristics:

Transmission or reception on one frequency; Duplex operation Relay or retransmission operation on voice and CW only; Operation by remote control.

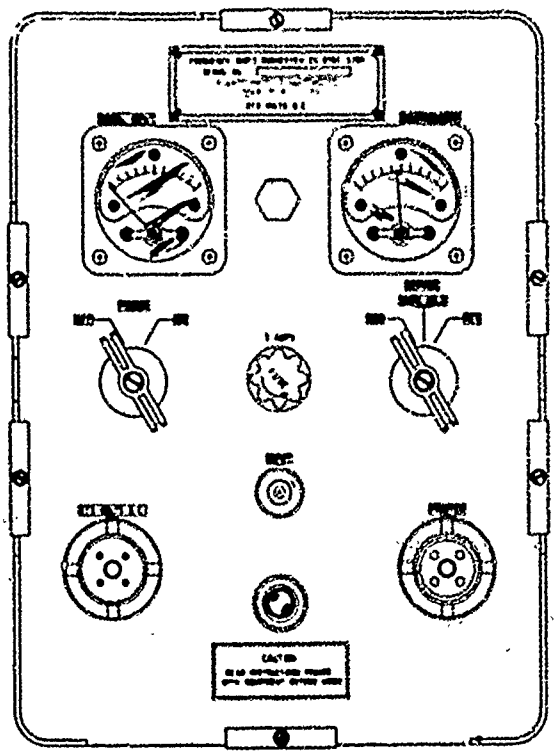
7-8. CHARACTERISTICS OF THE AN/GRC-46:

| | | | |
|---|---|---|---|
| Type of set | vehicular | Operating range | |
| Type of modulation | AM | Voice/FSK | 80 km |
| Type of emission | voice, CW and FSK (RTT) | CW | 120 km |
| | | Power output (nominal) | 100 watts |
| Frequency coverage | | Power source | same as AN/GRC-19 |
| Transmitter (10 bands) | 1.5 to 20 MHz | | |
| Receiver (32 bands) | .5 to 32 MHz | Antenna (3 MS-116, 1 MS-117 & 1 MS-118) | 4.5 meter whip |
| Tuning | continuous tuning | | |
| Preset facilities | | Weight | 1400 lbs including shelter |
| Transmitter | 7 & 1 Manual | | |



Radio Transmitter Modulator MD-203/GR

Figure 7-7. Components of Radio Teletypewriter Set AN/GRC-46.



Frequency Shift Converter CV-278( )/GR

Figure 7-8. Components of Radio Teletypewriter Set AN/GRC-46.

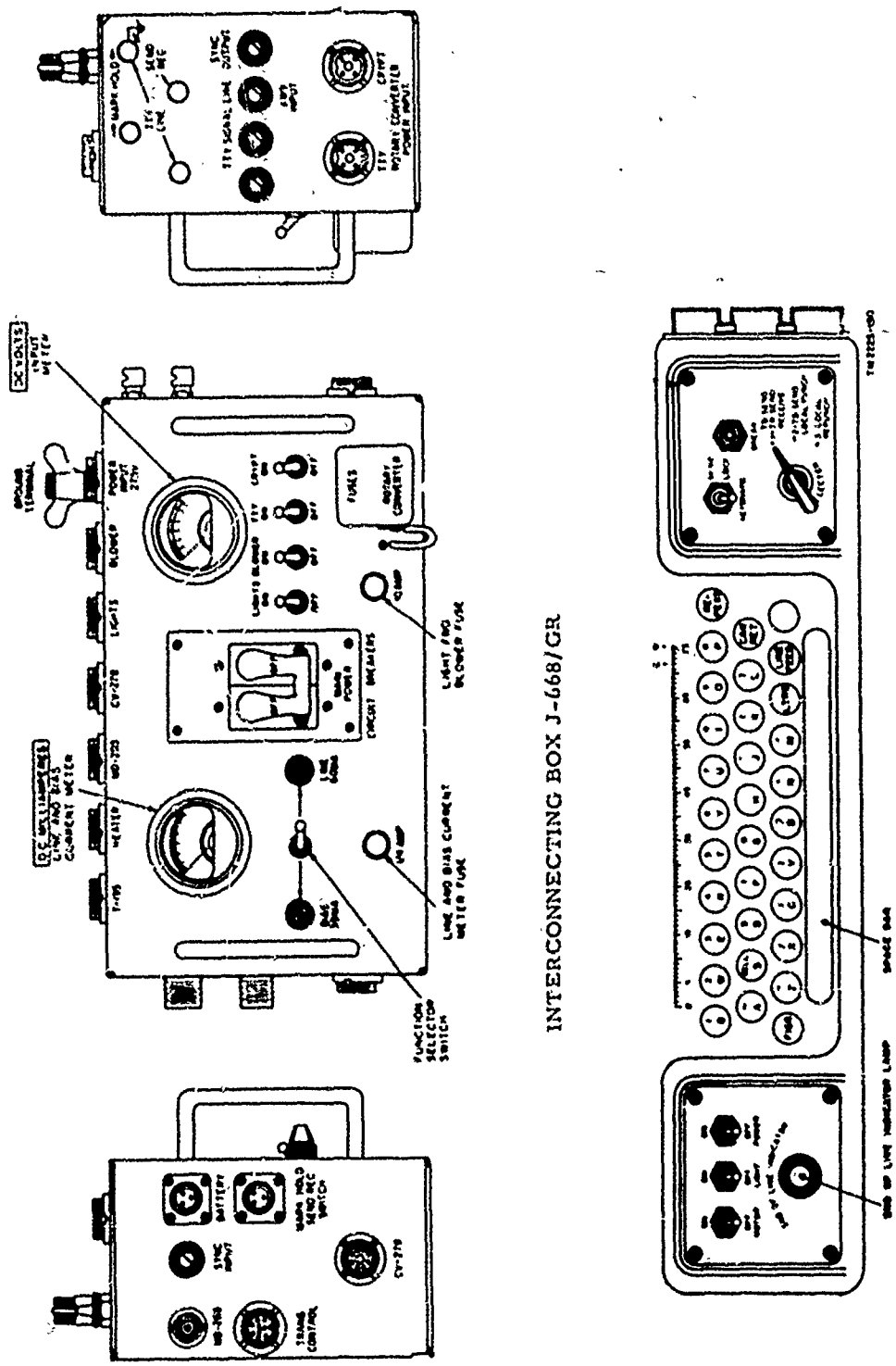



Figure 7-9. Components of Radio Teletypewriter Set AN/GRC-46.

7-9. PRELIMINARY SETTING OF CONTROLS & STARTING PROCEDURE FOR AN/GRC-46.

a. Preliminary setting on control panel for all type service is as follows:

| Component | Control | Position |
|---|---|---|
| Radio Transmitter T-195/GRC-19 | SERVICE SELECTOR switch | OFF |
| | DIAL DIM switch<br>Note: This switch must be in Dim or full for the TUNING INDICATOR to light. | DIM or FULL |
| | RELAY-NORMAL-DUPLEX switch | NORMAL |
| | TEST METER switch | PA CATHODE |
| | LINE LEVEL switch | + 12 |
| | Locking Bar BAND SELECTOR switch | Lock |
| | Locking Bar TUNING CONTROL | Lock |
| | PRESET CHANNELS switch | Set M or 1 through 7 |
| Radio Receiver R-392/URR | FUNCTION switch | OFF |
| | BFO switch | OFF |
| | BFO PITCH | O |
| | AGC switch | ON |
| | ANT TRIM | O |
| | AF GAIN control | Center of its range |
| | BAND WIDTH switch | 4 KHz |
| | DIAL DIM switch | DIM or ON |
| | RF GAIN control | All the way right (clockwise) |
| | DIAL LOCK | Unlocked |
| | DIAL ZERO | Unlocked |
| Radio Transmitter Modulator MD-203/GR | POWER switch | OFF |
| Frequency Shift Converter CV-278/GR | POWER switch | OFF |
| | SERVICE switch | NORMAL |
| Interconnecting Box J-658/GR (Junction Box) | MAIN POWER circuit breaker | OFF |
| | TTY POWER switch | OFF |
| | CRYPT POWER switch | OFF |
| | FUNCTION SELECTOR switch | BIAS 30 MA (left) |
| Teletypewriter TT-98B/FG | MOTOR switch | OFF |
| | LIGHT switch | OFF |
| | SEND-LOCK switch | SEND |
| Teletypewriter Reperforator TT-76/GGC | Distributor level | FEED-RETRACK |
| | KEYBOARD switch | SEND |
| | SELECTOR switch | 3 |
| | POWER switch | OFF |
| | LIGHT switch | OFF |
| | MOTOR switch | OFF |
| Teletypewriter SHELF | SEND-REC-MARKHOLD switch | MARK HOLD |

b. Starting procedure for all type service is as follows:

(1) Place the MAIN POWER (circuit breaker) switch on the JUNCTION BOX to ON.

NOTE: DC volts METER should read 27.5 to 28 volts.

(2) Turn Transmitter SERVICE SELECTOR switch to STANDBY.
(3) Turn Receiver FUNCTION switch to STANDBY.
(4) Turn MODULATOR POWER switch to ON.
(5) Turn FREQUENCY SHIFT CONVERTER POWER switch to ON.
(6) Turn TTY switch to ON, on JUNCTION BOX.

EQUIPMENT IS NOW READY FOR ANY TYPE OPERATION REQUIRED.

## NOTES

7-10. NET CONTROL STATION TUNING FOR AN/GRC-6.

a. Normal voice operation:

(1) In order for all stations in the Net to have adequate communications the NCS will establish the Operating Frequency for the entire Net.

(2) The NCS will perform the following steps:

(a) RECEIVER CALIBRATION. (See Para 7-6a NCS TUNING AN/GRC-19, 7-6a(1) (a) thru (h).)

(b) TRANSMITTER CALIBRATION. (See Para 7-6a NCS TUNING AN/GRC-19, 7-6a(2) (a) thru (h).)

(c) TUNING of the Power Amplifier and Antenna stages:

1. Turn the MODULATOR BAND SELECTOR switch to correspond to the assigned frequency of TRANSMITTER.
2. Turn the TRANSMITTER SERVICE SELECTOR switch to VOICE/FSK position.
3. Turn TRANSMITTER TEST KEY to ON or press the Microphone button.
   Note: Dynamotors should start and the RED TUNING INDICATOR will light.
4. Hold Microphone about 2 inches from the lips, press microphone button and speak in a normal voice.
   Note: Audio level meter needle should fluctuate slightly. Do not exceed a reading of over 100 on the meter.

b. Frequency-shift keying (radioteletype) operation:

The Net Control Station will inform subordinate stations that the Net is to prepare for Radioteletype operation. The NCS will Transmit a Radioteletype Test Tape.

EXAMPLE:
DE F711 TESTING WITH RYRYRYRYRY RY RYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRY RYRYRYRYRYRYRY THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 12345 67890 TIMES.

7-11. SECONDARY STATION TUNING FOR AN/GRC-6.

a. Normal voice operation:

(1) Secondary stations will perform the following steps:

(a) RECEIVER TUNING. (See Para 7-6b SECONDARY STATION TUNING of Radio Set AN/GRC-19, 7-6b(1) (b) 1 thru 8.

(b) TUNING TRANSMITTER TO RECEIVE. (See Para 7-6b SECONDARY STATION TUNING of Radio Set AN/GRC-19, 7-6b(1) (c) 1 thru 6.)

(c) TUNING OF POWER AMPLIFIER AND ANTENNA STAGES. (See NCS TUNING Para 7-10a(2) (c) 1 thru 4.)

b. Frequency-shift keying (FSK) Radio Teletype (RATT) operation:

(1) Reception:

(a) Place the Frequency Shift Converter POWER switch to ON.

(b) Turn the Receiver FUNCTION switch to NORMAL.

(c) Unlock the KILOCYCLES CONTROL.

(d) Place Receiver (BFO) switch to ON.

(e) Turn Receiver BAND WIDTH SWITCH to 4 KHz.

(f) As the Teletype Signal is being received from the NCS adjust the RF GAIN control so that the Signal heard is loud and clear.

(g) Adjust the KILOCYCLES control and the ANT TRIM control to maximum loudness. If a reading is noted on the CARRIER LEVEL METER adjust KILOCYCLES control and the ANT TRIM control to obtain maximum (peak) reading.

(h) Adjust the ANT TRIM control and the RF GAIN control for maximum reading on Frequency-shift converter SIGNAL INPUT meter.

(i) On the Teletypewriter, place the POWER, LIGHTS and MOTOR switch in the ON position and the SEND-LOCK switch in the SEND position.

(j) On the Reperforator, place the POWER, LIGHTS, and MOTOR switch in the ON position and the SELECTOR switch to Position 1.

(k) Place the meter FUNCTION SELECTOR switch on the Junction Box in the Line 60 MA position. If value indicated is high or low adjust to indicate 60.

(l) Place the meter FUNCTION SELECTOR switch back to 30 MA position.

(m) Turn the Frequency-Shift Converter SERVICE switch to the NORMAL position.

(n) Place the SEND-REC-MARK HOLD switch on the Teletypewriter shelf in the REC position. The teletypewriter and Reperforator should print readable copy.

(o) Lock the KILOCYCLES control.

(p) If voice is expected along with FSK reception, turn the Receiver BFO switch to the OFF position.

(2) Transmitting: (The NCS will discontinue sending a Test Tape)

(a) Place the SEND-REC-MARK HOLD switch in the SEND position. Note: Dynamotors should start and the TUNING INDICATOR should light.

(b) Place the Teletypewriter or Reperforator SEND LOCK switch in SEND position.

(c) Place the reperforator SELECTOR switch to position 3, Type a Test Tape.

EXAMPLE:
DE 5MF9 TESTING WITH RYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRYRY
THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 1234567890 TIMES.

(d) Open the FEED guide cover - insert the tape - typed message face up.

(e) Close the Feed guide cover.

(f) Change the Reperforator SELECTOR switch to position 2.

(g) Place the START STOP lever on TD to START position.

(h) The Teletypewriter printer will receive a copy of your Transmission.

(i) To Transmit VOICE along with Teletype press the microphone button and speak into it in a normal voice. Do not exceed 100 on Audio Level meter. Note: The pointer on the AUDIO LEVEL meter will move. The NCS will inform you of the Readability of your Signal.

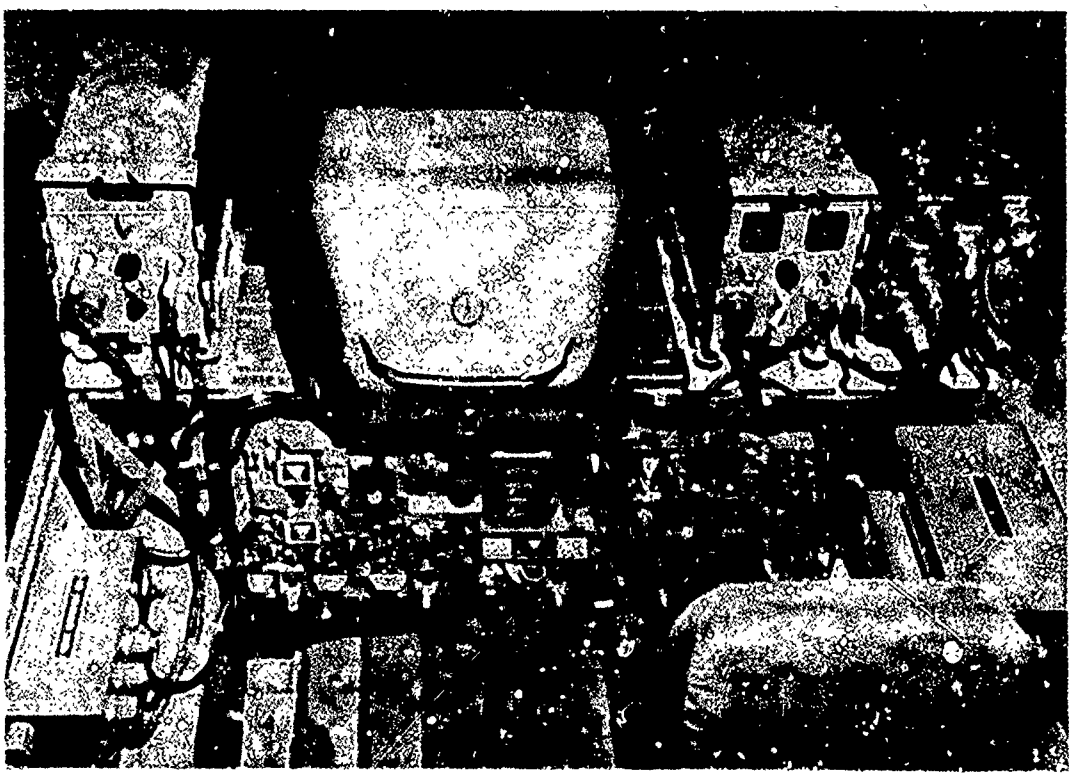


Figure 7-10. Radio Teletypewriter Set AN/VSC-1 in 1/4 ton Truck.

7-12. RADIO TELETYPEWRITER SET AN/VSC-1. (Replaced by AN/VSC-2.)

a. Radio Teletypewriter Set AN/VSC-1 has the same characteristics and facilities as the AN/GRC-46 less Reperforator and Shelter. For technical information refer to Paragraph 7-8.

b. This equipment is authorized in the Airborne Infantry (See paragraph 7-7b).

**NOTES**

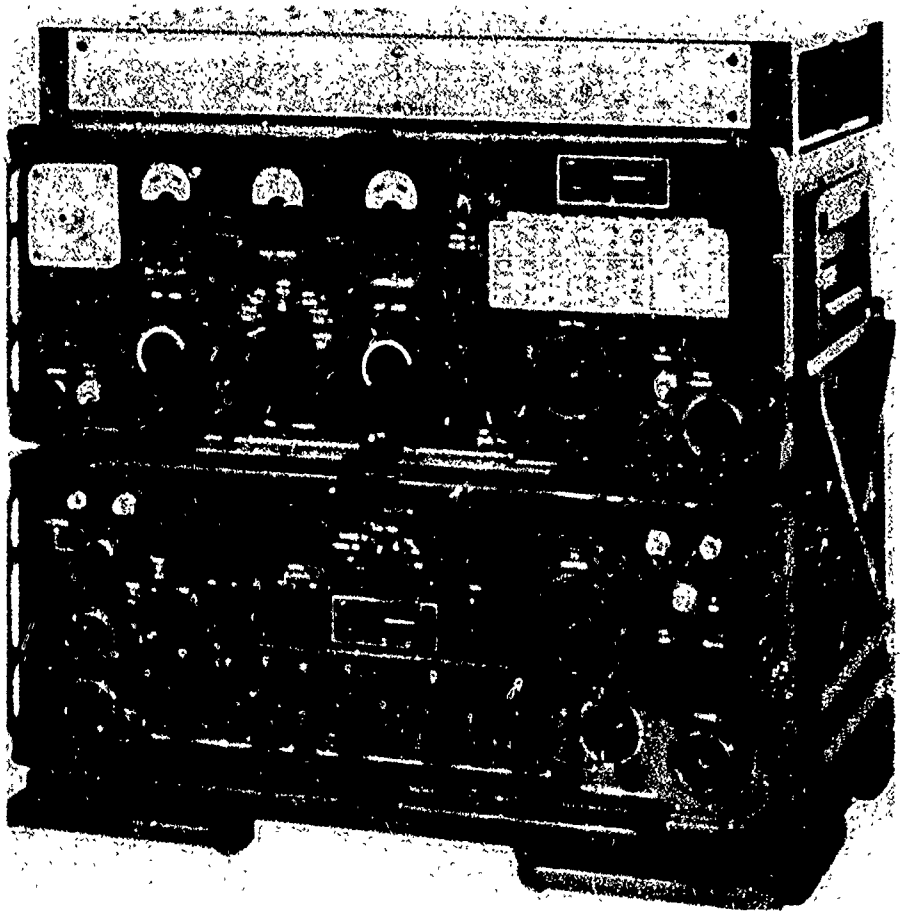


Figure 7-11. Radio Set AN/GRC-106.

7-13. RADIO SET AN/GRC-106. (TM 11-5820-520-12).

a. The Radio Set AN/GRC-106 is a small, lightweight vehicular mounted, high frequency (HF), dual mode single sideband (SSB)-amplitude modulated (AM) radio receiver-transmitter. The set provides voice, CW, and radio teletypewriter (NSK & FSK) service.

b. The components of the AN/GRC-106, are the Receiver-Transmitter RT-662/GRC and RF Amplifier AM-3349/GRC-106, a standard 15 foot whip antenna and installation kit.

c. This radio set will be organic to the type units listed in paragraph 7-4c as a replacement for the AN/GRC-19.

7-14. CHARACTERISTICS OF THE AN/GRC-106:

| | |
|---|---|
| Type of set | vehicular |
| Type of modulation | AM (Compatible)<br>SSB (Upper Side Band) |
| Type of emission | Voice, CW, FSK, and NSK. |
| Frequency Coverage | 2-29.99 MHz |
| Number of Channels | 28000 |
| Channel Spacing | 1 KHz |
| Tuning | continuous |
| Operating Range | 30 km |
| Power Source | 27 VDC |
| Power Output | CW, FSK, and NSK 200 watts |
| Power Output | AM voice 400 watts |
| Antenna | 15 ft whip |
| Weight | 105 pounds |



Figure 7-12. Radio Teletypewriter Set AN/VSC-2.

7-15. RADIO TELETYPEWRITER SETS AN/VSC-2 (TM 11-5815-331-14) AND AN/VSC-3 (TM 11-5815-332-14).

a. These radio sets are tactical single-channel, single sideband, radio teletypewriter terminals. Both are members of the AN/GRC-106 family of radio sets having the AN/GRC-106 as the basic radio, modem MD-522/GRC, and associated teletypewriter equipment.

b. The AN/VSC-2, mounted in a 1/4-ton truck, is the replacement for the AN/VSC-1 and will be organic to the type units listed in paragraph 7-7b. The AN/VSC-2 is now replacing the AN/VSC-1 in Vietnam.

c. The AN/VSC-3, mounted in Carrier, Command Post M-577, will replace the AN/VRC-29 and will be organic to the type units listed in paragraph 7-7b. Distribution of the AN/VSC-3 to Vietnam should begin by the end of calendar year 1967.

d. Characteristics of the basic radio, AN/GRC-106, are listed in paragraph 7-14.

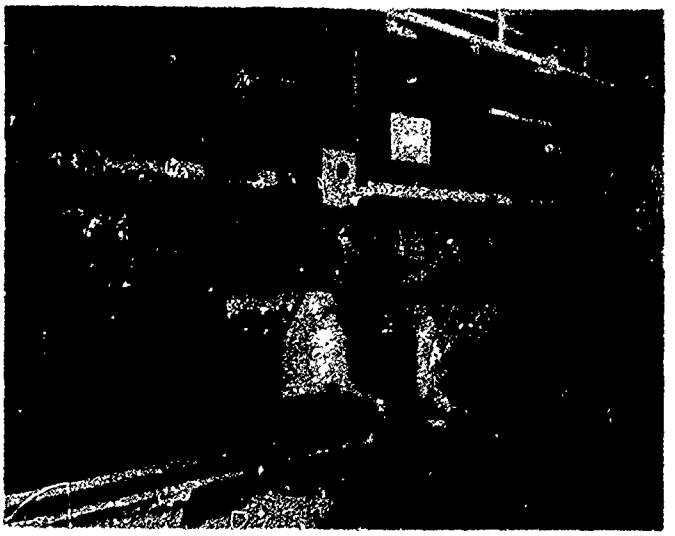


Figure 7-13. Radio Teletypewriter Set AN/VSC-3.



Figure 7-14. Radio Teletypewriter Set AN/GRC-142.

7-16. RADIO TELETYPEWIRTER SET AN/GRC-142 (TM 11-5815-334-12).

a. The Radio Teletypewriter Set AN/GRC-142 is an air-or-vehicular transportable, high frequency (HF), single sideband, shelter contained, radio teletypewriter system. It is a member of the AN/GRC-106 family of radio sets having the AN/GRC-106 as its basic radio set.

b. The AN/GRC-142 is normally mounted in a 3/4-ton electrical equipment shelter (S-318/G), transported on the bed of a 3/4-ton cargo truck. It is capable of provding one-way reversible communication (can transmit and receive, but not simultaneously) and may be operated from a remote location when additional equipment is supplied.

c. The major components of the AN/GRC-142 are:

Control Group AN/GRA-6
Radio Set AN/GRC-106
Radio Teletypewriter, Moden MD-522A/GRC (TM 11-5085-387-15-2)
Teletypewriter TT-98/FG (TM 11-5815-200-12)
Teletypewriter Reperforator-Transmitter TT-76A/GGC

d. The AN/GRC-142 will replace the AN/GRC-46 and be organic to the type units listed in paragrapn 7-7b.

e. Characteristics of the AN/GRC-142 are listed in paragraph 7-14.

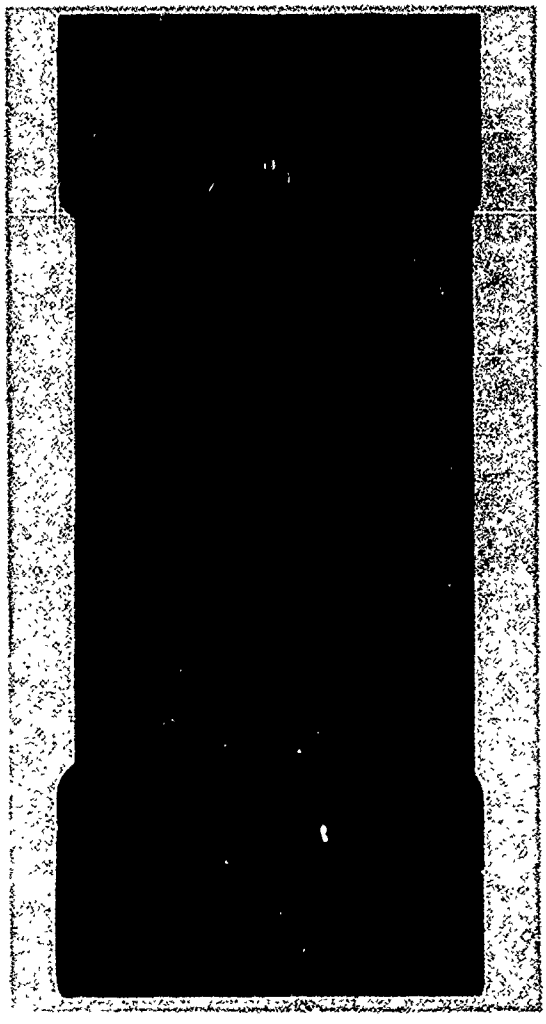


Figure 7-15. Radio Set AN/PRC-41.

7-17. RADIO SET AN/PRC-41 (TM 11-5820-889-3997).

The Radio Set AN/PRC-41 is a complete portable ground to air ultra-high frequency receiver-transmitter with antenna and accessories designed for manpack use.

7-18. CHARACTERISTICS OF THE AN/PRC-41.

| | |
|---|---|
| Type of set | Portable ground to air |
| Type of modulation | AM |
| Type of emission | Voice |
| Frequency coverage | 225-399.9 MHz |
| Number of channels | 1,750 |
| Tuning | Continuous |
| Power source | 24 VDC (BB-451/U)<br>26.5 VDC vehicular<br>115 AC |
| Antenna | Whip or logarithmic (yagi) |
| Weight (includes battery pack) | 35 pounds |

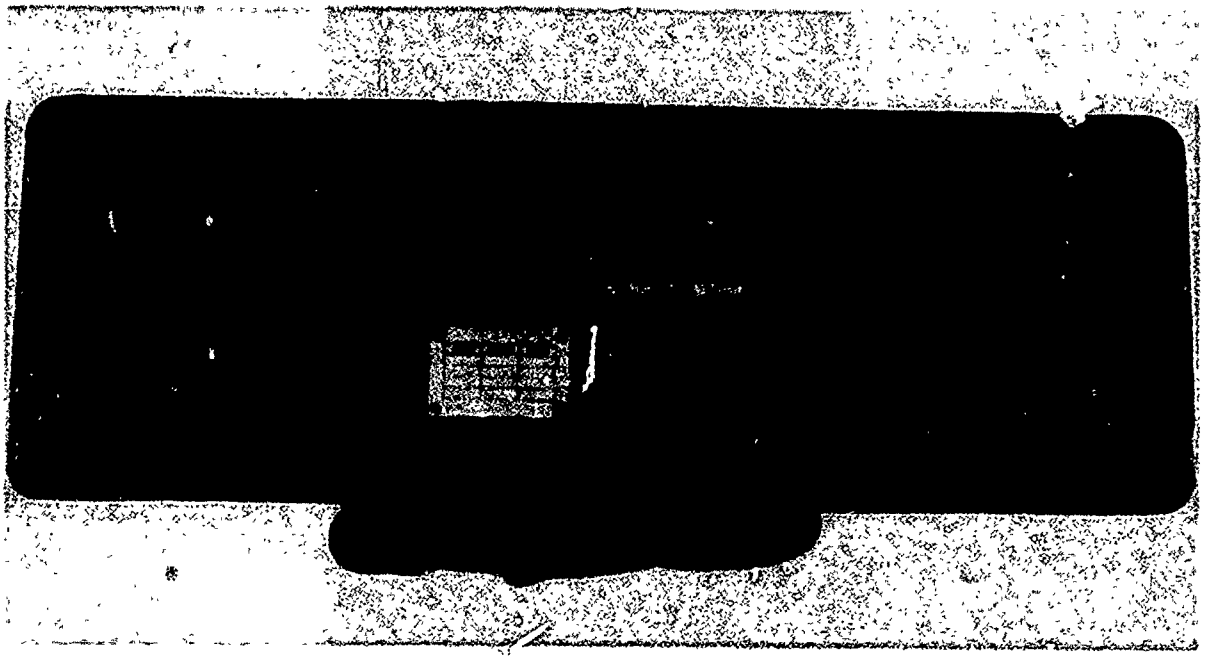


Figure 7-16. Radio Set AN/PRC-47.

7-19. RADIO SET AN/PRC-47. (TM 11-5820-509-12)

The Radio Set AN/PRC-47 is a two-man, pack-type, high frequency, single sideband (SSB) receiver-transmitter (RT) with antenna and accessories. It is capable of frequency shift keying (FSK) radio-teletype (RATT) communication when operating with a frequency shift keying converter (not a component of the AN/PRC-47).

7-20. CHARACTERISTICS OF THE AN/PRC-47.

| | |
|---|---|
| Type of set | Portable |
| Type of modulation | SSB |
| Type of emission | Voice<br>FSK<br>CW |
| Frequency coverage | 2-12 MHz |
| Number of channels | 10,000 |
| Tuning | Locked 1 KHz steps |
| Operating range | 40 KM |
| Power output | 20 watts low power<br>100 watts high power |
| Power source | 24 VDC (BB-451/U)<br>26.5 VDC vehicular<br>115 VAC |
| Antenna | 15 ft whip or long wire |
| Weight (less battery) | 115 lbs (RT 40.8 lbs) |
| battery | 17 lbs |

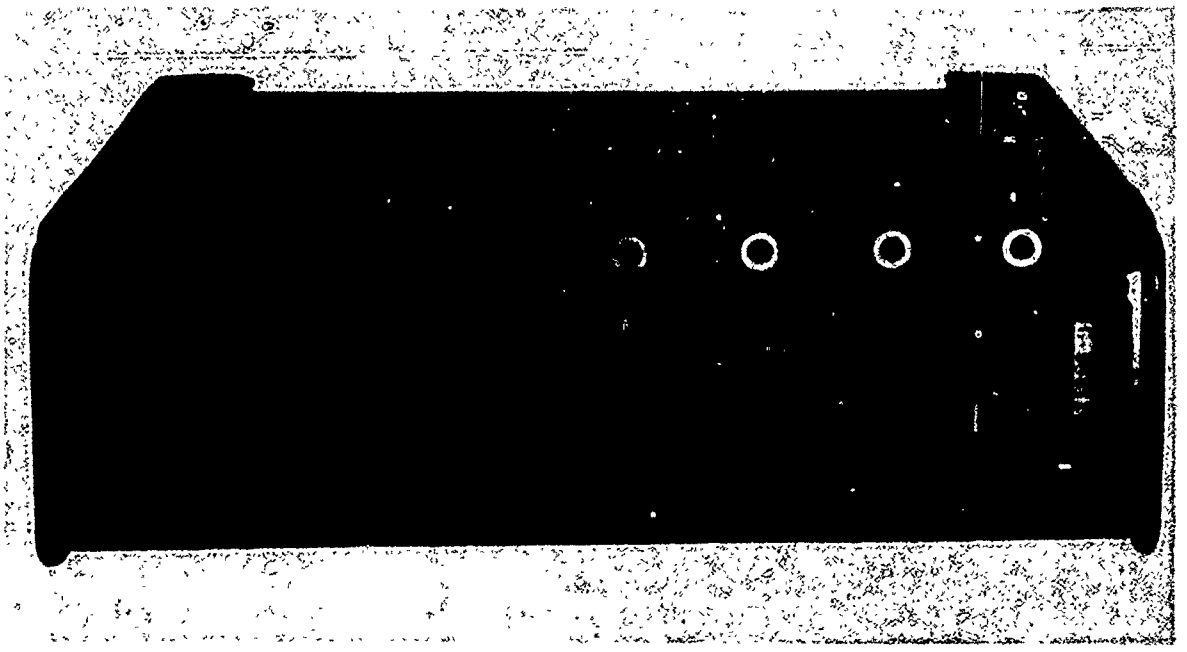


Figure 7-17. Radio Set AN/PRC-74B.

7-21. RADIO SET AN/PRC-74B. (TM 11-5820-590-12-1)

a. The Radio Set AN/PRC-74B is a low-powered, fully transistorized, high-frequency, single sideband (SSB), Receiver-Transmitter Radio RT-794/PRC-74. It is designed to provide voice or telegraph continuous wave (CW) communication in a man-portable package in areas where direct line of sight communication is not possible.

b. The component power supply (PP-4514/PRC-74) of the AN/PRC-74B facilitates operation of the set from alternating current or direct current power lines, or from a 24 volt vehicle battery. At present a wet cell battery is the only battery pack available for manpack operation. It is anticipated that in the near future a dry battery pack, consisting of 2 AN/PRC-25 batteries (BS-386), will be available.

c. The AN/PRC-74B is capable of automatic transmission of pre-recorded CW messages at a rate of 300 words per minute when utilizing Coder-burst Transmission Group AN/GRA-71 (not a component of the AN/PRC-74B).

7-22. CHARACTERISTICS OF THE AN/PRC-74B.

| | |
|---|---|
| Type of set | Portable |
| Type of modulation | Upper sideband (SSB) |
| Type of emission | Voice/CW |

| | |
|---|---|
| Frequency coverage | 2 to 18 MHz in 1 KHz steps |
| Tuning | Detent |
| Operating range | |
| Ground wave | 40 Km |
| Sky wave | Over 300 Km |
| Power output | 15 watts |
| Power source | |
| Fixed | External power supply 28 VDC, 110 VAC or 220 VAC single phase (para 7-20b above) |
| Portable | Rechargeable nickel-cadmium wet cell battery |

*Presently not authorized but is being considered for military purchase.

7-23. OPERATING PROCEDURE FOR AN/PRC-74B.

RECEIVE MODE

a. Attach whip antenna mounting bracket to receiver-transmitter.

b. Install whip antenna and adjust to desired frequency range.

c. Attach lead wire from whip antenna to front panel ANT terminal.

d. Connect headset to either front panel AUDIO jack.

(1) Set front panel MC, 100 KC, 10 KC, and 1 KC selector knobs to the desired frequency.

(2) Turn OFF-ON-TUNE switch to ON position.

(3) Set RF GAIN control to maximum and adjust PEAK NOISE control for a definite, noticeable increase in noise heard in the headset.

(4) Adjust ANT LOAD and ANT TUNE controls for maximum noise heard in headset.

(5) Press in CLARIFY/PUSH TO CALIBRATE knob and adjust so that a zero beat condition is observed in the headset.

(6) Release the CLARIFY/PUSH TO CALIBRATE knob and reset the pointer to mid-scale.

(7) Set RF GAIN control for desired volume of received signal.

(8) Adjust CLARIFY knob so that quality of received voice signals is natural.

TRANSMIT MODE

e. Perform steps outlined above, do not perform steps (7) and (8) if no received signal is present.

f. Connect either microphone or key (depending on mode of operation desired) to the remaining audio jack.

(9) Turn OFF-ON-TUNE switch to the TUNE position and listen for tone in headset.

(10) Adjust ANT TUNE knob to mid position. Adjust ANT LOAD knob until maximum reading is obtained on ANT IND meter. Adjust ANT TUNE knob until a maximum reading is obtained on ANT IND meter.

(11) Release OFF-ON-TUNE knob and allow to return to ON position.

NOTE: Repeat steps (9) through (11) each time transmitting frequency is changed.

g. Press microphone button and speak directly into the microphone.

CAUTION: Do not attempt to tune the radio set without a suitable antenna connected. Remember that during tuning the radio set transmits a signal and therefore breaks radio silence.

TAB
HERE

# CHAPTER 8

# SPECIAL RADIO SETS



Figure 8-1. Radio Set AN/GRC-87 (Receiver-Transmitter RT 77 only).

8-1. RADIO SETS AN/GRC-87 AND AN/VRC-34. (TM 11-5820-453-10)

a. The AN/GRC-87 is a radio set issued with the capability of being operated in a field installation. The AN/VRC-34 is the same radio set except that it is mounted and operated in a vehicle only. Both the AN/GRC-87 and the AN/VRC-34 may be operated in a fixed station when additional equipment is issued.

b. Operational facilities. Transmission or reception on one frequency.

8-2. CHARACTERISTICS OF THE AN/GRC-87.

| | |
|---|---|
| Type of set | general use |
| Type of modulation | AM |
| Type of emission | voice, CW and MCW |
| Frequency coverage | 2 to 12 MHz |
| Band 1: 6.6 to 12 MHz | |
| Band 2: 3.6 to 6.6 MHz | |
| Band 3: 2 to 3.6 MHz | |
| Tuning | continuous |
| Operating range (Stationary) | |
| CW | 48 km |
| MCW | 32 km |
| Voice | 24 km |
| Power output | |
| CW | 15 watts |
| Voice | 7 watts |

Power source

| | |
|---|---|
| Field installation . . . . . | hand generator (G-43/G) or hand generator and dry cell battery BA-48, or BA-317. |
| Vehicular installation . . . | vehicular battery 6, 12 or 24 volts through Dynamotor DY-88; or vehicular battery 24 volts through Dynamotor DY-105. |
| Fixed station . . . . . | 115 or 230 volts AC through Power Supply PP-327. (Not issued as a component of the AN/GRC-87.) |

Weight

(Transportable installation) . . . . . 115 pounds

Antennas

| | |
|---|---|
| (3 MS-116, 1 MS-117 & 1 MS-118) . . . . | 4.5 meter whip antenna for vehicular installation or for field operation when equipment must be moved rapidly and frequently from one location to another. |
| (AT-101 & AT-102) . . . . . | Long-wire antenna for permanent or semi-permanent installation. |

8-3. OPERATION OF THE AN/GRC-87 AND AN/VRC-34.

a. Net Control Station Tuning--In order for all stations in a net to have adequate communication, the Net Control Station will establish the operating frequency for the entire net. Perform the following steps:

(1) CALIBRATE THE RECEIVER.
- (a) Control "E" to STANDBY.
- (b) Control "L" to CAL.
- (c) Control "M" to correct BAND.
- (d) Controls "O" & "P" to MAXIMUM CLOCKWISE.
- (e) Control "N" to calibration point nearest the desired operating frequency and adjust it to zero beat. (This receiver provides calibration point at every even 200 KHz.)

(2) CALIBRATE THE TRANSMITTER.
- (a) Control "L" to NET.
- (b) Control "F" to MO position on the correct band for the operating frequency.
- (c) Control "D" to CW.
- (d) Control "E" to SEND. (Except when using Hand Generator and dry battery in which case it is placed in STANDBY.)
- (e) Control "I" to correct DIAL SETTING for the frequency that the RECEIVER is calibrated on.
- (f) Control "H" adjust for zero beat.

(3) SET THE TRANSMITTER TO THE OPERATING FREQUENCY.
- (a) Control "I" to correct DIAL SETTING for the desired operating frequency and lock it.

(4) NET THE RECEIVER TO THE TRANSMITTER.
- (a) Control "E" to SEND.
- (b) Control "D" to CW or MCW.
- (c) Control "L" to NET.
- (d) Control "F" to MO position on the correct BAND.
- (e) Control "N" tune to frequency of the transmitter, adjust to ZERO BEAT and lock it.

(5) TUNE THE ANTENNA.
- (a) Control "A" to highest numbered position of antenna being used.
- (b) Control "B" turn to line up two red dots.
- (c) Control "E" to SEND.
- (d) Control "D" to CW.
- (e) Control "F" to MO position on correct BAND.

(f) Control "L" to CW.

(g) PRESS the KEY and adjust Control "C" for brightest glow on Control "B." (If necessary repeat this operation after moving Control "A" to the next lower numbered position.)

(6) PLACE CONTROLS IN PROPER POSITION FOR TYPE OF OPERATION DESIRED.

| Controls | Voice | CW | MCW |
|---|---|---|---|
| Control "D" | Phone | CW | MCW |
| Control "L" | Phone | CW | Phone |

b. Secondary Station Tuning--To insure that all stations in a net have communication with each other, all the secondary stations will tune their sets to the frequency established by the Net Control Station. This is accomplished by first tuning the receiver to the NCS signal and then tuning the transmitter to the frequency obtained in the receiver. Perform the following steps:

(1) TURN POWER SWITCH TO ON ON DY-105 (AN/VRC-34 ONLY).

(2) ADJUST THE RECEIVER TO THE OPERATING FREQUENCY.

(a) Control "E" to STANDBY.

(b) Control "L" to CW.

(c) Control "O" & "P" to MAXIMUM clockwise.

(d) Control "M" to correct BAND.

(e) Control "N" adjust for ZERO BEAT to the NCS signal.

(3) ADJUST THE TRANSMITTER TO THE OPERATING FREQUENCY.

(a) Control "L" to NET.

(b) Control "D" to CW or MCW.

(c) Control "E" to SEND (except when using Hand Generator and Dry Battery in which case it is placed in STANDBY).

(d) Control "F" to MO position on the correct BAND.

(4) TUNE THE ANTENNA.

(a) Control "A" to highest numbered position of antenna being used.

(b) Control "B" turn to line up the two red dots.

(c) Control "E" to SEND.

(d) Control "D" to CW.

(e) Control "F" to MO position on the correct BAND.

(f) Control "L" to CW.

(g) PRESS the KEY and adjust Control "C" for brightest glow on Control "B". (If necessary repeat this operation after moving Control "A" to the next lower numbered position.)

(5) PLACE CONTROLS IN PROPER POSITION FOR TYPE OF OPERATION DESIRED.

| Controls | Voice | CW | MCW |
|---|---|---|---|
| Control "D" | Phone | CW | MCW |
| Control "L" | Phone | CW | Phone |

c. Interpolation--Interpolation is the mathematical process of determining the proper transmitter dial setting for frequencies that are not listed on the calibration chart of Radio Set AN/GRC-87. An operating frequency of 3760 KHz may be placed on the transmitter dial from a direct reading on the calibration chart, however interpolation must be used to obtain the transmitter dial setting for 3769 KHz.

Using 3769 KHz as an example and following the steps below, the correct transmitter or dial reading can be computed.

NOTE: Following is an extract from a calibration chart, Band 2. Examine the chart and locate the frequency and dial setting immediately below the assigned frequency and the frequency and dial setting immediately above the assigned frequency.

| Freq | +00KHz | +20KHz | +40KHz | +60KHz | +80KHz |
|---|---|---|---|---|---|
| 3600 | 201 | 241 | 281 | 319 | 357 |
| 3700 | 395 | 432 | 468 | 503 | 539 |
| 3800 | 574 | 607 | 641 | 674 | 706 |

Step 1: SUBTRACT: The frequency and corresponding dial setting immediately below the desired operating frequency from the frequency and corresponding dial setting immediately above the desired operating frequency.

(EXAMPLE) Frequency above 3780 KHz 539 Dial Setting
Frequency below 3760 KHz 503 Dial Setting
20 KHz 36 Dial Divisions

Step 2: DIVIDE: The number of Kiloherts into the number of dial divisions to find the number of dial divisions per kiloherts.

(EXAMPLE) 20 KHz equals 36 dial divisions.
1 KHz equals 1.8 dial divisions.

Step 3: MULTIPLY: The difference in frequency between the desired operating frequency and the frequency given by the chart immediately below the operating frequency by the number of dial divisions per kiloherts.

(EXAMPLE) Desired operating Freq 3769 KHz
Freq immediately below 3760 KHz
Difference Frequency 9 KHz X 1.8 equals 16.2 dial divisions.

Step 4: ADD: The number of dial divisions for the difference frequency to the dial setting of the frequency immediately below the desired operating frequency.

(EXAMPLE) 3760 KHz 503 Dial Setting
9 KHz 16.2 Dial Setting
3769 KHz 519.2 Dial Setting

ANSWER: The correct dial setting for 3769 kiloherts is 519.

NOTE: If the number to the right of the decimal is 5 or more, use the next higher number: If less than 5, use the lower number.

COMPLETE EXAMPLE:

| | | |
|---|---|---|
| | 3780 KHz - 539 | Dial Setting |
| Step 1 (Subtract) | 3760 KHz - 503 | Dial Setting |
| (Answer) | 20 KHz - 36 | Dial Divisions |
| Step 2 (Divide) | 20 KHz into 36 | Dial Divisions |
| (Answer) | 1 KHz - 1.8 | Dial Divisions |
| Step 3 (Multiply) | 9 KHz by 1.8 | Dial Divisions |
| (Answer) | 9 KHz - 16.2 | Dial Divisions |
| Step 4 (Add) | 503 to 16.2 | |
| (Answer) | 3769 KHz - 519.2 (519) | Dial Setting |

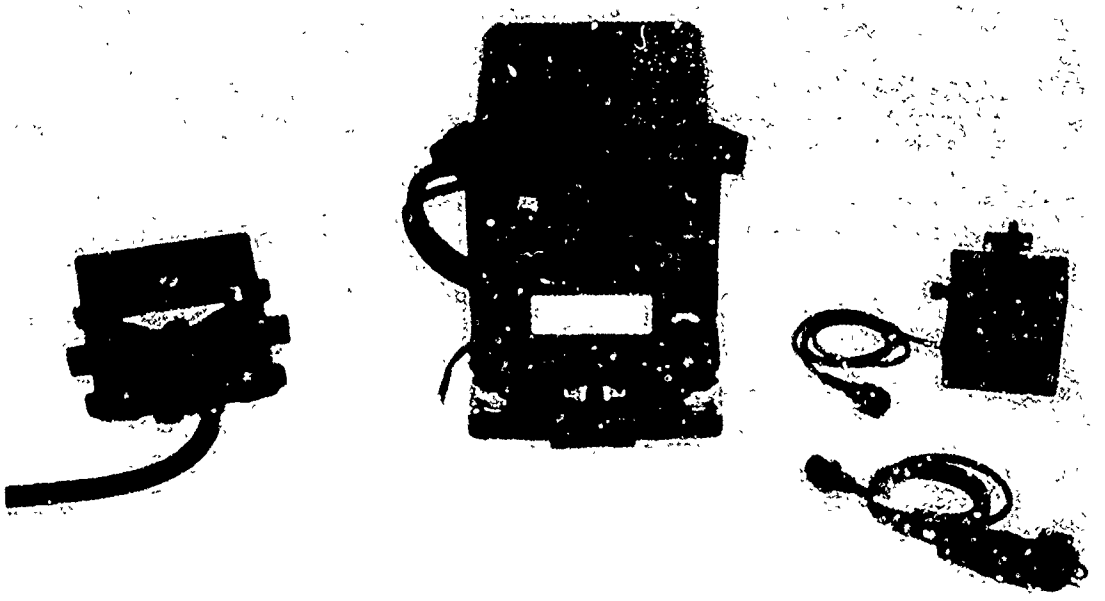


Figure 8-2. Radio Set AN/VRC-24.

8-4. RADIO SET AN/VRC-24. (TM 11-5820-222-10)

a. Radio Set AN/VRC-24 is a vehicular mounted, ultrahigh frequency (UHF), air-ground radio receiver-transmitter. This set consists of the Receiver-Transmitter RT-323 on a Mount MT-2076, a junction box and necessary interconnecting and control cables. This set is capable of operating in any one of 1750 channels.

b. The Radio Set AN/VRC-24 is organic to the following type units:

| | Battalion | | | | | Brigade | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | LtInf | Abn | AM | Mech | Inf | LtInf | Abn | AM | Mech | Inf | Abn | Mech |
| Hq & Hq Co | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 3 |

NOTE: When unit is augmented with a FAC one additional AN/VRC-24 is authorized.

c. Characteristics of the AN/VRC-24.

| | |
|---|---|
| Type of set | vehicular |
| Type of modulation | AM |
| Type of emission | voice |
| Frequency coverage | 225 to 399.9 MHz |
| Number of channels | 1750 |
| Channel spacing | 100 KHz |
| Preset facilities | 19 + manual |
| Operating range | 48 km |
| Power output | 15 watts |
| Power source | 24 volts |
| Weight | 82 pounds |

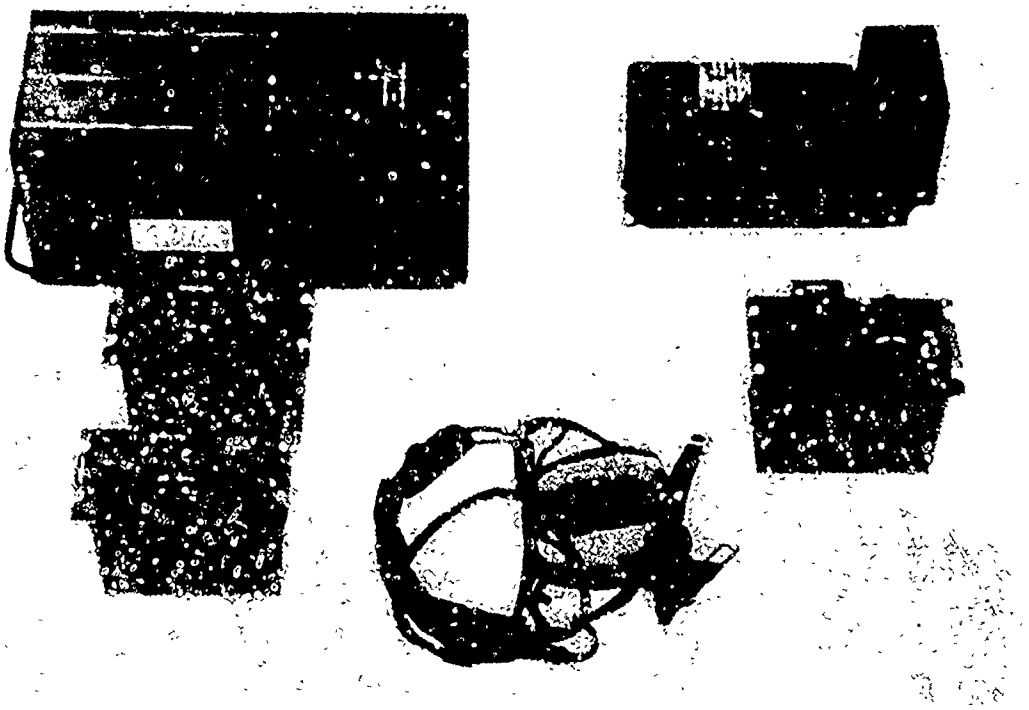


Figure 8-3. Radio Set AN/ARC-44.

8-5. RADIO SET AN/ARC-44. (TM 11-5821-204-12)

a. Radio Set AN/ARC-44 is an Army aircraft mounted, very high frequency (VHF), FM, air-ground receiver-transmitter. This set consists of the Receiver-Transmitter RT-294 on a Mount MT-1268, Control Panel CB-327, Signal Distribution Panel SB-329, Dynamotor DY-107 and necessary interconnecting and control cables. This set nets with the AN/GRC-3 thru -8 series of radios assigned to the Armor, Artillery and Infantry. This set is being replaced by the AN/ARC-54. (See paragraph 8-6.)

b. Characteristics of the AN/ARC-44:

| | |
|---|---|
| Type of set | aircraft |
| Type of modulation | FM |
| Type of emission | voice |
| Frequency coverage | 24 to 51.9 MHz |
| Number of channels | 280 |
| Channel spacing | 100 KHz |
| Tuning | continuous detent |
| Operation range | 80 km (line of sight) |
| Power output | 8 watts |
| Power source | 27.5 vdc aircraft electrical system and Dynamotor DY-107/AR |
| Weight | 34 pounds |

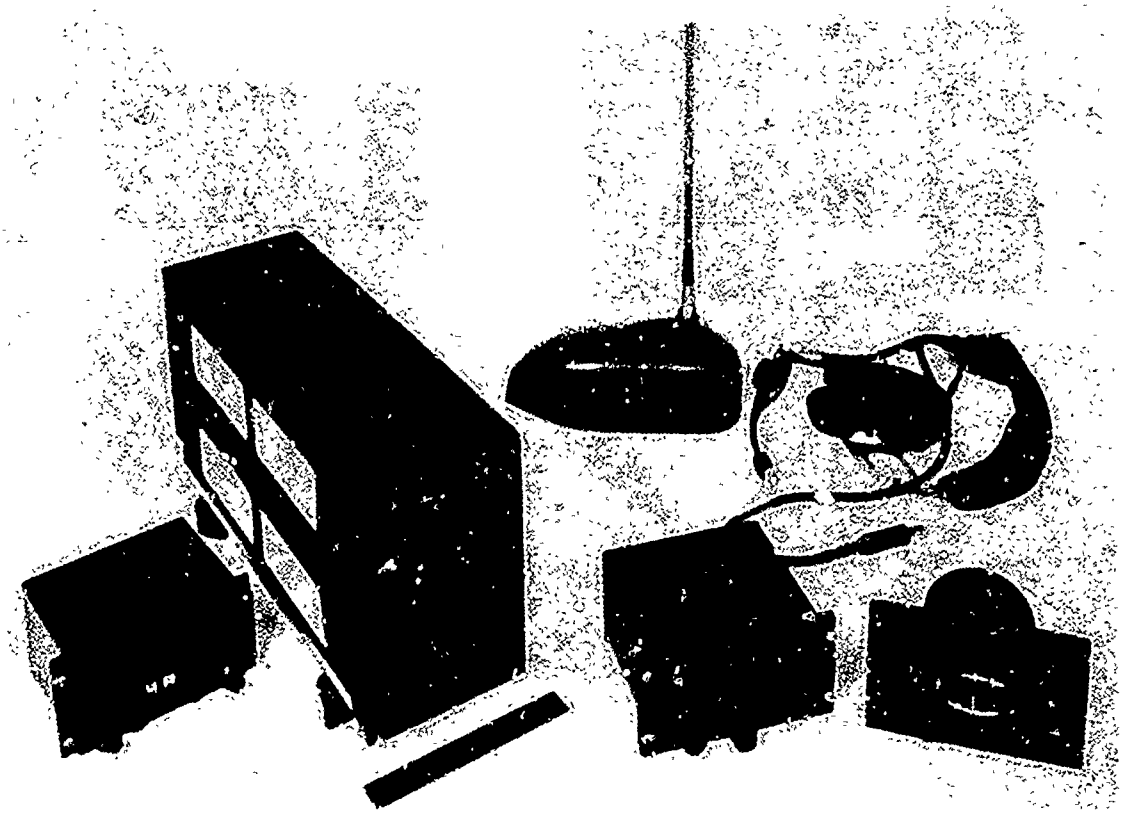


Figure 8-4. Radio Set AN/ARC-54.

8-6. RADIO SET AN/ARC-54. (TM 11-5821-244-12)

a. Radio Set AN/ARC-54 is an aircraft mounted, very high frequency (VHF), FM, air-ground receiver-transmitter. This set consists of the Receiver-Transmitter RT-348 on a Mount MT-1535, Radio Control C-3835 and Antenna AT-765. This set is also capable of visual read-out of FM homing signals and retransmission. This set nets with the AN/VRC-12 series of radios and will replace the AN/ARC-44.

b. Characteristics of the AN/ARC-54.

| | |
|---|---|
| Type of set | aircraft |
| Type of modulation | FM |
| Type of emission | voice |
| Frequency coverage | 30 to 69.95 MHz |
| Number of channels | 800 |
| Channel spacing | 50 KHz |
| Tuning | continuous detent |
| Operating range | 46 km. (line of sight) |
| Power output | 10 watts |
| Power source | 27.5 vdc aircraft electrical system |
| Weight | 25 pounds |

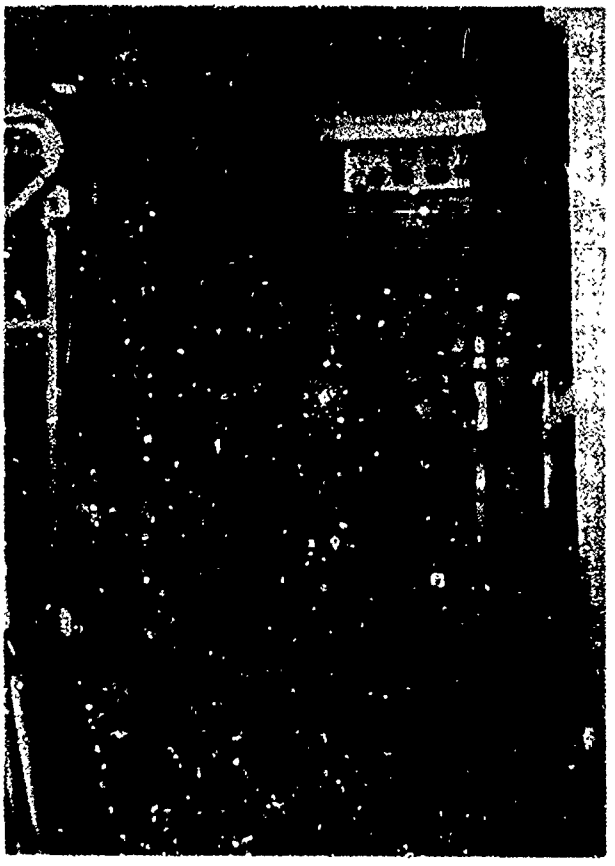


Figure 8-5. Radio Terminal Set AN/MRC-69(V).

8-7. RADIO TERMINAL SET AN/MRC-69(V). (TM 11-5820-204-15)

a. Radio Terminal Set AN/MRC-69(V) is an air-or-vehicular-transportable, radio relay carrier terminal set. It is normally mounted in a 2 1/2-ton electrical equipment shelter and transported on the bed of a 2 1/2-ton cargo truck.

b. The AN/MRC-69(V) is utilized in the division area of an area communication system and is normally employed in pairs or with other compatible equipment. It may be used to provide two 12-channel radio-relay systems ("Shots") or one 12-channel radio-relay system and one 12-channel land line system.

c. Characteristics of the AN/MRC-69(V).

| | |
|---|---|
| Type of set | air-or-vehicular-transportable |
| Type of modulation | FM |
| *Frequency coverage | 50-1875 MHz |
| Operating range | 48 Km |
| Power source | 2 ea 10 KW generators in 1 1/2-ton trailer (PU-474/M) |
| Weight | |
| Assemblage (shelter included) | 7500 lbs |
| Power unit | 4700 lbs |

*Determines which type antenna group and accessories are utilized.

**NOTES**

TAB HERE

# CHAPTER 9

# ANTENNAS AND FIELD EXPEDIENTS

9-1. ANTENNA GROUP RC-292. (TM 11-5820-348-15, TM 11-5020)

a. The Antenna RC-292 is an elevated, wide band, modified ground plane antenna designed to operate with, and increase the operating range of FM radio sets 2 to 3 times. The antenna requires no tuning in operation, however, the length of the antenna elements must be preadjusted for the different frequencies used. This is accomplished by changing the number of mast sections which make up the antenna elements.

b. Technical characteristics:

Radio sets with which used: All ground FM radios.
Frequency coverage: . . . . . 20 to 75.95 (dependent on antenna sections used)

Weight . . . . . 48 lbs
Erection time (2 men) . . . . . 15 minutes
Erection height . . . . . 12.5 meters

c. The Antenna Group RC-292 is organic to the following type units:

| | Battalion | | | | | Brigade | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | LtInf | Abn | AM | Mech | Inf | LtInf | Abn | AM | Mech | Inf | Abn | Mech |
| Hq & Hq Co | 6 | 10 | 14 | 10 | 3 | 0 | 8 | 8 | 14 | 3 | 7 | 8 | 7 |
| Rifle Co | 1 | 3 | 0 | 3 | 2 | | | | | | | | |
| Total | 9 | CS 6 / 25 | 14 | CS 6 / 25 | 9 | 0 | 8 | 8 | 14 | 3 | 7 | 8 | 7 |

| | | VERTICAL ANTENNA SECTIONS | | | | | GROUND PLANE ANTENNA SECTIONS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FREQUENCY (MHz) | RECEIVER-TRANSMITTER | Ant Sec Required | AB-21 | AB-22 | AB-23 | AB-24 | Ant Sec Required | AB-21 | AB-22 | AB-23 | AB-24 |
| 20 to 27.9 | RT-66 AN/PRC-8 | 6 | 3 | 1 | 1 | 1 | 18 | 3 | 1 | 1 | 1 |
| 27 to 38.9 | RT-67 AN/PRC-9 | 4 | 1 | 1 | 1 | 1 | 15 | 2 | 1 | 1 | 1 |
| 38 to 54.4 | RT-68 AN/PRC-10 | 3 | - | 1 | 1 | 1 | 12 | 1 | 1 | 1 | 1 |
| 30 to 36.95 | RT-246 RT-524 AN/PRC-25 | 4 | 1 | 1 | 1 | 1 | 15 | 2 | 1 | 1 | 1 |
| 37 to 50.95 | | 3 | - | 1 | 1 | 1 | 12 | 1 | 1 | 1 | 1 |
| 51 to 75.95 | | 2 | - | 1 | - | 1 | 9 | - | 1 | 1 | 1 |

Figure 9-1. Antenna Section - Frequency Chart RC-292.

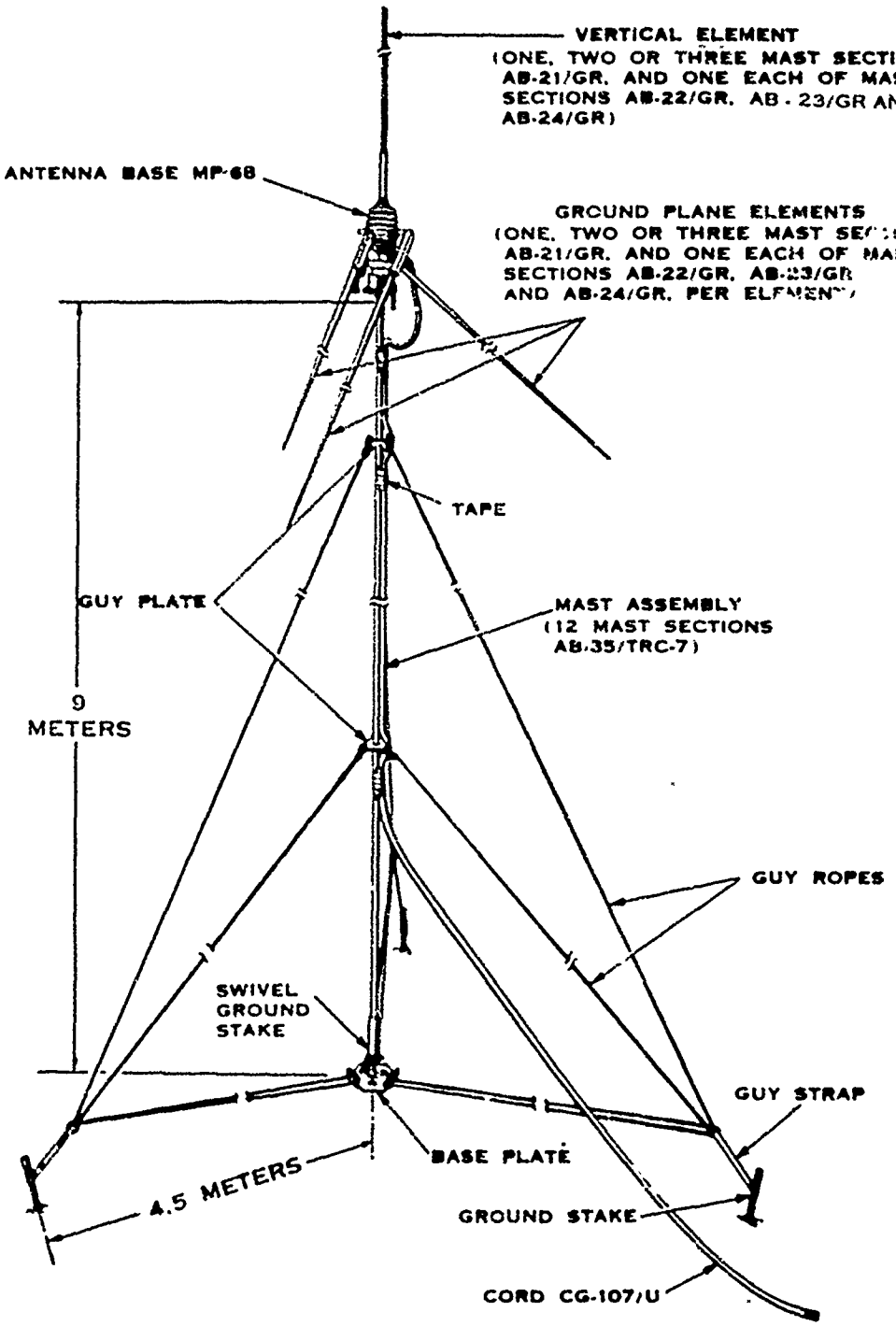



Figure 9-2. Antenna Group RC-292.

9-2. RADIO FIELD EXPEDIENTS (GENERAL).

Poor radio communication or lack of communication can be due to any one of a number of reasons and it is not always due to excessive distances or bad terrain. Poorly kept equipment and improper operation can be just as effective in preventing communication as excessive distances or mountainous terrain. It is imperative that the following precautions be observed at all times:

a. Read the technical manuals for the pertinent radio sets. They outline complete operating instructions and maintenance procedures.

b. Keep the radio set clean.

c. Keep the radio set dry.

d. Handle the set carefully.

e. Set up routine inspection and check procedure covering the following points:

(1) Plugs and jacks should be clean.

(2) Antenna insulators must be dry and clean.

(3) Antenna connections must be tight.

(4) Power connections must be tight.

(5) Knobs and controls should operate easily without binding.

(6) Motors, fans, etc., should run freely.

(7) Dry cell batteries should be fresh.

(8) When equipment is stored or not in use, remove the batteries.

9-3. PROBABLE CAUSES FOR POOR RADIO COMMUNICATION.

When equipment is in good operating condition, lack of communication or poor communication can be caused by:

a. Too great a distance between radio sets.

b. Poor choice of location (siting) at one or both ends of the circuit.

c. Bad terrain--hills and mountains.

d. Noise and interference.

e Poor antenna installation.

f. Poor frequency selection.

9-4. GENERAL OPERATING HINTS.

a. Use a handset or headset in place of a loudspeaker if the incoming signal is weak.

b. Make sure the microphone or handset is in good condition. Speak directly into the microphone, speak slowly and distinctly.

c. If set is in a vehicle, make sure the battery voltage is up. Keep engine running to charge battery.

d. Moving the set a few meters may improve reception considerably.

e. Use CW in place of voice for increased range.

## NOTES




Figure 9-3. Siting of Radio Sets.

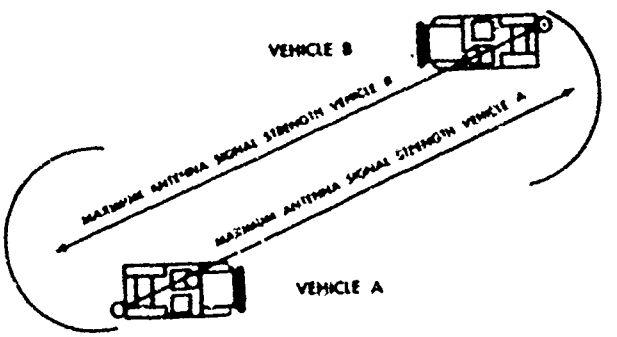



Figure 9-4. Siting of Vehicular Mounted Radios.

9-5. TIPS ON PORTABLE SETS.

a. Make it Easy to Carry.

(1) Place the AN/PRC-6 in a field pack and communicate using the handset H-33/PT. Make sure that the flexible antenna is protruding upright through the cover flap of the pack. Remember that when the operator is in the prone position he may not be able to communicate, because the antenna radiates 360 degrees in a horizontal plane only when the antenna is vertical.

(2) Another means of carrying the AN/PRC-6 is to suspend it in the middle of the back. This can be done by using two small straps. One strap could be slipped under the carrying strap fastener on the top back side of the radio. Then this strap is connected to the top portion of the pack straps. Another strap is connected to the bottom of the radio and tied or hooked to the pistol belt. This fixes the radio to the center of the back. In order to allow the operator hands free monitoring of this radio, we can tie the handset to the side hook of the helmet, and insert the handset under the side of the helmet. This gives the operator the capability of monitoring the set, yet allows him to use his hands to hold his weapon or perform other functions. (By the way this same method of hooking the handset to the helmet can be used with the AN/PRC-10.)

b. AN/PRC-6.

(1) If any of the corners of the case on your AN/PRC-6 radio set are burred or bent, you're in for some real damp trouble. Even with the rubber gasket in place, rain, splashed water and other moisture can still find its way inside the set.

(2) Give the case a look and send it to support fast if it's damaged. A water-corroded set costs a lot more to fix than a chipped case--so don't be shy in speaking up.

(3) When replacing the cover of the AN/PRC-6 radio, be sure to square up the cover first. If you tilt it, it's liable to snag the internal push-to-talk micro-switch. This could cause the radio set to become inoperative.

c. Expedient Antenna for the AN/PRC-6. If the antenna for your AN/PRC-6 becomes damaged simply remove it and replace it with a two (2) or three (3) foot length of WD-1 Commo wire. The end of the wire should be placed in the auxiliary antenna well. In order to transmit effectively, the wire must be held as close to the vertical position as possible. Try taping or tying the wire to a small twig or piece of wood.

d. AN/PRC-10.

(1) The tuning knob does have some built-in slippage, but if you put on the pressure without first releasing the DIAL LOCK, the gears are going to strip as you force them against the lock. This damages the lock, and the stripped gears allow that old familiar drifting to set in.

(2) Since the TUNING knob should turn freely during operation of the set, any resistance means you probably forgot to unlock it. So check that lock--fast!

## 9-6. TIPS ON VEHICULAR SETS.

a. Points on Vehicular Sets. When using the GRC-3 thru 8 series radios, make sure that your radios are in the OFF position before starting the vehicle. We have received word that a good many tubes are being blown because the sets have been in the ON position when starting the vehicle. This is particularly true in track vehicles. The radio set was not made to withstand that sudden excess flow of current. On the VRC-12 series, the circuit breaker will activate if an over load is received. This should give you the needed warning if you forget to turn the set off initially.

b. Cables for the AN/GRC-3 thru 8 Radio Sets. "Choosy" is the word for cables on the AN/GRC-3 thru 8 radio sets. If you don't plug them in the right holes, they'll do you about as much good as a dead snake. Get them wrong, and the set won't work. The next time you set up shop and the set won't work make a quick check to see that the cables are properly connected.

c. Vehicular Antennas.

(1) When your vehicle is sporting a whip antenna, it's like you're wearing a hat with a mighty long plume. Any kind of overhead obstacle will clobber it. What you really want to be careful of are power lines, particularly naked trolley lines.

(2) If your antenna reaches up and kisses a trolley line, your radio will get the charge of her life and will be spoiled for good. That high current will blow her tubes to blazes. You'll just be plain lucky if you get off with nothing more than a sizzled radio. . . .A high-tension line can fry you and everybody in the vehicle. The moral is keep your antenna down when you have to go under any wire. All you need is an insulator and two short pieces of rope.

d. Mounts.

(1) Radio mounts need to be protected, but if the entire mount is painted every time there's a scratch in the paint, the day could come when you couldn't lock on the set because of paint. A "little" spot painting is usually all that's needed.

(2) The rubber bushings, part of the connector retainers on the GRC-3 thru 8 mounts, serve as insulators and cushions when you attach the cable connectors to them (when the cables aren't connected to the set components).

(3) If the bushings are missing, serious damage to the pins and a "Short to Ground" may result.

(4) Get your support to install new bushings when the old ones are no longer fit to do the job.

e. Receiver-Transmitter RT-66, -67, or -68/GRC. If the control knobs on the RT-66, -67, or -68 receiver transmitter stick, call the repairman. It could mean a slipped cam link. This is a simple repair job Don't force it or it might become a major repair job.

f. Radio Receiver R-110/GRC. A light touch is a must with the detent locking screws. A little heavy handedness with those and you can put yourself out of business fast. The locking screws turn clockwise to lock. When you feel them engage, That's it. A little extra force can break the dial drive detent springs.

g. Loudspeaker LS-166/U. Stretchability is something the electrical cable on the LS-166/U loudspeaker doesn't have. The cables are just not going to stretch. Remember this when your moving the LS-166/U or the speaker may get a case of the deep silence.

9-7. TIPS ON RADIO EQUIPMENT (MISC).

a. Electron Tubes. The most critical period for a new tube is during the first few operating hours. If then has a chance to "Shape Up Or Ship Out". . .and if it passes its basic, it should have a bright future ahead. So if your manuals don't specify replacement after a certain number of hours, think twice before you replace a perfectly good tube just because it's seen a little service.

b. Batteries (Dry Cell)

(1) Having problems with batteries? If these batteries are not producing proper power output, or if the cold climate that you are operating in is draining these batteries too fast, try heating the battery. This can be done simply by having the operator carry the battery under his jacket or parka, or you can place the batteries in a warm room or near a heat source such as a register, heater, or fire.

(2) To protect your equipment, remove the battery when the equipment is not used. If you don't you may have battery acid "enjoying a meal" on your internal components.

c. Canvas Items.

(1) Keeping grommets, buckles, and tabs on your canvas equipment gig-proof usually is no snap.

(2) The brass or steel hardware can corrode in a hurry, even though the equipment is stored away neatly. A light coat of black enamel on the hardware should end your worries for a year or so. Remember to be real neat and keep the paint off the canvas.

d. Cables and Cords. Neatness - like any other virtue - can sometimes be carried a little too far with your communications gear. Nothing looks neater for an inspection than a piece of equipment with its cord wrapped around the equipment like the braid on a swagger stick. Wire cords and cables are meant to carry the message - not the stress and strain brought about by sharp bends and tight wrapping. Inspections are made to see if the equipment is combat ready. Seems sort of silly, doesn't it, for the equipment to take a beating in the process?

e. Handsets. Did your H-33/PT Handset finally become something like a collectors item? Which means it's in short, short supply, with little chance of any new replacements? If so, practice PM in double doses whenever you handle one of those H-33's. Little things like:

(1) Resist the temptation to fiddle. Things like loosening and tightening the transmitter cap.

(2) Lay it down easy-like. That plastic can't stand much pounding, dropping, banging, etc. without showing the strain.

(3) Don't peck at the transmitter breath shield with a pencil, finger nail, or any other sharp instrument.

f. Audio Caps. The audio caps for your receiver-transmitters are mighty handy little items for helping you fight against dust, dirt and water. So handy, in fact, that most of them were chained to the set-to start with, at least. Since they're a little tricky to put on, put a small dab of white paint on the connector and cap so that the cap will slip on easy when the painted marks are lined up.

g. Storage of Communications Equipment. Having trouble with rust and mildew on equipment in storage? One way to prevent this is by building cabinets and lining them with aluminum foil and hanging a 100 watt bulb in the cabinet.

9-8. TIPS ON THE RADIOTELETYPEWRITER SET AN/GRC-46.

a. SAVE REPAIR TIME: Troubles in TTY machines are responsibility of the teletype repairman, however, out of operation time can sometimes be reduced if trouble is experienced where the TTY machines run open. A check of one HIDDEN FUSE under the TT-98 paper roll could enable the Organizational Electronics Specialist to effect repair without calling for support. This is a 1/4 amp fuse with a spare fuse next to it.

b. IN EMERGENCIES: When the TT-98 Key Board becomes damaged or defective, on-the-air keyboard operation of the TT-76 can be provided by insertion of the unused black plug in the rear of the TT-76 into the TT-76 TR Jack.

9-9. POINTERS ON TELETYPE WRITER TT-4. Did you know that when the Teletypewriter, TT-4, is running open and the milliamps meter is reading below "zero" that it means that you have reversed polarity? To correct this, simply reverse the lead-ins to the machine. Be sure to unplug the teletypewriter before handling the lead-ins - - - this will prevent (ahem!) shock.




Figure 9-5. Unplug Equipment.

9-10. RADAR SET, AN/PPS-4. Prior to connecting the battery, to protect the set, the POWER and STROBE switches must be in the OFF positions, and the VOLTAGE ADJ switch must be in position "1". That way you avoid damage to the power transistors. Don't overlook the "warning" decal on the face of the set concerning the VOLTAGE ADJ position.

Turn the set on by flicking the power switch to standby position. Following a 90-second warm-up period, turn the power switch to transmit.

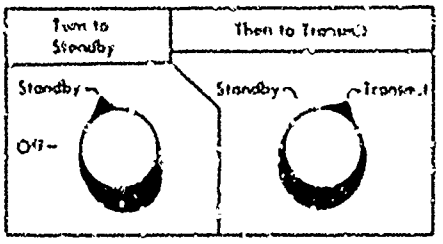



Figure 9-6. Power Switch Settings.

9-11. FIELD EXPEDIENT ANTENNAS. The following antennas are expedient antennas that can be used to increase the planning range of radio sets. These antennas are easily constructed and can be made from field wire, and lance poles, or existing trees for support. THE MOST IMPORTANT CONSIDERATION IS SITE SELECTION AND LOCATION OF RADIO SET. THE FIELD EXPEDIENT ANTENNA SHOULD NOT BE A SUBSTITUTE FOR THESE CONSIDERATIONS.

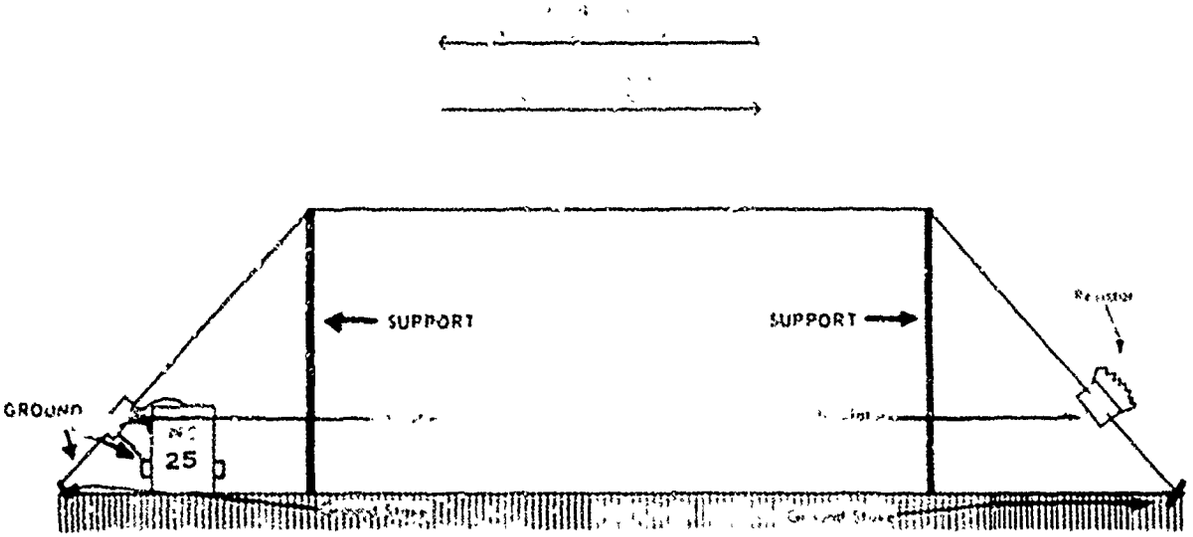



Figure 9-7. Long Wire Antenna.

a. Long Wire Antenna. This antenna is used with both AM and FM radios to increase the range. It is normally used in open terrain where the physical characteristics for installation can be obtained. It is bi-directional and can be made highly directional by use of a resistor.

| | |
|---|---|
| Length | .5 or 7 wavelengths of operating frequency |
| Height | .3 meters |
| Range | .Up to 2 to 3 times the operating range of set |
| Resistor | .400 - 700 ohms |
| Radiation | .Without resistor--Equally off both ends<br>With resistor--Off resistor end only |

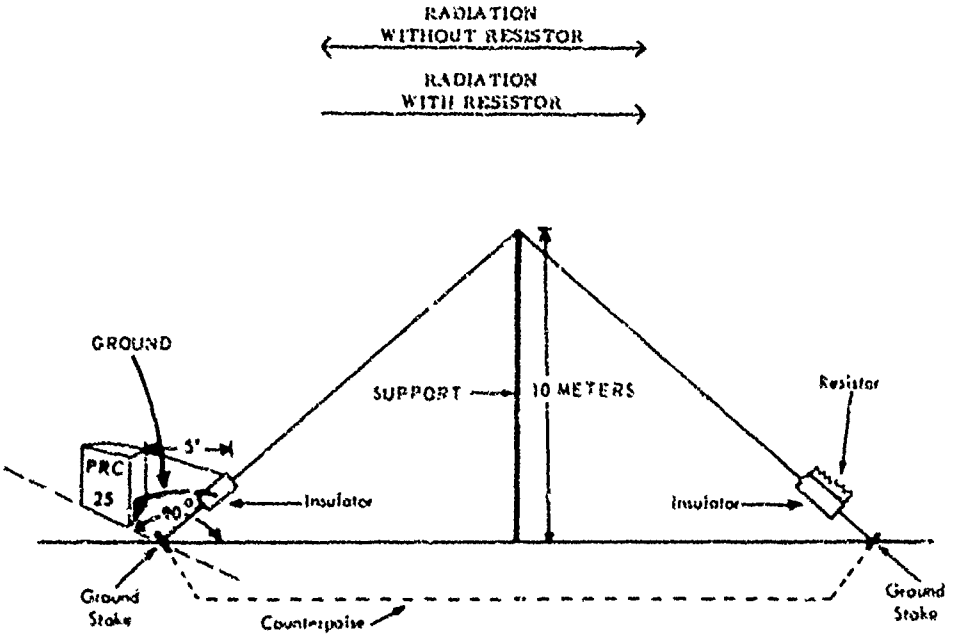



Figure 9-8. Vertical Half Rhombic Antenna.

b. Vertical Half Rhombic Antenna. This antenna is used primarily with FM radios. It is used extensively in lightly wooded areas where its physical characteristics for installation can be obtained.

| | |
|---|---|
| Length . . . . . | 5 wavelengths of operating frequency, with a 1 1/2 meter lead-in. |
| Height . . . . . | 10 meters |
| Range . . . . . | Up to 2 to 3 times operating range of set |
| Resistor . . . . . | 400 - 700 ohms |
| Radiation . . . . . | Without resistor--Equally off both ends<br>With resistor--Off resistor end only |

NOTE: Counterpoise is used as an additional ground in very dry climate. When the counterpoise is used it is placed on top of the ground and is laid from one ground stake to the other ground stake and then to the battery case clip on the radio. Height of the insulator and/or resistors are approximately knee high.

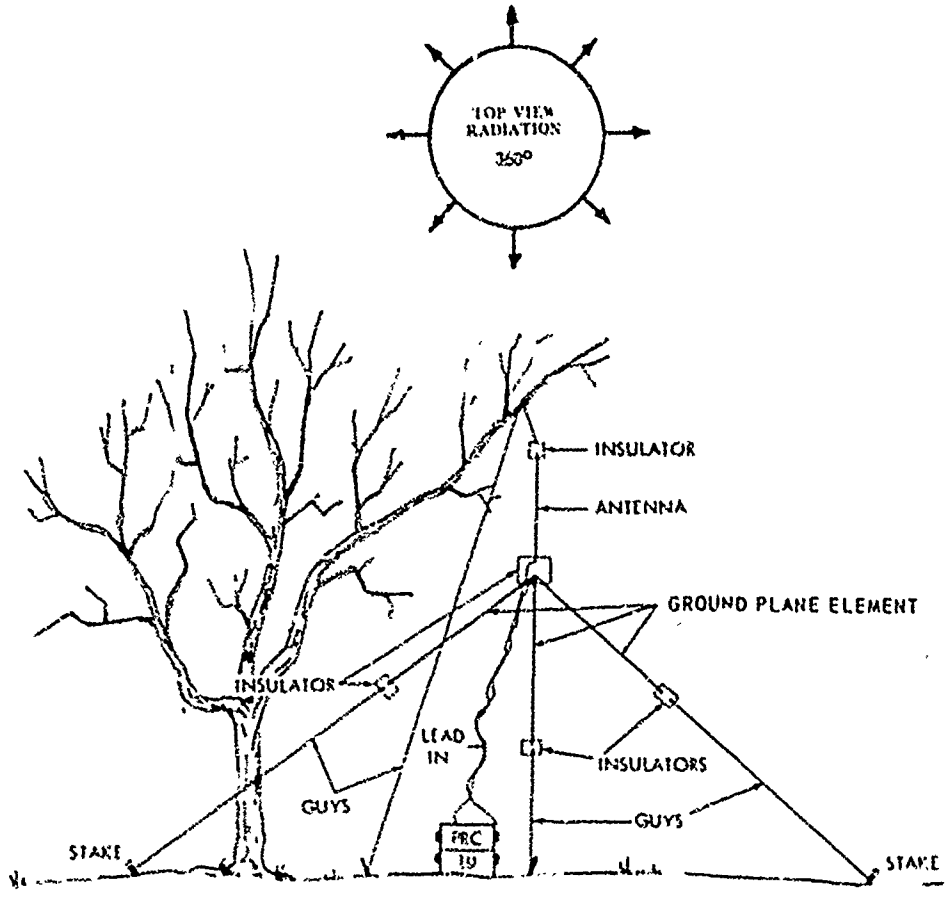



Figure 9-9. Ground Plane Antenna.

c. Ground Plane Antenna. This antenna is used with FM radios. It is used in place of the Antenna Equipment RC-292 when such antennas are not available. The length of the antenna elements listed below are for the Infantry frequency spectrum.

| | |
|---|---|
| Length | Antenna Element -- 2 meters<br>Ground Plane Elements--2 1/2 meters |
| Height | Variable (lead in not over 13 meters) |
| Range | Under most conditions will increase the range of the set. |
| Radiation | 360 degrees |

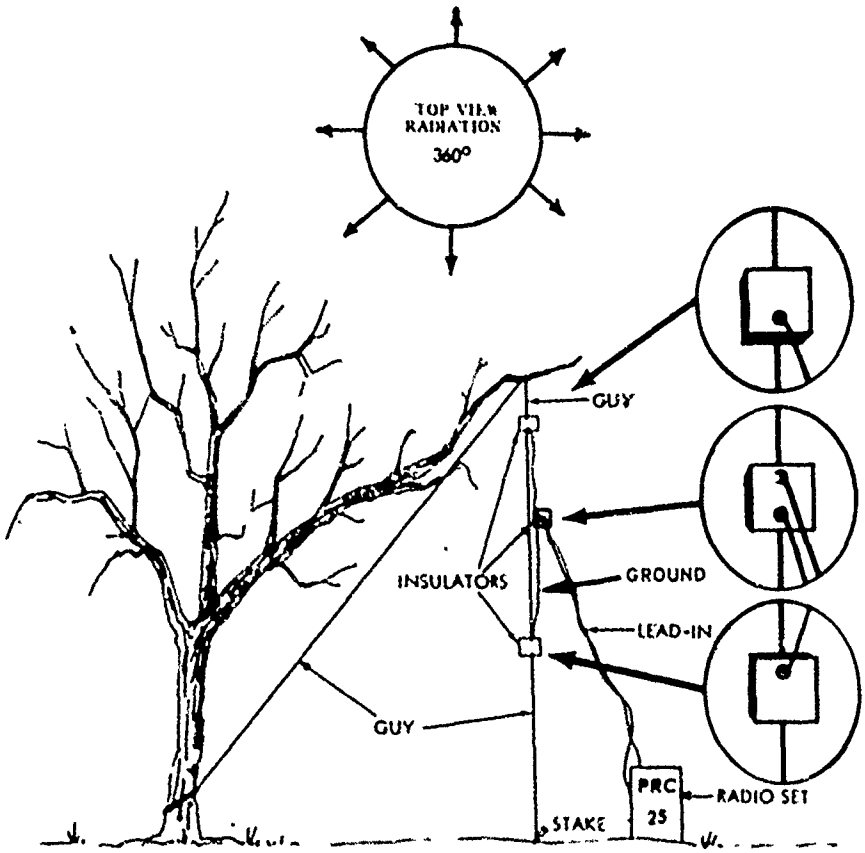



Figure 9-10. Patrol Antenna.

d. Patrol Antenna. This antenna is used primarily with FM radios. It is used extensively in heavily wooded areas with the portable radio set AN/PRC-25 to increase line of sight and will correspondently increase the range.

| | |
|---|---|
| Length | 1/2 wavelength of operating frequency |
| Height | Variable (lead in not over 13 meters) |
| Radiation | 360 degrees |

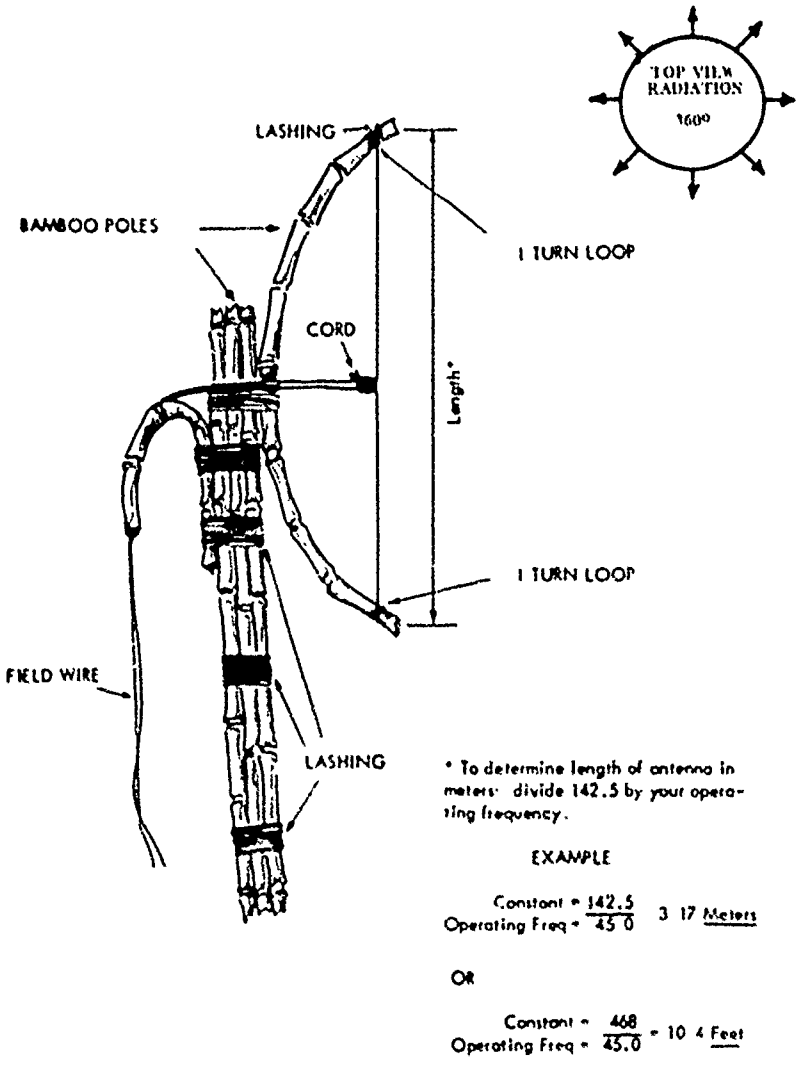



Figure 9-11. Bent Bamboo Antenna.

c. Bent Bamboo Antenna. This antenna is used with FM radios. It is a short center-fed half-wave antenna, which under most conditions will increase the operating range of the radio set. The lead-in should not be over 13 meters.

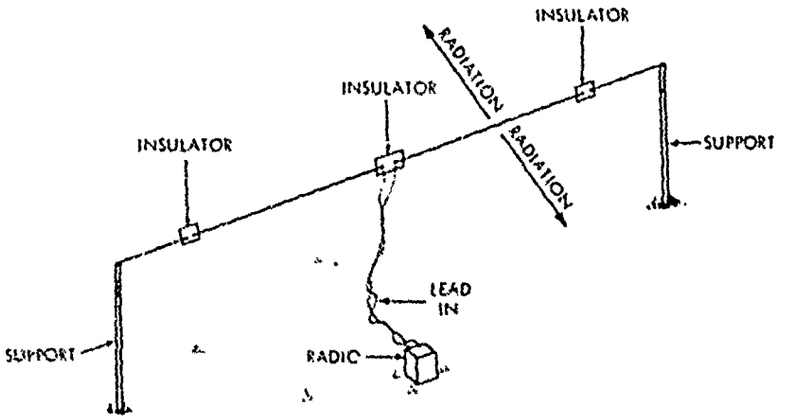



Figure 9-12. Doublet Antenna.

f. Doublet Antenna. This antenna is primarily used with low-powered high frequency AM or SSB radios. It is used in place of the radio's organic antennas to increase the range.

| | |
|---|---|
| Length | 1/2 wavelength of operating frequency |
| Height | Variable |
| Range | Up to 2 to 3 times operating range of set |
| Radiation | Off broad side of antenna |

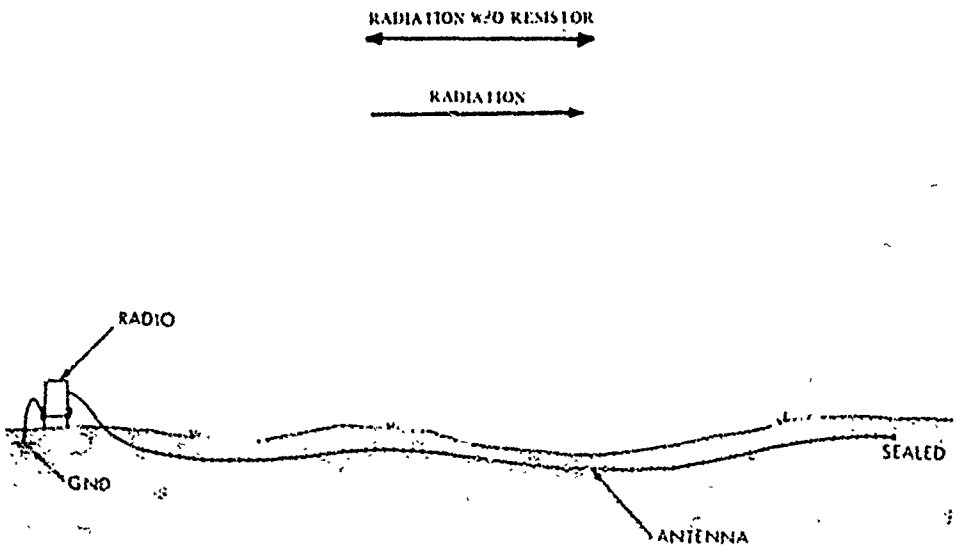



Figure 9-13. Underground Long Wire Antenna.

g. Underground Long Wire Antenna. This antenna is used with high frequency AM radios, in the CW mode when necessary to prevent its destruction by mortar fire. However, antennas should be installed above the ground when possible.

| | |
|---|---|
| Length | 2 to 3 wavelengths of operating frequency |
| Depth | 15 to 30 centimeters |
| Range | Under most conditions will increase the operating range of a radio that uses a whip antenna. |
| Radiation | Off end of antenna |

NOTE. The end of the antenna must be sealed to prevent a "Direct Short" to ground.

h. Field Expedient Antennas (General).

(1) Steel wires should be clipped off leaving only the copper wires. The copper wires are twisted together and placed into the center hole of the aux antenna connector, or the antenna connector, making sure the wires do not touch any other part of the radio set.

(2) Whip antenna broken try this--

If the antenna of your vehicular radio has become damaged, try a piece of Communication wire tied to a broomstick or a tree limb. Insert the end of the wire in the antenna connector. The stick or limb can then be held in a vertical position and you should be able to communicate. It will not be as effective as it would have been with the whip antenna but this antenna is definitely better than no antenna at all.

9-12. TIPS ON WIRE EQUIPMENT AND WIRE LAYING.

a. Wire to FDC.

(1) Having trouble with the wire line to the FDC? The mortar platoon leader can use this method effectively: take the RL-39 and fasten it to a board about one and one-half inches thick, approximately twelve inches long and twelve inches wide. Drill holes as illustrated in Figure 9-14 at the four corners of the board.

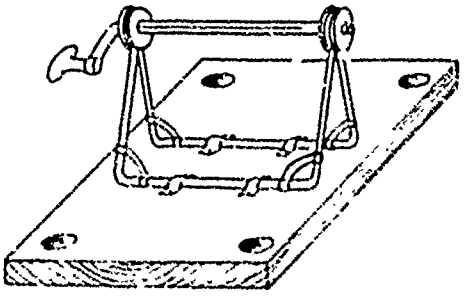


Figure 9-14. Mounting RL-39.

(2) Have holes drilled in metal strips to match those in the board. The metal strips should be about twelve inches long and three inches wide. Using four bolts install the reel equipment on your vehicle as shown in Figure 9-15.

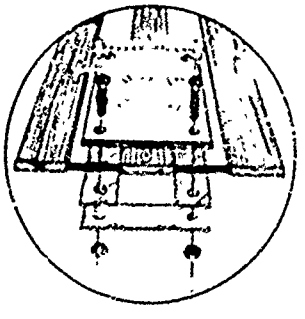


Figure 9-15. Mounting RL-39 to Vehicle.

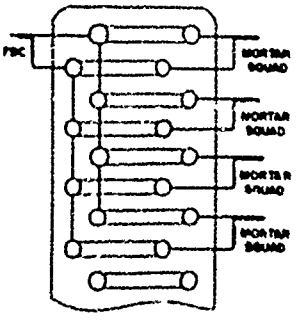



Figure 9-16. Terminal Strip TM -184.

(3) To further simplify the laying of wire within your positions, take the terminal strip (TM-184) and fasten it to the outside of your FDC vehicle and wire the terminal in series. (See Figure 9-16.) This will eliminate excess wire lines in the FDC area and you will be able to provide adequate communications to each squad.

b. Forward Observer Hotline.

(1) Under the existing wire system of the Hv Mort platoon, there are no provisions, neither personnel nor equipment, to permit the FO to enter the wire system.

(2) If he does so, there are still two or three switchboards that he must go through to connect the FDC. This is slow and time consuming. What he needs is a simple and rapid method of entering the wire system. The need can be answered with the "Hot Lines" which bypass the Company and Battalion switchboards and enables the FO to contact the FDC direct. Utilizing repeating coils C-161 and a small amount of wire, a private wire line can be established over existing wire lines. The repeating coils must be requested as they are not issued to the FO under TOE. The method for using these repeating coils is the simplex circuit arrangement.

(3) One coil is connected in the OP to company wire line at a point nearest the FO's position. The FO's telephone is then connected with a ground return. The next coil is connected in the wire line before it reaches the company switchboard and forms a bypass to the other side of the switchboard connecting in the company to battalion line with another repeating coil. The fourth coil is placed in the company to battalion wire line at a point nearest the FDC. From this coil a line is connected into the FDC telephone or switchboard with a ground return and the "Hot Line" is complete.

(4) This permits simultaneous communications over one wire line, the OP to company and the FO to FDC, without interference. Equipment not properly utilized does us little good. The "Hot Line" is one method that will help improve your wire capabilities. Clear? ? ? See Figure 9-17.

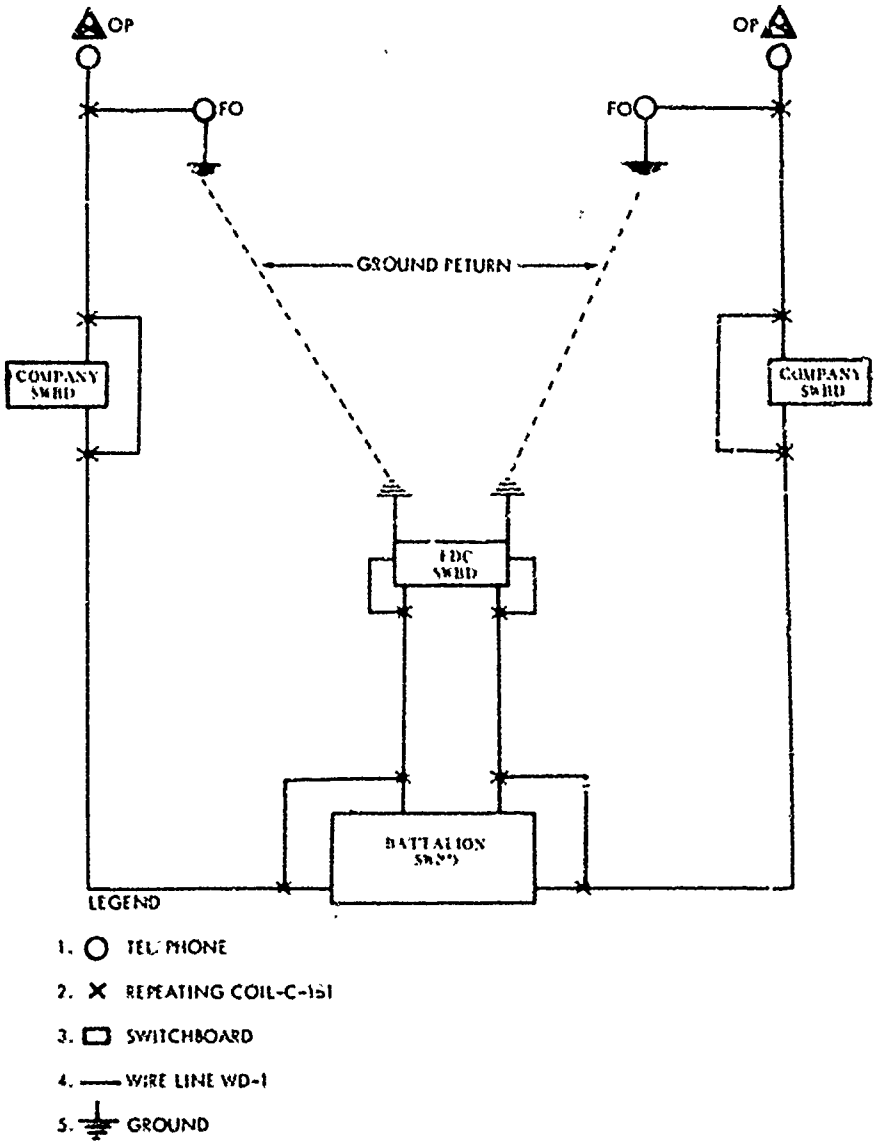



Figure 9-17. Forward Observer Hot-Line.

c. Platoon Hot Loop. With the sound-powered telephone, TA-1, the platoon leader can have wire communication with his squad leaders by installing a "hotloop." A hotloop is nothing more than a wire line from the platoon leader to all his squads. This permits the transmission of an audible or visual signal instantaneously. To accomplish this, the telephone must be connected in series (see diagram). First the platoon leader's telephone is connected in the normal fashion, one conductor to each terminal. The wire line is connected to the three rifle squads by cutting one conductor, removing the insulation and connecting it to the terminals of TA-1. The weapons squad will make the normal connection as was done on the platoon leader's telephone. Although this system provides the platoon leader with simultaneous communications it has a major disadvantage. Most of us have gone through agonizing frustration seeking out the bulb that burnt out in the old Christmas tree lights system. The same is true of this system because if one telephone goes out all telephones must be checked individually to find the culprit. Even though, the ability to communicate by telephone to all squad leaders far outweighs this one disadvantage. By the way, this is a good expedient method of setting up a simulated radio net for practice work on radiotelephone procedure.

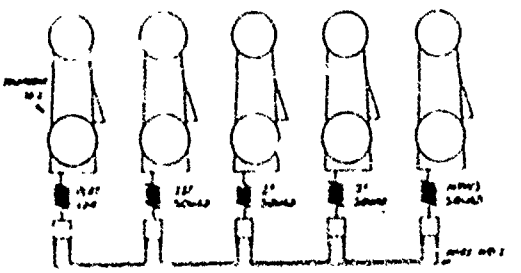


Figure 9-18. Platoon Hot Loop.

d. Wire Out--Try This. Been in a situation where your wire line suddenly went out? Yes most of us have been; here is one to try the next time it happens. Try taking both pieces of wire and place them both in the same terminal post. From the other post run a piece of wire to a ground stake. The same thing must be done at the other end of the line. If both positions follow this procedure your communications may be restored. This is called a ground return means of communicating and was used extensively in the Pacific during WW II both by the allies and enemy forces. If wire is scarce, we can simply lay one strand of wire, hook it to one terminal, again ground the other terminal, and have fine communications. See figure 9-19.

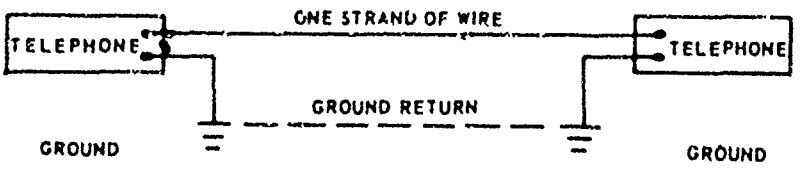
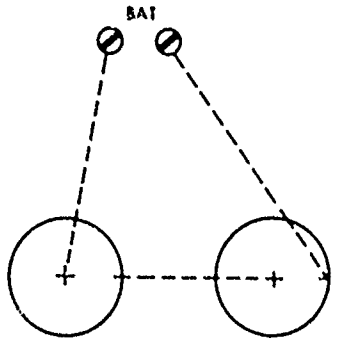



Figure 9-19. Ground Return Circuit.

e. Telephone Set TA-312/PT Tips.

(1) External Power Source. On the face of the Telephone TA-312 there are (2) two chrome headed screws marked (BAT). These two screws are for applying a field expedient method of connecting any external (3) three volt DC power source such as (2) two BA-30 batteries. This method can be used when no BA-30 batteries are available.




BATTERIES WITH (3) VOLT SECTIONS

BA-270 (PRC-6 Batteries)
BA-279 (PRC-10 Batteries)
BA-386 (PRC-25 Batteries)

Several other batteries may also be used that will give the user a (3) volt source.

Figure 9-20. External Battery Connections.

(2) Need a Visual Signal for the TA-312? It is possible to receive a visual signal with the Telephone Set TA-312/PT by connecting an adapter plug, U-184/GT, to the binding post and turning the volume control to the low position.

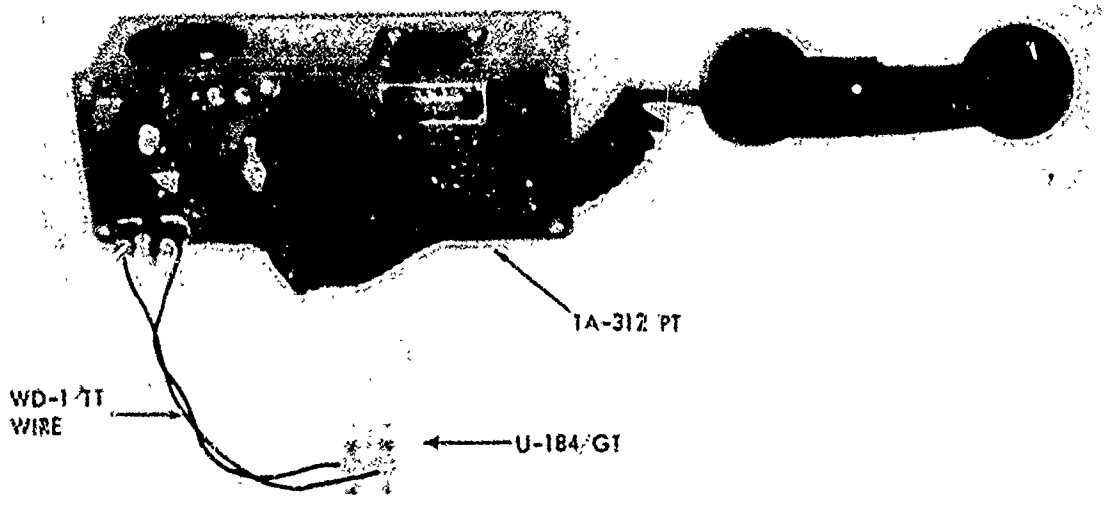



Figure 9-21. Telephone Set TA-312/PT with Visual Signal.

(3) Operation of TA-312 Without Batteries. You want to use your Telephone Set TA-312 and discover that no batteries are available or that the transmitter element is inoperative. You can still communicate by applying a field expedient measure by speaking directly into the receiver and placing the receiver to your ear to receive. For this method DO NOT depress the push-to-talk switch. You are using the sound power principle thus reducing the transmitting range to that of a sound powered instrument (6 1/2 - 16 KM).

f. Telephone Set TA-1/PT Tips.

(1) Place yourself in a situation where the transmitter element of your Telephone Set TA-1 becomes inoperative. You can still communicate with this telephone by applying a field expedient measure to it. You can use the receiver for both transmitting and receiving. When using this method speak directly into the receiver and then place the receiver to the ear to receive. DO NOT depress the press-to-talk switch for either receiving or transmitting.

(2) Now reverse the situation when the receiver element is inoperative. The operation is the same using the transmitter as both a transmitter and a receiver, except you MUST DEPRESS the push-to-talk switch for both transmitting and receiving.

(3) A second's hesitation can save you an hour's sweat with the belt clip on your TA-1/PT telephone. Remember that the next time you're tempted to force the clip over a tree limb or some handy perch. The clip was made to slip over a narrow belt and anything wider'n that may either break it....or bend it just enough so's it'll never hold snug on a belt again. If you ruin the clip you create problems for some other people besides yourself. There is no way to get a new one, which means the clip's gotta be cannibalized from an unrepairable TA-1, or your support outfit has to make you a new one.

(4) Another good way to keep your TA-1 away from the repairman is to keep your fingernails off the push-to-talk switch. That goes for when you're usin' the telephone. Fingernails can cut up the rubber cover of the switch over a period of time and make the cover useless. Best deal is to leave your fingerprints on the switch... by pushing it with the flat of your fingers.

8. Reel Quick Fix. Been losing the corner braces of your RL-39 reel unit while you're playing out or recovering telephone field wire? Your unit mechanic or support unit can put a stop to that by spot welding the braces to the frame.

h. Wire Field Expendients (General). The purpose of the following field expedients is to acquaint personnel using wire equipment with several suggested methods for increasing the flexibility of the equipment. Prior to applying field expedient methods to wire equipment, consult TM 11-2240.



Figure 9-22. Using Rifle Grenade to Lay Wire From Dispenser MX-306A/G.
NOTE. Place MX-306 at least 30 meters in front of firer.

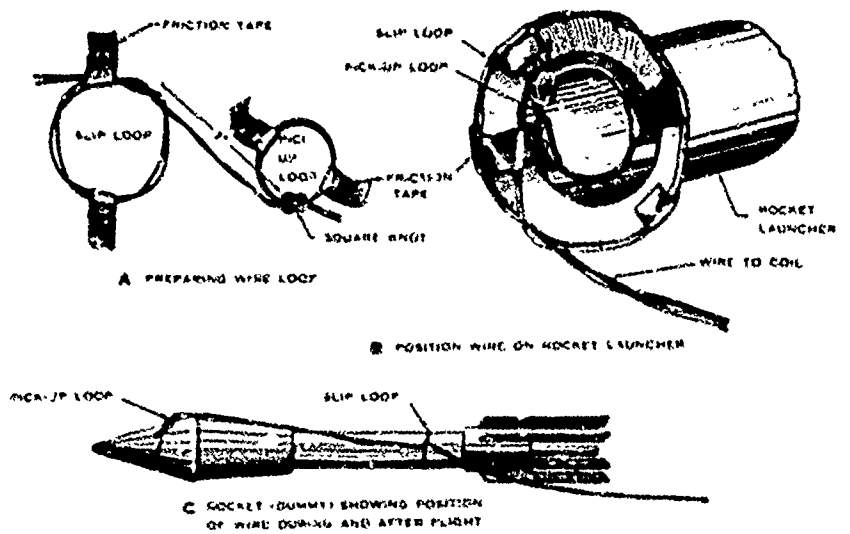



Figure 9-23. Steps in Using 3.5-Inch Rocket Launcher To Lay Wire.



Figure 9-24. 3.5-Inch Rocket Launcher Ready To Lay Wire.
NOTE: Place MX-306 at least 30 meters in front of firer.

i. Worried About Lightning? Then ground your signal equipment. Illustrated below is an example of what we mean. The SB-22 must be "grounded" unless you want a "flying operator". The few seconds it takes to ground the equipment may save the operators life, and/or the equipment's life, when a stray bolt of lightning hits one of the wire lines.

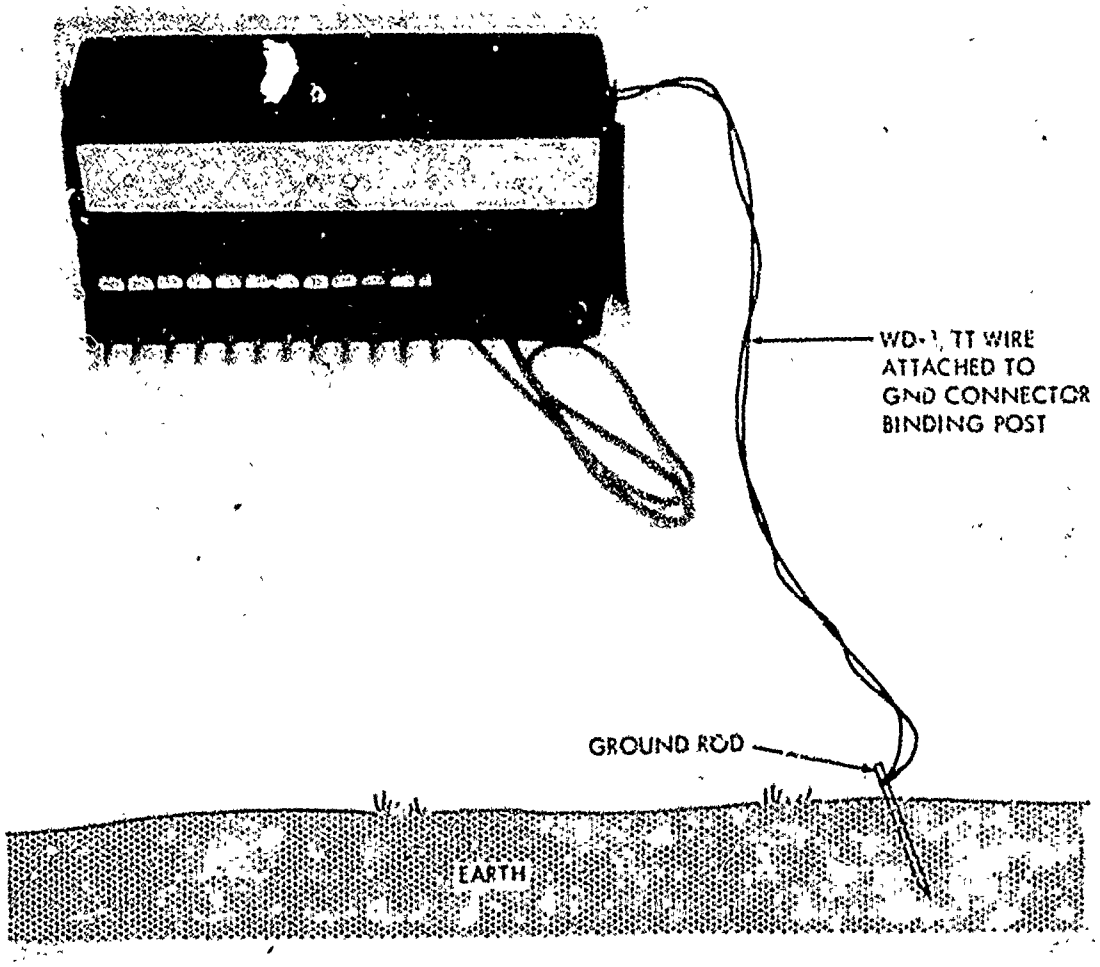



Figure 9-25. Grounding of Switchboard SB-22/PT.

9-13. VISUAL COMMUNICATIONS TIPS - USE OF PANELS.

a. Sometimes when we are moving forward at a rapid rate it is difficult to tell where our frontlines are or how far our troops have advanced. In order to be able to identify your forward positions more readily, have your forward platoon leader carry a panel with him. This panel can be placed on the back of one of the men in the front squad and the movement of the forward elements then can be followed more easily. When the movement stops, the panel should be placed on the ground to help friendly aircraft identify your position.

b. Panels may be used for a variety of marking jobs such as drop zones, helicopter landing sites, and vehicle and troop identification displays. Two types of panels are used by infantry units:

(1) VS-17/GVX, Panel Marker, Aerial Liaison Type. Consists of 2 panels, 6 feet long and 2 feet wide. One side is yellow and the reverse side is red; both colors have a flourescent effect under moonlight. The VS-17/GVX is used to mark vehicles, frontlines, or other ground troops for friendly aircraft. These displays usually change on a daily basis and are often contained in the unit SOI. The VS-17/GVX is organic to the following type units:

| | Battalion | | | | | Brigade | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | AM | Mech | Inf | Lt Inf | Abn | AM | Mech | I | A | M |
| Hq & Hq Co | 22 | 8 | 18 | 13 | 1 | 12 | 16 | 12 | 2 | 10 | 20 | 16 | 20 |
| Rifle Co | 4 | 4 | 4 | 4 | 2 | | | | | | | | |
| CS | | 8 | | 4 | | | | | | | | | |
| TOTAL | 34 | 28 | 30 | 29 | 7 | 12 | 16 | 12 | 2 | 10 | 20 | 16 | 20 |

(2) AP-30C and AP-30D Panel Sets. AP-30C consists of 13 black and AP-30D, 13 white cotton panels, each 12 feet long by 2 1/3 feet wide. Both have suitable pins for fastening to the ground and are used for marking drop zones and for sending prearranged messages to aircraft. The prearranged meanings are illustrated in FM 21-60 and in the unit SOI. These panel sets are organic to the following units:

(a) AP-30C (Black).

| | Battalion | | | | | Brigade | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | AM | Mech | Inf | Lt Inf | Abn | AM | Mech | I | A | M |
| Hq & Hq Co | 2 | 0 | 1 | 0 | 14 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 |

(b) AP-30D (White).

| | Battalion | | | | | Brigade | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | AM | Mech | Inf | Lt Inf | Abn | AM | Mech | I | A | M |
| Hq & Hq Co | 2 | 0 | 2 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 |

c. When using a panel(s) on a helicopter landing site, be certain that it is fastened securely to the ground or the turbulence caused by the helicopter blades may cause the panel(s) to be drawn up into the blades.

d. Any number of things can be used to substitute for panels if the occasion should arise. We can use sheets, pillow cases, T-shirts or, if the ground is a light color such as sand, you might use shelter halves or blankets.

9-14. RADIO-WIRE INTEGRATION.

Radio-wire integration is not a capability limited to only the Division Signal Battalion. Utilizing communication equipment found within the Infantry Rifle Company, Battalion, and/or Brigade, it is possible for you to establish a radio-wire integration facility. This equipment is as follows:

Old Family RW I
AN/GRC-3 - 8 series or the PRC-8, -9 & -10

1 Switchboard SB-22/PT
1 Remote Control Group AN/GRA-6
1 Handset H-33
1 Radio Set AN/GRC-3 - 8 series or PRC-8, -9, or -10
Field Wire WD-1/TT as needed

New Family RW I
AN/VRC-12 series or PRC-25

1 Switchboard SB-22/PT
1 Remote Control Group AN/GRA-39
1 Handset H-138/U
1 Radio AN/VRC-12 series or PRC-25
Field Wire WD-1/TT as needed

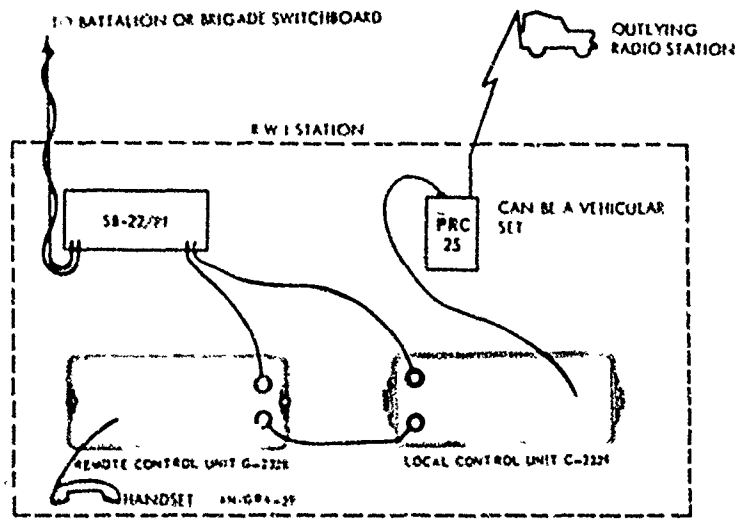



Figure 9-26. RWI Station Hookup.

NOTE: In the Fig shown the equipment is for the VRC-12 series; however, the GRC-3-8 series may be used with the AN/GRA-6.

Steps for placing the radio-wire integration into operation.

. WD-1 wire is connected to one line pack of the SB-22. One conductor is connected to the upper line post of the Local Unit C2329, the other to the upper line post of the Remote Unit C-2328.

2. A single strand of wire is connected between the lower line posts of both units.

3. The radio is connected to the local unit by the radio cable. (For the GRA-6 either cable may be used.)

4. The handset is connected to the audio connector of the remote unit.

5. When an outgoing call is completed at the switchboard between the incoming line pack and the RWI line pack, the operator must push the "push-to-talk" switch on the handset to key the radio for the party on the telephone.

6. Once the RWI station is set up, the operator at the RWI station must answer the radio with the handset on the remote unit and his switchboard with the operators headset. When making an RWI call, the operator will inform the party on the phone that proper radiotelephone procedure and call signs must be used both for security and so that the operator will know when to key the radio for the party on the telephone.

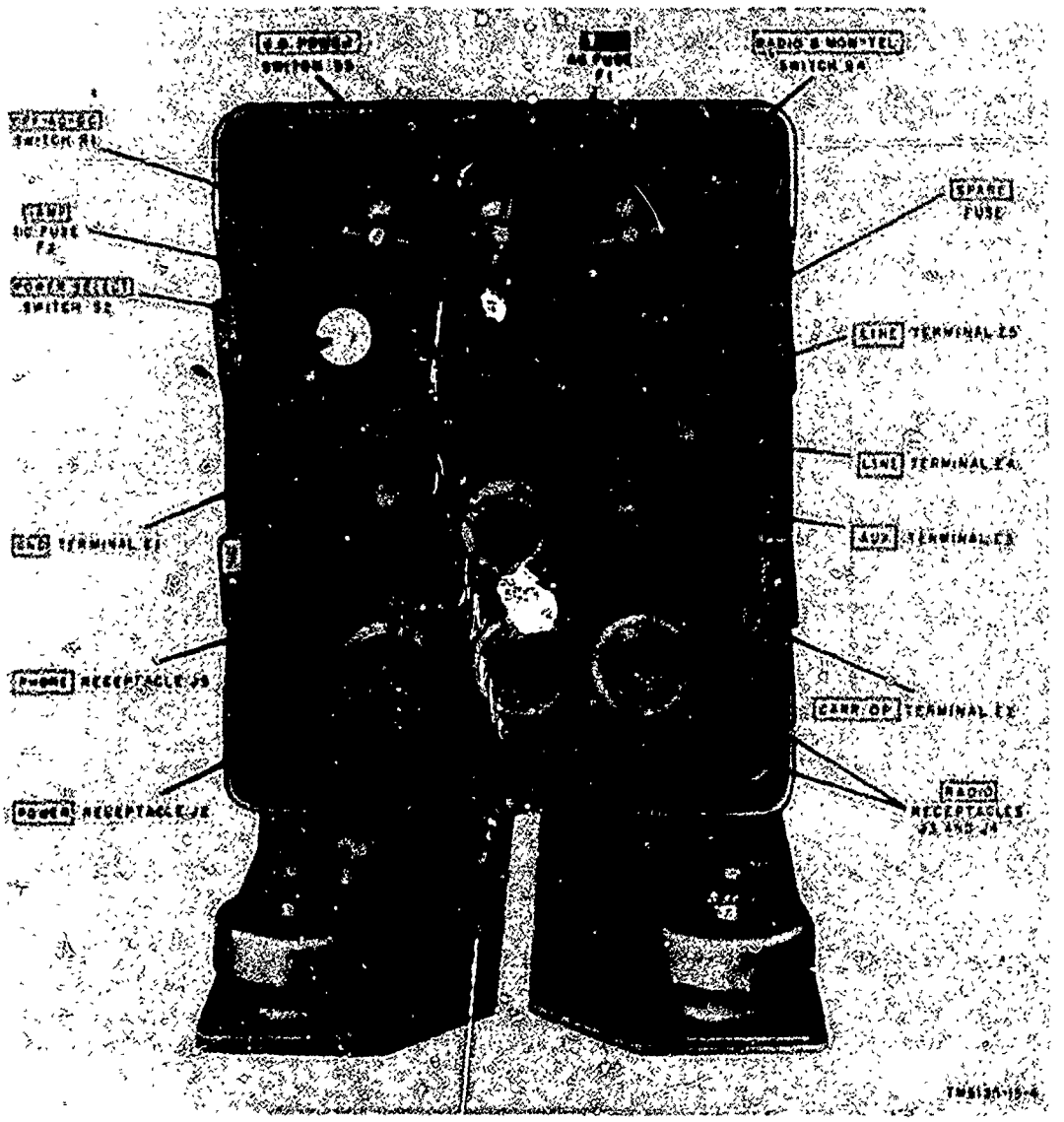



Figure 9-27. Radio Set Control AN/GSA-7.

9-15. RADIO SET CONTROL AN/GSA-7. (TM 11-5135-15)

Radio Set Control AN/GSA-7 is a small light weight electronic switching device for use in radio-wire integrated systems. It is used to interconnect radios with local battery telephone equipment on a push-to-talk basis. After the radio set control is connected and power is applied to it and to the radio, no attendant is necessary. This set is used with the AN/GRC 3 to 8 series of radios. It is used with the VRC-12 series radios when used with the special purpose cable assembly CX-7474/U.

# CHAPTER 10

# WIRE COMMUNICATION

TAB HERE

## 10-1. WIRE COMMUNICATION (GENERAL).

Wire is a means of communication used within and between units for tactical control, fire control, and administrative traffic. It is used whenever there is time for a system to be installed, the tactical situation being the deciding factor. Wire, particularly adaptable to static situations, can be used in most tactical operations if its use is properly planned.

## 10-2. ADVANTAGES OF WIRE COMMUNICATION.

a. Wire communication provides person-to-person conversation with break-in operation. Break-in operation means persons conversing can interrupt one another without waiting until a transmission is completed.

b. Wire is a relatively secure means of communication. However, it does not assure the security of information transmitted in the clear because it is susceptible to enemy monitoring devices.

c. Wire is dependable in all types of weather and terrain.

## 10-3. DISADVANTAGES OF WIRE COMMUNICATION.

a. A wire system takes time and effort to install. However, the time required and effort expended can be greatly reduced by timely planning and proper training of personnel.

b. Wire communications can be interrupted by broken wire lines, which are largely the results of negligence rather than enemy action. Therefore, it is essential that our personnel be aware of the importance of wire lines so they will take every precaution to avoid breaking them. In addition, wire personnel must select installation sites and routes in such a manner as to make the wire system less vulnerable to interruption.

## 10-4. CHARACTERISTICS OF FIELD WIRE.

Field Wire WD-1/TT consists of a twisted pair of conductors having a tensile strength of approximately 200 pounds. Each conductor consists of four copper strands, three steel strands, an insulator of polyethelene, and a protective covering of nylon. The wire weighs approximately 48 pounds per 1.5 kms. The light weight facilitates rapid laying of wire lines with a minimum of personnel and equipment. The transmission range over this wire is dependent upon the equipment used with it.

## 10-5. FIELD WIRE SPLICES.

Splicing is a method of joining conductors to regain electrical continuity. There are two methods of splicing field wire, the standard splice using Splicing Kit MK-356 and the hand splice using Tool Equipment TE-33 and Insulation Tape. A good splice can prevent broken wire lines, short or open circuits, grounded conductors, and higher resistance to current flow. Due to the importance of wire communication, all personnel should be familiar with the construction of the standard splice and be capable of constructing a hand splice.

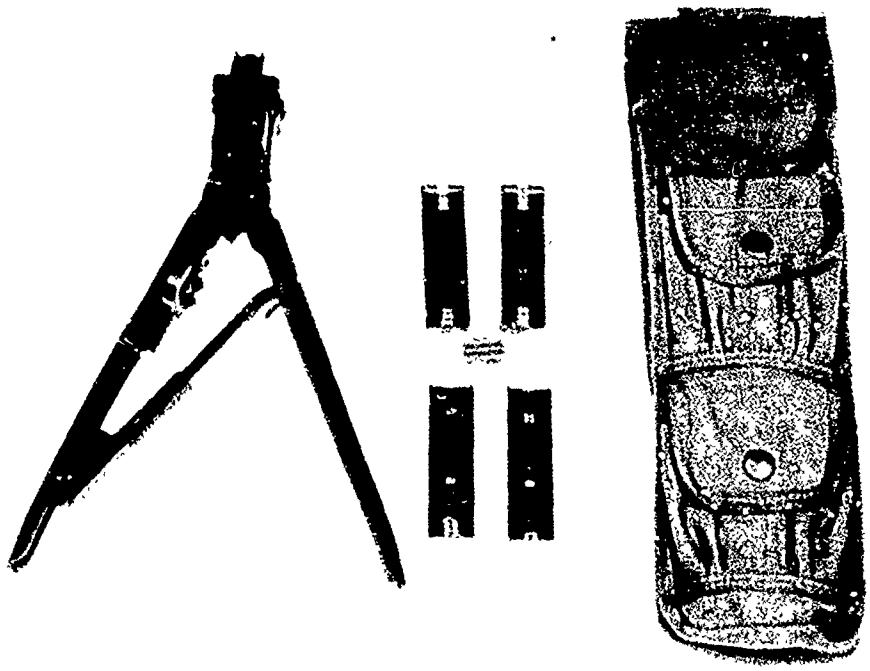


Figure 10-1. Wire Splicing Kit MK-356/G.

10-6. WIRE SPLICING KIT MK-356/G. (FM 24-20)

a. The Wire Splicing Kit MK-356 consists of a canvas carrying case, four magazines for splicing cartridges, and a crimping tool TL-582. The weight of the Splicing Kit MK-356 is approximately 5 pounds. One handle of the Tool TL-582 has a wire cutter and stripper. The stripped ends of the conductors to be spliced are inserted into the opposite ends of a splicing cartridge that has been fed into the jaws of the tool. The handles of the tool, which operate on a ratchet principle, are then squeezed together crimping the cartridge. Each cartridge is made of 3 sleeves, one tin, one copper, and one plastic. The finished splice is abrasive resistant, waterproof and forms a good electrical connection.

b. Wire Splicing Kit MK-356 is organic in the type units as follows:

| | Battalion | | | | | Brigade | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | AM | Mech | Inf | Lt Inf | Abn | AM | Mech | I | A | M |
| Hq & Hq Co | 9 | 0 | 2 | 0 | 1 | 4 | 6 | 4 | 0 | 8 | 6 | 6 | 6 |
| Rifle Co | 2 | 0 | 2 | 0 | 0 | | | | | | | | |
| | | CS 0 | | CS 0 | | | | | | | | | |
| TOTAL | 15 | 0 | 8 | 0 | 1 | 4 | 6 | 4 | 0 | 8 | 6 | 6 | 6 |

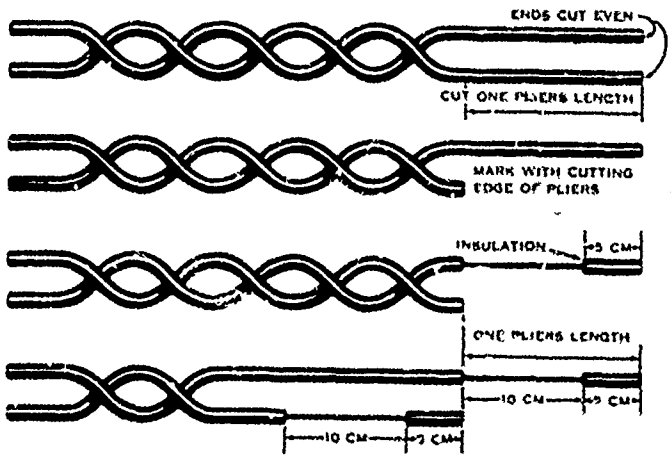



Figure 10-2. Preparation of Wire for Splicing.

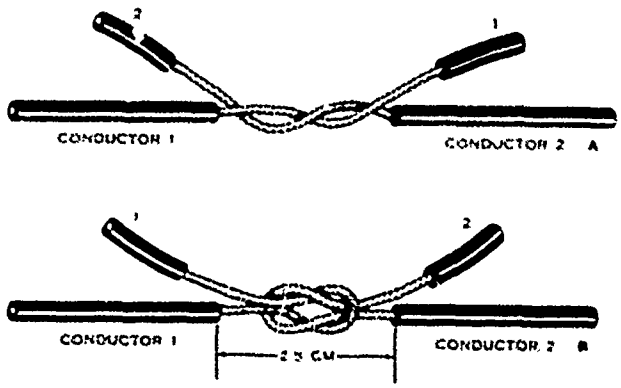



Figure 10-3. Tying Square Knot.

10-7. CONSTRUCTION OF THE HAND SPLICE. (FM 24-20)

a. The conductors are first prepared as shown above. This preparation staggers the splices preventing excessive bulk and eliminating possible electrical contact between them. The insultation is left on the ends of the conductors, as shown, to bind the strands of wire together until after the square knots have been tied. The first knot is tied and then the twist is restored in the wire line by wrapping the two remaining conductors around the two conductors that have already been tied. After the twist is restored the second square knot is tied.

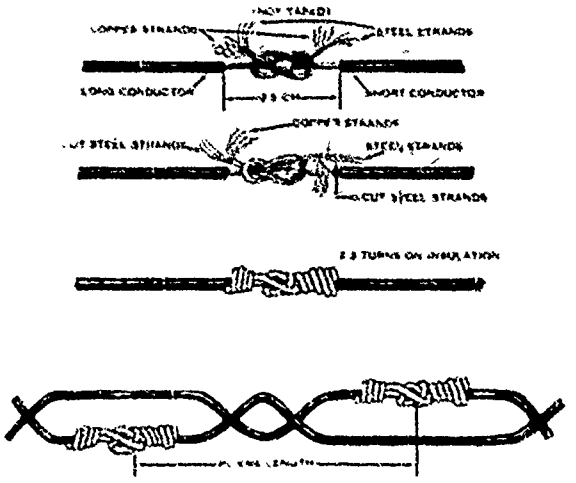


Figure 10-4. Construction of the Splice.

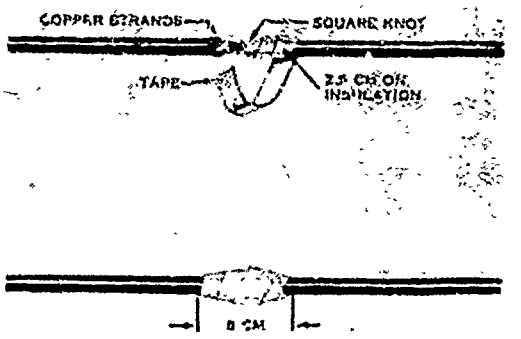



Figure 10-5. Taping the Splice.

b. When the knots have been tied remove the insulation left on the end of the conductors and separate the steel and copper strands as shown in figure 10-4. The steel strands are then cut off even with the insulation on the side of the knot from which they protrude. The copper strands are bent across the square knot to the side opposite that from which they protrude and are wrapped, as shown in figure 10-4, until they extend two or three turns on the insulation. This is done to seize the knot so that it will not slip and to bind the steel strands against the conductor preventing their penetration of the tape.

c. After seizing the splices, insulation tape is applied as shown to prevent water seepage and short circuits. The tape used is electrical insulation tape TL-600 or TL-636.

d. To use this tape, first remove the backing and stretch the tape to activate its self-binding properties. Then start taping at the center of the splice, using a steady pull, and tape to at least 2.5 cm beyond the insulation on one end. Then tape back over the knot to at least 2.5 cm beyond the insulation on the other end. The final step is to reverse the taping direction and tape back to the center of the splice.

e. Taping with friction tape - Start at either end about 1.5 cm beyond the electrical insulation tape. Continue the taping to a point 1.5 cm beyond on the opposite side.

f. To repair a broken wire line, even though splicing equipment is not available, use a bayonet or some other sharp instrument to prepare the wire as nearly as possible as shown in figure 10-2. Then tie the first square knot, restore the twist and tie the second square knot. If time is available, seize the knots with the copper strands (figure 10-4). If tape of any kind is available, tape the splices, if tape is not available, get the splices up off the ground and separate them with a stick or twig to prevent electrical contact between the conductors. All temporary splices should be marked and communication personnel notified of their location as soon as possible.

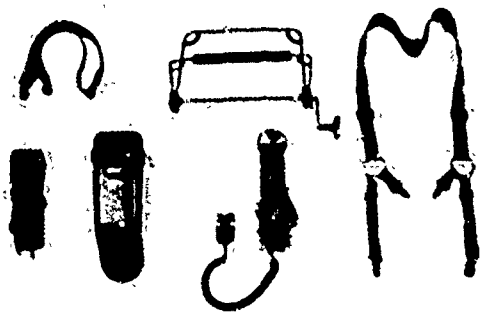


Figure 10-6. Reel Equipment CE-11.

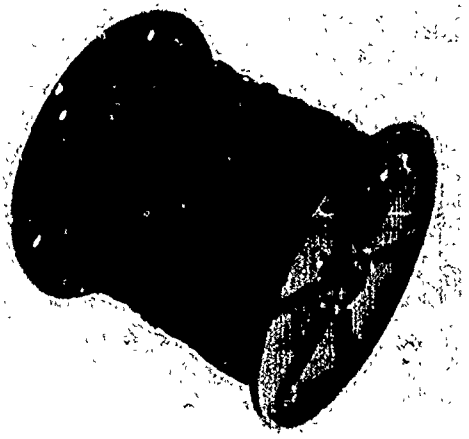


Figure 10-7. Reel Cable DR-8 with wire WD-1/TT.

10-8. REEL EQUIPMENT CE-11 (TM 11-3895-203-12P).

a. The Reel Equipment CE-11 is a lightweight, portable unit designed for laying and recovering short wire lines. It consists of the following components:

(1) Reeling Machine Cable Hand RL-39 consisting of an axle with crank, carrying handles and straps ST-34 and ST-35.

(2) Telephone Set TA-1/PT.

b. The RL-39 Component mounts the Reel Cable DR-8 which will hold 400 meters of field wire WD-1/TT. The DR-8 and the wire are separate items and ARE NOT components of the CE-11 or the RL-39.

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

d. The Reel Equipment CE-11 is organic to the following type units:

| | Battalion | | | | | Brigade | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | AM | Mech | Inf | Lt Inf | Abn | AM | Mech | I | A | M |
| Hq & Hq Co | 17 | | 10 | | 18 | 5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Rifle Co | 3 | 9 | 9 | 9 | 2 | | | | | | | | |
| | | CSO | | CSO | | | | | | | | | |
| TOTAL | 26 | 27 | 37 | 27 | 24 | 5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

e. The Reeling Machine Cable Hand RL-39 is organic to the following type units:

| | Battalion | | | | | Brigade | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | AM | Mech | Inf | Lt Inf | Abn | AM | Mech | I | A | M |
| Hq & Hq Co | 20 | 6 | 19 | 6 | 15 | 3 | 16 | 8 | 2 | 3 | 15 | 18 | 12 |
| Rifle Co | 11 | 0 | 5 | 0 | 14 | | | | | | | | |
| | | CS 7 | | CS 7 | | | | | | | | | |
| TOTAL | 53 | 13 | 34 | 13 | 57 | 3 | 16 | 8 | 2 | 3 | 15 | 13 | 12 |

f. The Reel Cable DR-8 with 400 meters of wire WD-1/TT is organic to the following type units:

| | Battalion | | | | | Brigade | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | AM | Mech | Inf | Lt Inf | Abn | AM | Mech | I | A | M |
| Hq & Hq Co | 34 | 6 | 51 | 6 | 42 | 9 | 27 | 13 | 1 | 11 | 14 | 30 | 11 |
| Rifle Co | 12 | 3 | 19 | 3 | 20 | | | | | | | | |
| | | CSO | | CSO | | | | | | | | | |
| TOTAL | 70 | 15 | 108 | 15 | 102 | 9 | 27 | 13 | 1 | 11 | 14 | 30 | 11 |

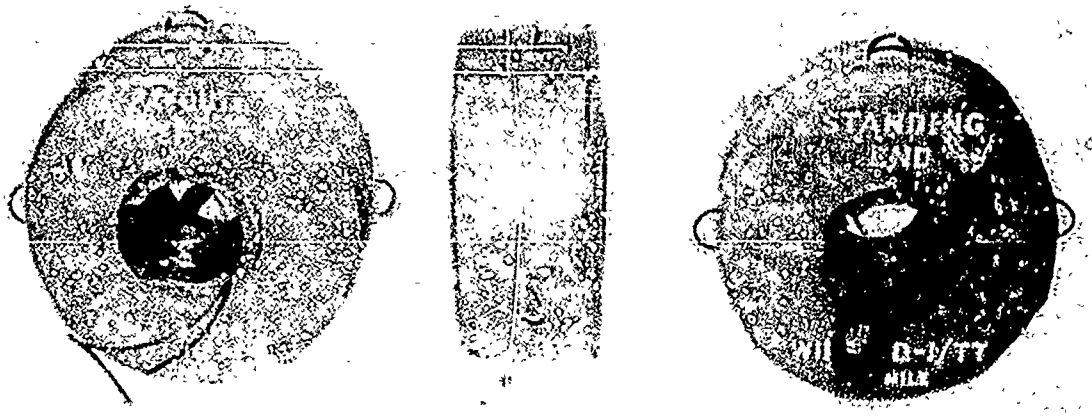



Figure 10-8. Wire Dispenser MX-306A/G.

10-9. WIRE DISPENSER MX-306A/G. (TM 11-2240)

a. Wire dispenser MX-306 contains 800 meters of field wire WD-1. It weighs 25-26 pounds. The payout end of the wire comes from the center of the coil. The standing end protrudes from the side of the dispenser opposite the payout end. Continuous communication can be achieved while laying the wire line by connecting telephones to the payout end and the standing end. This dispenser may be hand carried, using an improvised handle tied to the "D" rings, or it may be lashed to a packboard. Several dispensers may be spliced together and lines laid with the dispensers carried in aircraft or vehicles. The canvas and tape dispenser is expendable once the wire has been dispensed from it. The battalion does not have facilities to repack the dispenser.

b. Wire Dispenser MX-306 is organic in the type units as follows:

| | Battalion | | | | | Brigade | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | AM | Mech | Inf | Lt Inf | Abn | AM | Mech | I | A | M |
| Hq & Hq Co | 45 | 20 | 36 | 20 | 21 | 20 | 20 | 22 | 20 | 20 | 40 | 20 | 40 |
| Rifle Co | 15 | 18 | 18 | 18 | 18 | | | | | | | | |
| | | CS 10 | | CS 10 | | | | | | | | | |
| TOTAL | 90 | 84 | 90 | 84 | 75 | 20 | 20 | 22 | 20 | 20 | 40 | 20 | 40 |

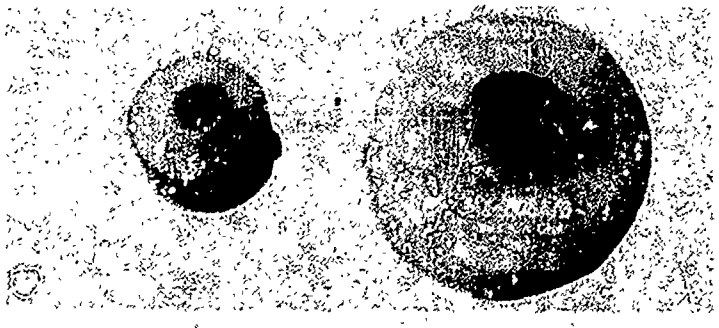


Figure 10-9. Comparison of MX-306/G with Cable Telephone WD-36/TT.

10-10. CABLE TELEPHONE WD-36/TT.

This assault wire is a parallel pair of 23 AWG solid aluminum conductor with polyethylene insulation. The wire has a tensile strength of 25 pounds and weighs 9 pounds per mile. It was developed by the Canadian Army and is intended for use at Platoon and Company level. This wire will be issued in a 1/4 mile dispenser (MX-6895/TT) and a 1/2 mile dispenser (MX-6894/TT). A basis of issue is being developed for this equipment.

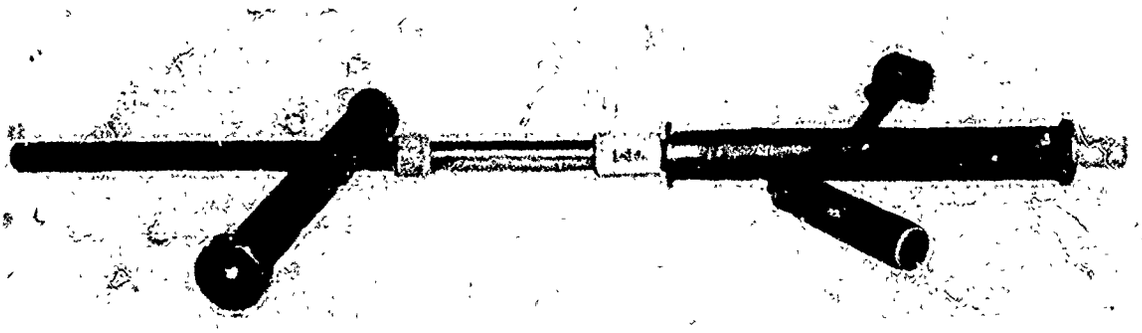


Figure 10-10. Reeling Machine Cable Hand RL-27.

10-11. RL-27 WITH COMPONENT CRANK GC-15. (TM 11-3895-201-12P) 2P)

a. The RL-27 is an eight-pound machined steel bar with two knurled handles. One handle can be removed to permit insertion of the RL-27 into Reel RL-159. The RL-27 is used by two men to lay wire. The crank GC-15 is used when recovering wire.

b. The RL-27 is organic to the type units as follows:

| | Battalion | | | | | Brigade | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | AM | Mech | Inf | Lt Inf | Abn | AM | Mech | I | A | M |
| Hq & Hq Co | 8 | 1 | 3 | 1 | 4 | 4 | 5 | 2 | 2 | 5 | 5 | 5 | 5 |
| Rifle Co | 1 | 1 | 1 | 1 | 0 | | | | | | | | |
| | — | CS 0 | — | CS 0 | — | — | — | — | — | — | — | — | — |
| TOTAL | 11 | 4 | 6 | 4 | 4 | 4 | 5 | 2 | 2 | 5 | 5 | 5 | 5 |

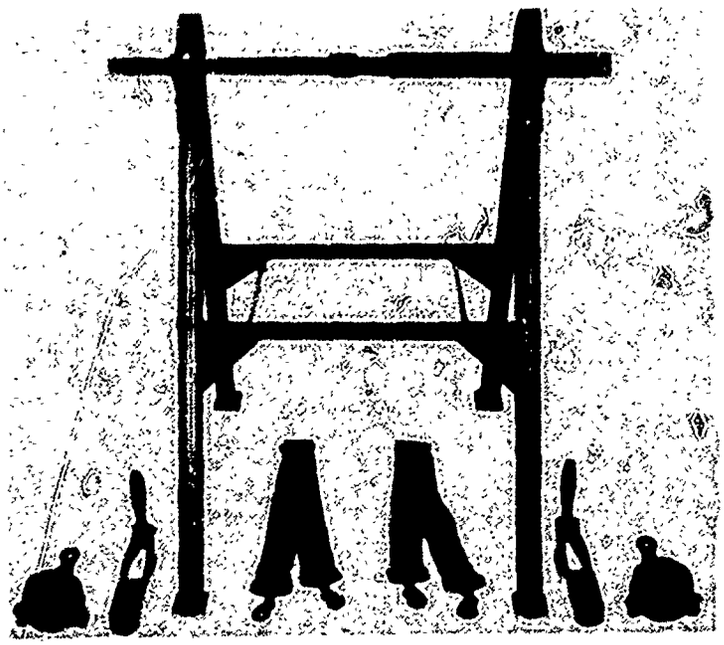


Figure 10-11. Reeling Machine Cable Hand RL-31.

10-12. REELING MACHINE RL-31 (TM 11-3621. ..).

a. The RL-31 is a portable wire-laying device designed to facilitate paying out and recovering field wire and field cable. The reel unit (less wire) weighs about 46 pounds. It may be mounted in a vehicle or hand carried.

b. The unit consists of:

Frame--Basic Component

Brake Units GC-10-For controlling the speed of the wire reels during payout of the wire.

Cranks GC-4--Used to turn the axle when recovering wire.

Carrying Straps ST-19A-For carrying the reel unit litter style.

Divided Axle--For use when two reels are mounted on the reel unit. The axle allows either reel to operate independently of the other.

Toe Clamps--For vehicular mounting

c. The RL-31 is organic in the type units as follows:

| | Battalion | | | | | Brigade | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | AM | Mech | Inf | Lt Inf | Abn | AM | Mech | I | A | M |
| Hq & Hq Co | 2 | 2 | 3 | 2 | 2 | 2 | 5 | 4 | 2 | 2 | 6 | 5 | 6 |
| Rifle Co | 0 | 0 | 0 | 0 | 0 | | | | | | | | |
| | | CSO | | CSO | | | | | | | | | |
| TOTAL | 2 | 2 | 3 | 2 | 2 | 2 | 5 | 4 | 2 | 2 | 6 | 5 | 6 |

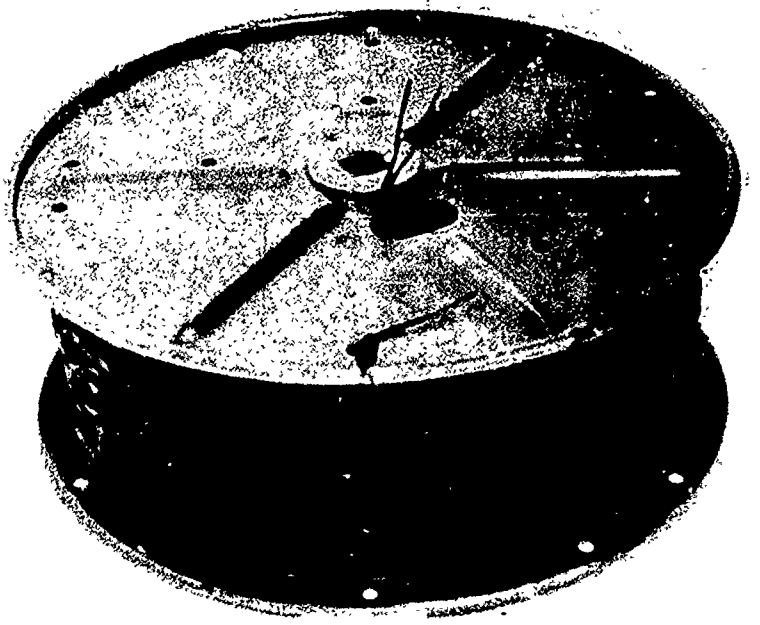


Figure 10-12. Reel Cable RL-159/U (with Wire WD-1/T).

10-13. REEL RL-159/U.

a. Reel RL-159 is a metal drum capable of holding 1.5 km of Wire WD-1. It is used in conjunction with the RL-27 and RL-31.

b. Reel RL-159 is organic in the type units as follows:

| | Battalion | | | | | Brigade | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | AM | Mech | Inf | Lt Inf | Abn | AM | Mech | I | A | M |
| Hq & Hq Co | 7 | 6 | 4 | 6 | 5 | 6 | 9 | 6 | 6 | 9 | 6 | 9 | 6 |
| Rifle Co | 1 | 1 | 4 | 1 | 7 | | | | | | | | |
| | | CSO | | CSO | | | | | | | | | |
| TOTAL | 10 | 9 | 16 | 9 | 26 | 6 | 9 | 6 | 6 | 9 | 6 | 9 | 6 |

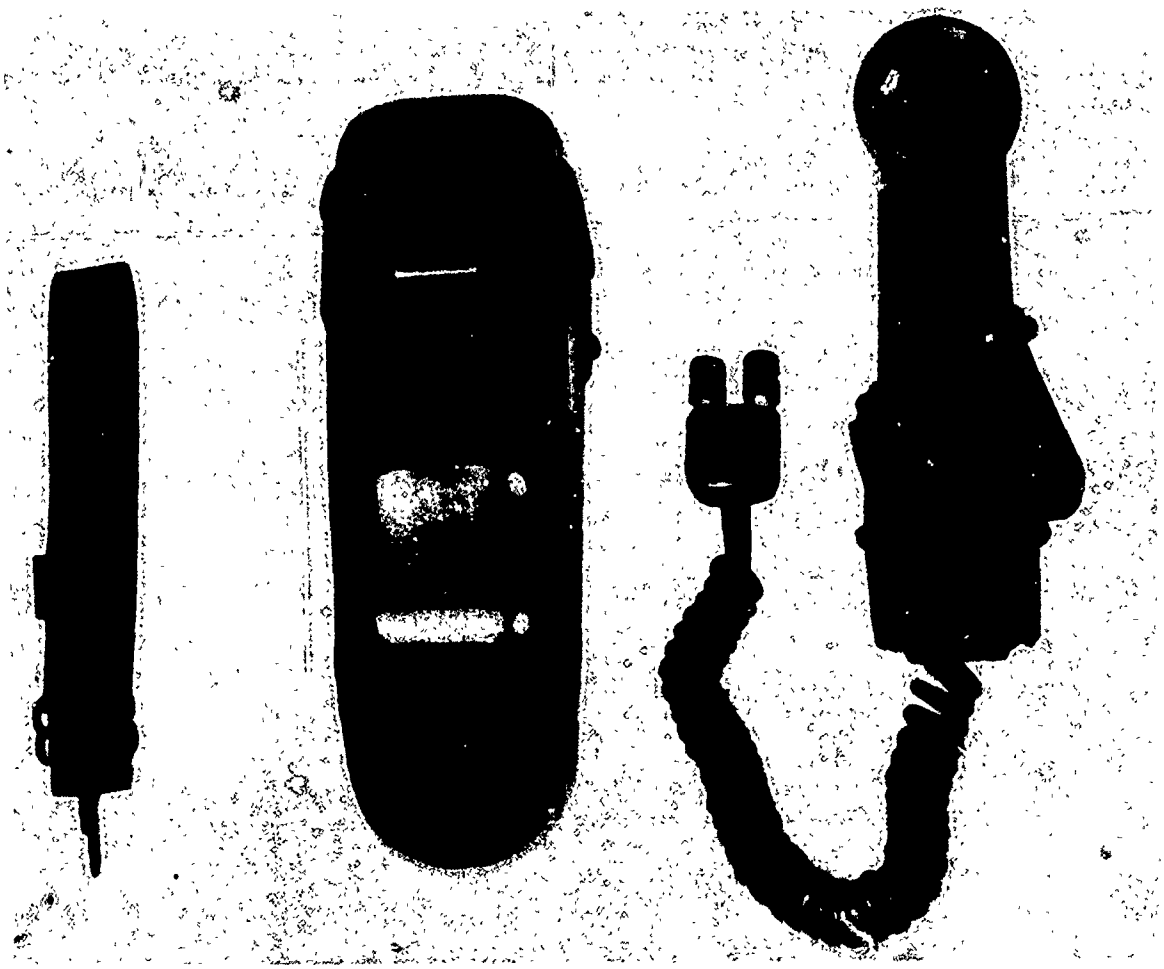


Figure 10-13. Telephone Set TA-1/PT.

10-14. TELEPHONE SET TA-1/PT. (TM 11-5805-243-12)

a. The Telephone Set TA-1 is a complete sound-powered telephone in handset form designed to provide facilities for talking and signalling without using batteries. The weight of the TA-1 is approximately 3.5 pounds. The planning range for the TA-1 for both signalling and talking, using Wire WD-1, is 6.5 to 16 km.

b. The Telephone Set TA-1 provides an audible signal and visual signal. The audible signal can be adjusted in volume from loud to complete silence. The visual signal operates whenever the telephone is signalled regardless of the position of the volume control lever.

c. Telephone Sets TA-1, in addition to those as components of the CE-11 equipment, are organic in the type units as follows:

| | Battalion | | | | | Brigade | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | AM | Mech | Inf | Lt Inf | Abn | AM | Mech | I | A | M |
| Hq & Hq Co | 0 | 0 | 0 | 0 | 0 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| Rifle Co | 25 | 15 | 20 | 15 | 28 | | | | | | | | |
| | | CS 0 | | CS 0 | | | | | | | | | |
| TOTAL | 75 | 45 | 60 | 45 | 84 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |

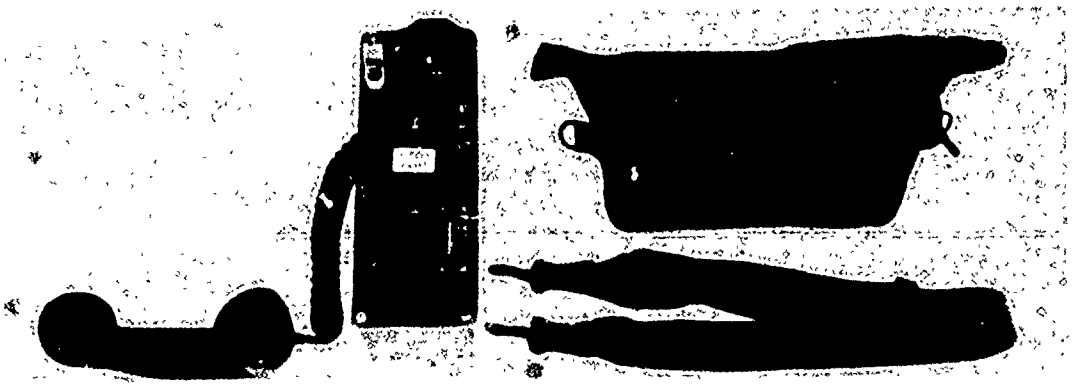


Figure 10-14. Telephone Set TA-312/PT.

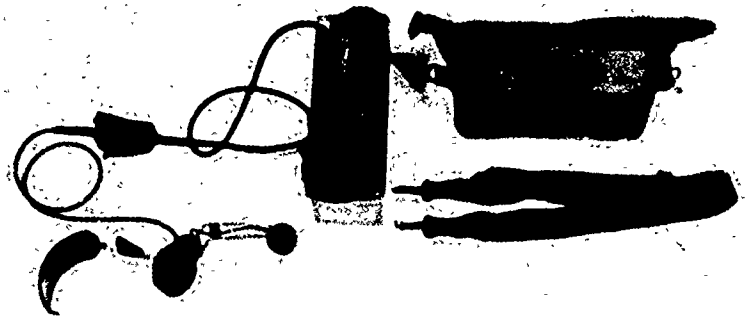


Figure 10-15. Telephone Set TA-312 with Handset-Headset H-144.

10-15. TELEPHONE SET TA-312/PT. (TM 11-2155)

a. Telephone Set TA-312 is a light weight, rugged telephone set designed for field service. It weighs approximately 9.5 pounds. The receiver end of the handset is designed to fit under the steel helmet of the user. A canvas carrying case protects the set, and facilitates handling. The telephone has a talking and signalling range of 22 to 35 km over Field Wire. A volume control has been provided for the incoming buzzer signal.

b. The Telephone Set TA-312 is designed for use on a horizontal surface or it may be mounted vertically on a wall or other support. The carrying case with its strap and flat loops on the bottom is for vertical mounting. When mounted vertically, the telephone must be positioned so the binding posts are at the top. This position facilitates operation of the generator and helps secure the handset when it is not being used.

c. Handset-Headset H-144, can be connected to the Telephone Set TA-312 thus providing hands free operation. The Handset-Headset H-144 is a separate item of equipment and is not included as a component of the TA-312.

d. Telephone Set TA-312 is found in the type units as follows:

| | Battalion | | | | | Brigade | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | AM | Mech | Inf | Lt Inf | Abn | AM | Mech | I | A | M |
| Hq & Hq Co | 55 | 24 | 57 | 24 | 46 | 26 | 36 | 22 | 28 | 26 | 25 | 38 | 23 |
| Rifle Co | 8 | 7 | 5 | 7 | 4 | | | | | | | | |
| | | CS 10 | | CS 9 | | | | | | | | | |
| TOTAL | 79 | 55 | 72 | 54 | 58 | 26 | 36 | 22 | 28 | 26 | 25 | 38 | 23 |

e. Testing of Telephone Set TA-312.

(1) There are four (4) fundamental circuits that require testing prior to installation.

(a) TRANSMITTER (PRIMARY)
(b) RECEIVER (SECONDARY)
(c) OUTGOING SIGNALLING CIRCUIT (GENERATOR)
(d) INCOMING SIGNALLING CIRCUIT (BUZZER)

(2) Local Battery (LB) Test.

(a) Testing of the Transmitter and Receiver circuit.

1. Install batteries in the telephone.
2. Place selector switch in the LB position.
3. Without depressing the press-to-talk switch, blow into the transmitter while listening in the receiver, you should hear nothing. If sidetone is heard, your transmitter and receiver are unserviceable.
4. Depress the press-to-talk switch, blow into the transmitter, you should hear sidetone. If no sidetone is heard, replace batteries and repeat test. If no sidetone is heard T&R are unserviceable.

(b) Testing of the Outgoing Signalling Circuit.

1. Turn hand generator to determine normal drag.
2. Connect telephone under test to a serviceable telephone with a short length of field wire.
3. Turn hand generator of telephone being tested. Buzzer should ring on serviceable telephone. If buzzer fails to ring and hand generator turns hard with a drag, the outgoing signalling circuit (generator) is Shorted. If the hand generator turns free and easy and fails to signal the serviceable instrument, this will indicate that the outgoing signalling circuit is Open.

(c) Testing of the Incoming Signalling Circuit.

Turn hand generator on serviceable telephone, buzzer should ring on telephone being tested. If buzzer does not ring and hand generator turns hard with a drag, the incoming signalling circuit (buzzer) is Shorted. If hand generator turns free and easy and the instrument under test fails to ring, the incoming signalling circuit is Open.

10-16. FIELD EXPEDIENT OPERATION OF TELEPHONE SETS.

a. If it is determined that the transmitter or receiver is defective on the Telephone Set TA-1, it is possible to transmit and receive. If the receiver is used for both transmitting and receiving, do not depress the press-to-talk switch. If the transmitter is used for both transmitting and receiving, it is necessary to depress the press-to-talk switch when transmitting or receiving.

b. It is possible to increase the range of a transmission, when using sound powered telephone sets, by talking louder and more distinctly.

c. If it is determined that the transmitter of the Telephone Set TA-312 is defective or if no batteries are available to furnish transmitting power, it is possible to transmit and receive using the receiver of the telephone. This is possible because the receiver element is constructed in the same manner as the transmitter and receiver elements in the sound powered telephones. It is not possible to use the transmitter of the TA-312 for receiving since it is a carbon granule transmitter and does not operate on the same principle as sound powered elements.



Figure 10-16. Telephone Set TA-264/PT.

10-17. TELEPHONE SET TA-264/PT. (TM 11-2059)

a. Telephone Set TA-264/PT is a portable, battery operated amplifier telephone set designed to provide communications over greater distances than those obtained with ordinary local battery telephone sets.

b. Telephone Set TA-264/PT uses batteries in conjunction with amplifying circuits to give 2-way amplification for long-range wire communications. This telephone cannot be used in a common-battery or common-battery signaling system. It is designed for use with local-battery terminal equipment. The voice transmission planning range of the Telephone Set TA-264/PT, using wire WD-1/TT, is approximately 33 miles (53 km) under wet conditions and 60 miles (96 km) under dry conditions, when using the amplifying circuits, and 12 miles (19 km) under wet conditions and 18 miles (29 km) under dry conditions when not using the amplifying circuits.

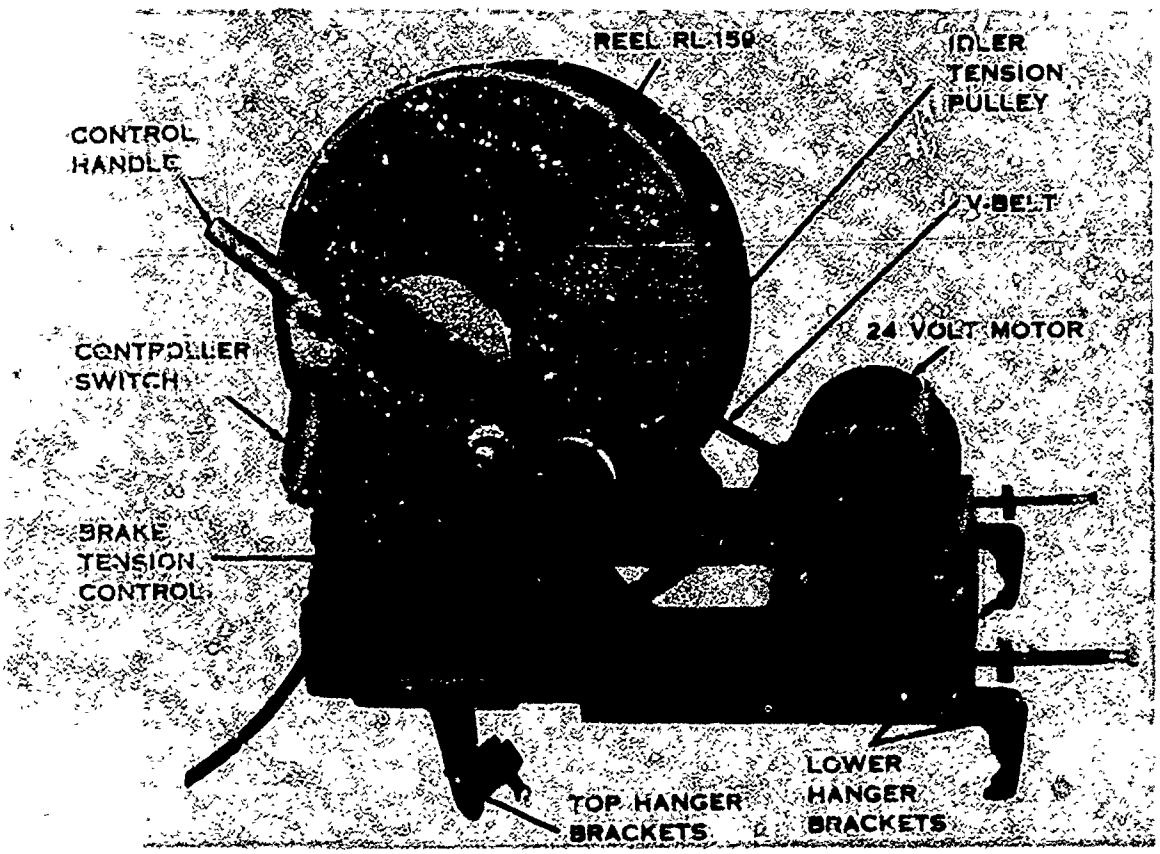



Figure 10-17. Reeling Machine Cable, Motor Driven RL-172( )/G.

10-18. REELING MACHINE CABLE, MOTOR DRIVEN RL-172( )/G. (FM 24-20)

a. Reeling Machine RL-172 ( )/G (figure 10-15) which weighs approximately 100 pounds, is used to pay out and pick up field wire from Wire Reels RL-159( )/U. The reeling machine is normally mounted vertically on the tailgate of a truck. It also may be operated horizontally from the bed of a truck.

b. The reel is driven by a 24-volt dc motor. Power for the motor is provided by the vehicle battery. A handcrank is provided for manual operation.

c. The reeling machine is designed for one-man operation and is provided with controls for starting, stopping, and reversing the direction of rotation of the reels.

d. Wire can be payed out or reeled in from either the back or the front of the reel. The speed of the reel can be controlled and varied from 0 to 300 revolutions per minute (rpm) by using the braking mechanism and varying the pressure on the handle.

e. The RL-172 is organic to the type units as follows:

| | Battalion | | | | | Brigade | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | AM | Mech | Inf | Lt Inf | Abn | AM | Mech | I | A | M |
| Hq & Hq Co | 3 | 0 | 0 | 0 | 1 | 4 | 0 | 0 | 0 | 4 | 6 | 0 | 6 |
| Rifle Co | 0 | 0 | 0 | 0 | 0 | | | | | | | | |
| TOTAL | 3 | 0 | 0 | 0 | 1 | 4 | 0 | 0 | 0 | 4 | 6 | 0 | 6 |

10-19. SWITCHBOARDS.

Switchboards add flexibility to a wire system by providing interconnection of wire lines. Most switchboards provide the facilities for interconnecting voice frequency circuits, i.e., telephone circuits, remote control radio circuits, and voice frequency teletypewriter circuits.

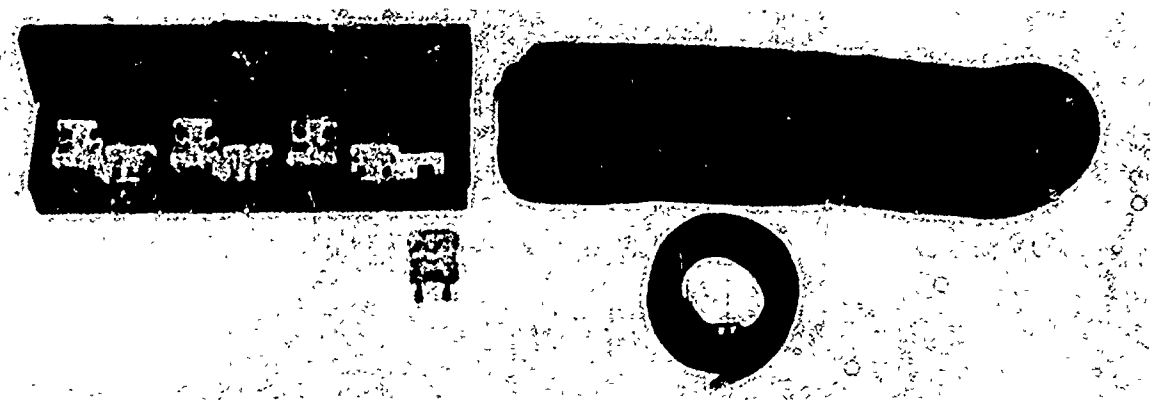


Figure 10-18. Switchboard SB-993/GT.

10-20. SWITCHBOARD SB-993/GT. (TM 11-5805-294-15)

a. The Switchboard SB-993 weighs 2 1/4 pounds and accommodates six field wire lines and the operator's telephone. The operator's telephone is not a part of the switchboard. Either the TA-312 or the TA-1 may be used as an operator's telephone.

b. The Switchboard SB-993 is found in the type units as follows:

| | Battalion | | | | | Brigade | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | AM | Mech | Inf | Lt Inf | Abn | AM | Mech | I | A | M |
| Hq & Hq Co | 2 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rifle Co | 2 | 3 | 1 | 2 | 2 | | | | | | | | |
| TOTAL | 8 | 6 | 5 | 6 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

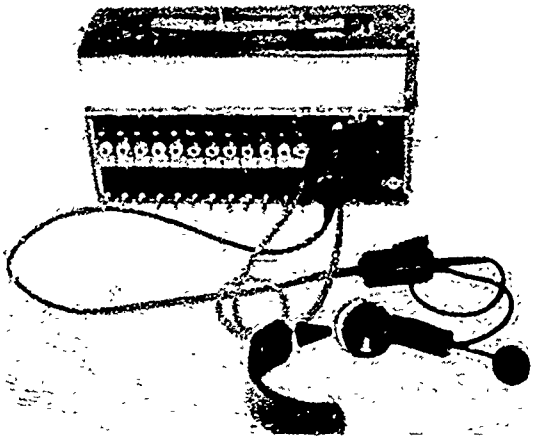


Figure 10-19. Switchboard SB-22/PT.

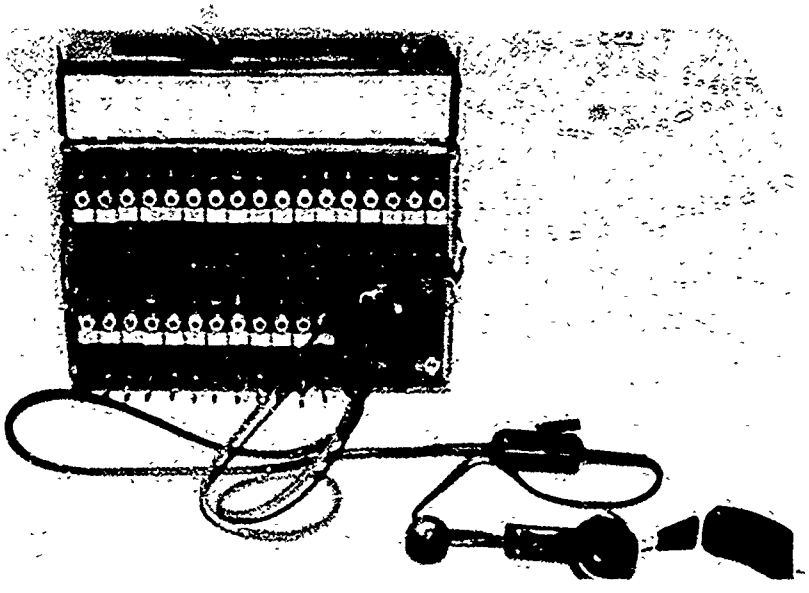


Figure 10-20. Two SB-22's Stacked.

10-21. SWITCHBOARD SB-22/PT. (TM 11-5805-262-12)

a. The Switchboard SB-22 weighs approximately 28 pounds and accommodates 12 field wire lines. In addition to a luminous drop, the switchboard has facilities by which the operator may select either a visible signal (a light) or an audible signal (a buzzer) to alert him of an incoming call. A night light is available for illuminating the switchboard panel at night.

b. Two SB-22's may be stacked together and operated by one operator. In the 2nd switchboard, the operator's pack may be removed and five line packs inserted in its place to provide a total of 29 jacks available on the two boards.

c. The Switchboard SB-22 is found in the type units as follows:

| | Battalion | | | | | Brigade | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | AM | Mech | Inf | Lt Inf | Abn | AM | Mech | I | A | M |
| Hq & Hq Co | 3 | 2 | 3 | 2 | 3 | 2 | 2 | 1 | 4 | 2 | 2 | 2 | 2 |
| Rifle Co | 1 | 0 | 1 | 0 | 1 | | | | | | | | |
| | | CS 1 | | CS 1 | | | | | | | | | |
| TOTAL | 6 | 3 | 6 | 3 | 6 | 2 | 2 | 1 | 4 | 2 | 2 | 2 | 2 |

d. Testing of SB-22.

NOTE: Prior to testing the SB-22:

1. Ground the board.
2. Install the batteries.
3. Connect headset-handset.

(1) Testing of Night Light Circuit.

(a) Pull out nite-light receptacle. (Light should operate)
(b) If light does not operate.

1. Check batteries and battery case contacts, repeat (a) above.
2. Replace bulb, repeat (a) above.

(2) Testing of Transmitter and Receiving Circuit.

(a) Remove operator's plug from operator's jack.
(b) With push-to-talk switch in the OFF position blow into transmitter. No sidetone should be heard.
(c) If sidetone is heard, switch is defective and should be replaced.
(d) Depress switch to ON position #3, blow into transmitter. Sidetone should be heard.
(e) Push switch to ON position #2, blow into transmitter. Sidetone should be heard.
(f) If no sidetone is heard in Tests (d) and (e) above, check batteries, replace if necessary, repeat test. If no sidetone is heard T & R is OUT and headset-handset must be replaced.

(3) Testing of Audio-Visual Switch, Incoming and Outgoing Signalling Circuits.

(a) Operate AUDIO-VISUAL switch to VISUAL position.
(b) Connect serviceable test instrument to first line pack.
(c) Turn generator of test instrument (luminous "DROP" should appear and visual signal should light).
(d) Operate AUDIO-VISUAL switch to AUDIO position (buzzer should sound).
(e) Insert operator's plug into the "JACK" of line pack (drop should restore to BLACK position).
(f) Operate RING-BACK POWER RING FORWARD switch to the RING BACK position and turn generator of SB-22/PT (test instrument should ring).
(g) Connect test instrument to line pack 2, turn generator of test instrument, drop should drop and buzzer should sound.
(h) Repeat test g on each succeeding line pack.

(4) Testing of Line Pack Cords.

NOTE: Do not perform the following test on any unserviceable line pack.

(a) Leave serviceable test instrument connected to the last line pack tested (line pack 12).
(b) Insert operator's plug into jack of line pack one (1).
(c) Insert plug from line pack one (1) into jack of line pack twelve (12).
(d) Turn generator of SB-22. Test instrument should ring.
(e) Repeat test (b), (c), and (d) on each line pack that is not known to be unserviceable.

NOTE: Test instrument must be moved to another serviceable line pack to test the cord on line pack 12.

10-22. SWITCHBOARD SB-86/P. (TM 11-2134)

a. The Switchboard SB-86 is a portable, field type, telephone switchboard which can be rapidly installed or dismantled for quick moves. It can also be used to interconnect voice-frequency teletypewriter circuits.

b. One Jack Field section of 30 Jacks is provided for field telephones or trunks to other switchboards. The SB-86 can be expanded to a 60-line switchboard by stacking a second Jack Field section above the first one. A rotary switch, mounted beneath each jack, provides a selection of common battery or magneto supervision for each circuit. Two of the circuits can be used as trunks to civilian exchange line circuits.

c. Eight cord packs and the operator's pack are mounted in the key shelf section. Each cord pack contains two cord circuits.

d. A power pack is provided to furnish common battery signalling and ringing current. It is encased in a metal box which contains the switches, voltmeter, binding posts, and compartments for two banks of batteries. This switchboard requires the following batteries for operation; four BA-30, and ten BA-200, or it may be powered from any source of 24-volt DC current.

e. The SB-86 weighs approximately 170 pounds with one Jack Field section (30 lines) or 200 pounds with two Jack Field sections (60 lines).

f. The Switchboard SB-86/P is organic in the type units as follows:

| | Battalion | | | | |
|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | AM | Mech |
| Hq & Hq Co | 1 | 0 | 0 | 0 | 0 |
| Rifle Co | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 1 | 0 | 0 | 0 | 0 |

| | Brigade | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|
| Unit | Inf | Lt Inf | Abn | AM | Mech | I | A | M |
| Hq & Hq Co | 2* | 2 | 2 | 0 | 2* | 2* | 1 | 2* |

*As component of Central Office Telephone, Manual AN/MTC-7. (See para 10-30.)

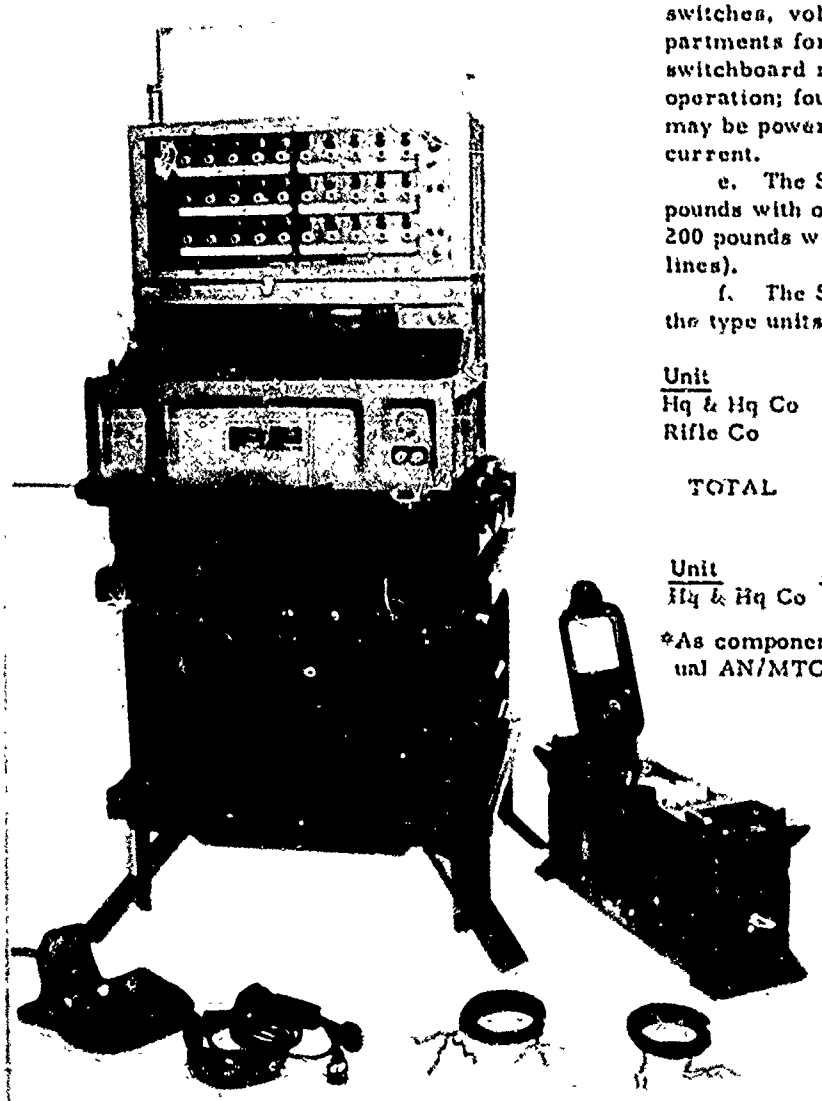


Figure 10-21. Switchboard SB-86/P.

g. Testing of the SB-86.

NOTE: Before beginning the test, be sure that batteries are installed properly in the equipment and that all connections are properly made. (Fig 10-21)

(1) Power Pack PP-990/G.

(a) Move the "EXT - INT BATT" switch to "INT" position. Set "INT SWBD BATT" switch to "LOW" position. Push "BATT CHECK" switch to position #1. Voltmeter should read 20 V to 26.5 V.

(b) If below 20 V, move "INT SWBD BATT" switch to "HI" position. Meter should read between 20 V to 26.5 V.

(c) If reading is still below 20 V, change upper bank of batteries.

(d) Push "BATT CHECK" switch to position #2. Voltmeter should read from 20 V to 30 V.

(e) If meter reads below 20 V, replace lower bank of batteries.

(f) Operate "RING FWD-RING BACK" switch on the operator's pack. The ringing supply indicator lamp should light.

(g) If lamps fail to function, check: (1) Fuses (2) Lamp. Replace defective part.

(2) Operator's Telephone Circuit TA-220/P and Headset-Handset H-91/U.

(a) Connect plug PL-79 to connector U-79U. Then match the flat portions of connector and plug, push in and rotate clockwise until locked.

(b) Operate "BATT-TALK" switch to the "ON" position. Blow into transmitter; sidetone should be heard in the receiver of the operator's telephone.

(c) If no sidetone is heard, replace batteries in the rear of key shelf section.

(d) Blow into transmitter again, if no sidetone is heard, replace Handset-Headset H-91/U.

(3) Hand Ringing Generator G-42/PT.

(a) Set "EXT BATT INT" switch to "EXT" position. Connect a serviceable telephone to line terminals #1. Set selector switch for pair #1 to position "M." Plug a calling cord into #1 line jack.

(b) Operate "TALK LIST CONF" switch for cord being used to "TALK LIST" position. Operate "RING FWD-RING BACK" switch to "RING FWD" position and turn hand crank generator.

(c) Test telephone should ring.

(4) Panel Lamps.

(a) Operate "LAMP SWITCH" to "ON" position. Panel lamp should light.

(b) If lamps do not light, replace BA-30's in jack field section.

(c) If lamps still do not light, one or both bulbs may be burned out, replace as required.

(d) Operate "LAMP SWITCH" to "OFF" position. Lamps should go out.

(5) Line Circuits, Drops, Night Alarm System and Jacks One through Thirty (LOCAL BATTERY).

(a) Set "INT EXT BATT" switch to "INT" position. Set all selector switches to "M" position. Connect serviceable telephones to line terminals #1 and #30. Operate generator on test telephone connected to line terminal pair #1. Drop associated with line jack #1, should rotate to white position.

(b) Move "AUD-VIS" switch to "VIS" position. Panel Lamps should light. Operate to "AUD" position, and night alarm buzzer should sound.

(c) Insert an answering cord into line jack #1. Drop should rotate to black and buzzer should stop.

(d) Operate generator on test phone connected to line terminal pair #30. Drop should rotate to white and buzzer sound, plug in calling cord associated with answering cord already in use. Drop #30 should rotate to black position and buzzer should stop, conversation should be possible between the two telephones. Move the "TALK LIST CONF" switch to the "TALK-LIST" position and conversation should be possible between the operator and the two test telephones.

(e) Operate the "RING FWD-RING BACK" switch to "RING FWD" position and the telephone connected to pair #30 should ring. Move switch to "RING BACK" position and the phone connected to pair #1 should ring. Return "TALK-LIST-CONF" switch to neutral position.

(f) Turn generator on test telephone on line jack #1. Supervisory drop associated with answering cord #1 should rotate to white. Ring off with telephone connected to line jack #30. Action should be same as on #1. Remove answering and calling cords and supervisory drops should rotate to black position.

(6) Repeat steps (c) through (f) above for remaining line jacks by moving test telephones to line terminals 2 and 29, 3 and 28, etc. Use different sets of cords until all cords are checked.

(7) Line signals, Jacks and Conference Circuits One through Thirty. (COMMON BATTERY SIGNAL)

(a) Set selector switches on test telephones to "C B S" position. Set selector switches on SB-86 to "C" position. Connect test telephones to line terminals #1 and #30.

(b) Ring in by lifting handset on telephone connected to line #1. Drop should rotate to white position and buzzer sound. Insert answering cord #1 in jack #1. Drop should rotate to black and buzzer stop.

(c) Ring in with phone connected to line #30 in same manner. Drop #30 should rotate to white position and buzzer should sound. Plug in calling cord from pair #16. Drop should rotate to black position and buzzer stop.

(d) Move "TALK-LIST-CONF" switch for cord pairs #1 and #16 to "CONF" position and conversation should be possible between the two phones. Move "CONF SUPV-TRK-SIG" switch to "CONF SUPV" position. Conversation between the two telephones and the switchboard operator should be possible. Allow the "CONF SUPV" switch to return to neutral position.

(e) Replace handset of test telephone in brackets. Supervisory drop associated with answering cord in use, should rotate to white position. Remove answering and calling cords and return to plug seats. Supervisory drops should rotate to black position.

(f) Continue same test for remaining line jacks by moving test telephone to line terminals 2 and 29, 3 and 28, etc. Use answering cord #2, calling cord #15 with line terminals pairs 2 and 29, etc.

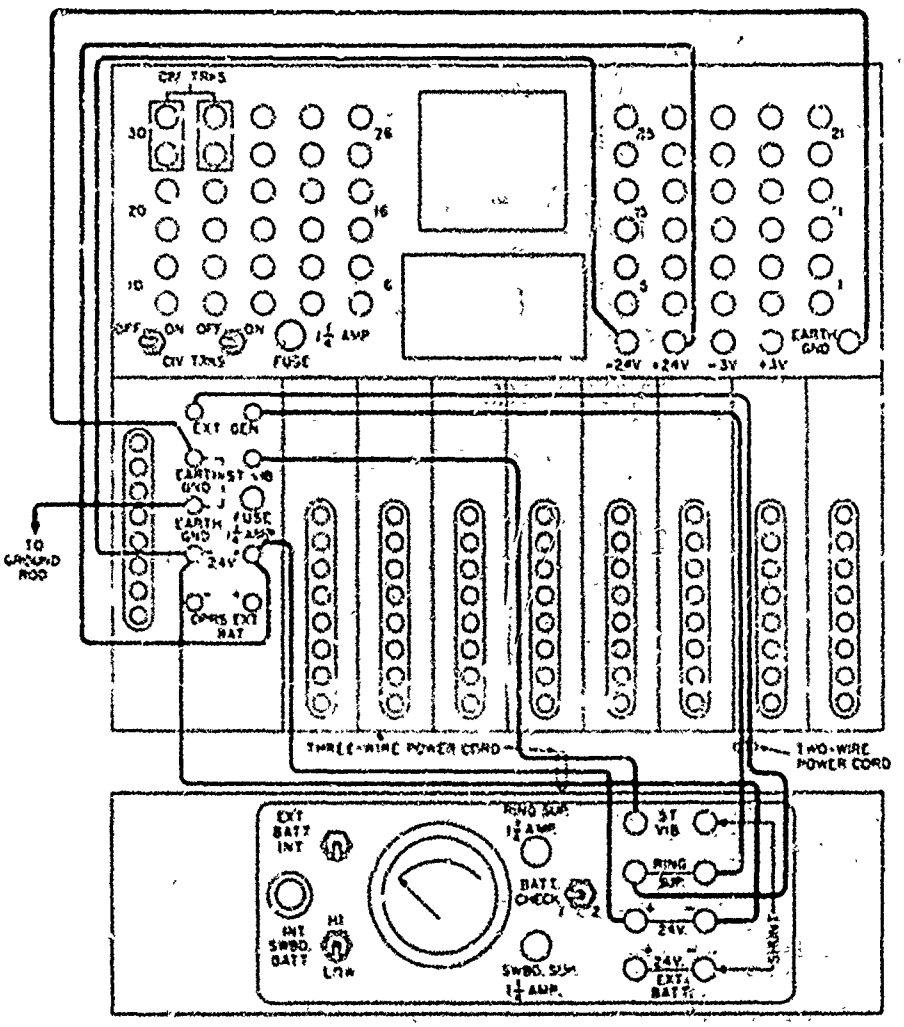



Figure 10-22. Wire Hookup of Switchboard SB-86/P.

(Shown above are the necessary electrical connections required for normal field operation.)

10-23. TELETYPEWRITER EQUIPMENT. (TM 11-655)

a. Shown in Figure 10-24 is the Teletypewriter TT-4A/TG which is a component of the Teletypewriter Set AN/PGC-1. The TT-4A is a lightweight, portable, page-printing sending and receiving teletypewriter set designed for field use.

b. Two AN/PGC-1 are organic to each brigade message center.

c. Its operating speeds are 60, 66, 75 or 100 words per minute and requires 105 to 125 volts ac at 50 to 60 hzps.



Figure 10-23. Teletypewriter Set AN/PGC-1.

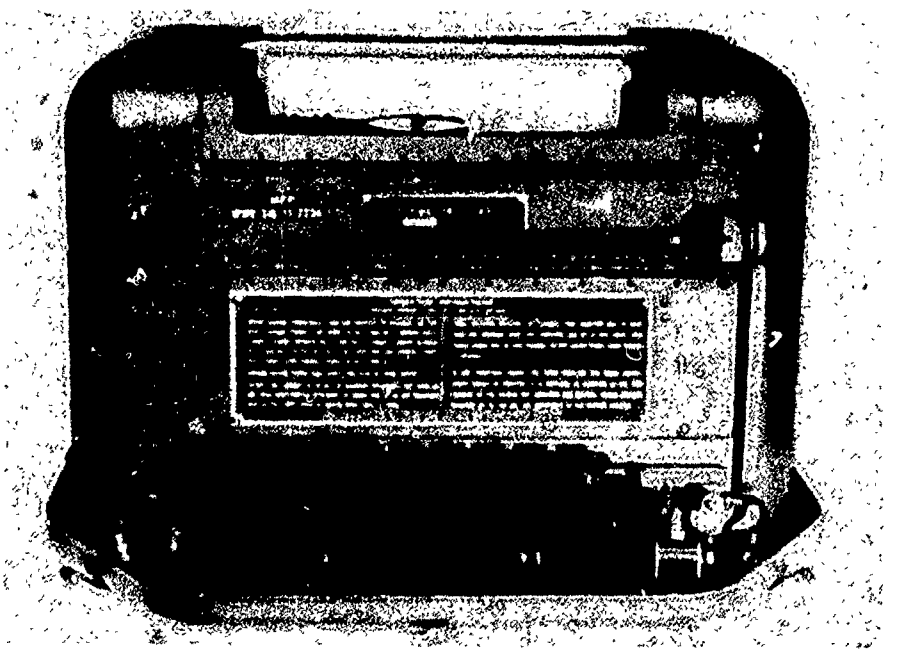


Figure 10-24. Teletypewriter TT-4/TG.

10-24. TELETYPEWRITER SET AN/GGC-3. (TM 11-5815-238-12)

a. The Teletypewriter Set AN/GGC-3 is a lightweight, transportable unit which may be used in either fixed or tactical military teletypewriter stations. It provides facilities for manual transmission direct from keyboard and for tape transmission from the transmitter-distributor. Received messages are printed and perforated on a paper tape for later transmission.

b. Two AN/GGC-3 are organic to each brigade message center.

c. The set includes Teletypewriter Reperforator-Transmitter TT-76/GGC, Teletypewriter Table FN-52/GGC, and a case.

d. Its operating speeds are 60, 66, 75 or 100 words per minute and requires 115 or 230 volts ac at 50 to 60 hzps.

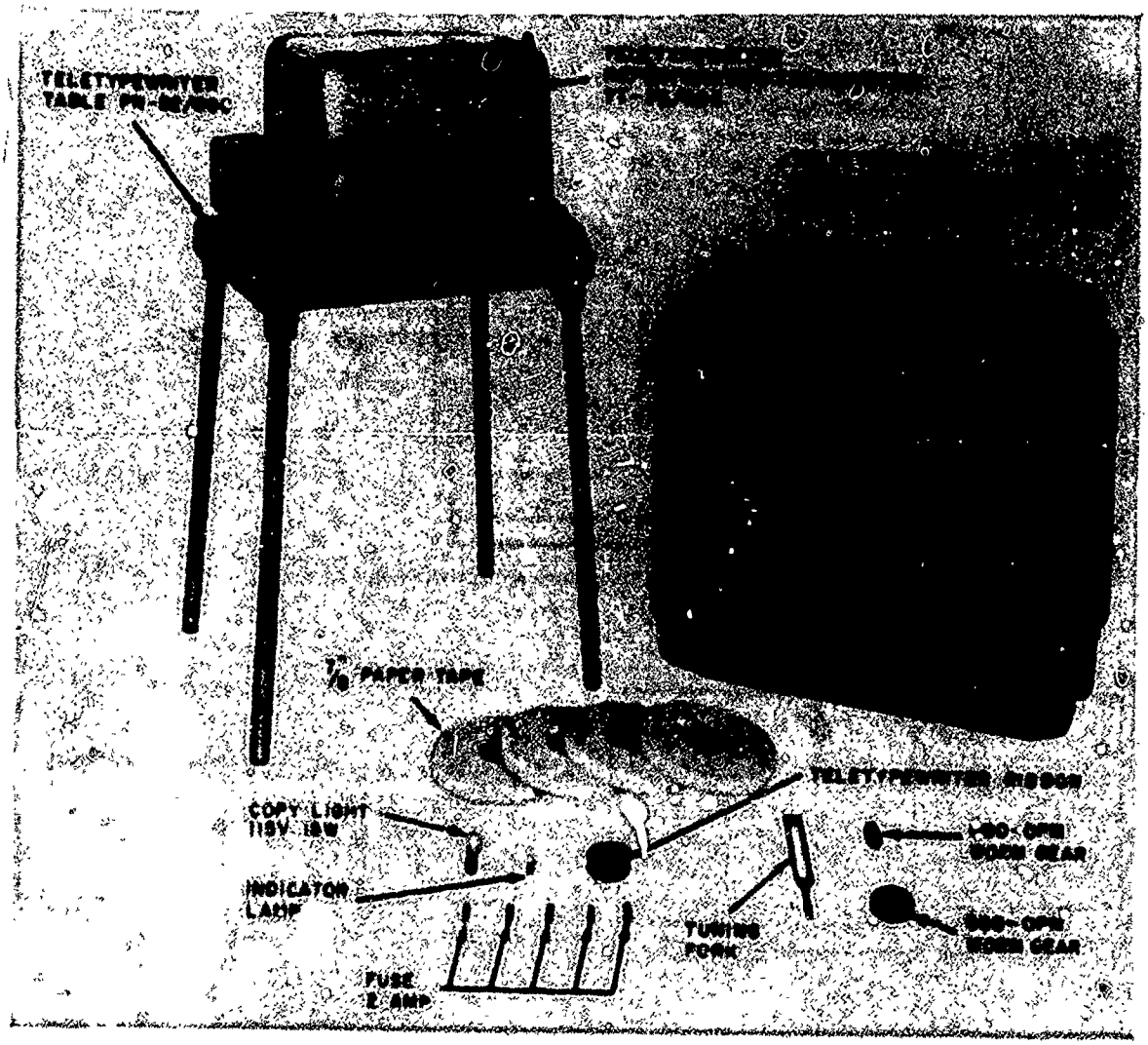



Figure 10-25. Teletypewriter Set AN/GGC-3.

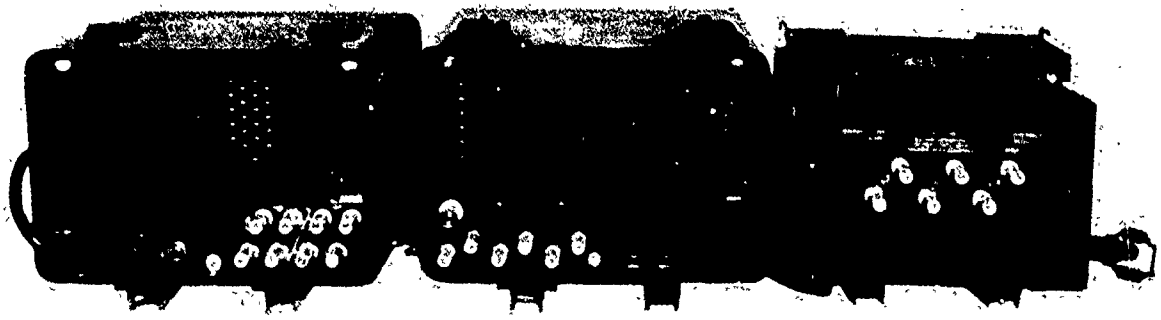
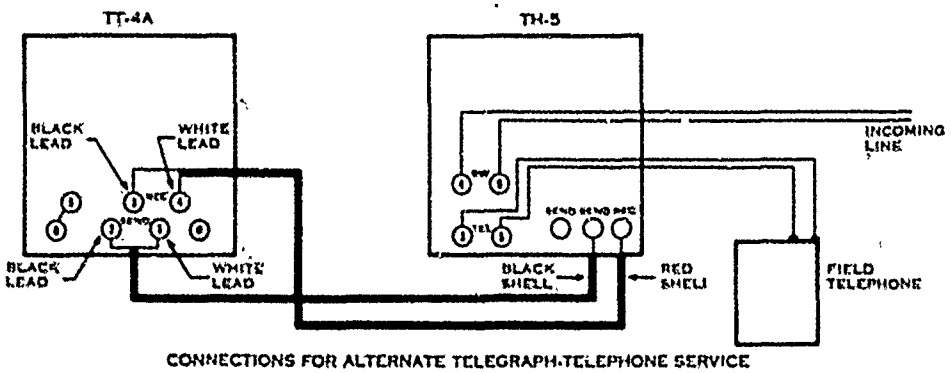


Figure 10-26. Telegraph Terminal Group AN/TCC-14.

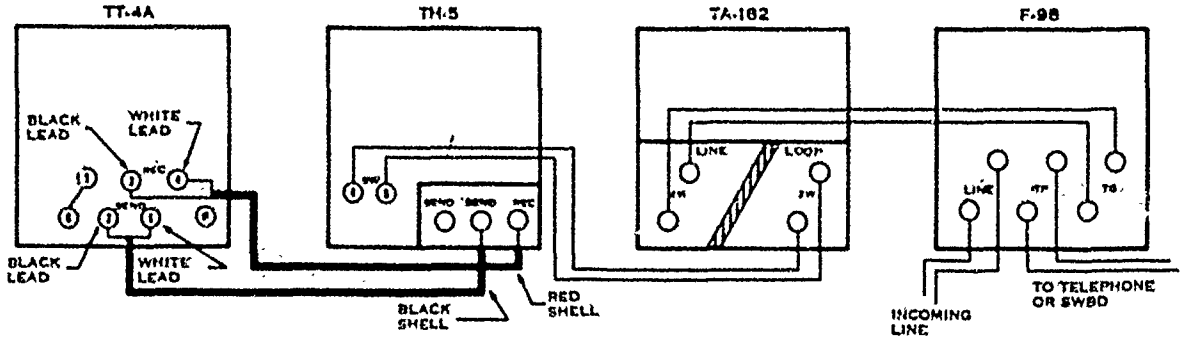
10-25. TELEGRAPH TERMINAL GROUP AN/TCC-14. (TM 11-2239)

a. Telegraph Terminal Group AN/TCC-14 is a combination of three separate components. These components are Telegraph Terminal TH-5, Electrical Filter Assembly F-98, and Telegraph-telephone Signal Converter TA-182. This combination permits simultaneous transmission of telegraph pulses and of speech (voice).

b. Two Telegraph Terminal Group AN/TCC-14 are organic to the brigade message centers. (To be replaced by AN/TCC-29)




CONNECTIONS FOR ALTERNATE TELEGRAPH-TELEPHONE SERVICE




CONNECTIONS FOR SIMULTANEOUS TELEGRAPH-TELEPHONE SERVICE

Figure 10-27. Wire Hookup of Teletypewriter and Terminal Equipment.

10-26. TELEGRAPH-TELEPHONE AN/TCC-29. (TM 11-5805-356-12)

a. Telegraph-Telephone AN/TCC-29 is a combination of three separate components. These components are Terminal, Telegraph TH-22/TG, Converter, Telegraph-Telephone Signal CV-425/U and Filter Assembly, Electrical F-316/U. The AN/TCC-29 permits simultaneous transmission of telegraph pulses and speech, in the voice frequency range. The telegraph signals utilize part of the frequency band used by the telephone channel, while permitting the channel to carry speech.

b. The AN/TCC-29 may be used in point-to-point systems, network systems, switched systems, and remote control radio systems.

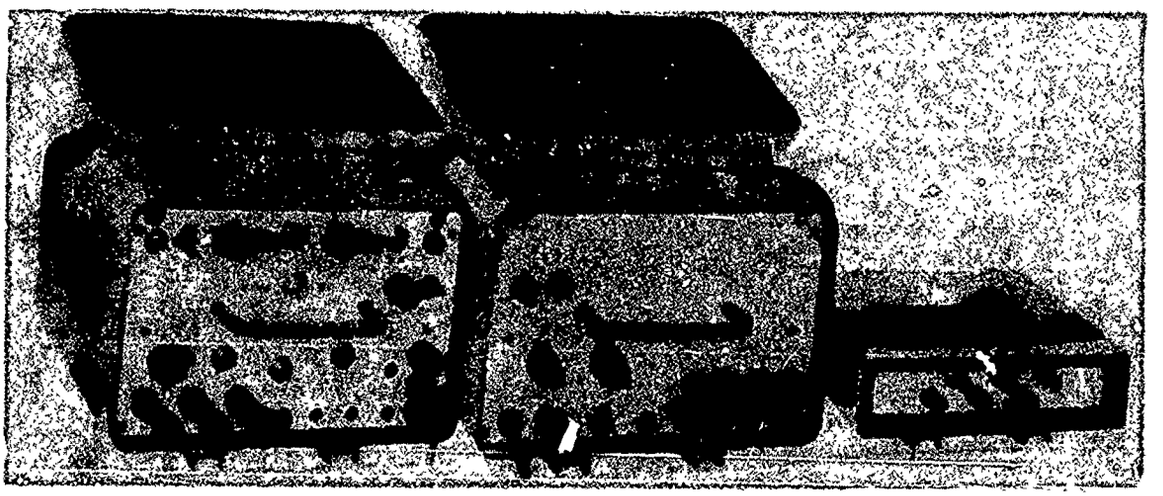


Figure 10-28. Telegraph-Telephone AN/TCC-29.

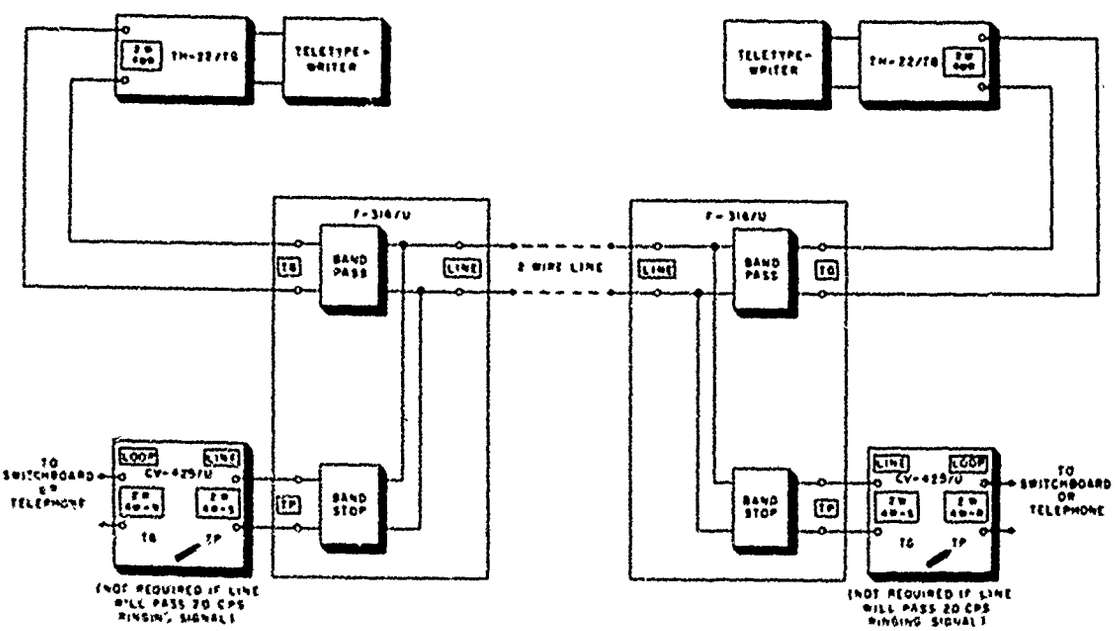
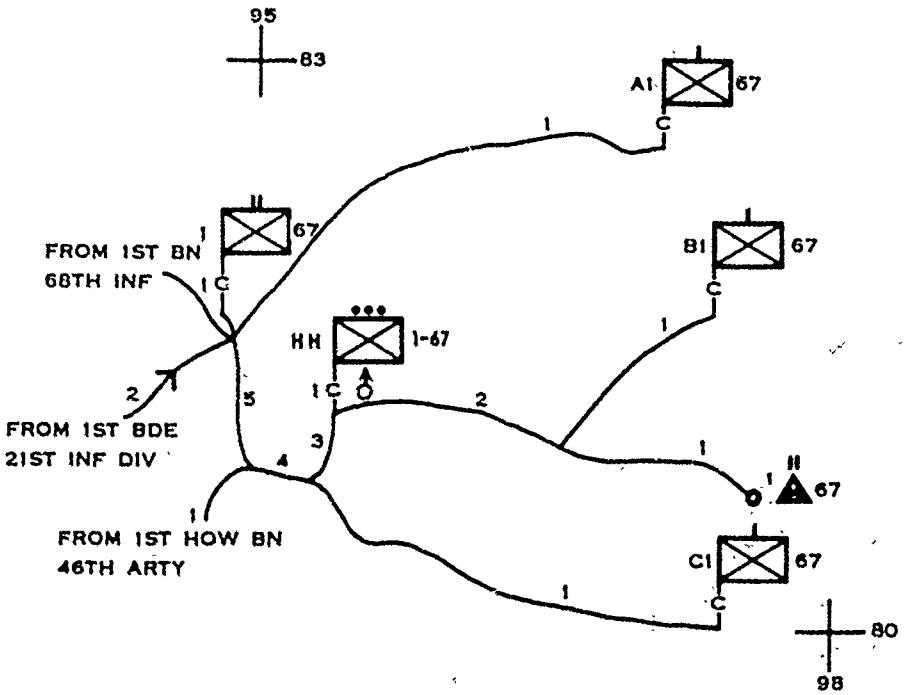



Figure 10-29. Two-Wire Facility, Speech Plus Half-Duplex Service.




FORT BENNING
SHEET 4048 IV SW
GEORGIA 1:25,000

| LINE ROUTE MAP<br>1ST BN 67TH INF<br>AS OF 1800 19 APRIL 70 | | | | |
|---|---|---|---|---|
| ACTION | DATE | SIGNATURE | GRADE | TITLE |
| PREPARED | 19Apr. | W. Pattict | E6 | WIRE FOREMAN |
| CHECKED | 19 Apr. | H. Sullivan | E7 | COMM CHIEF |
| APPROVED | 19 Ap. | J. Hyer | LT | CMD |

LEGEND:

C 1 — COMMAND POST WITH TELEPHONE SWITCHING CENTRAL

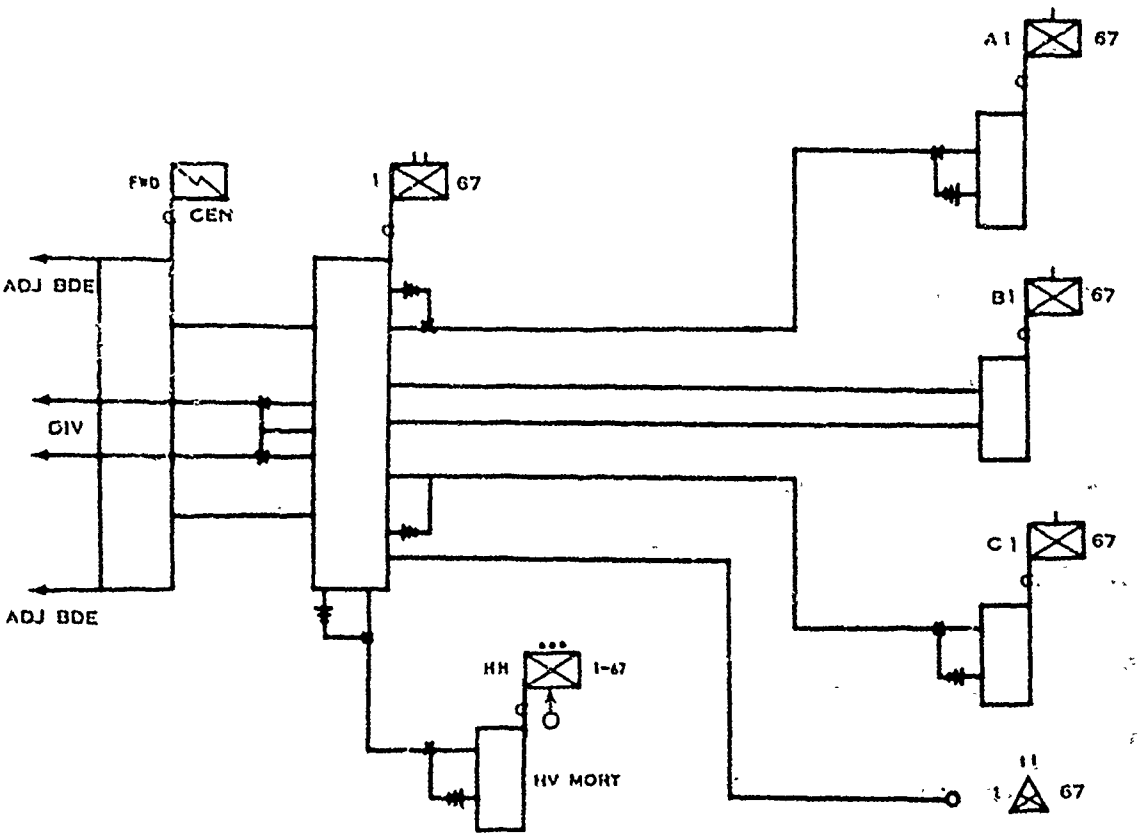
O — TELEPHONE

2 — FIELD WIRE NUMBER INDICATES NUMBER OF LINES

Figure 10-30. Type Line Route Map.

10-27. LINE ROUTE MAP.

A line route map is a map, map substitute, or an overlay, suitably titled on which are shown the actual or projected routes of a wire system.




| CIRCUIT DIAGRAM 1ST BN 67TH INF AS OF 1800 19 APRIL 20 | | | | |
|---|---|---|---|---|
| ACTION | DATE | SIGNATURE | GRADE | TITLE |
| PREPARED | 19 Apr. | W. Porter | AC | Bn Commander |
| CHECKED | 19 Apr. | L. Collins | E7 | Comm Chief |
| APPROVED | 19 Apr. | F. Mays | LT | Bn S3 |

LEGEND:

SWITCHING CENTRAL AT A COMMAND POST

TELEPHONE

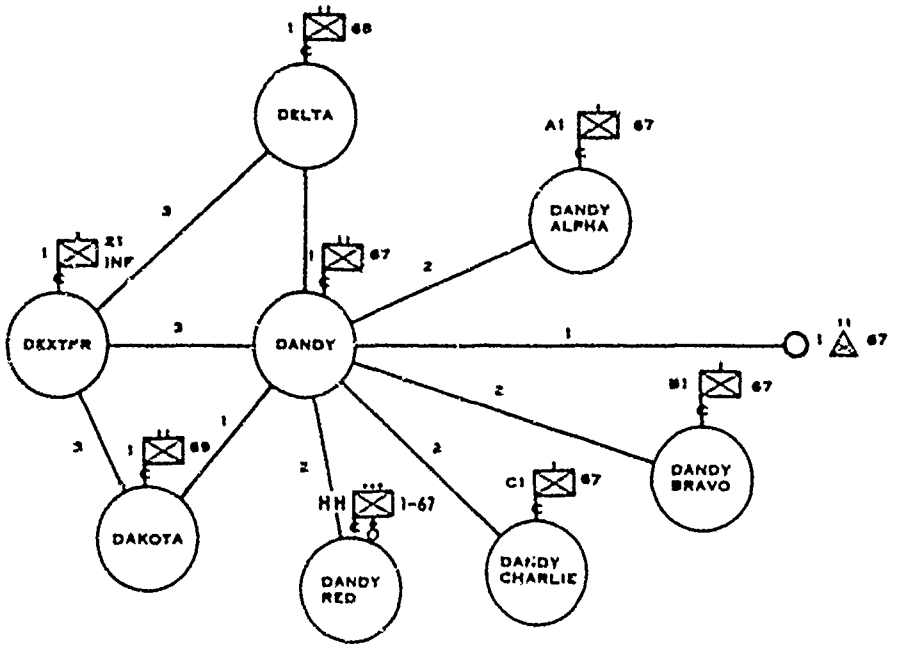
REPEATING COIL IN SIMPLEX CIRCUIT

GROUND

Figure 10-31. Type Circuit Diagram.

10-28. CIRCUIT DIAGRAM.

A tactical circuit diagram is an illustration, in symbol form, of the technical arrangement and connection of a wire system.




| TELEPHONE TRAFFIC DIAGRAM<br>1ST BN 67TH INF<br>AS OF 1800 19 APRIL 70 | | | | |
|---|---|---|---|---|
| ACTION | DATE | SIGNATURE | GRADE | TITLE |
| PREPARED | 19 APR | M. Prather | E 6 | WIRE FOREMAN |
| CHECKED | 19 APR | H. Guthrie | E 7 | COMM CHIEF |
| APPROVED | 19 APR | J. Moya | LT | COMMO |

DANDY — TELEPHONE SWITCHING CENTRAL 1ST BN 67TH INF

3 — NUMBER OF CHANNELS LINKING TELEPHONE TERMINALS

Figure 10-32. Type Telephone Traffic Diagram.

10-29. TRAFFIC DIAGRAM.

A telephone traffic diagram is an illustration showing the number of telephone circuits existing between switching centrals of a wire system, and is used by the switchboard operator to route telephone calls through the wire system.



Figure 10-33. Manual Telephone Control Office AN/MTC-7.

10-30. MANUAL TELEPHONE CENTRAL OFFICE AN/MTC-7. (TM 11-5805-211-15)

a. Manual Telephone Central Office AN/MTC-7 is an air-or-vehicular-transportable telephone central office. It is normally mounted in a 3/4 ton electrical equipment shelter and transported on the bed of a 3/4-ton cargo truck.

b. The AN/MTC-7 contains one Manual Telephone Switchboard SB-86/P and one additional Jack Field section (see para 10-22). This equipment provides facilities for 60 circuits and is used to connect local telephone circuits with trunk circuits (circuits interconnecting switchboards) and to interconnect local telephone circuits.

c. Characteristics of the AN/MTC-7

| | |
|---|---|
| Type of set | Air-or-vehicular-transportable |
| Type of operation | Manual |
| Circuit capacity | 60 |
| Power source | 2 ea 2.5 KW generators in 3/4-ton trailer (PU-322/G) |
| Weight | |
| Assemblages (shelter included) | 1,410 lbs |
| Power unit | 2,300 lbs |

d. The AN/MTC-7 is organic to the following type units:

| Brigade | | | | | | Sep Bde | | |
|---|---|---|---|---|---|---|---|---|
| Inf | Lt Inf | Abn | AM | Mech | | I | A | M |
| 2 | 1 | 0 | 0 | 2 | | 2 | 0 | 2 |

## NOTES

# CHAPTER 11

# GROUND SURVEILLANCE EQUIPMENT

TAB HERE



Figure 11-1. Radar Set AN/PPS-4.

11-1. RADAR SET AN/PPS-4. (TM 11-5840-211-12)

a. The AN/PPS-4 is a lightweight, partially transistorized, portable radar set designed primarily for short range ground surveillance. It uses a 24-volt dc power source.

b. Characteristics and capabilities:

The AN/PPS-4 is capable of searching for, detecting, and locating moving targets such as personnel and vehicles within a radius of approximately 80-8,000 meters. It is also capable of detecting certain stationary features. The AN/PPS-4 utilizes the doppler principle to detect moving targets and information regarding the range, azimuth, and elevation of the targets is shown on the range indicators of the control panel and on the azimuth and elevation dials of the tripod. Target identification is based on the audio tones the operator receives.

c. Technical characteristics:

| | | |
|---|---|---|
| (1) | Range | |
| | (a) Maximum | 8000 meters-large moving target<br>1500 meters-moving personnel |
| | (b) Minimum | 80 meters |
| | (c) Accuracy | ± 25 meters |
| (2) | Type | Noncoherent doppler principle |
| (3) | Type target indications | |
| | (a) Moving | Characteristic audio tones |
| | (b) Large stationary | Deflection of needle on range extension meter |
| (4) | Azimuth | |
| | (a) Coverage | 6,400 mils continuous (3 detents) |
| | (b) Accuracy | ± 10 mils |
| | (c) Sector Scan | 540 mils |
| | (d) Type coverage | Manual only |

(5) Elevation:
- (a) Coverage . . . . . + 350 to -800 mils
- (b) Accuracy . . . . . ± 10 mils

(6) Frequency . . . . . 8,900 - 9,400 MHz

(7) Weight . . . . . Approximately 115 lbs

(8) Power Source . . . . . Battery BB-422/U, Nickel-Cadmium 24-volt dc or Generator Set PU-532/U

d. The AN/PPS-4 is organic to the type units as follows:

| | BATTALION | | | BRIGADE |
|---|---|---|---|---|
| Unit | Inf | Abn | Mech | Air Mobility |
| Hq & Hq Co | 4 | 2 | 4 | 2 |
| Rifle Co | 0 | 0 | 0 | 0 |
| Total | 4 | 2 | 4 | 2 |

## NOTES

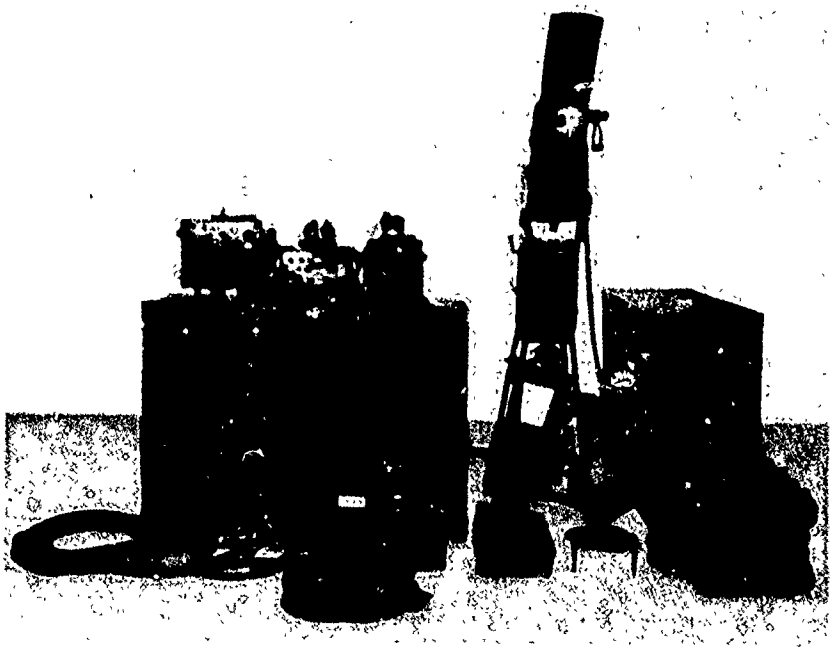


Figure 11-2. Radar Set AN/TPS-33.

11-2. RADAR SET AN/TPS-33. (TM 11-5840-229-15)

a. The Radar Set AN/TPS-33 is a lightweight, man-packed, transportable radar that is designed primarily for medium range ground surveillance. It uses a combination 115-volt ac, 400 cycle and 28-volts dc power source.

b. Characteristics and capabilities:

The set is capable of searching for and detecting moving ground targets, such as personnel and vehicles within a radius of 91 to 18,280 meters. It is also capable of detecting certain stationary features. The AN/TPS-33 utilizes the doppler principle to detect moving targets and depicts range, azimuth, and elevation and the target on a combination of counters, range scales, and meters. In addition, the AN/TPS-33 depicts the target on an "A" scope. Target identification is based on the Audio Tones the operator receives.

c. Technical Data:

| | | |
|---|---|---|
| (1) | Range: | |
| | (a) Maximum | 18,280 meters |
| | (b) Minimum | 91 meters |
| | (c) Accuracy | ± 23 meters or 1 percent of range, whichever is greater |
| (2) | Type | Noncoherent doppler principle |
| (3) | Type target indications: | |
| | (a) Moving | Characteristic audio tone in operator's headset and a characteristic pip on the "A" scope |
| | (b) Stationary | Characteristic pip on the "A" scope. |
| (4) | Azimuth: | |
| | (a) Coverage | 6-6,400 mils continuous |
| | (b) Accuracy | ± 25 mils |
| | (c) Type coverage | Manual or automatic |
| | (d) Sector Scan | 600 - 2,200 mil sectors or continuous 6,400 mil rotation |

(5) Elevation:
  (a) Coverage . . . . . ± 350 mils
  (b) Accuracy . . . . . ± 25 mils
(6) Frequency . . . . . 9,375 MHz fixed ±30 MHz.
(7) Weight w/o carrying case . . . . . 320 lbs
  w/carrying case . . . . . 660 lbs
(8) Power . . . . . 115 volt ac, 400 cycle, single phase and 28 volt dc from Generator Set PU-422/U

d. The AN/TPS-33 is organic to the type units as follows:

| Unit | Inf | Battalion Abn | Mech |
|---|---|---|---|
| Hq & Hq Co | 2 | 0 | 2 |
| Rifle Co | 0 | 0 | 0 |
| | 2 | 0 | 2 |

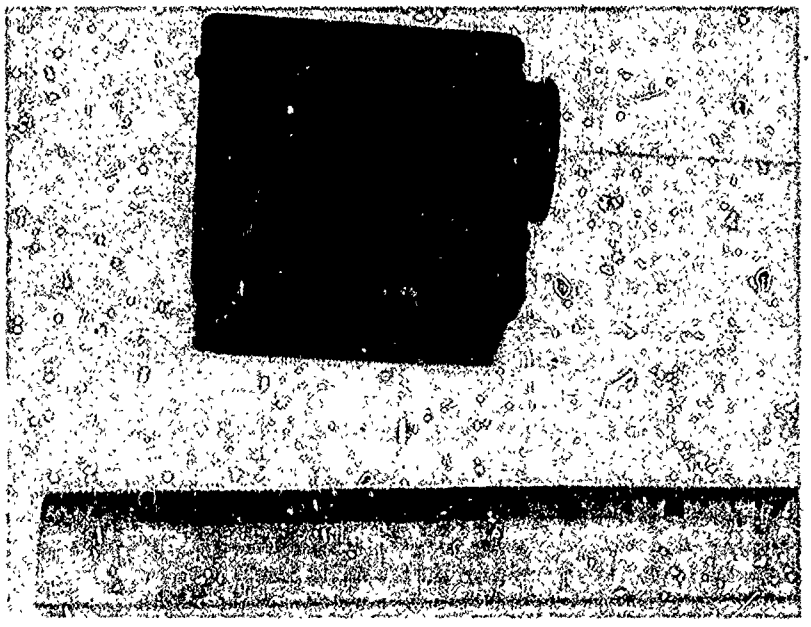


Figure 11-3. Alarm Set Anti Intrusion AN/GSS-9.

11-3. ALARM SET ANTI INTRUSION AN/GSS-9

a. The Alarm Set AN/GSS-9 is designed to be a small, lightweight, expendable, rugged, all weather device to alert sentries of a penetration of a perimeter or sector. The Alarm set employs a fine wire-pair, which when broken, causes the activation of an alarm and the resultant indication of a intrusion into the local security of an area.

b. A small plastic box houses all components of the alarm except the shorting connector. The box contains a receptacle for a plug-in-wire loaded plastic spool holding at least 2,000 yards of fine wire-pair (AWG No 44, 3.5-6.0 ounce tensile strength) which is not intended for recovery or reuse, a receptacle for a BA-30 or BA-2030 battery which provides power for the electrical circuit, and electronic board which mounts the circuitry, control and alarm devices (audio and light) and a test button to check the operation of simulating a break in the wire-pair.

c. The shorting connector, a device consisting of two wing nuts on a metal screw, is used to make a circuit connection in the alarm set.

d. The alram set measures 3.0 inches x 3.5 inches x 1.5 inches and weighs 11 ounces when assembled for operation.



Figure 11-4. Radar Set AN/PPS-5.

11-4. RADAR SET AN/PPS-5. (TM 11-5840-298-12).

a. The Radar Set AN/PPS-5 is a lightweight, man-portable, partially transistorized radar set designed for detection of moving targets at short range. It uses a 6-volt dc power source or it can be converted to operate on a 24-volt dc power source.

b. Characteristics and Capabilities: The set is capable of searching for, detecting, and locating moving ground targets. The radar can be operated from the antenna location or remotely operated up to 50 feet from the antenna. Primary target detection and identification is by an audible tone when a moving target is within the range gate. Visual detection is possible from the remote unit, with an A-scope providing detection in range and a B-scope detection in azimuth. Range is presented by a counter reading in meters. Azimuth and elevation are presented by counters in mils.

c. This set will replace the PPS-4 and the TPS-33.

d. Range:

(1) Maximum . . . . . Moving Vehicles, 10,000 meters
(2) Minimum . . . . . Moving Vehicles, 50 meters
(3) Maximum . . . . . Moving Personnel, 6000 meters
(4) Minimum . . . . . Moving Personnel, 50 meters
(5) Accuracy . . . . . ±20 meters

e. Weight: 98 pounds ( no component exceeding 25 pounds).

f. Status: Type Classified "LP".

# CHAPTER 12

# DEVELOPMENTAL EQUIPMENT

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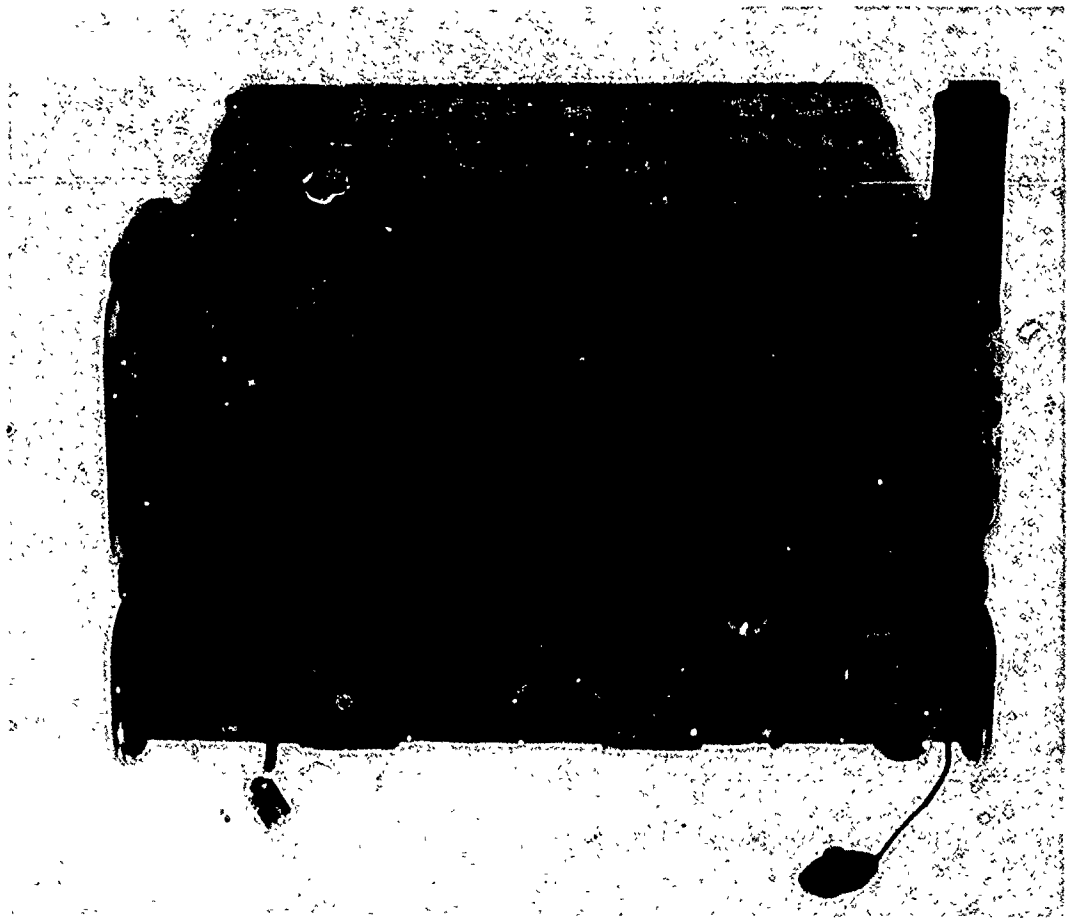


Figure 12-1. AN/PRC-25 with Radio Amplifier AM-4306/GRC.

12-1. RADIO AMPLIFIER AM-4306/GRC.

a. Radio Amplifier AM-4306/GRC is a lightweight, solid state, transmitter amplifier, similar in size to the receiver-transmitter (RT) unit of the AN/PRC-25 (RT-505/PRC) and AN/PRC-77 (RT-841/PRC-77) and includes a battery case.

b. The AM-4306/GRC is designed to increase the operating range of the AN/PRC-25 or AN/PRC-77 comparable to that of the AN/VRC-12 series of radio sets. This added range will enable the company commander to operate over terrain that restricts his vehicle with its radio and still maintain communications with higher headquarters.

c. For manpack use, the AM-4306/GRC is clamped to either RT unit on a modified pack harness. For vehicular operation, it is clamped to either RT unit and a modified Amplifier-Power Supply Group OA-3633/GRC (modified AN/VRC-53 plus AM/4306/GRC).

d. The frequency coverage remains 30 to 75.95 MHz. Transmitting power output is 2 watts (power only from RT unit) or 25 watts (power from AM-4306/GRC). The operating power requirement is 24 VDC supplied by a 24 volt dry cell battery in manpck operation or a 24 volt vehicular battery (power applied thru modified OA-3633/GRC) when operating from a vehicle. The weight of the manpack version is approximately 36 pounds including the radio set.

STATUS: Type Classified "Limited Production" and being service tested with the AN/PRC-77 and applicable voice security equipment. Expected date of distribution is during 3d QTR FY-68.

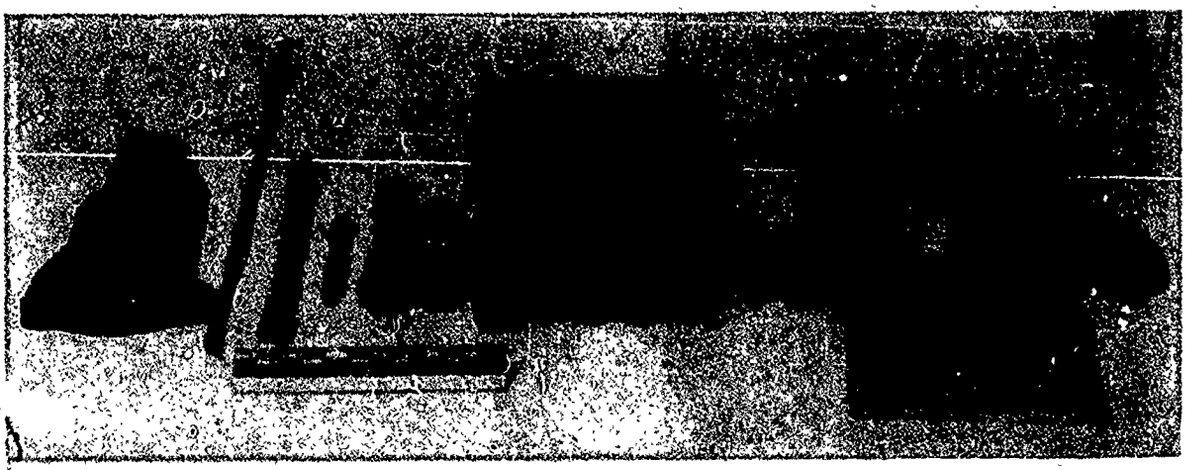


Figure 12-2. Radio Set AN/PRC-77.

12-2. RADIO SET AN/PRC-77( ).

a. Radio Set AN/PRC-77( ) is a lightweight, manpack, portable, solid state, frequency modulated (FM) Receiver-Transmitter Radio (RT-841/PRC) used to provide two-way voice communications.

b. The AN/PRC-77 is a product improvement of Radio Set AN/PRC-25 to permit reliable operation with Radio Amplifier AM-4306/GRC and related security equipment. This radio set has an X-mode interface facility for secure voice communications and its complete solid state design provides longer battery life.

c. Basic components:

Receiver-Transmitter RT-841/PRC
Antenna AT-892/PRC-25 (short)
Antenna AT-271A/PRC (long)
Antenna Support AB-591/PRC-25
Dry Battery BA-386/PRC-25
Handset H-189/GR
Cotton Duck Bag CW-503/PRC-25
Electrical Equipment Harness ST-138/PRC-25

d. Operational Capabilities - same as Radio Set AN/PRC-25 (Page 3-14, para 3-15d) plus secure voice communications.

12-3. CHARACTERISTICS OF THE AN/PRC-77 - Same as Radio Set AN/PRC-25 (Page 3-15, para 3-16) except the Battery Life will approximate 30 hours and the weight of the Receiver-Transmitter (RT-841/PRC) will be reduced to about 14 pounds (less battery).

STATUS: The AN/PRC-77 will replace Radio Set AN/PRC-25 on an attrition basis. No additional contracts for production of the AN/PRC-25 will be awarded; however production and delivery of AN/PRC-25s under existing contracts will continue and those in the field will remain in service. The AN/PRC-77 is Type Classified "Limited Production" and is being service tested with Radio Amplifier AM-4306/GRC and applicable secure equipment.

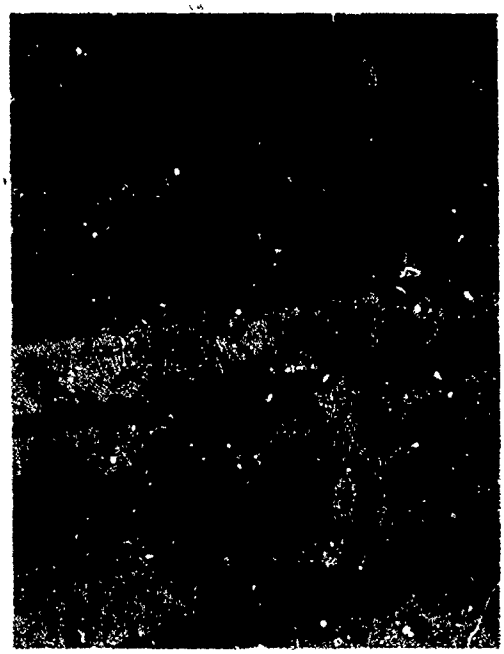


Figure 12-3. AN/GRT-13 Rigged for Air-Drop.

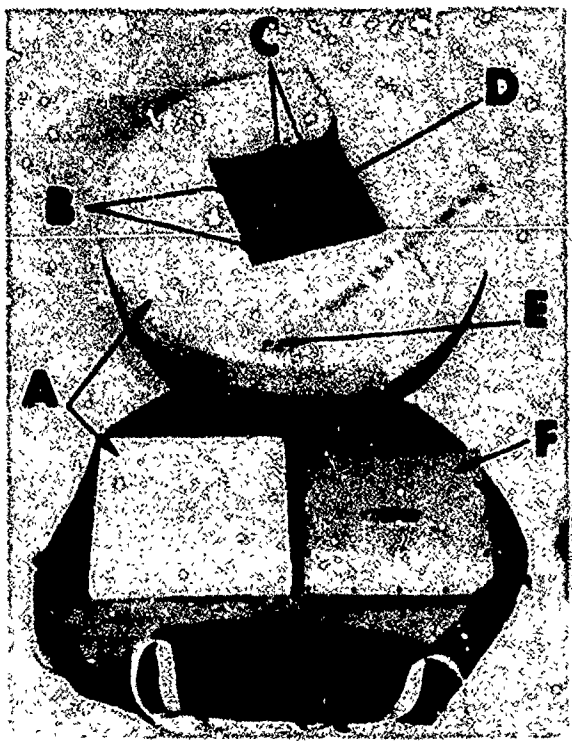



Figure 12-4. AN/GRT-13 Internal View.

A. Protective plastic foam
B. Battery connecting wires
C. Battery and transmitting housings
D. Transmitter
E. Activation pin and lanyard
F. Metal top for battery and transmitting housing

12-4. RADIO TRANSMITTING SET AN/GRT-13. (TM 11-5820-608-15 to be published)

a. Radio Transmitting Set AN/GRT-13 is an electronic site marking device used to facilitate locating air-dropped bundles. It consists of a transmitter with an integral antenna and power supply. The AN/GRT-13 emits a frequency-modulated (FM) tone that may be received and tracked by personnel using Radio Sets AN/PRC-25 and/or AN/PRC-10 equipped with the homing antenna AT-784/PRC.

b. Employment. The AN/GRT-13 is attached to an air-drop bundle or associated parachute. A timer, activated by a chord attached to the aircraft static line, turns on the transmitter approximately 45 seconds after the bundle leaves the aircraft. The transmitter emits the omnidirectional signal which is keyed 6 seconds on and 4 seconds off. When recovered, the locating personnel turn off the transmitter and then return the AN/GRT-13 for reuse in subsequent air drops.

c. The AN/GRT-13 is a crystal controlled set capable of operating over 50 preselected channels within the frequency range of 45 to 54.8 MHz. It uses a BA-386/PRC (AN/PRC-25 battery) and has a power output of 12 watts tapering off to 4 watts after operating for 2 hours.

STATUS: Type Classified "Limited Production" (LP). Expected fielding date is November 1969.

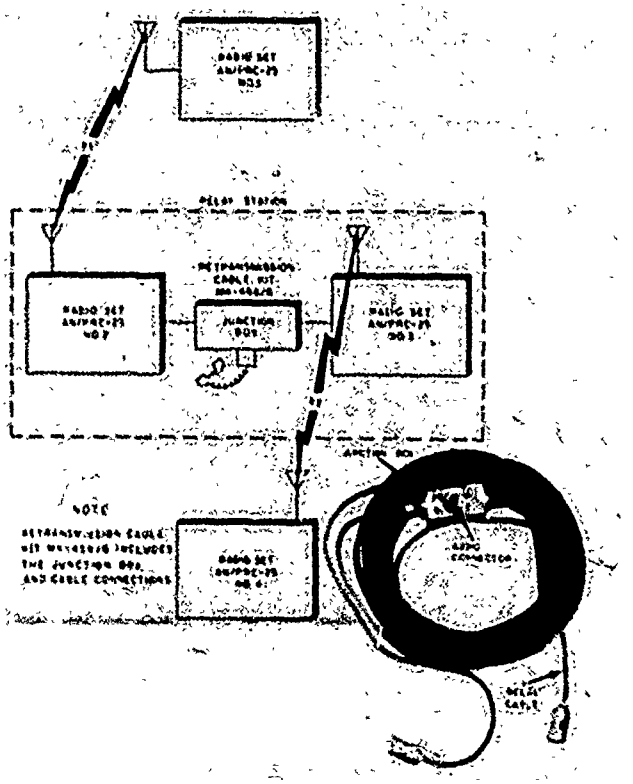


Figure 12-5. Retransmission Cable Kit MK-456/G.

12-5. RETRANSMISSION CABLE KIT MK-456/G. (TM 11-5820-398-10)

a. The Retransmission Cable Kit MK-456/G, not a component of a radio set, is used to connect two AN/PRC-25 radios for automatic relay operation. The cable is 5.5 meters in length with a five pin connector at each end and a junction box in the center. The junction box has a connector for a handset to allow monitoring of the retransmission signals.

b. The two radio sets at the relay station must be tuned to two different frequencies. These frequencies must be at least 3 megahertz apart and must be selected so that the transmitters and receivers of the two radios do not interfere with each other as shown on retransmission interference chart in the Operators Manual for the AN/PRC-25. The function switch must be set in the RETRANS position on both radios at the relay site.

STATUS: The original cable kits were found to be defective when subjected to field use. During second quarter FY-68, an improved MK-456/G was accepted and a production contract was awarded. Production is scheduled to begin 3d Quarter FY-68 and the kits should be available through normal supply channels prior to the end of FY-68.

12.6. LIGHTWEIGHT SPEAKER LS-549/PRC

The Lightweight Speaker LS-549 when used in conjuction with the Radio Sets AN/PRC-25, AN/PRC-74B and AN/PRC-77 provides a lightweight, hands-free monitoring capability by the operator or those in the vicinity of the unit. A phone jack and earphone are provided for silent monitoring and multiple mounting clips provide maximum flexibility in choice of field configuration.

Status: Contract has been awarded Delco Division and initial deliveries have been made to USARV.

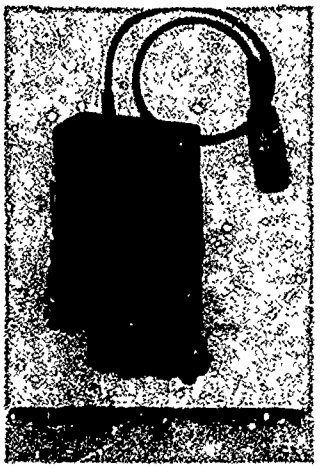


Figure 12-6. LS-549/PRC

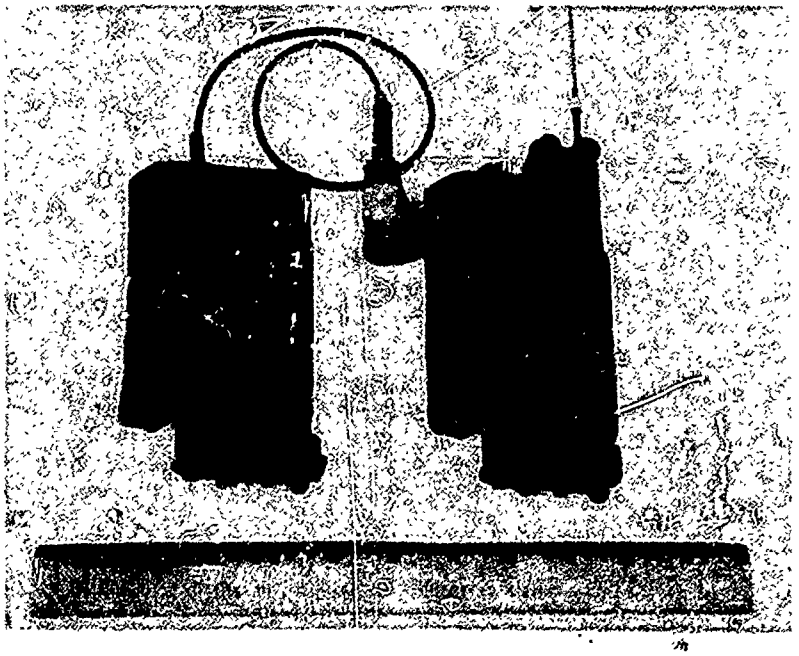


Figure 12-7. Comparison of LS-549/PRC and AN/PRR-9

# CHAPTER 13

# COMMUNICATIONS

# INFANTRY BATTALION AND BRIGADE

| | TOE |
|---|---|
| HHC BDE | 7-42G |
| Battalion | 7-15G |
| HHC Bn | 7-16G |
| Rifle Co | 7-18G |

TAB HERE

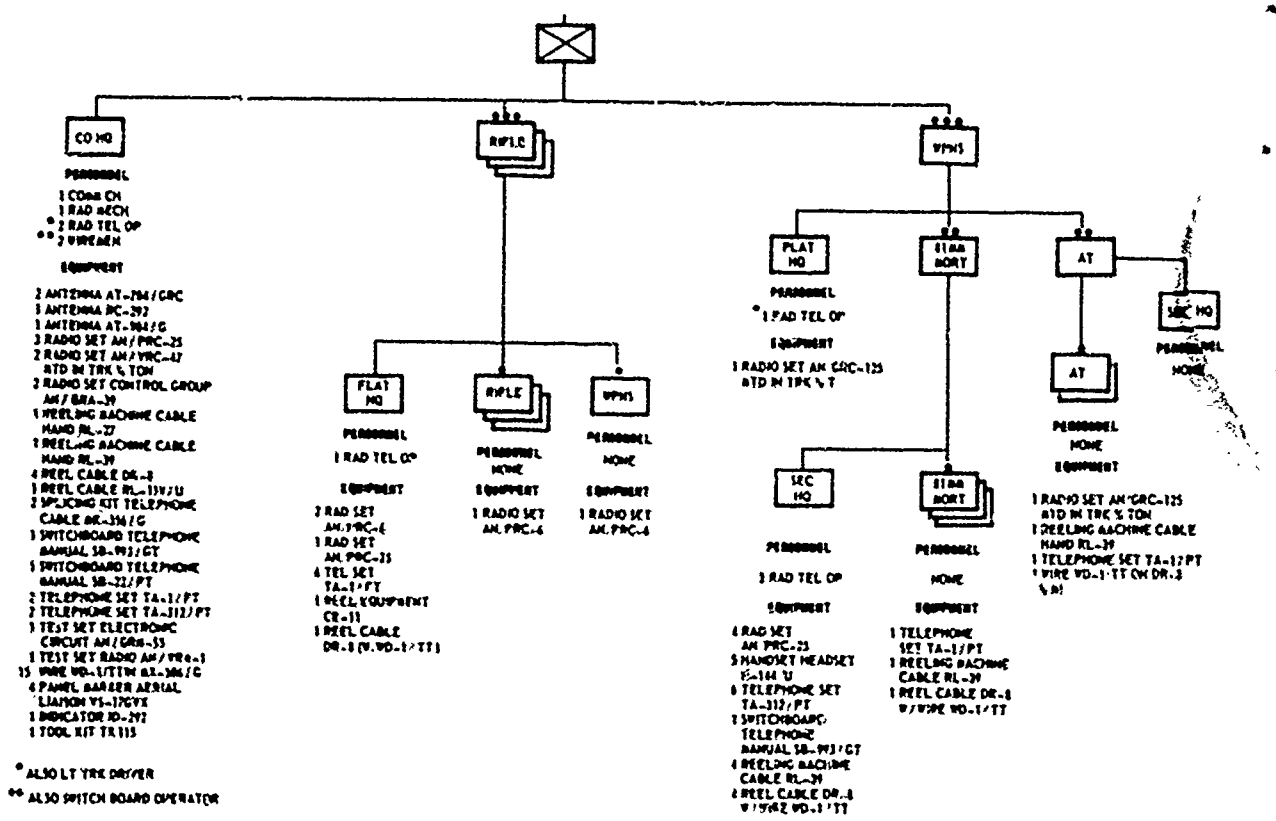



Figure 13-1. Communication Personnel and Equipment, Rifle Company, Infantry Battalion.

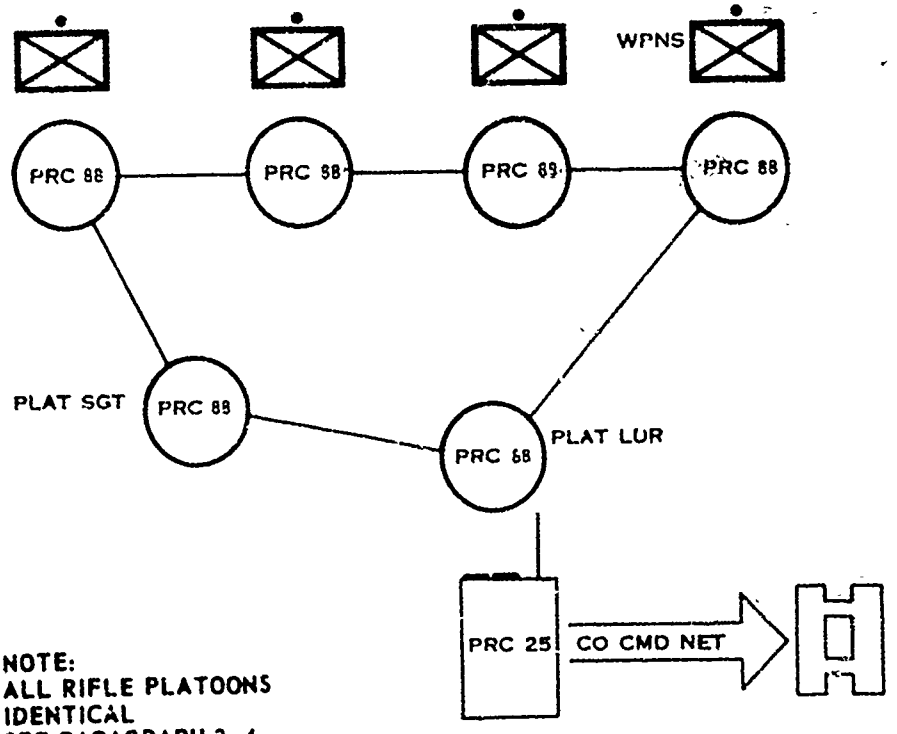



Figure 13-2. Type Rifle Platoon Command Net, Infantry Rifle Company.

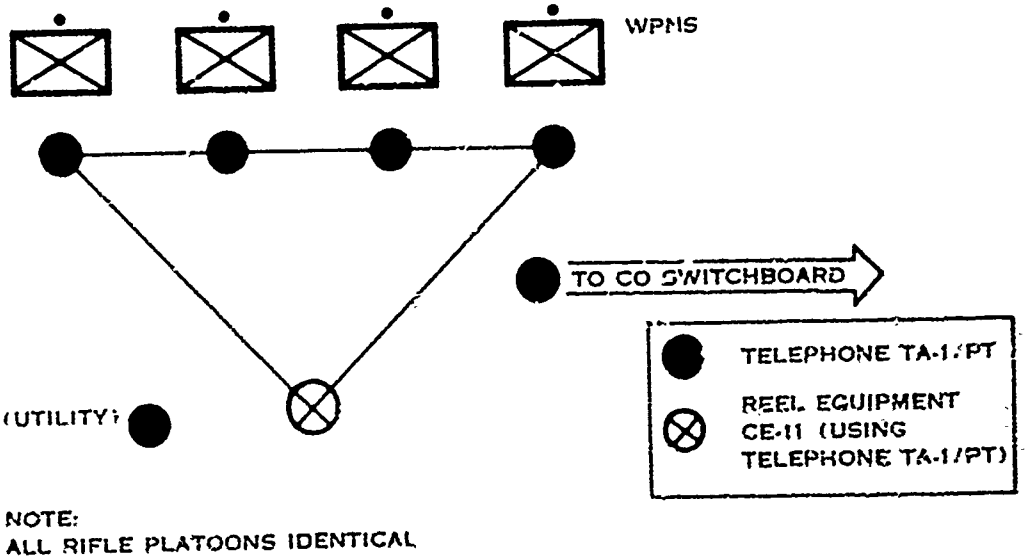
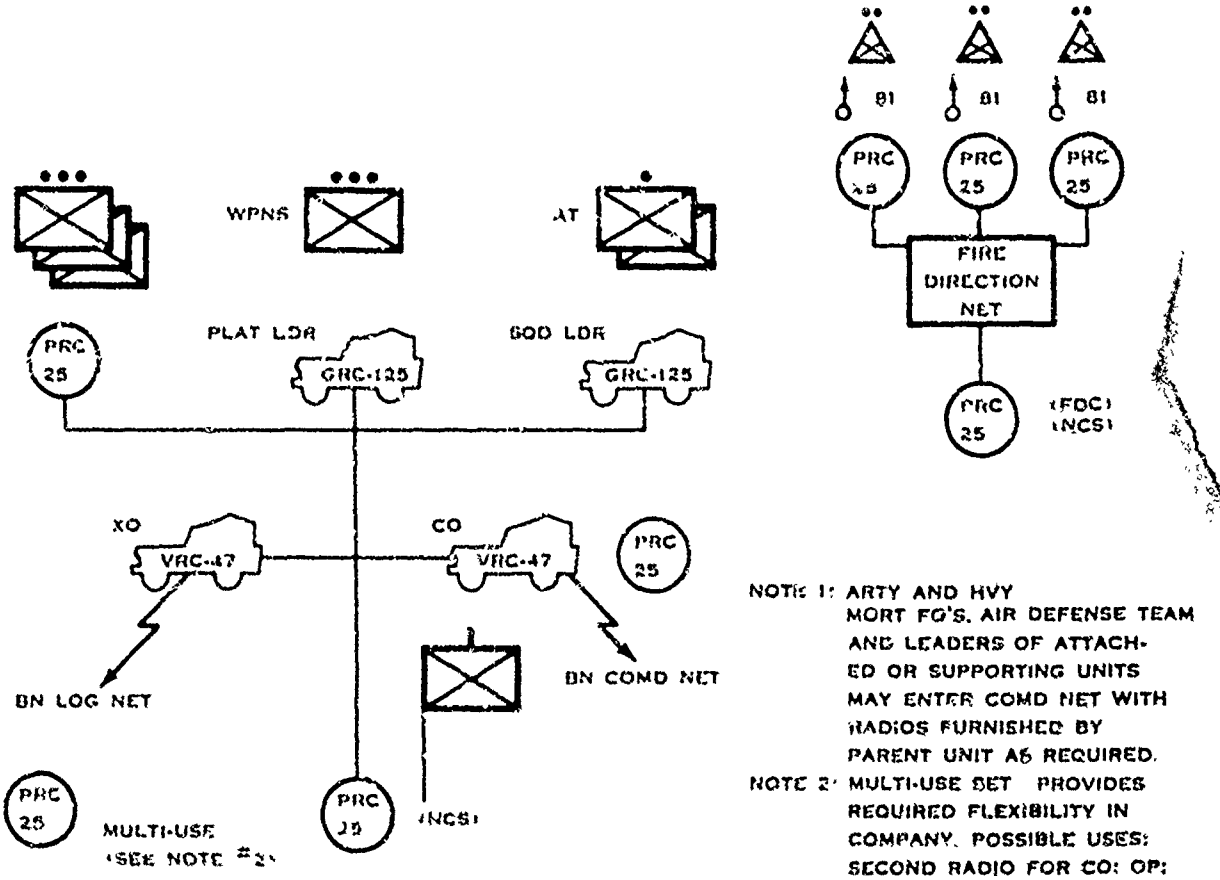



Figure 13-3. Type Rifle Platoon Wire System, Infantry Rifle Company.




NOTE 1: ARTY AND HVY MORT FO'S, AIR DEFENSE TEAM AND LEADERS OF ATTACHED OR SUPPORTING UNITS MAY ENTER COMD NET WITH RADIOS FURNISHED BY PARENT UNIT AS REQUIRED.

NOTE 2: MULTI-USE SET PROVIDES REQUIRED FLEXIBILITY IN COMPANY. POSSIBLE USES: SECOND RADIO FOR CO: OP: PATROLS: ROAD BLOCKS: CHECK POINTS: COPL: MAINTENANCE REPLACEMENT.

Figure 13-4. Type Radio Nets, Rifle Company, Infantry Battalion.

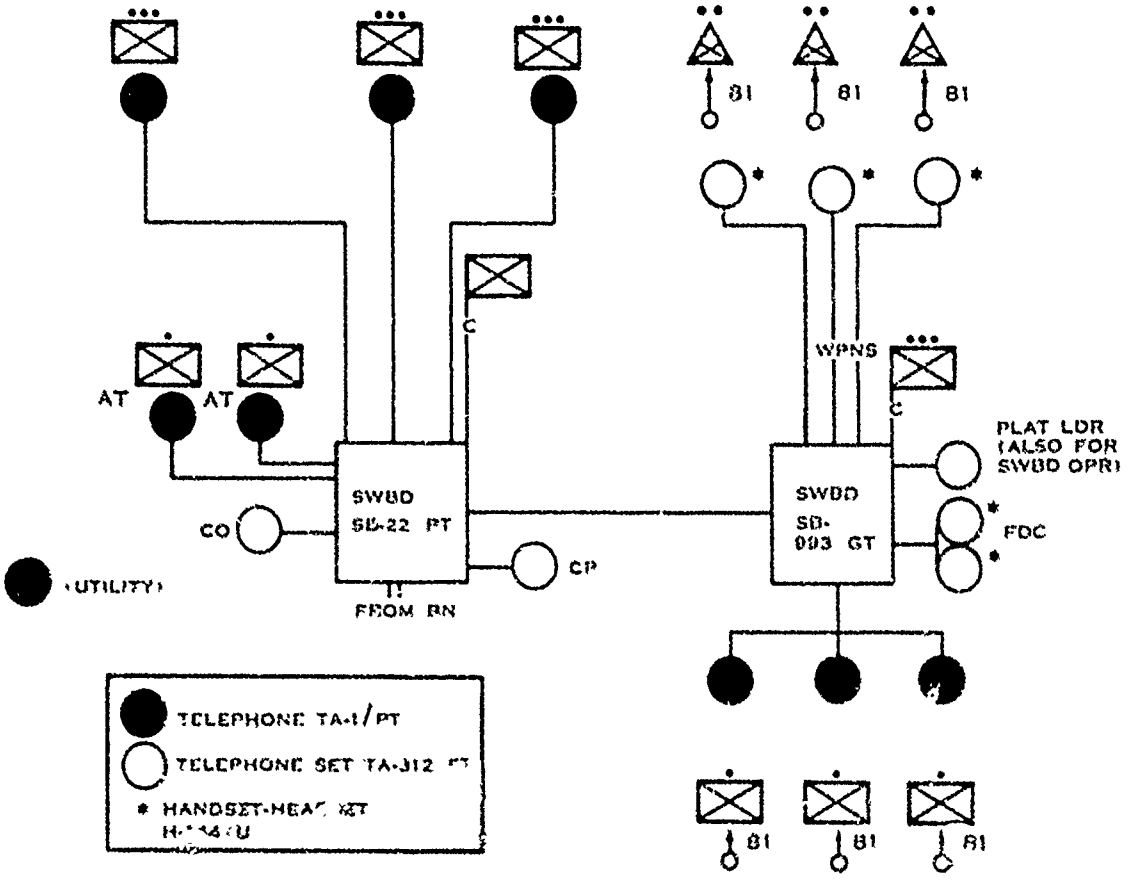



Figure 13-5. Type Wire System, Rifle Company, Infantry Battalion.

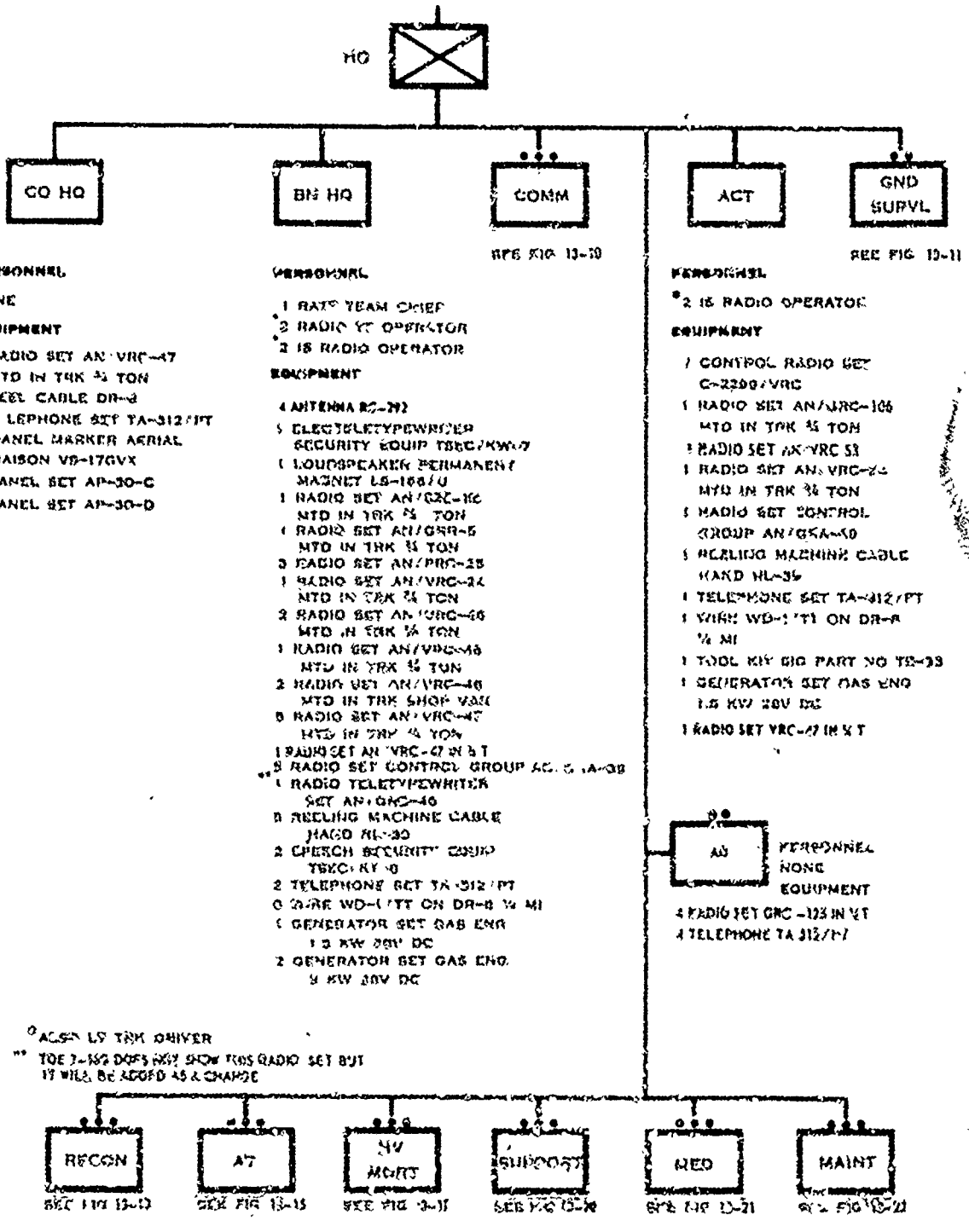
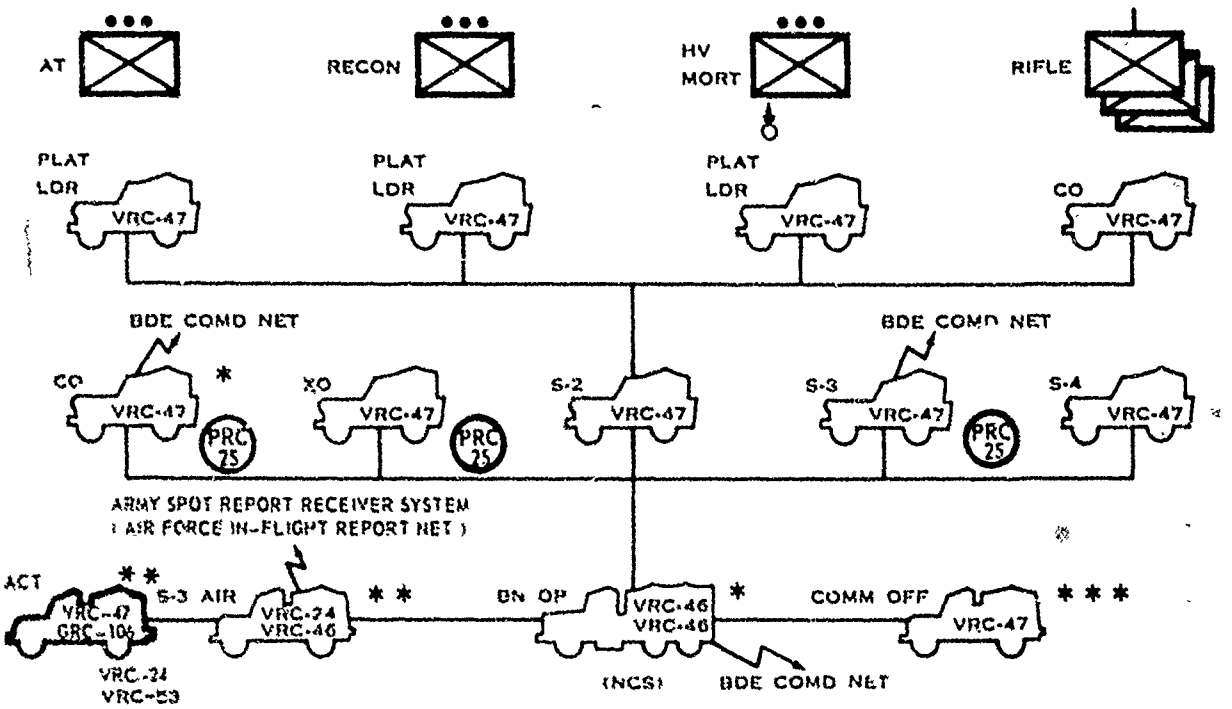



Figure 13-6. Communication Personnel and Equipment, Headquarters and Headquarters Company, Infantry Battalion.



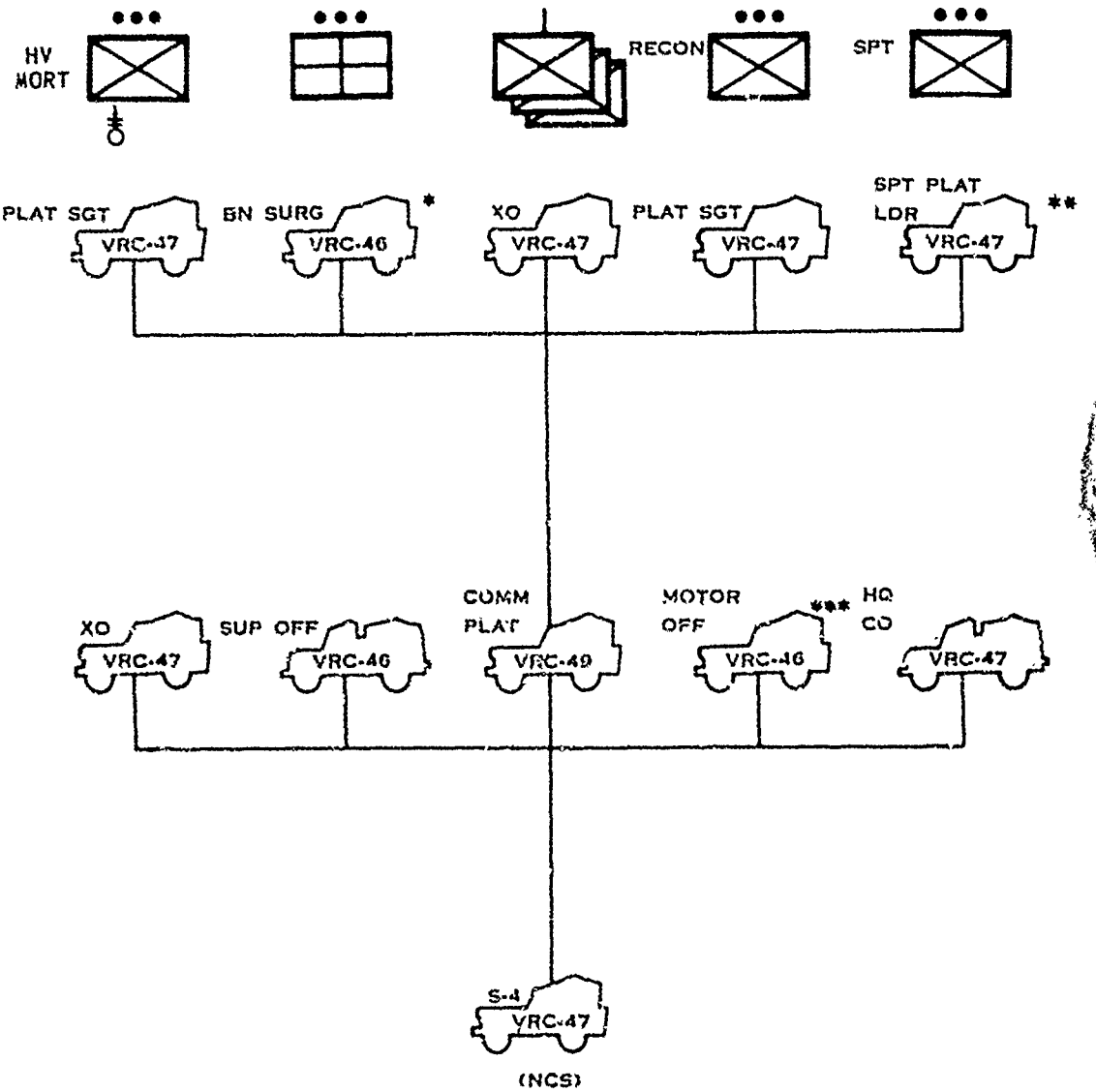

* SPEECH SECURITY EQUIPMENT INSTALLED

* * S-3 AIR HAS TWO ¼ T TRUCKS SEE FIGURE 13-23

* * * EQUIPMENT ORGANIC TO COMMUNICATIONS PLATOON

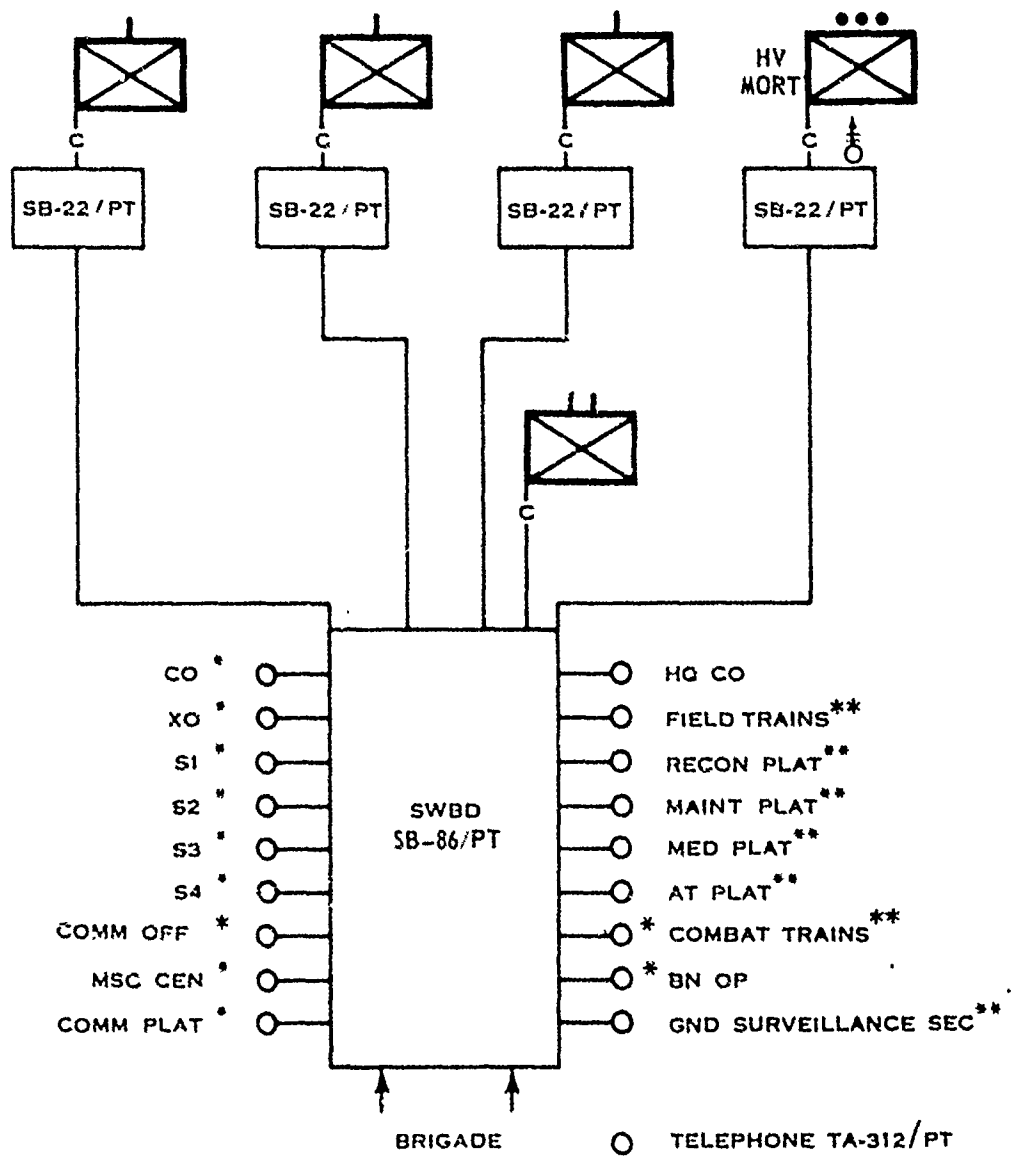
NOTE LIAISON OFFICERS ENTER NET AS REQUIRED WITH AN/VRC-46 MOUNTED IN 1/4 T TRUCKS AIR DEFENSE TEAM ENTER NET AS REQUIRED.

Figure 13-7. Type Command Net, Infantry Battalion.




*ORGANIC TO MEDICAL PLATOON.
**ENTERS BRIGADE LOGISTICAL NET AS REQUIRED
***ORGANIC TO MAINTENANCE PLATOON.
NOTE COMBAT TRAINS MAY USE ONE OF THE MULTI-PURPOSE AN/PRC-25 RADIO SETS ORGANIC TO THE BN HQS SECTION IF REQUIRED.

Figure 13-8. Type Logistical Net, Infantry Battalion.




*ORGANIC TO COMMUNICATION PLATOON
**TIE INTO BN WIRE SYSTEM AT NEAREST SWITCHBOARD

Figure 13-9. Type Wire System, Infantry Battalion.




**PERSONNEL**

1 COMM CHIEF
1 WIRE FOREMAN
2 WIRE TEAM CHIEF
1 RADAR MECHANIC
1 SR RADIO MECHANIC
*2 RADIO MECHANIC
1 SR MESSAGE CLERK
1 SR SWBD OPERATOR
2 SENIOR WIREMAN
* *1 LT TRUCK DRIVER
3 MESSAGE CLERK
2 MOTOR MESSENGER
**2 SWITCHBOARD OP
*4 WIREMAN

**EQUIPMENT**

2 ANTENNA RC-292
4 ANTENNA AT-984 G
5 CASE BC-5
2 CIPHER MACHINE TSEC KL-7
2 LOUDSPEAKER PERMANENT MAGNET LS-166 U
3 MULTIMETER AN URM-105
1 RADIO SET AN VRC-47 MTD IN TRK ¾ TON
1 RADIO SET AN VRC-49 MTD IN TRK ¼ TON
2 RADIO SET CONTROL GROUP AN GRA-39
4 REEL CABLE DR-8
4 REEL CABLE RL-159 U
4 REEL EQUIPMENT CE 11
4 REELING MACHINE CABLE HAND RL-27
2 REELING MACHINE CABLE HAND RL-31
2 REELING MACHINE CABLE HAND RL 39
3 REELING MACHINE CABLE MOTOR DRIVEN RL-172 G
3 SPLICING KIT TELEPHONE CABLE MK-356 G
2 SWITCHBOARD TELEPHONE MANUAL SB-22 PT
1 SWITCHBOARD TELEPHONE TERMINAL SB-86 PT
23 TELEPHONE SET TA-312/PT
8 TERMINAL BOARD TM-184
1 TEST SET ELECTRON TUBE TV-7 U
1 TEST SET ELECTRONIC CIRCUIT AN GRM-55
1 TEST SET RADIO AN VRM-1
3 TOOL KIT RADIO REPAIRMAN TK-115 U
1 TOOL KIT RADAR AND RADIO REPAIRMAN TK-87 U
1 INVERTER VIBRATOR PP-68/U
2 WIRE WD-1 TT ON DR-8 ½ MI
36 WIRE WD 1 TT IN MX-306 G
16 WIRE WD-1 TT ON RL-159 U
1 GENERATOR SET GAS ENG 1.5 KW 28V DC
1 CLOCK MESSAGE CENTER M-2
1 PANEL SET AP-30-C
1 PANEL SET AP-30-D
6 CRYSTAL UNIT SET CR-6 PRC 6
1 INDICATOR ID 292

*ALSO LT TRK DRIVER
** ALSO RADIOTELEPHONE OPERATOR

Figure 13-10. Communication Personnel and Equipment, Communications Platoon, Infantry Battalion.




**PERSONNEL**

NONE

**EQUIPMENT**

4 GENERATOR SET GASOLINE PU-532/PPS
2 GENERATOR SET GASOLINE PU-422 U
4 RADAR SET AN/PPS-4
2 RADAR SET AN/TPS-33
6 RADIO SET AN/PRC-25
1 RADIO SET AN VRC-46 MTD IN 1/4 T TRK
2 RADIO SET AN VRC-46 MTD IN 3/4 T TRK
6 REELING MACHINE CABLE HAND RL-39
6 TELEPHONE SET TA-312/PT
1 TEST SET AN/UPM-93
6 WIRE WD-1/TT ON DR-8
6 SPLICING KIT TELEPHONE CABLE MK-356 'G

Figure 13-11. Communication Personnel and Equipment, Ground Surveillance Section, Infantry Battalion.

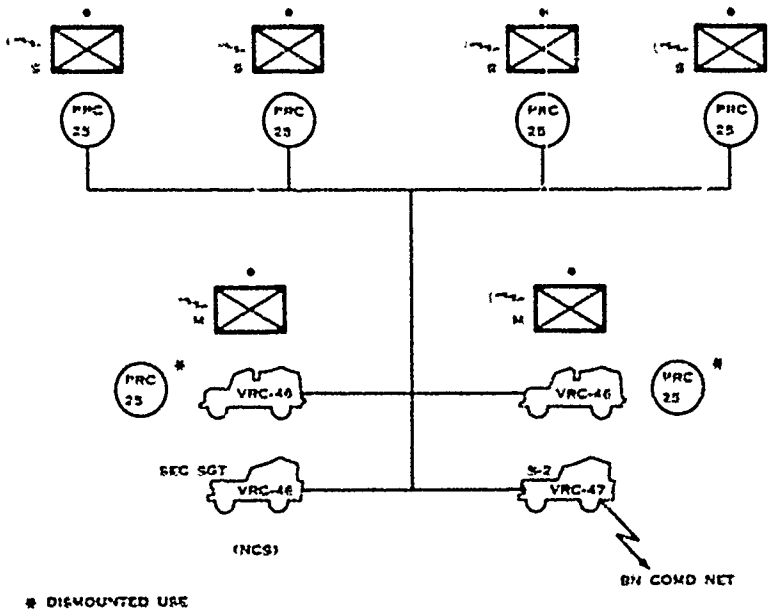



Figure 13-12. Type Radio Net, Ground Surveillance Section, Infantry Battalion.

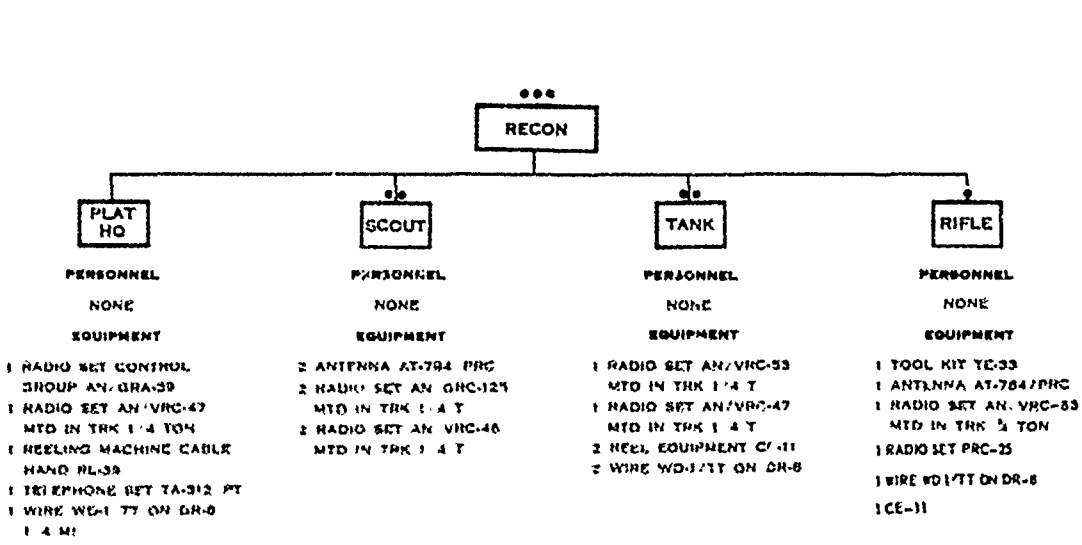



Figure 13-13. Communication Personnel and Equipment, Reconnaissance Platoon, Infantry Battalion.

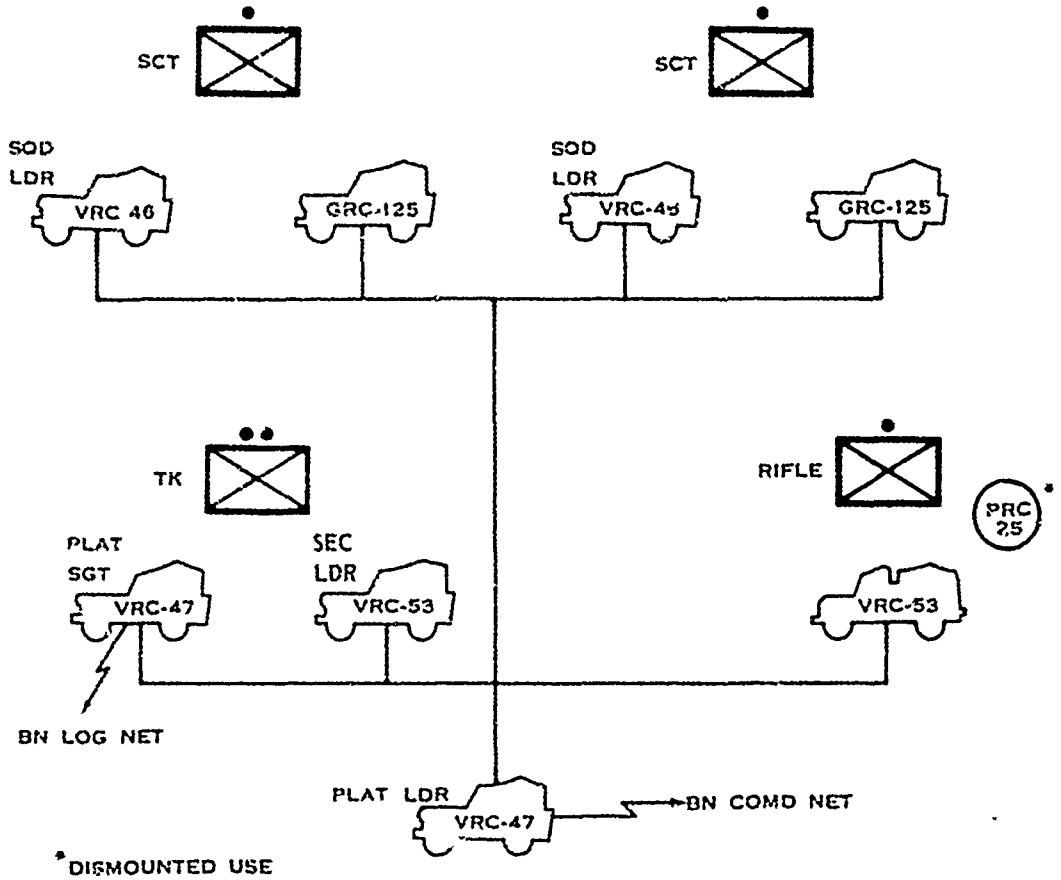



Figure 13-14. Type Radio Net, Reconnaissance Platoon, Infantry Battalion.

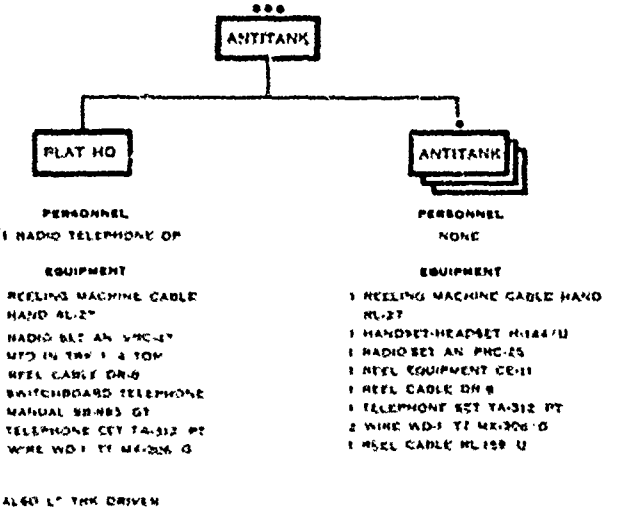



Figure 13-15. Communication Personnel and Equipment, Antitank Platoon, Infantry Battalion.

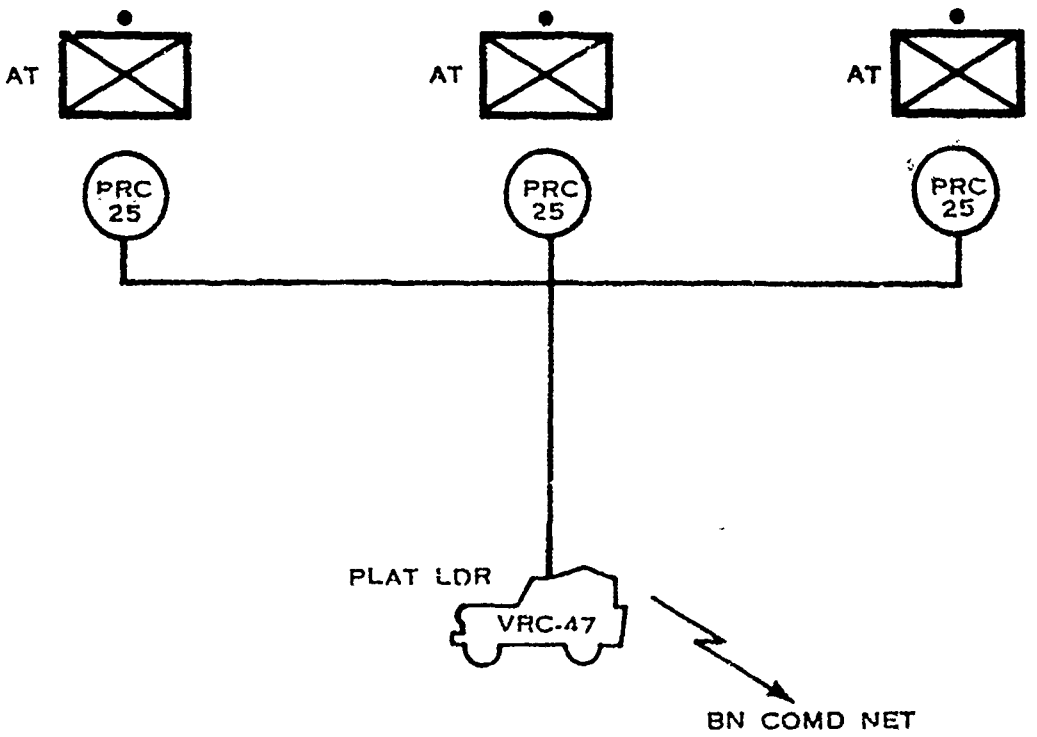
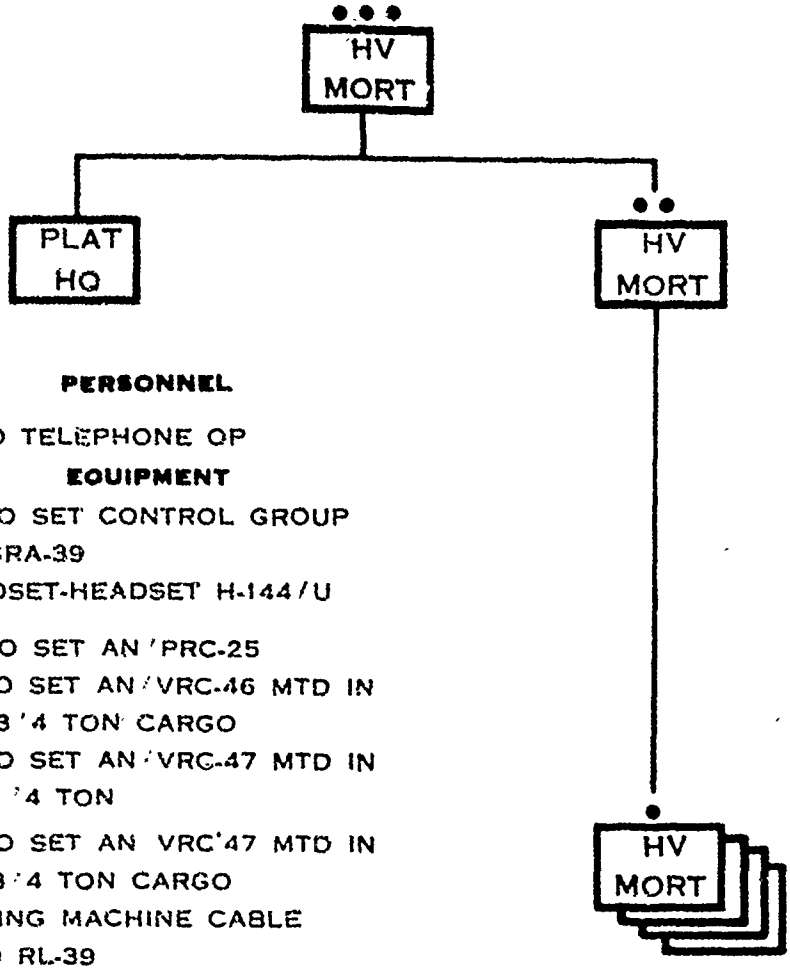



Figure 13-16. Type Radio Net, Antitank Platoon, Infantry Battalion.




**PERSONNEL**

*4 RAD TELEPHONE OP

**EQUIPMENT**

8 RADIO SET CONTROL GROUP AN/GRA-39
2 HANDSET-HEADSET H-144/U
3 RADIO SET AN/PRC-25
1 RADIO SET AN/VRC-46 MTD IN TRK 3/4 TON CARGO
5 RADIO SET AN/VRC-47 MTD IN TRK 1/4 TON
1 RADIO SET AN VRC'47 MTD IN TRK 3/4 TON CARGO
2 REELING MACHINE CABLE HAND RL-39
3 REEL EQUIPMENT CE-11
1 SWITCHBOARD TELEPHONE MANUAL SB-993/GT
1 SWITCHBOARD TELEPHONE MANUAL SB-22 PT
9 TELEPHONE SET TA-312/PT
8 WIRE WD-1/TT ON DR-8 1/4 MI

*ALSO LT TRK DRIVER

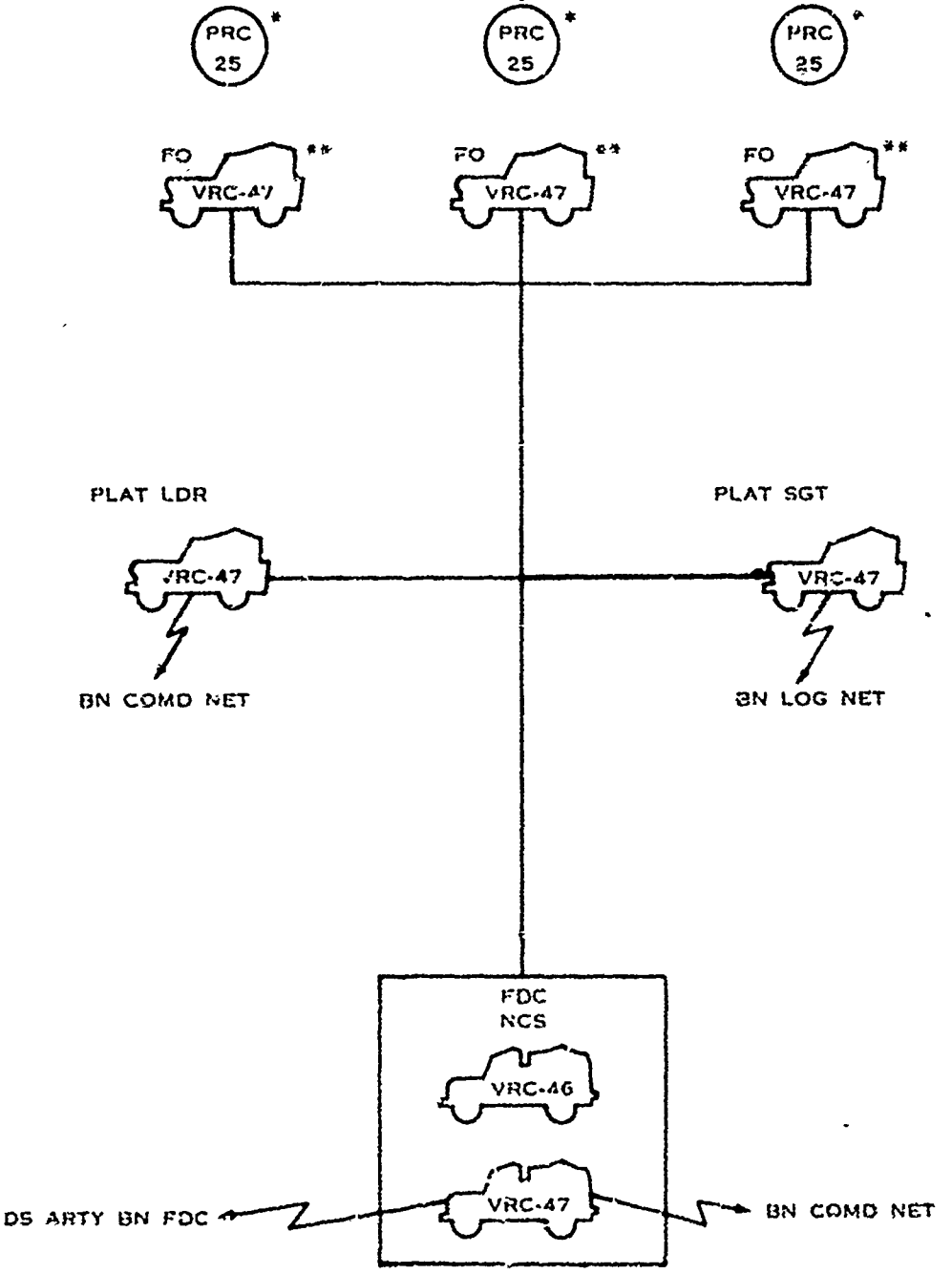
**PERSONNEL**

NONE

**EQUIPMENT**

1 REEL EQUIPMENT CE-11
1 WIRE WD-1/TT ON DR-8

Figure 13-17. Communication Personnel and Equipment, Heavy Mortar Platoon, Infantry Battalion.




*DISMOUNTED USE IN FIRE DIRECTION NET

**ALSO ENTERS SUPPORTED UNIT COMMAND NET

Figure 13-18. Type Fire Direction Net, Heavy Mortar Platoon, Infantry Battalion.

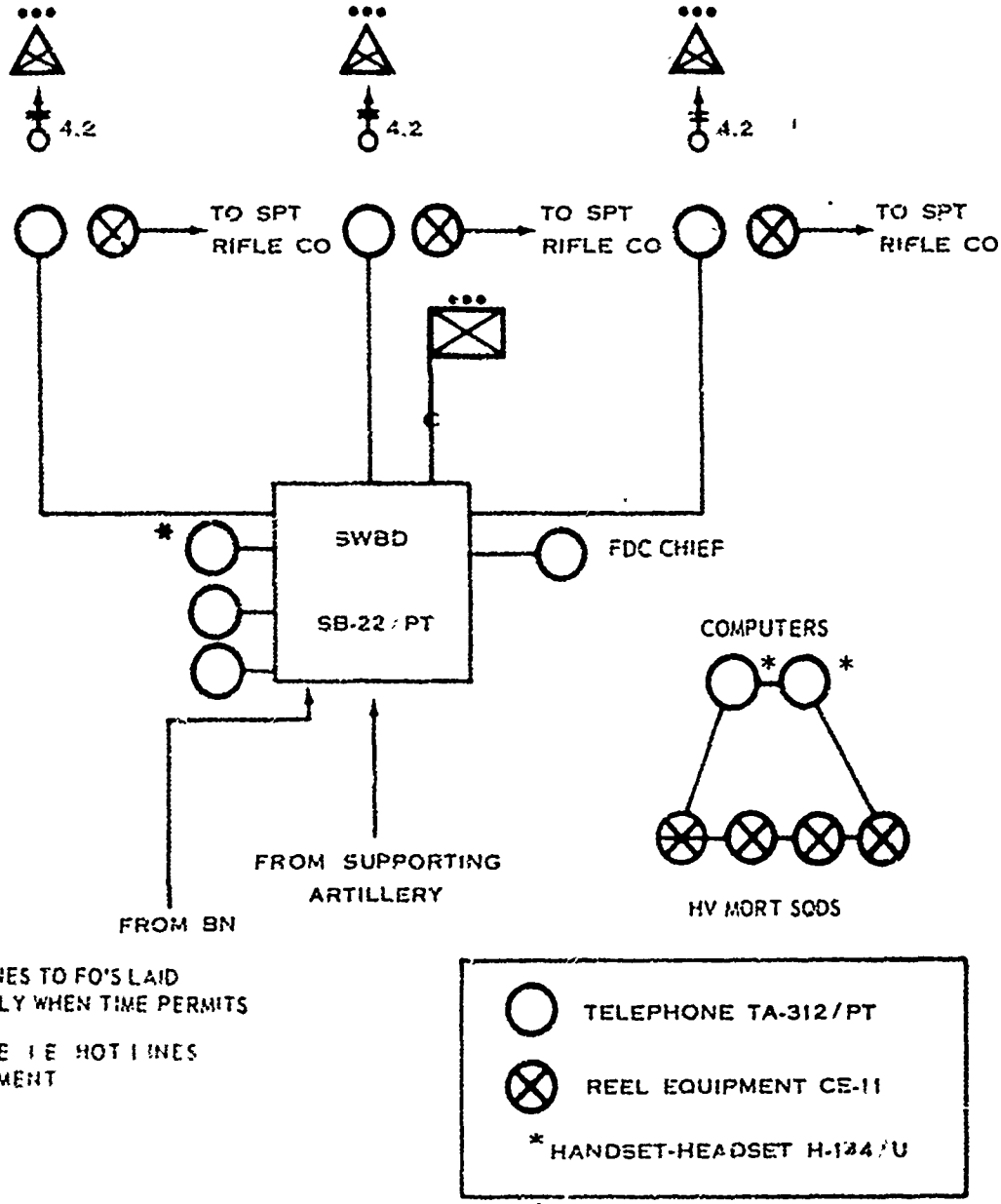



Figure 13-13. Typical Wire System, Heavy Mortar Platoon, Infantry Battalion.

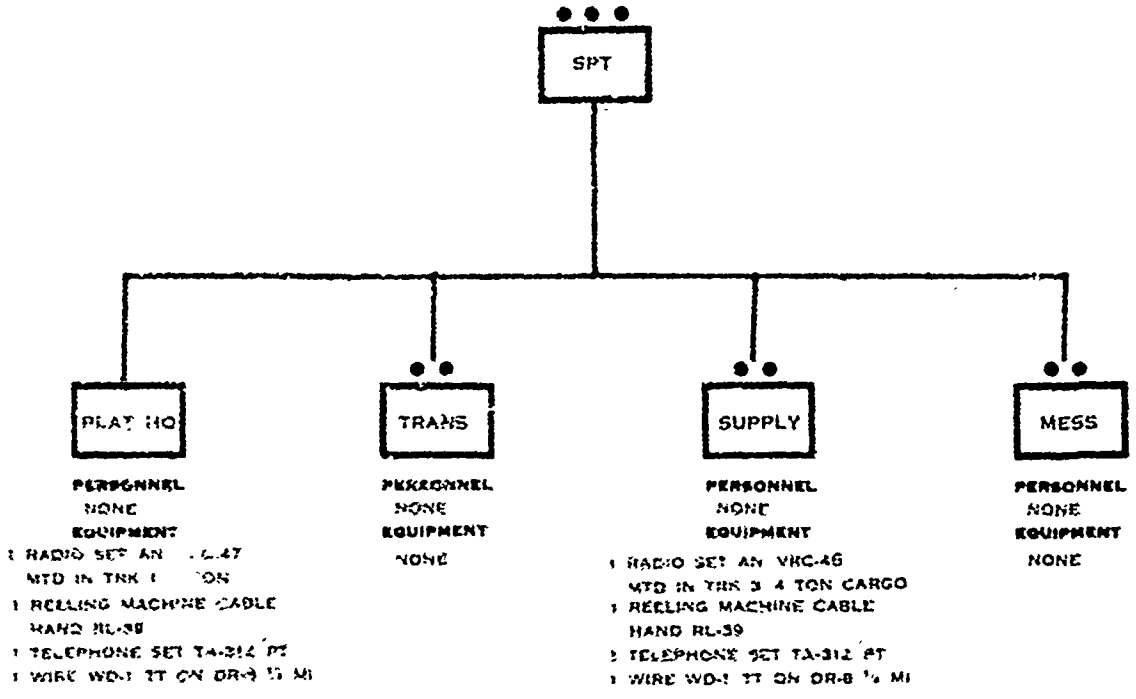



Figure 13-20. Communication Personnel and Equipment, Support Platoon, Infantry Battalion.




**PERSONNEL**

NONE

**EQUIPMENT**

1 RADIO SET AN/VRC-46
MTD IN TRK 1/4 TON
1 TELEPHONE SET TA-312/PT

Figure 13-21. Communication Personnel and Equipment, Medical Platoon, Infantry Battalion.




**PERSONNEL**

NONE

**EQUIPMENT**

1 RADIO SET AN/VRC-46
MTD IN TRK 1/4 T
1 REELING MACHINE CABLE
HAND RL-39
1 TELEPHONE SET TA-312/PT
1 WIRE WD-1/TT ON DR-8

Figure 13-22. Communication Personnel and Equipment, Maintenance Platoon, Infantry Battalion.

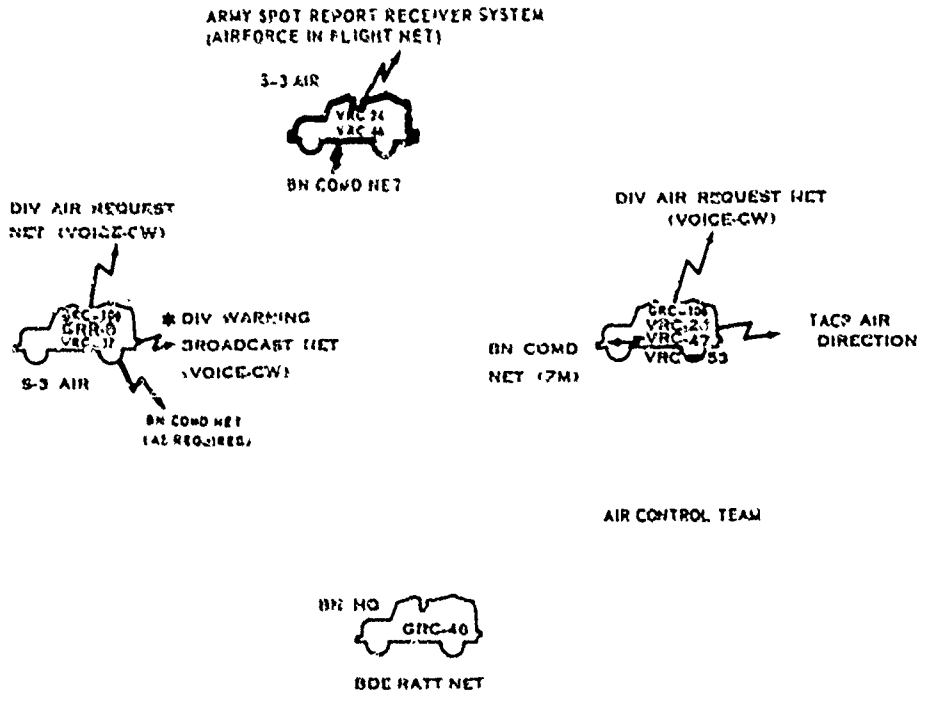



Figure 13-23. Type Employment, AM Radio Equipment, Infantry Battalion.

## NOTES

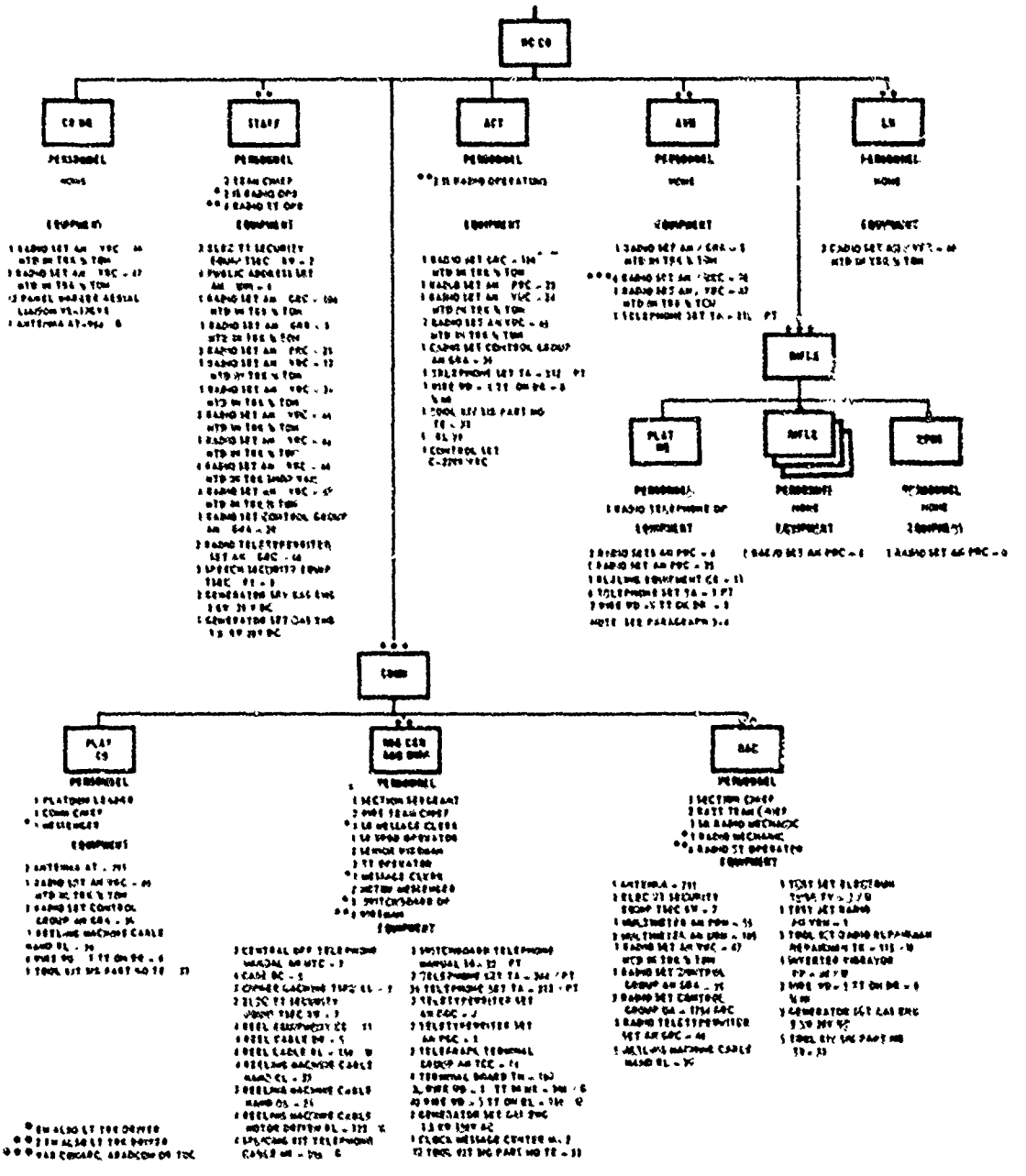
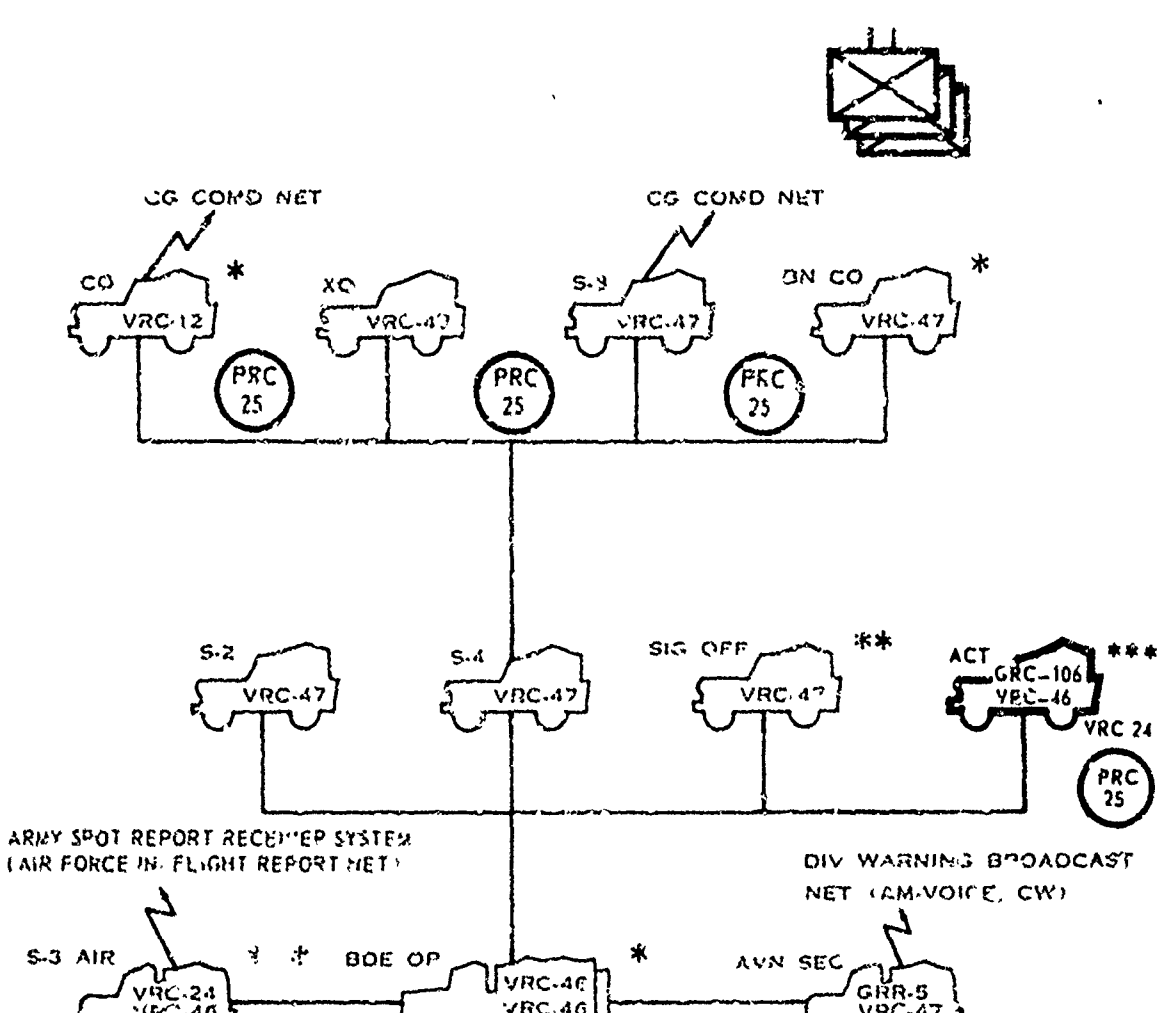


Figure 13-24. Communication Personnel and Equipment, Headquarters and Headquarters Company, Infantry Brigade.




*SPEECH SECURITY EQUIPMENT INSTALLED

**ORGANIC TO COMMUNICATION PLATOON

***(SEE FIGURE 13-28 EMPLOYMENT AM RADIOS)

NOTE: LIAISON OFFICERS ENTER NET AS REQUIRED WITH AN VRC-46 MOUNTED (N 1/4 T TRUCKS

Figure 13-25. Type Command Net, Infantry Brigade.

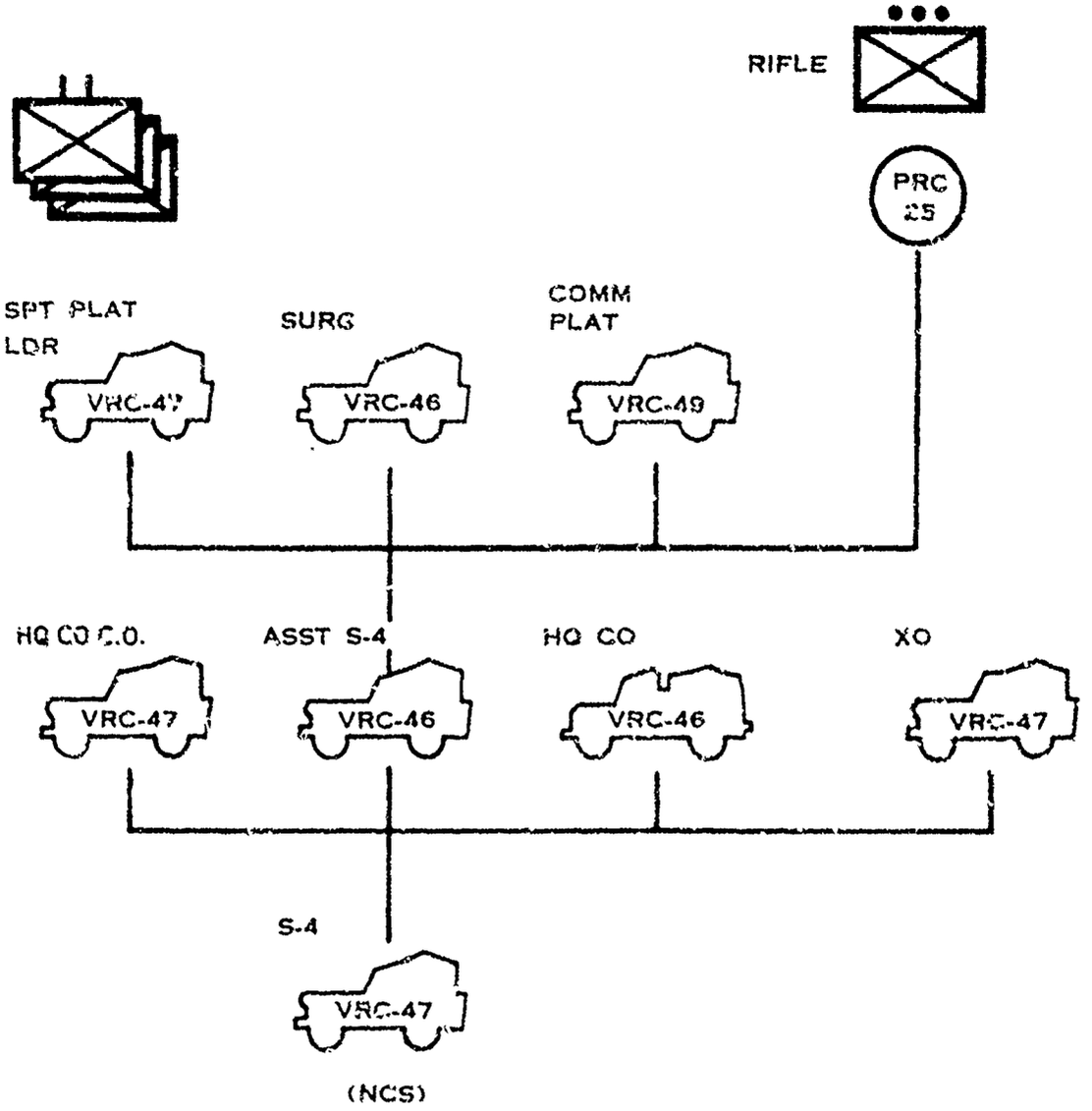
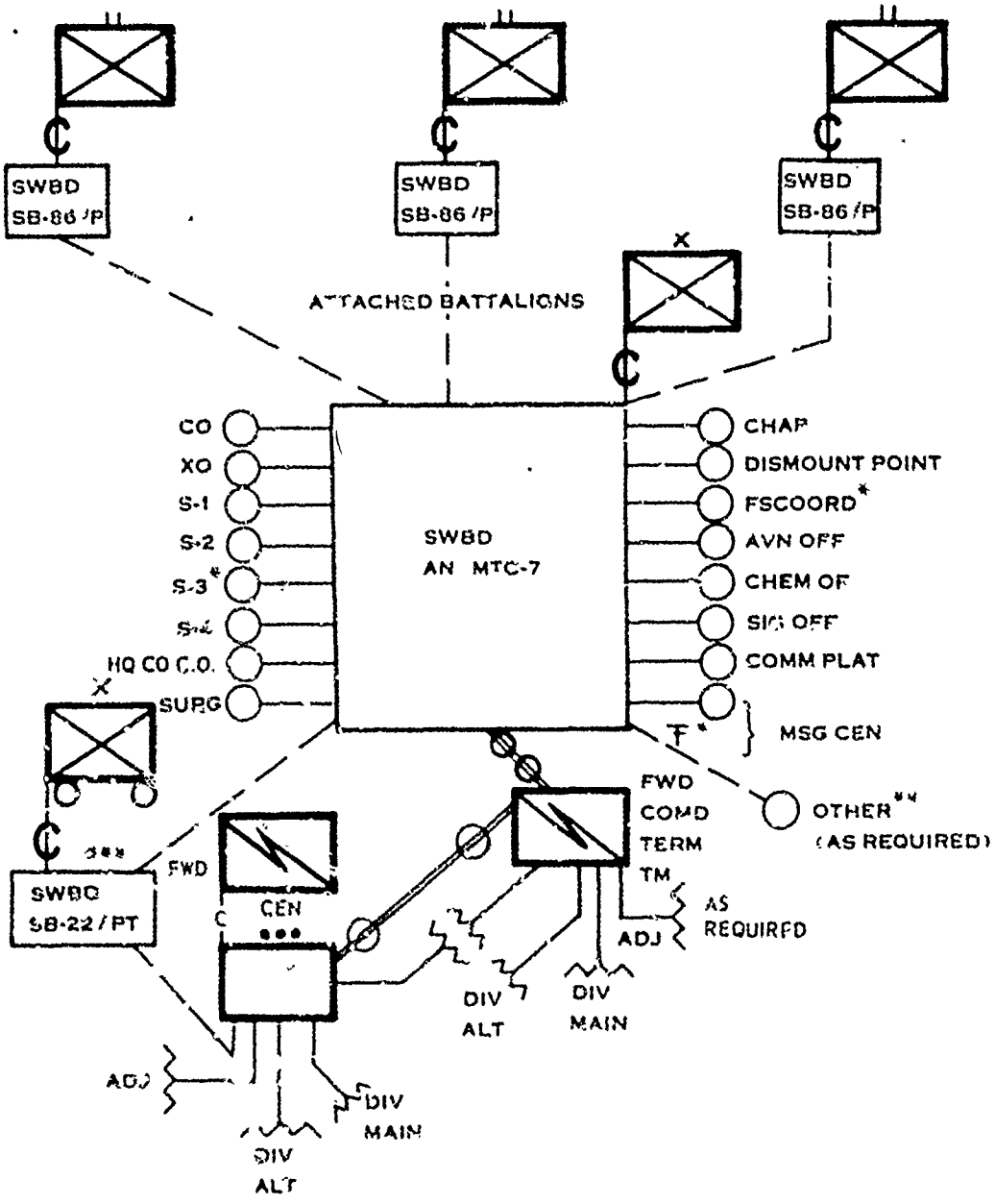



Figure 13-25. Type Logistical Net, Infantry Brigade.




NOTES:

*HOTLINES WILL ALSO BE ESTABLISHED INTO AREA SYSTEM TO DIVISION.

**INCLUDES OTHER SUPPORT OR ATTACHED UNITS, RADIO TRUCKS, AND AUGMENTATIONS.

***INITIAL WIRE COMMUNICATIONS ESTABLISHED THROUGH AREA SYSTEM.

Figure 13-27. Type Wire System, Infantry Brigade.

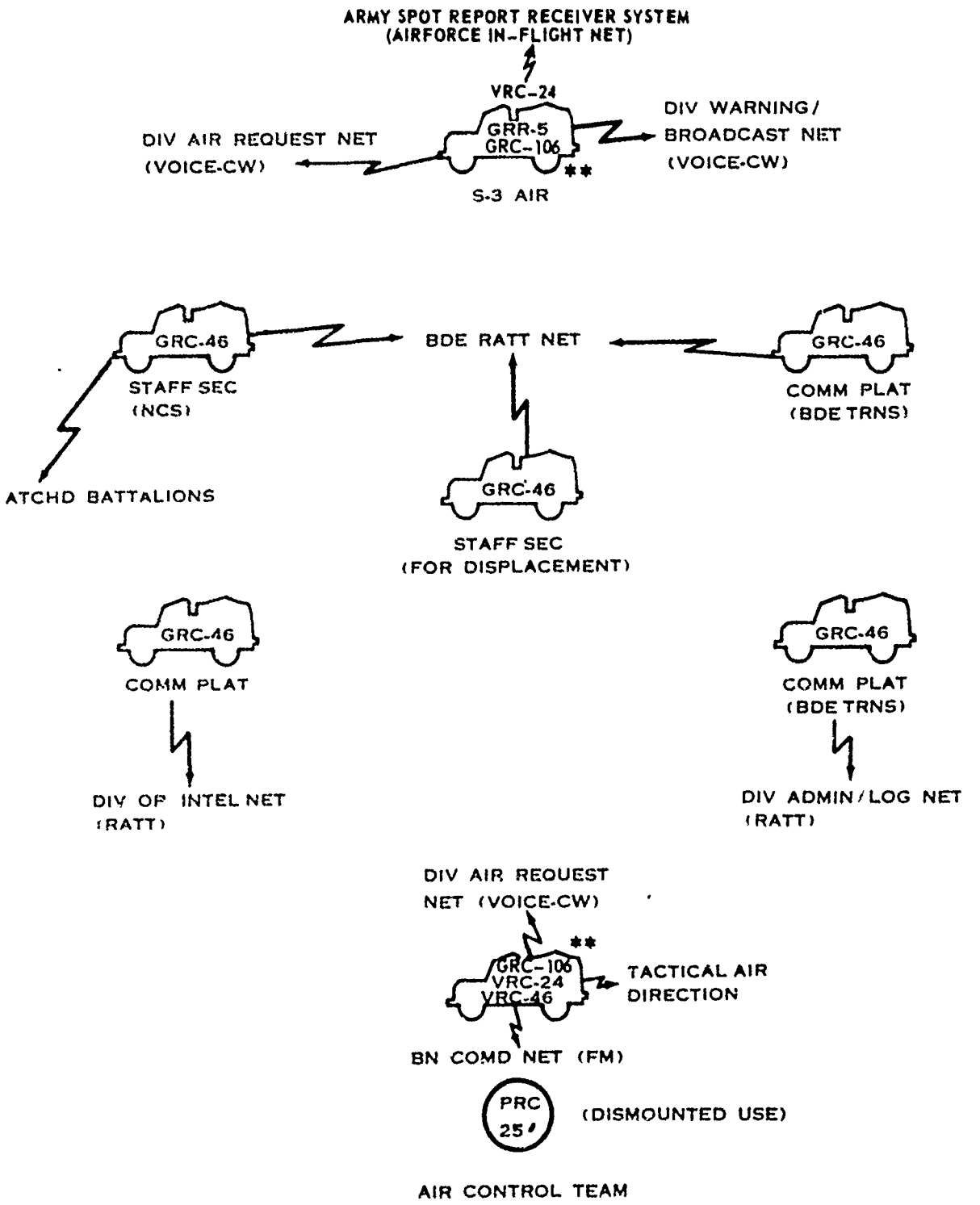



Figure 13-28. Type Employment, AM Radio Equipment, Infantry Brigade.

## NOTES

# CHAPTER 14

## COMMUNICATIONS

## AIRBORNE INFANTRY BATTALICNS AND BRIGADES

| | TOE |
|---|---|
| HHC BDE | 57-42G |
| Bn | 7-35G |
| HHC Bn | 7-36 G |
| Rifle Co | 7-37G |

TAB HERE

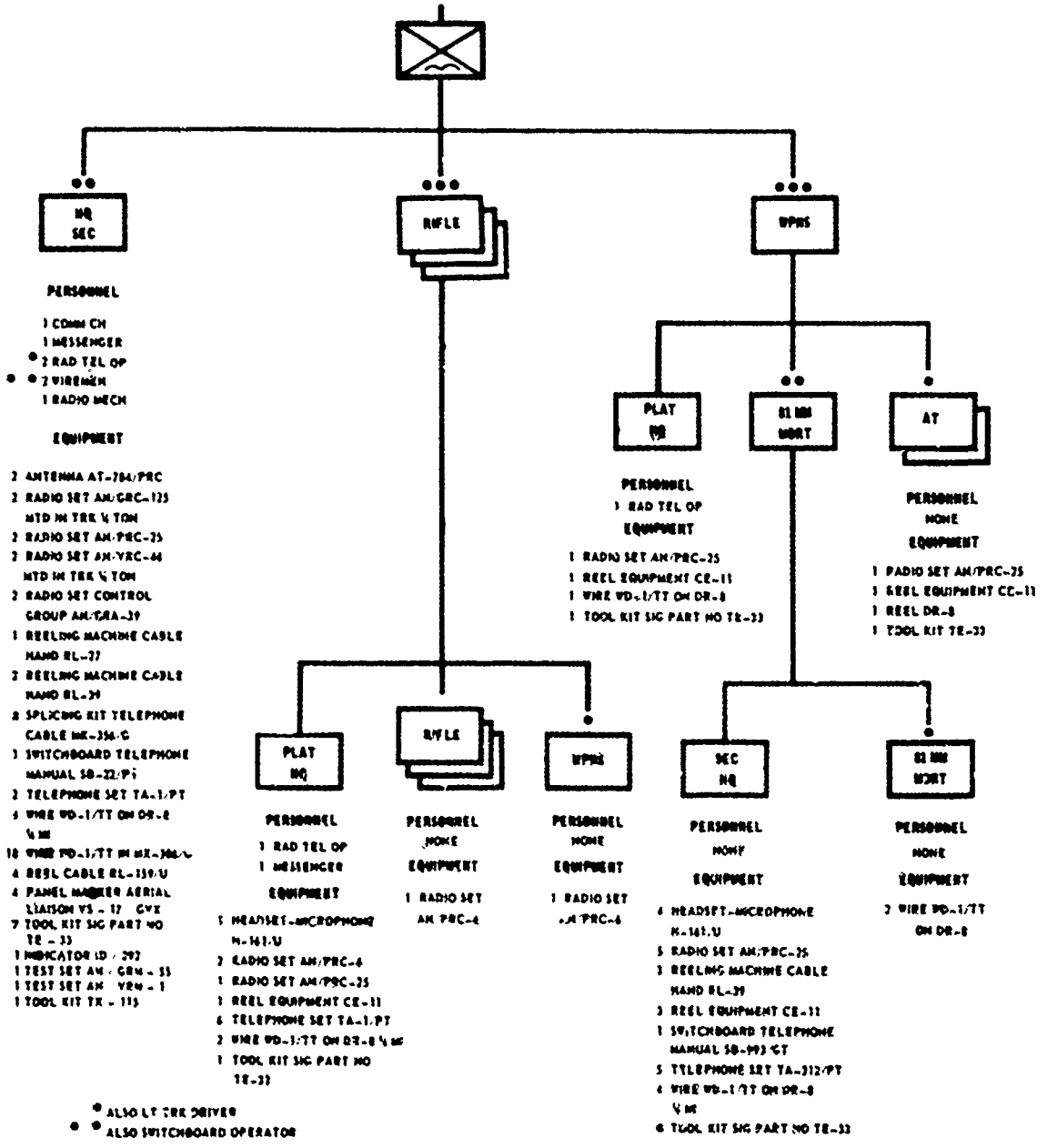



Figure 14-1. Communication Personnel and Equipment, Rifle Company Airborne Battalion.

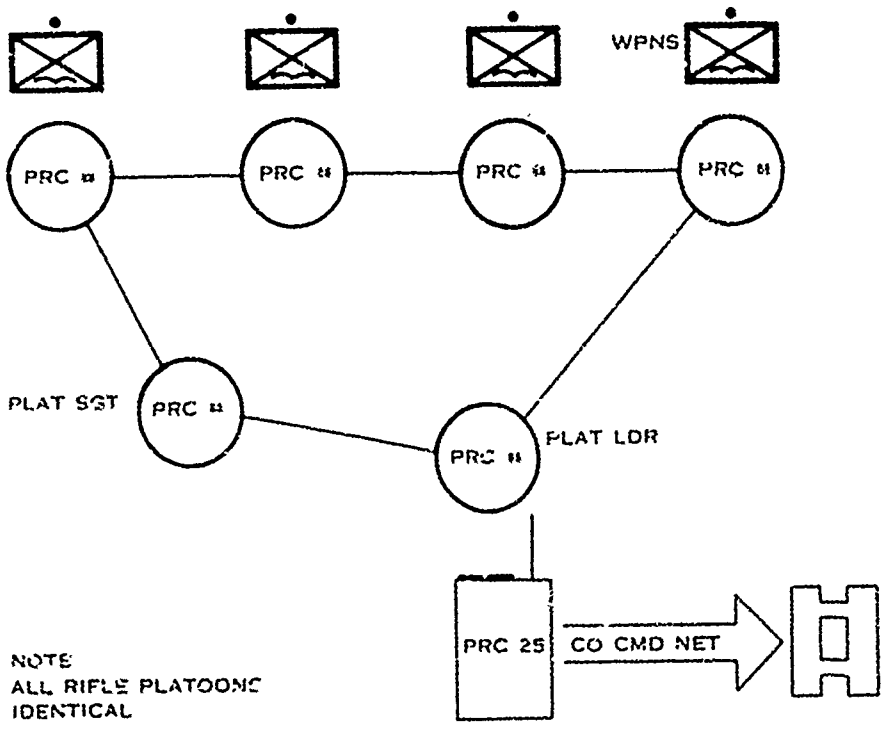



Figure 14-2. Type Rifle Platoon Command Net, Rifle Company, Airborne Infantry Battalion.

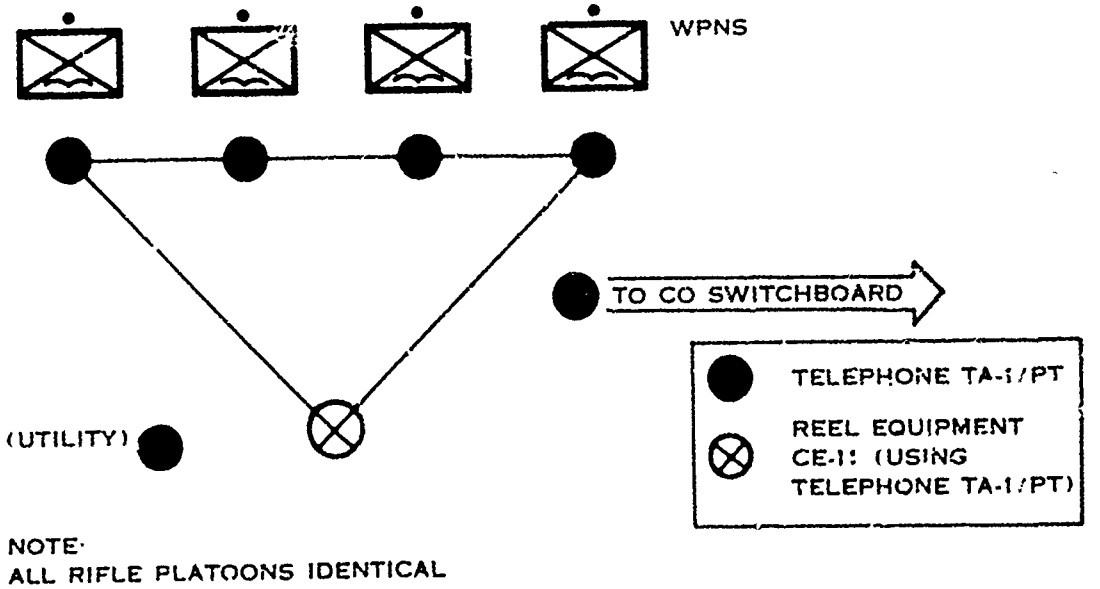
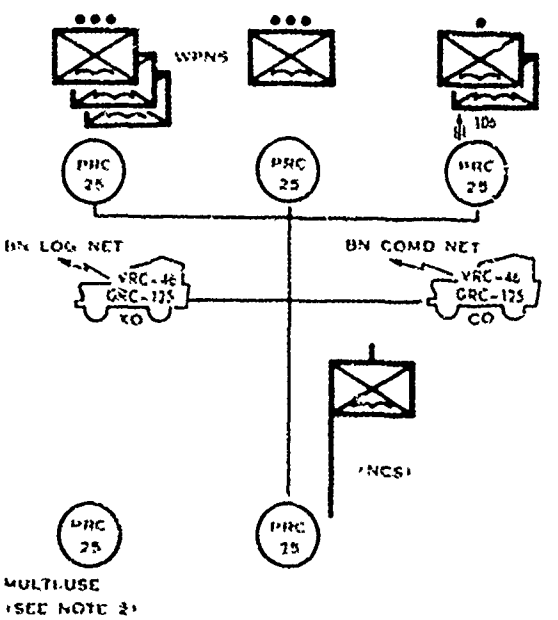
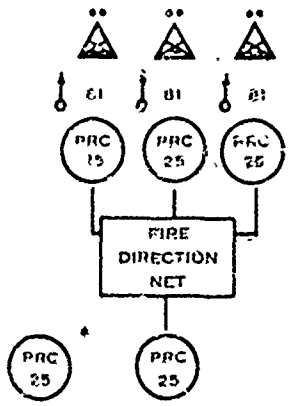



Figure 14-3. Type Rifle Platoon Wire System, Rifle Company, Airborne Infantry Battalion.




*FOR DISPLACEMENT OF FDC




NOTE 1 MORT FO'S AND LEADERS OF ATTACHED OR SUPPORTING UNITS MAY ENTER COMD NET WITH RADIOS FURNISHED BY PARENT UNIT AS REQUIRED

NOTE 2 MULTI-USE SETS PROVIDE REQUIRED FLEXIBILITY IN COMPANY POSSIBLE USES: SECOND RADIO FOR CO; OP; PATROLS, ROAD BLOCKS, CHECK POINTS COPL MAINTENANCE REPLACEMENT

Figure 14-4. Type Radio Nets, Rifle Company, Airborne Infantry Battalion.

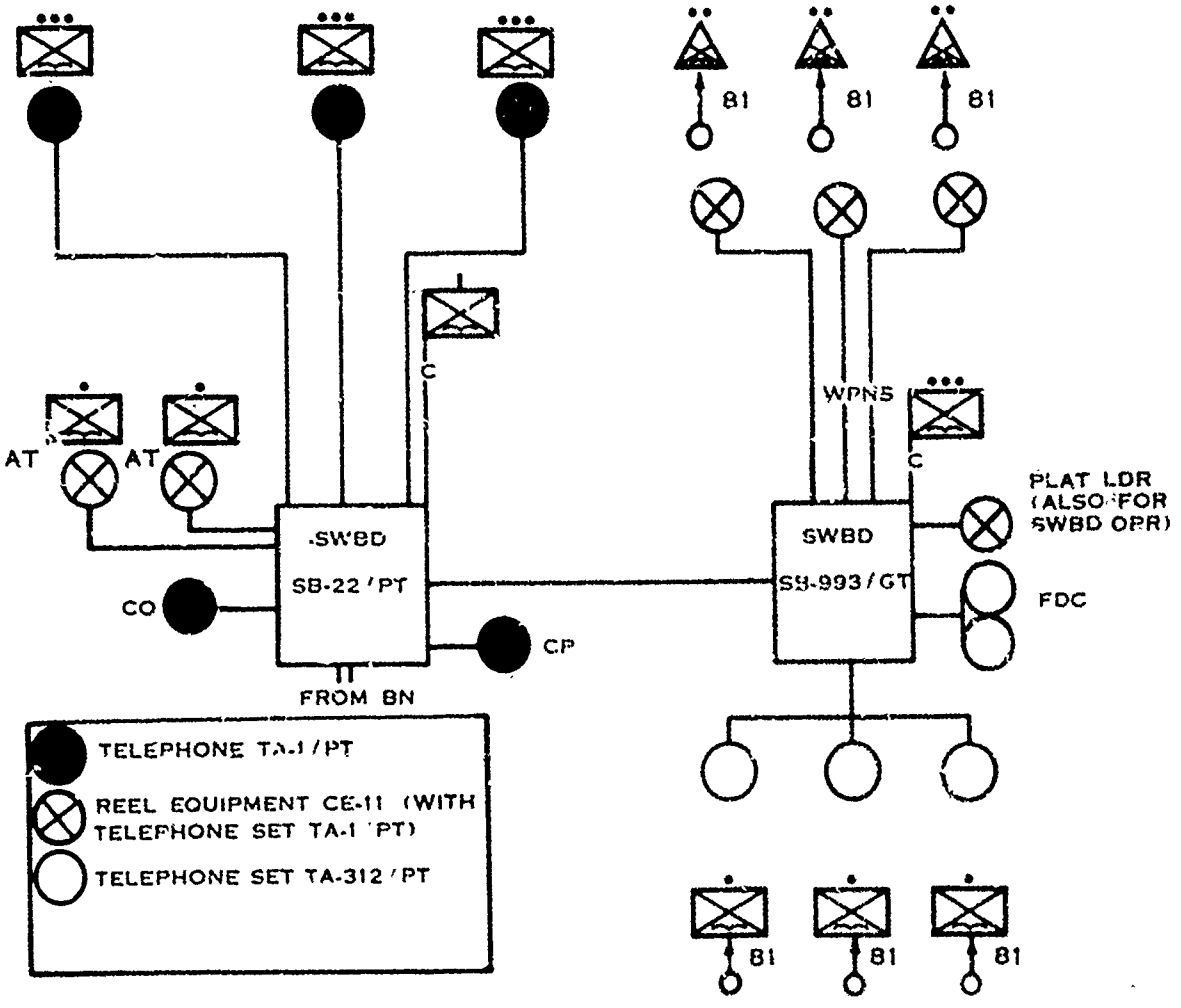



Figure 14-5. Type Wire System, Rifle Company, Airborne Infantry Battalion.

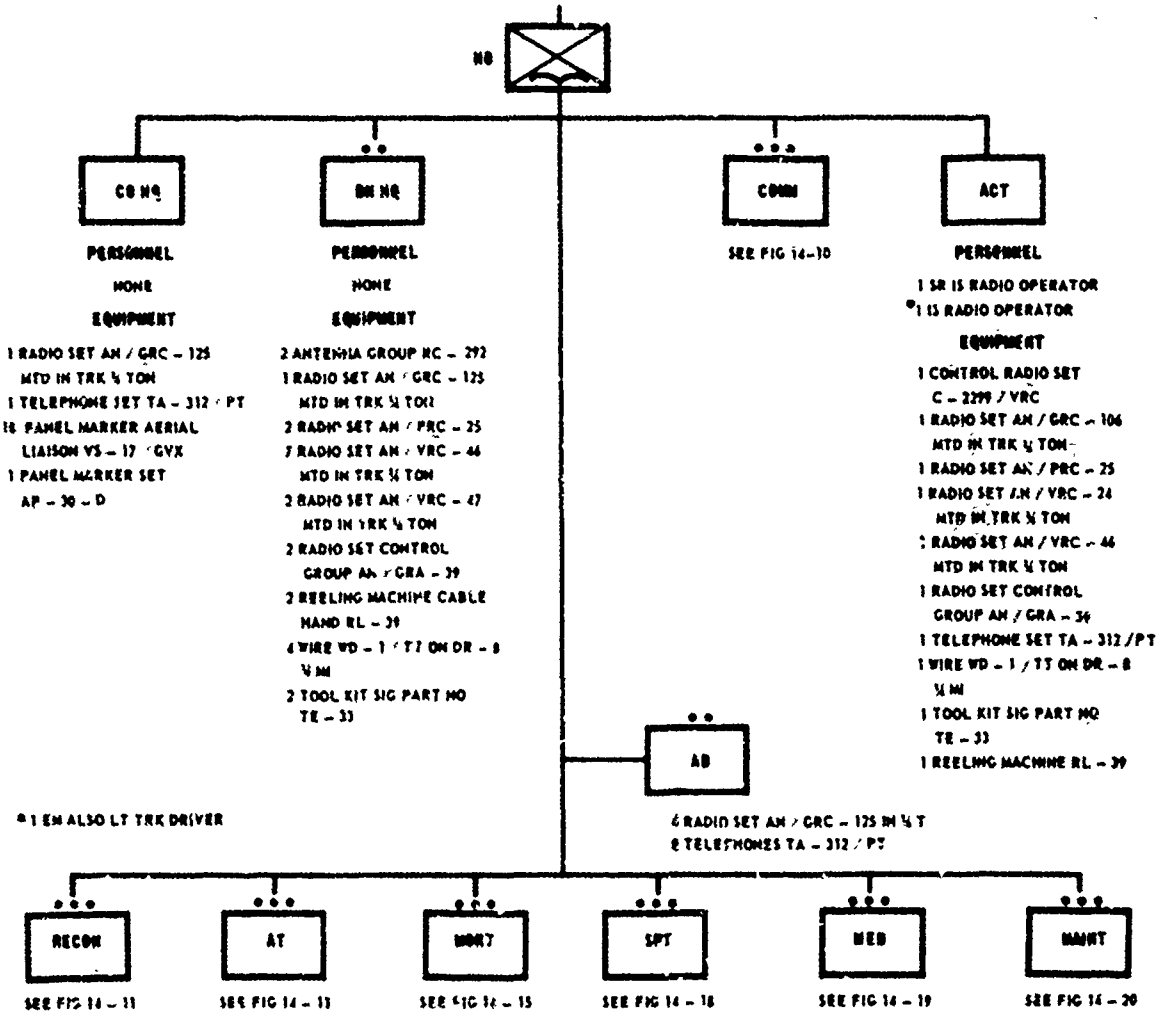
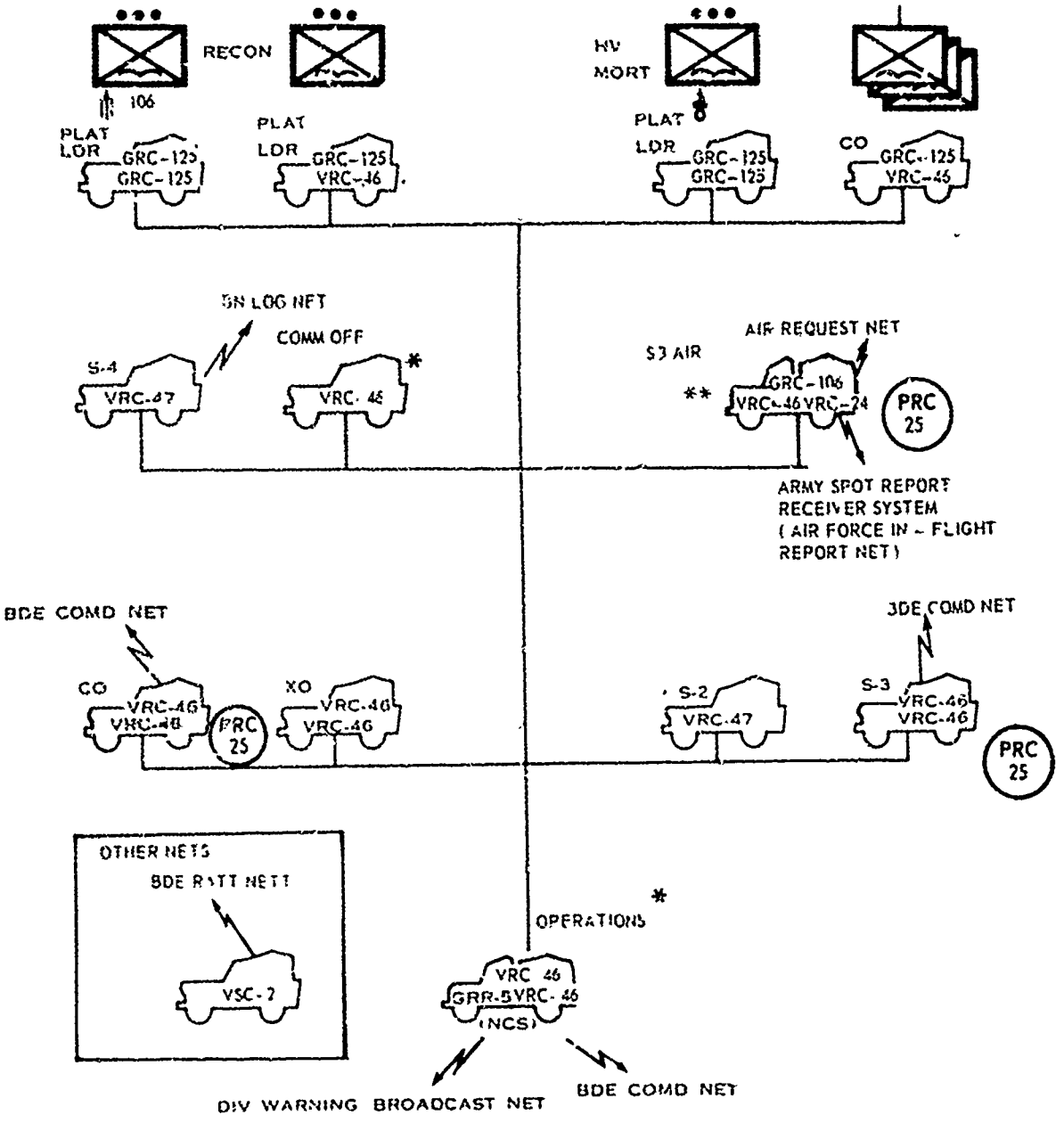



Figure 14-6. Communication Personnel and Equipment, Headquarters and Headquarters Company, Airborne Infantry Battalion.

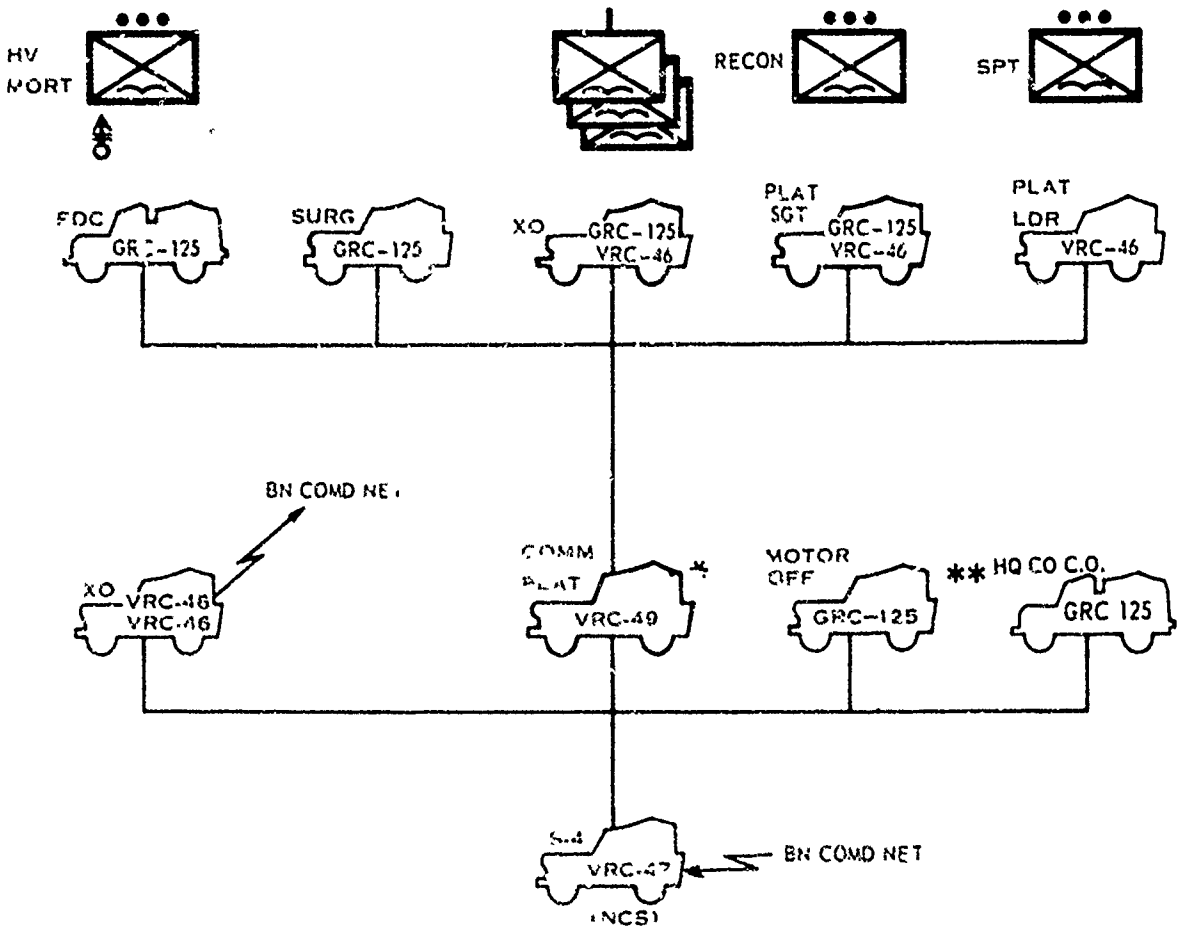



* EQUIPMENT ORGANIC TO COMMUNICATION PLATOON

** EQUIPMENT ORGANIC TO AIR CONTROL TEAM

NOTE LIAISON OFFICERS ENTER NET AS REQUIRED WITH ONE VRC-46 MTD IN ¼ T TRUCK AND ONE GRC-125 MTD IN ¼ T TRUCK
AIR DEFENSE TEAMS ENTER NET AS REQUIRED

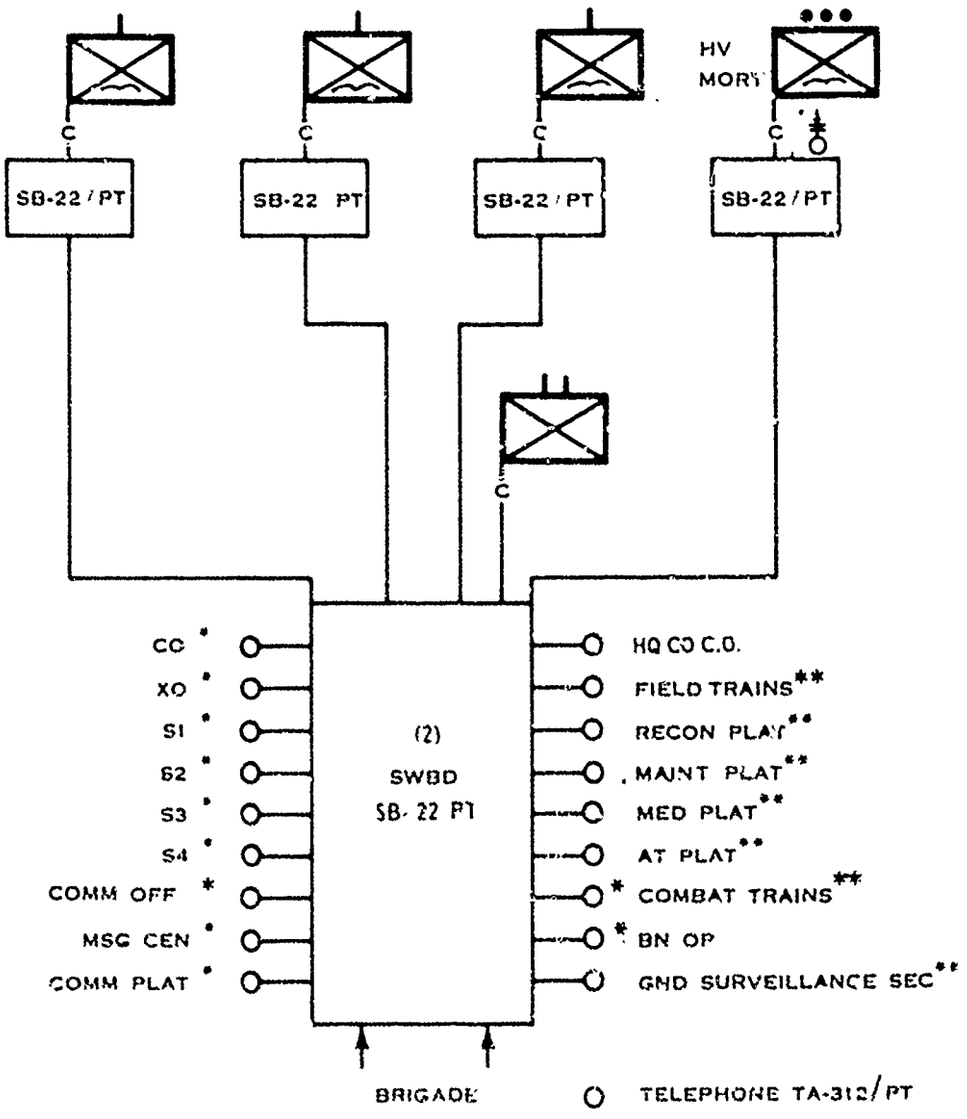
Figure 14-7. Type Command Net, Airborne Infantry Battalion.




* RETRANSMISSION AND RELAY STATION

**ORGANIC TO MAINTENANCE PLATOON

Figure 14-8. Type Logistical Net, Airborne Infantry Battalion.




*ORGANIC TO COMMUNICATION PLATOON
**TIE INTO BN WIRE SYSTEM
AT NEAREST SWITCHBOARD

Figure 14-9. Type Wire System, Airborne Infantry Battalion.




**PERSONNEL**

1 COMM CHIEF
1 WIRE FOREMAN
1 RATT TEAM CHIEF
2 WIRE TEAM CHIEF
1 SR RADIO MECHANIC
2 RADIO MECHANIC
1 SR MESSAGE CLERK
1 SR SWBD OPERATOR
2 SENIOR WIREMEN
2 RATT OPERATOR
3 MESSAGE CLERKS
2 MOTOR MESSENGER
2 SWITCHBOARD OP
4 WIREMEN
4 RADIO TELEPHONE

**EQUIPMENT**

1 ANTENNA AT-784 PRC
4 ANTENNA GROUP RC-292
3 CASE DC-3
1 CIPHER MACHINE TSEC KL-7
2 CRYSTAL UNIT SET CK-6 PRC-6
1 ELEC TELETYPEWRITER SECURITY EQUIP TSEC KW-7
1 INDICATOR CHANNEL ALIGNMENT ID-292 PRC-6
1 KEYBOARD ADAPTER KLX-7 TSEC
3 MULTIMETER AN URM-105
2 POWER SUPPLY PP-2953 U
1 RADIO SET AN GRR-5 MTD IN TRK ¾ TON
1 RADIO SET AN VRC-46 MTD IN TRK ¾ TON
2 RADIO SET AN VRC-46 MTD IN TRK ¾ TON
1 RADIO SET AN VRC-49 MTD IN TRK ¾ TON
3 RADIO SET CONTROL GROUP AN GRA-39
1 RADIO SET CONTROL GROUP AN GRA-74
1 RADIO TELETYPEWRITER SET AN-VSC-2
3 REELING MACHINE CABLE HAND RL-27
3 REELING MACHINE CABLE HAND RL-31
4 REELING MACHINE CABLE HAND RL-39
2 REEL CABLE DR-8
4 REEL CABLE RL-159 U
2 SPLICING KIT TELEPHONE CABLE MK-356-G
7 SWITCHBOARD TELEPHONE MANUAL SB-22 PT
1 TAPE READER TSEC KL-10
21 TELEPHONE SET TA-312 PT
8 TERMINAL BOARD TM-184
2 TEST SET ELEC TUBE TV-7 U
2 TEST SET ELEC CIRCUIT AN/GRM-35
2 TEST SET RADIO AN VRM-1
2 VIBRATOR PACK PP-90 U
6 WIRE WD-1 TT ON DR-8 ¼ MI
28 WIRE WD-1 TT IN MX-306 G
16 WIRE WD-1 TT ON RL-159 U
1 CLOCK MESSAGE CENTER M2
14 TOOL SET SIG PART NO TE-33
3 TOOL SET RADIO REPAIR 32 COMP
1 PANEL SET AP-30-C
1 PANEL SET AP-30-D
3 GENERATOR SET GAS ENG 3 KW 28V DC

*ALSO LT TRK DRIVER
**2 EM ALSO LT TRK DRIVER

Figure 14-10. Communication Personnel and Equipment, Communications Platoon, Airborne Infantry Battalion.

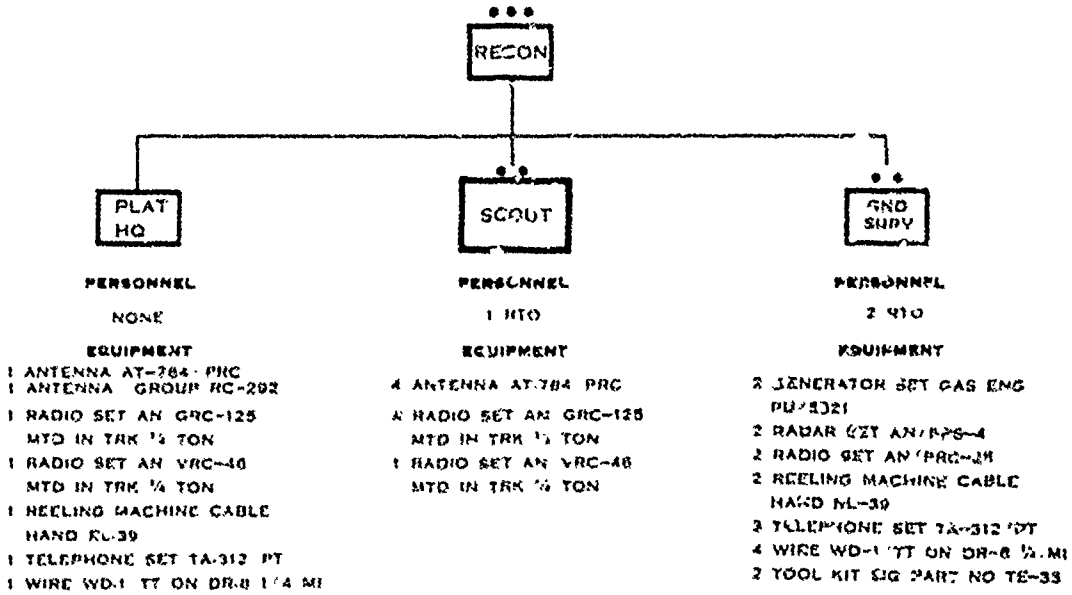



Figure 14-11. Communication Personnel and Equipment, Reconnaissance Platoon, Airborne Infantry Battalion.

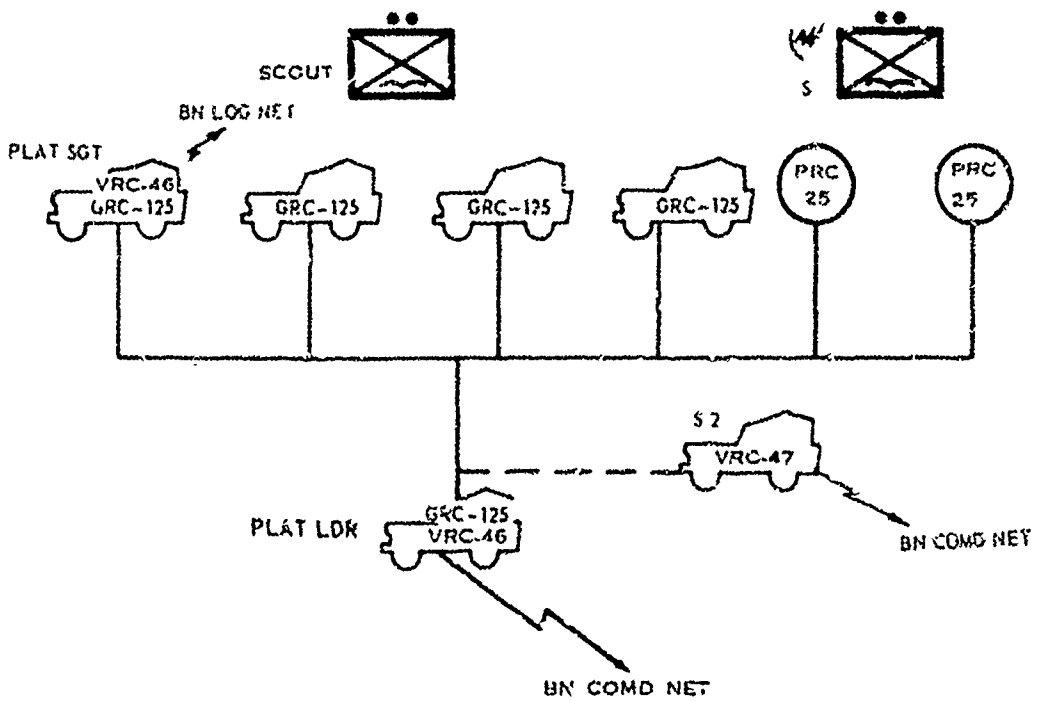



Figure 14-12. Type Radio Net, Reconnaissance Platoon, Airborne Infantry Battalion.

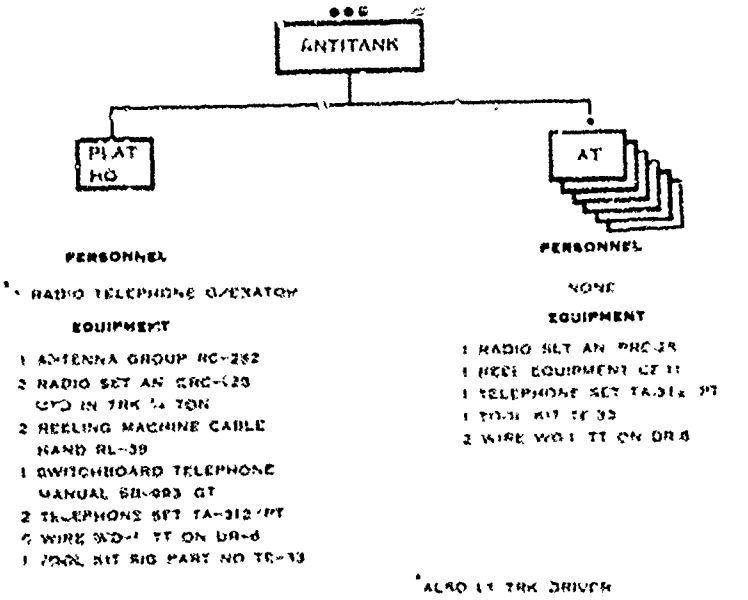



Figure 14-13. Communications Personnel and Equipment, Antitank Platoon, Airborne Infantry Battalion.

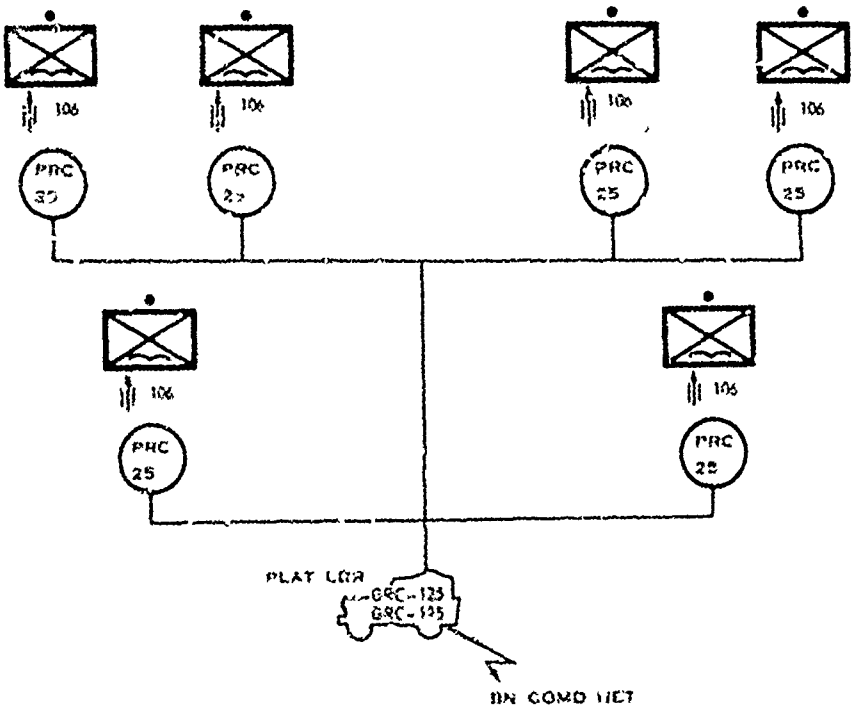
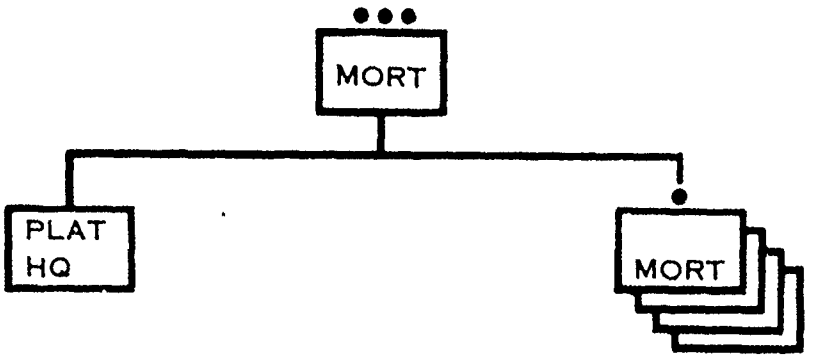



Figure 14-14. Type Radio Net, Antitank Platoon, Airborne Infantry Battalion.




**PERSONNEL**

* 3 RAD TELEPHONE OP

**EQUIPMENT**

4 ANTENNA GROUP RC-292
5 HEADSET-MICROPHONE H-161/U
2 RADIO SET AN/GRC-125
MTD IN TRK ¼ TON
2 RADIO SET AN/GRC-125
MTD IN TRK ¾ TON
5 RADIO SET AN PRC-25
4 REELING MACHINE CABLE
HAND RL-39
1 SWITCHBOARD TELEPHONE
MANUAL SB-993 GT
1 SWITCHBOARD TELEPHONE
MANUAL SB-22/PT
6 TELEPHONE SET TA-312/PT
10 WIRE WD-1/TT ON DR-8 ¼ MI
2 TOOL KIT SIG PART NO TE-33

**PERSONNEL**

NONE

**EQUIPMENT**

1 REEL EQUIPMENT CE-11
1 TELEPHONE SET TA-312/PT
1 WIRE WD-1TT ON DR-8 ¼ MI
1 TOOL KIT SIG PART NO TE-33

Figure 14-15. Communication Personnel and Equipment, Battalion Mortar Platoon, Airborne Infantry Battalion.

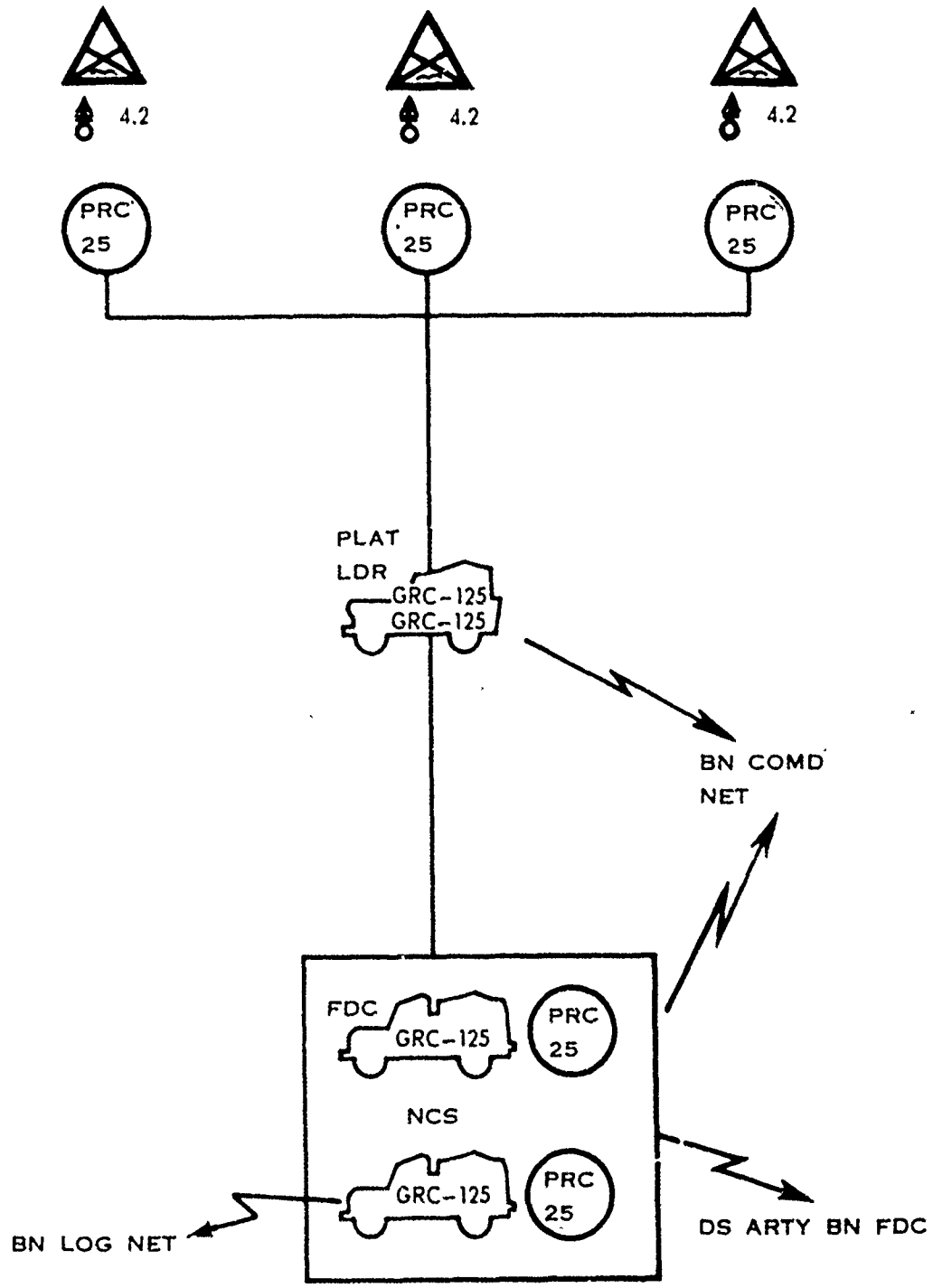



Figure 14-16. Type Fire Direction Net, Battalion Mortar Platoon, Airborne Infantry Battalion.

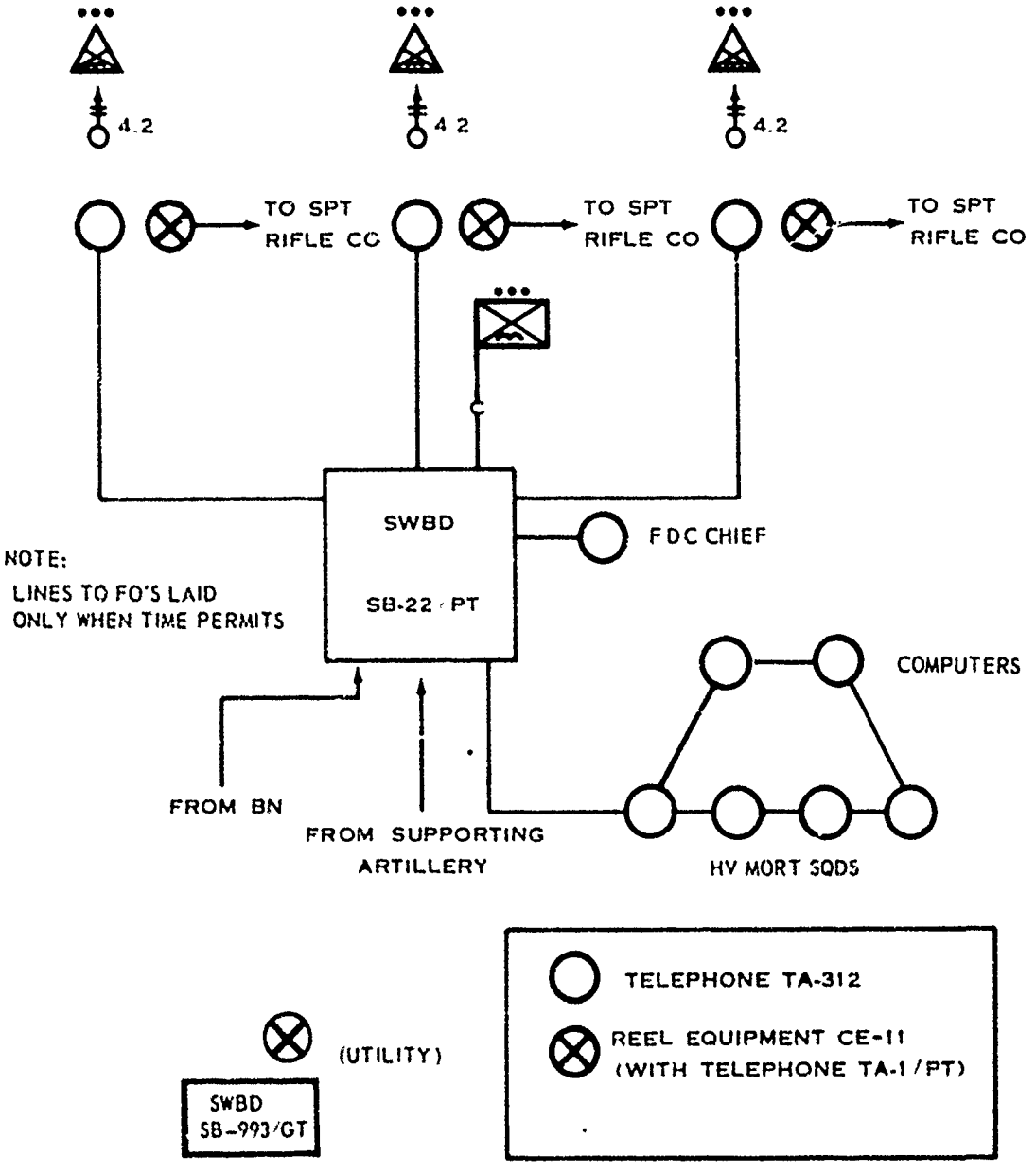
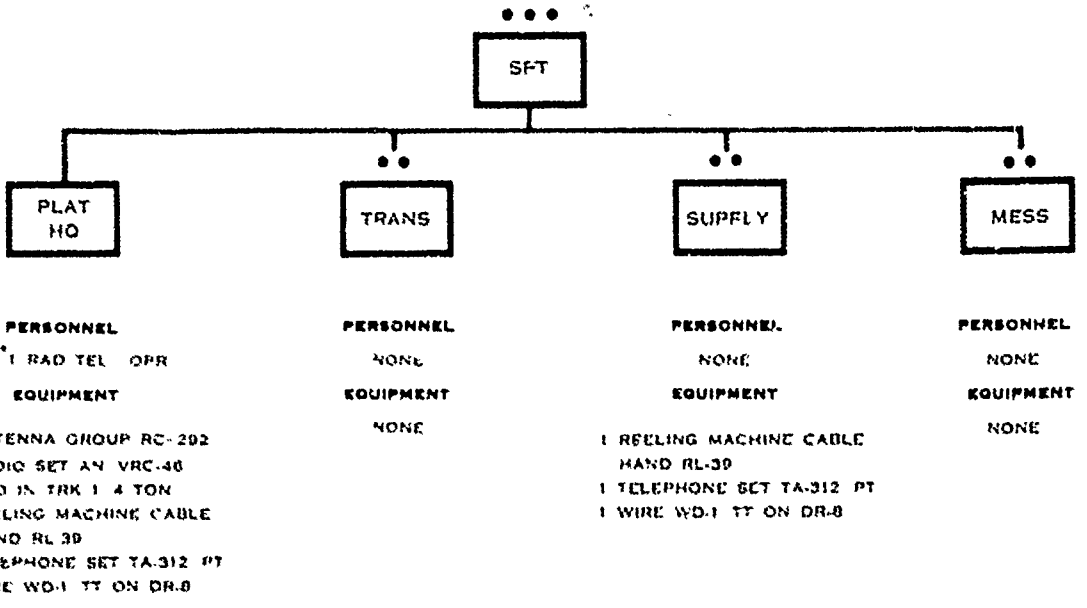



Figure 14-17. Type wire system, Battalion Mortar Platoon, Airborne Infantry Battalion.




*ALSO LT TRK DRIVER

Figure 14-18. Communication Personnel and Equipment, Support Platoon, Airborne Infantry Battalion.




Figure 14-19. Communication Personnel and Equipment, Medical Platoon, Airborne Infantry Battalion.




Figure 14-20. Communication Personnel and Equipment, Maintenance Platoon, Airborne Infantry Battalion.

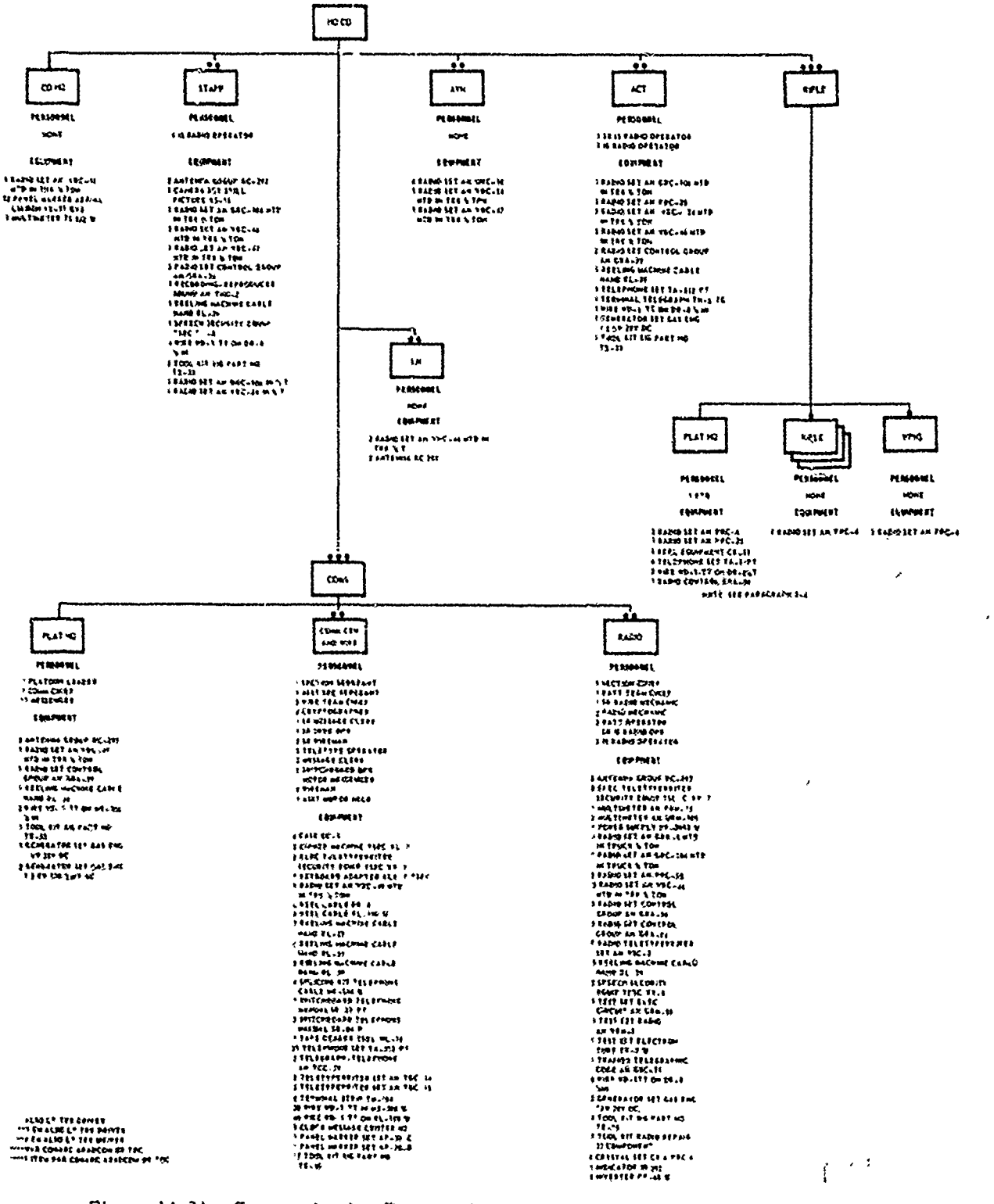


Figure 14-21. Communication Personnel and Equipment, Headquarters and Headquarters Company, Airborne Brigade.

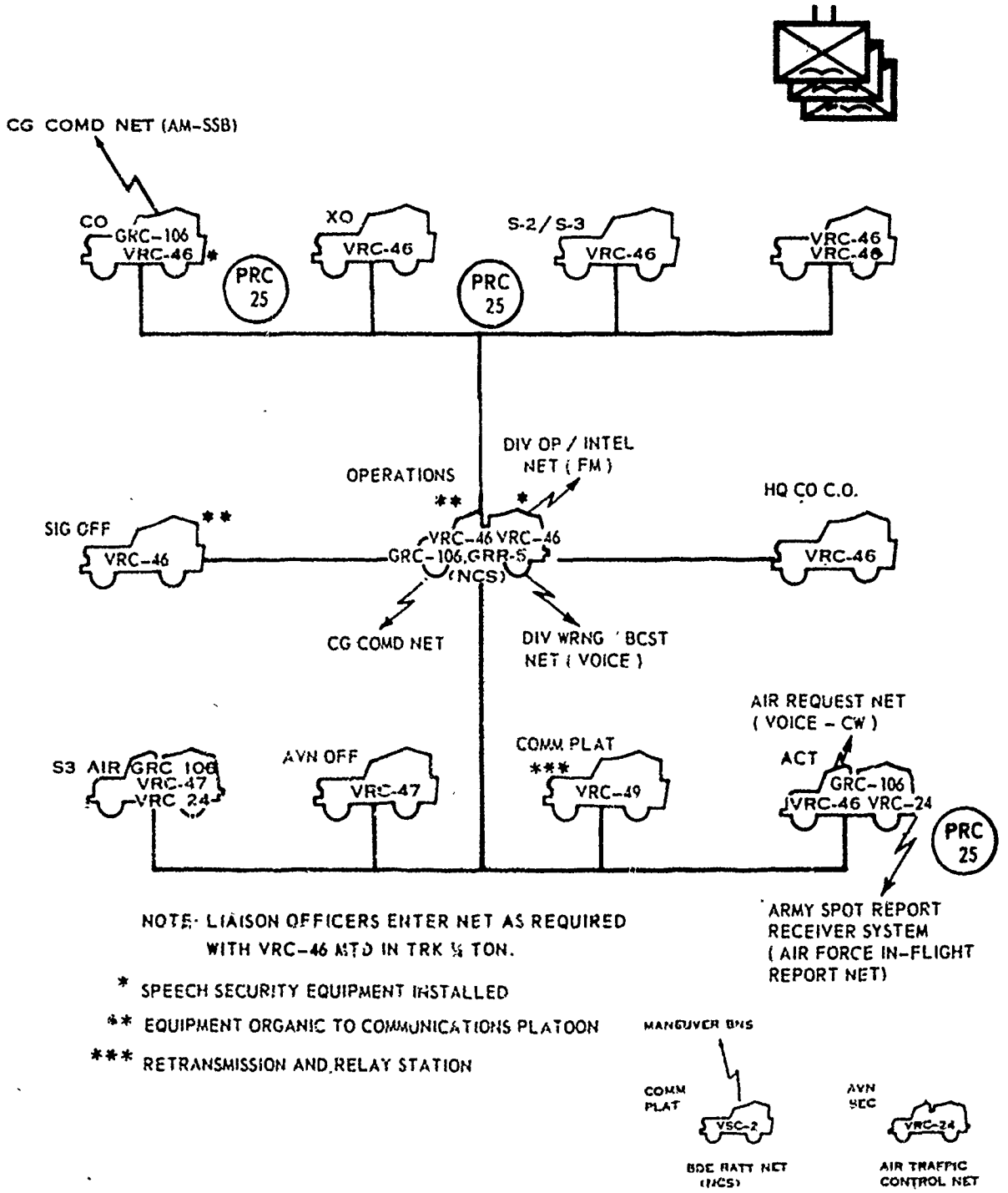
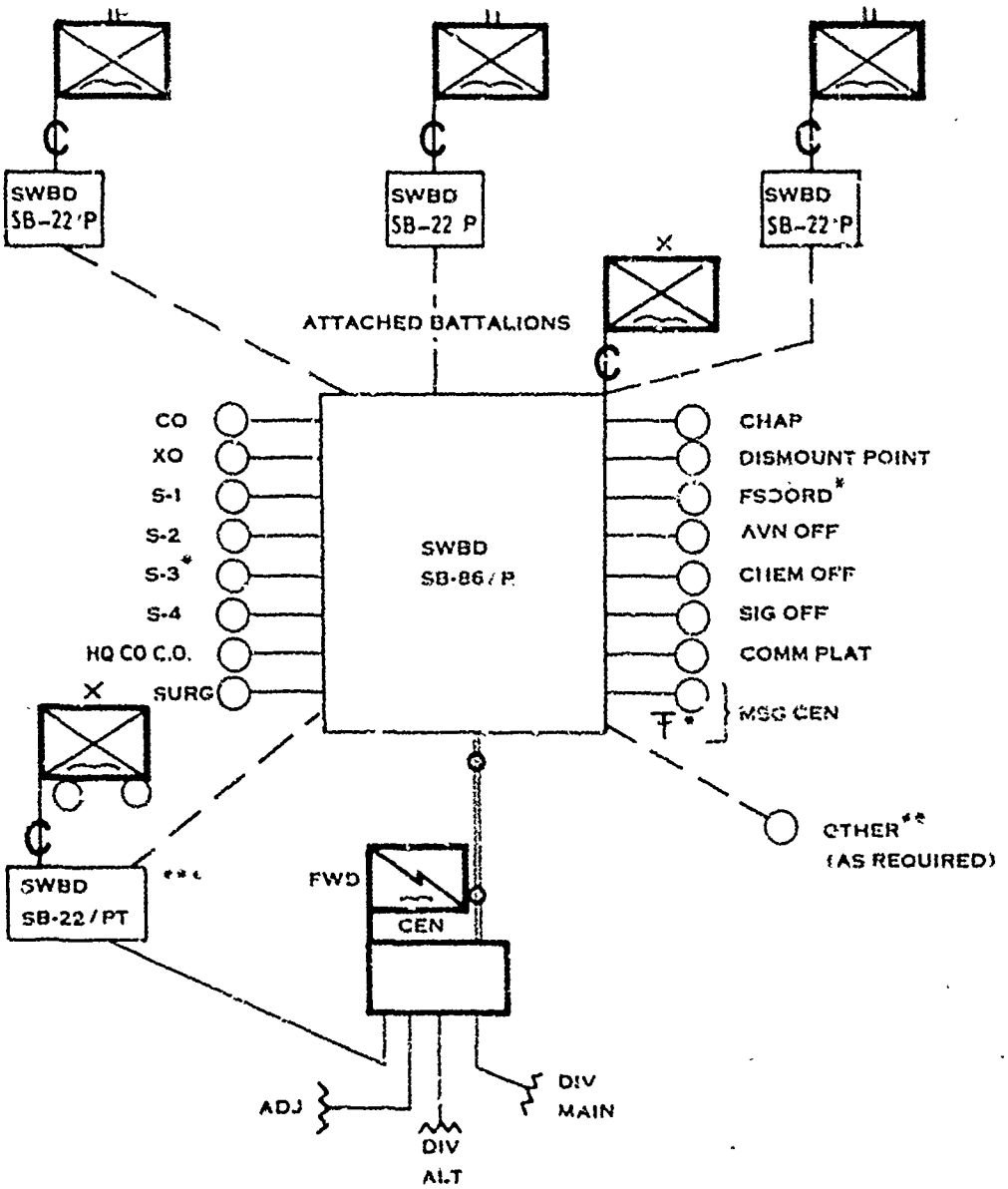



Figure 14-22. Type Command Net, Airborne Brigade.




Figure 14-23. Other Nets.




NOTES:

*HOTLINES WILL ALSO BE ESTABLISHED INTO AREA SYSTEM TO DIVISION.

**INCLUDES OTHER SUPPORT OR ATTACHED UNITS, RADIO TRUCKS, AND AUGMENTATIONS.

***INITIAL WIRE COMMUNICATIONS ESTABLISHED THROUGH AREA SYSTEM.

Figure 14-24. Type Wire System, Airborne Brigade.

## NOTES

# CHAPTER 15

# COMMUNICATIONS

# MECHANIZED INFANTRY

# BATTALIONS AND BRIGADES

| | TOE |
|---|---|
| HHC BDE | 37-12G |
| Bn | 7-45G |
| HHC Bn | 7-46G |
| Rifle Co | 7-47G |

TAB HERE

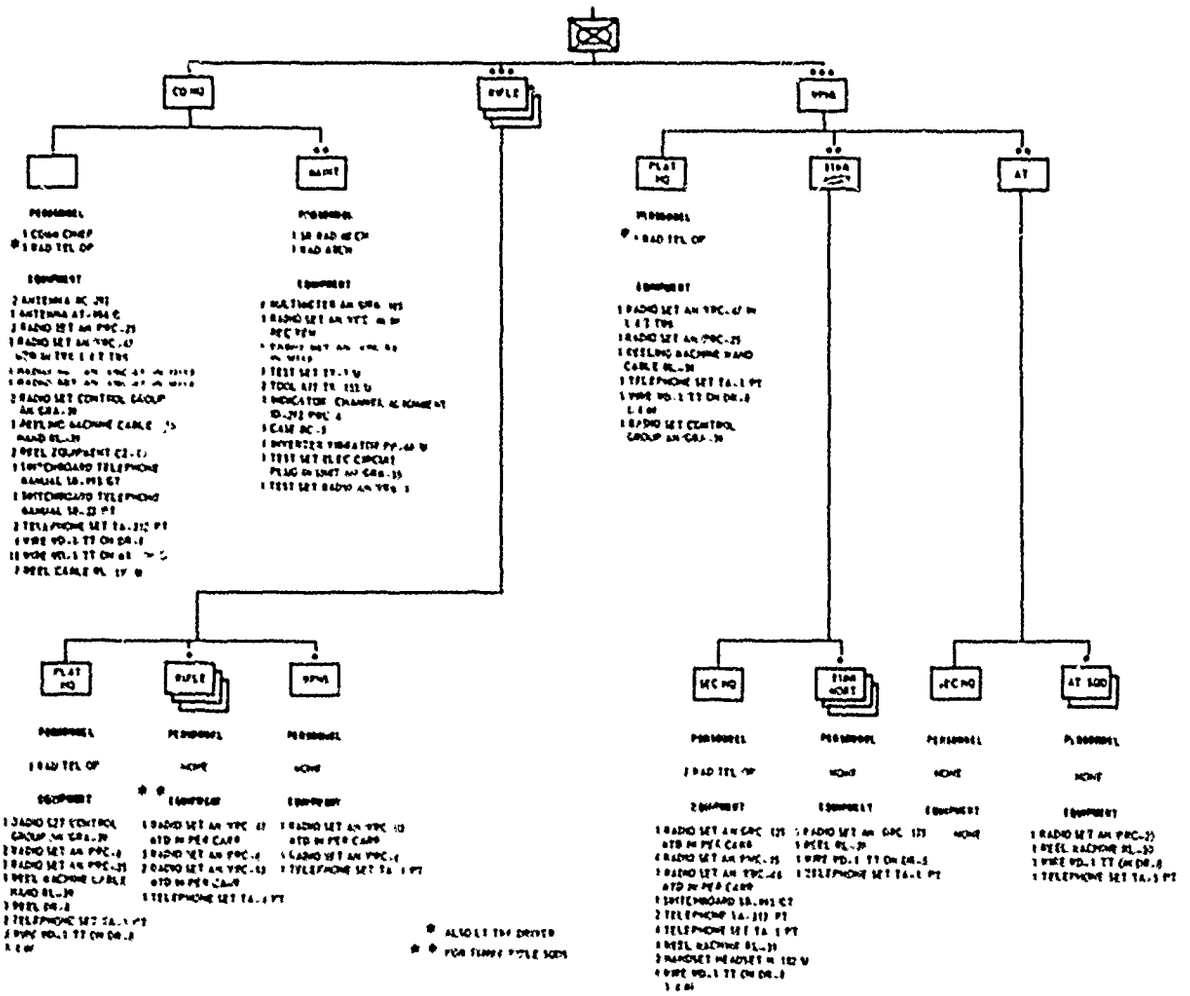
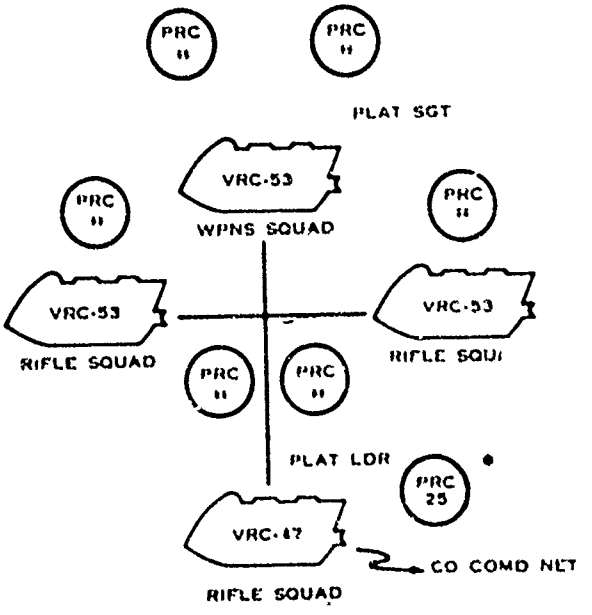


Figure 15-1. Communication personnel and equipment, rifle company, mechanized infantry battalion.




*DISMOUNTED USE

NOTE ALL PLATOONS IDENTICAL
SEE PARAGRAPH 3-4

Figure 15-2. Type Radio Net, Rifle Platoon, Mechanized Rifle Company.

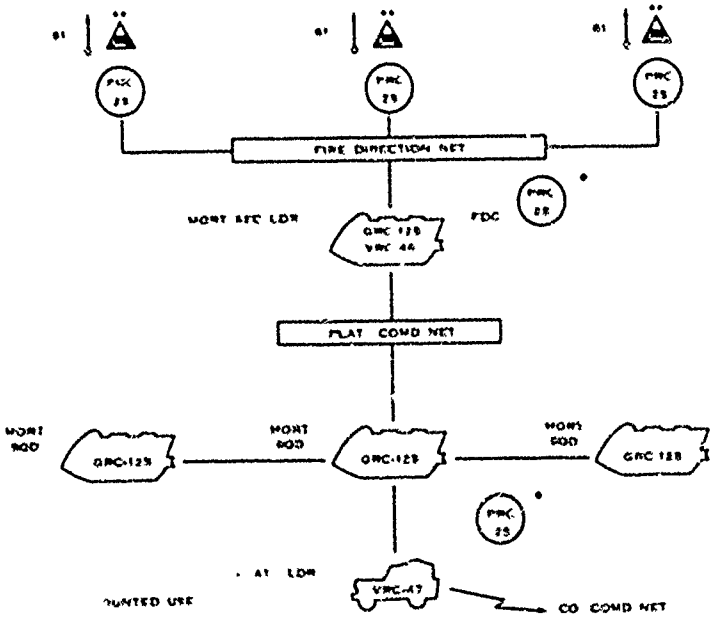



Figure 15- Type Radio Nets, Weapons Platoon, Mechanized Rifle Company

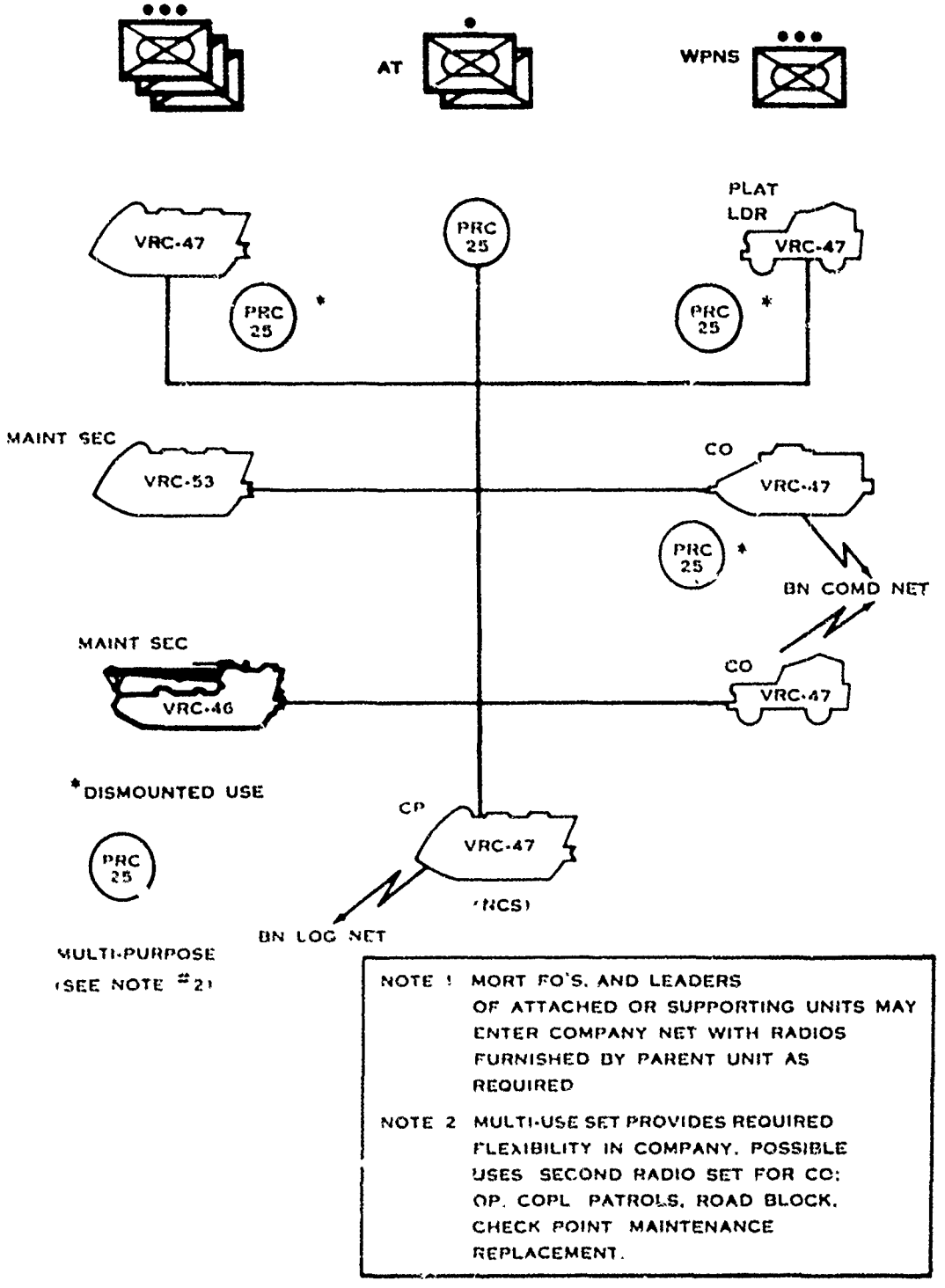



Figure 15-4. Type Radio Net, Rifle Company, Mechanized Infantry Battalion

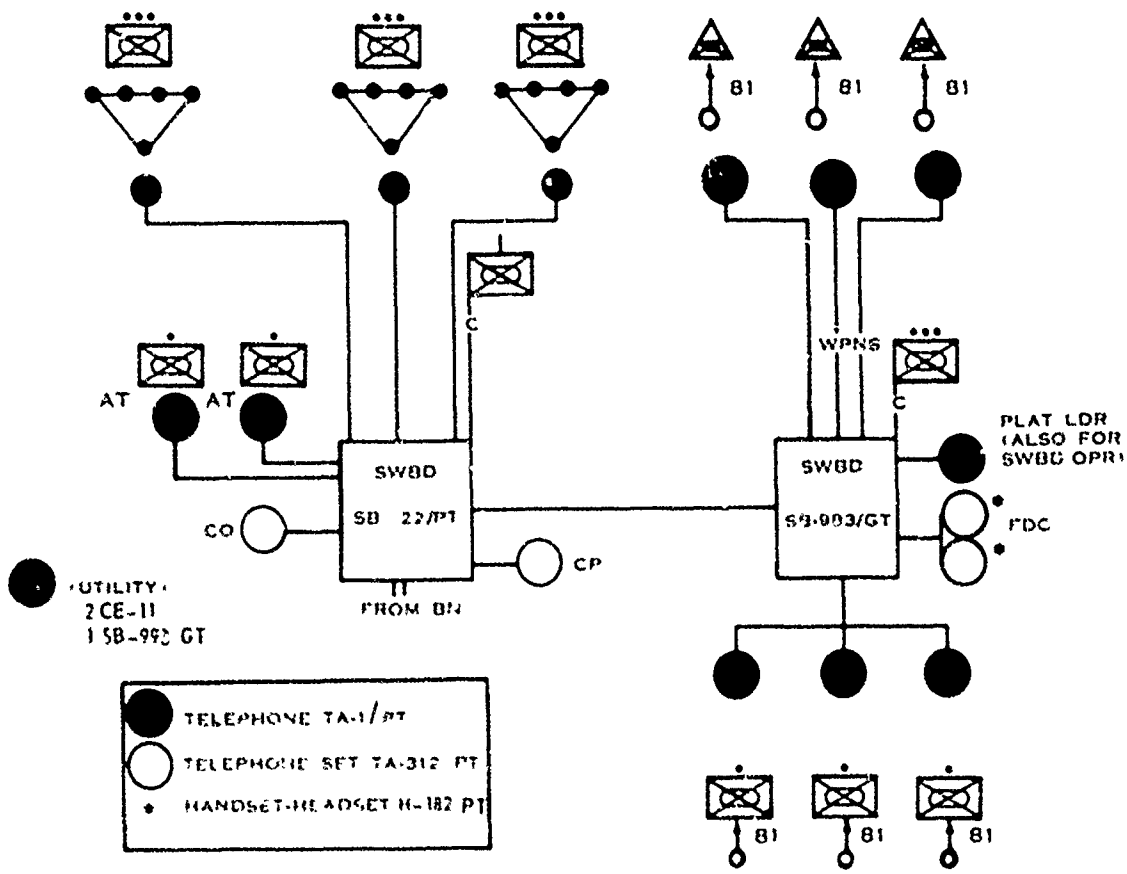



Figure 15-5. Type wire system, rifle company mechanized infantry battalion

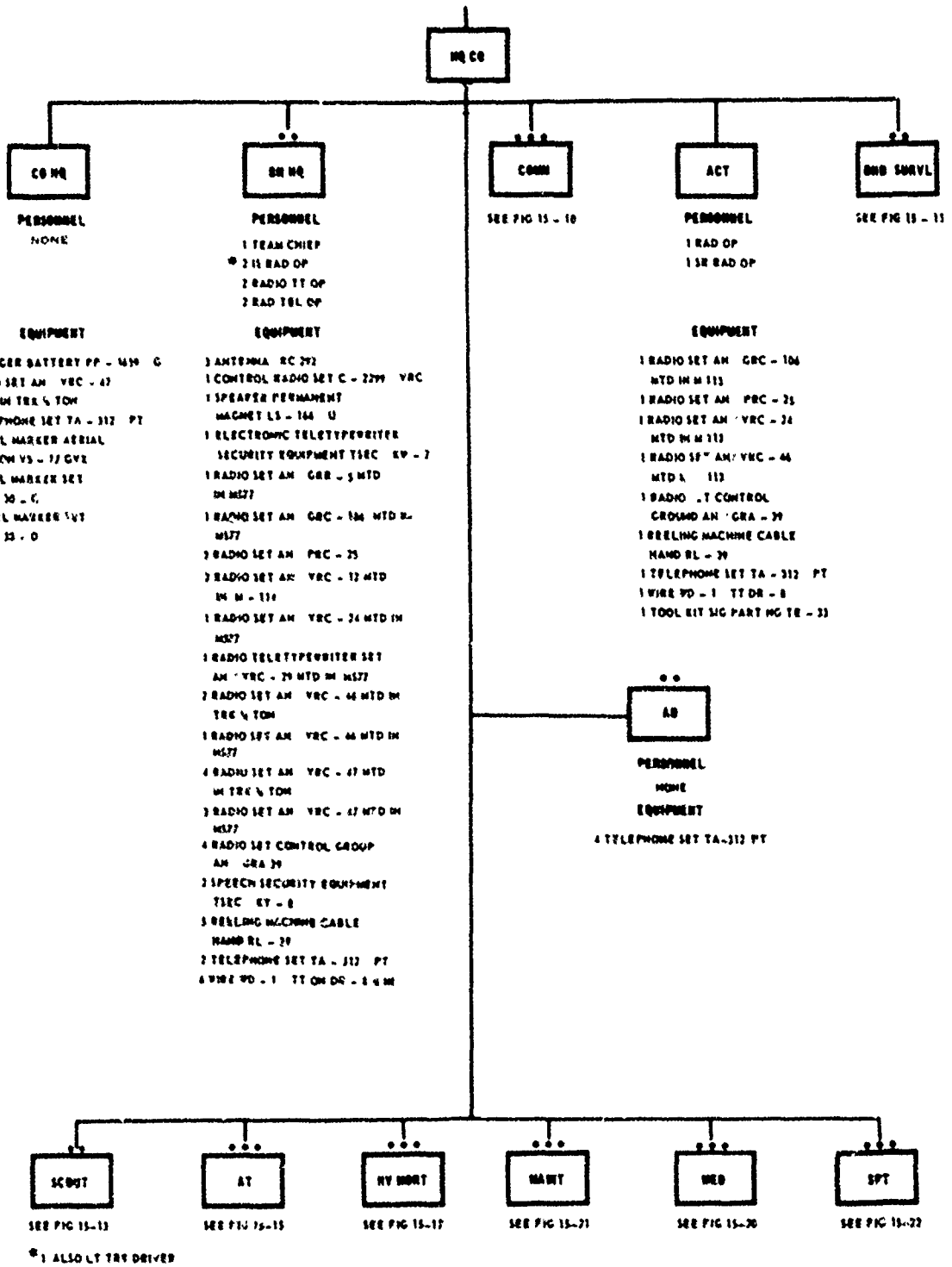
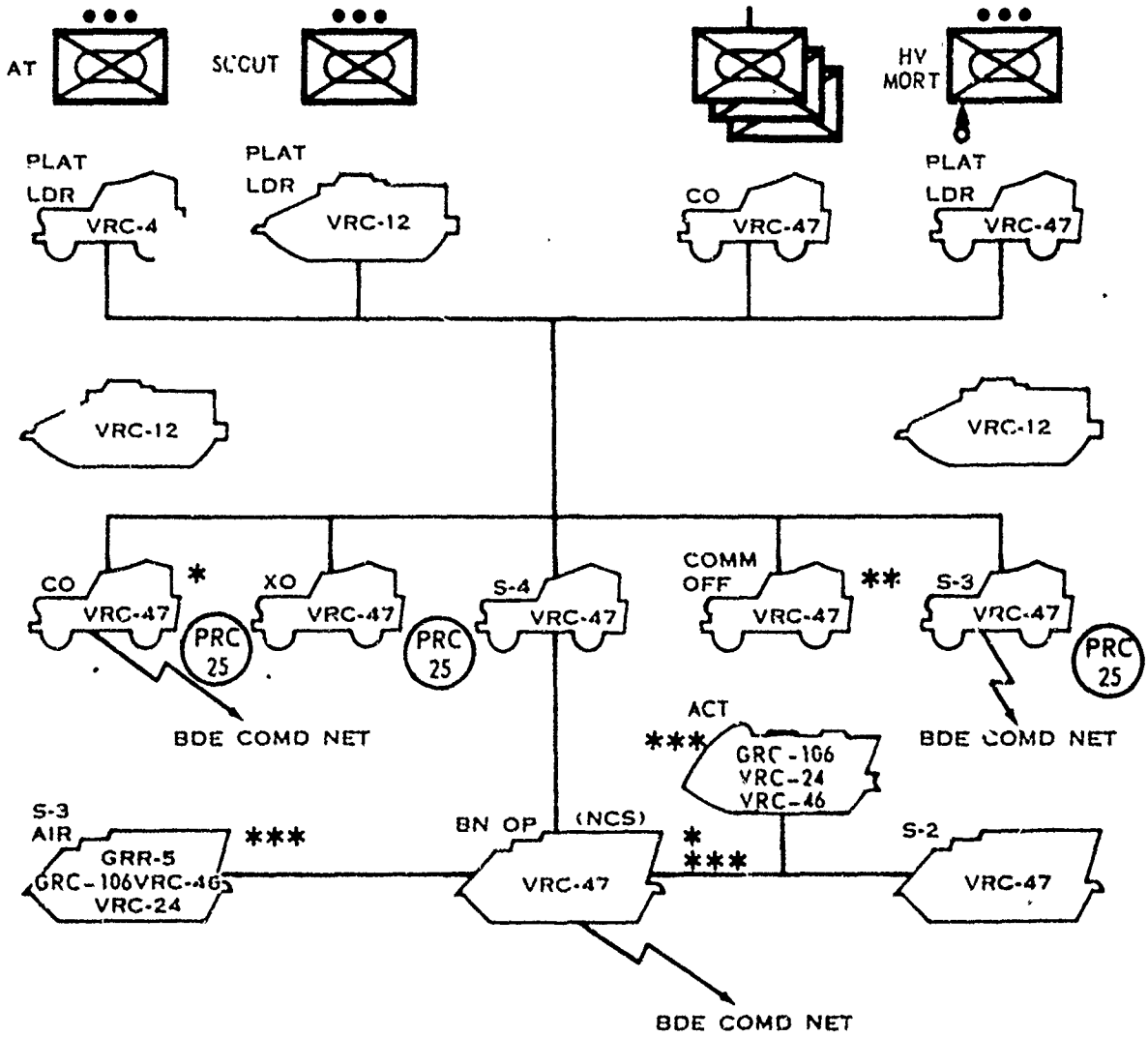



Figure 15-6. Communication Personnel and Equipment, Headquarters and Headquarters Company, Mechanized Infantry Battalion



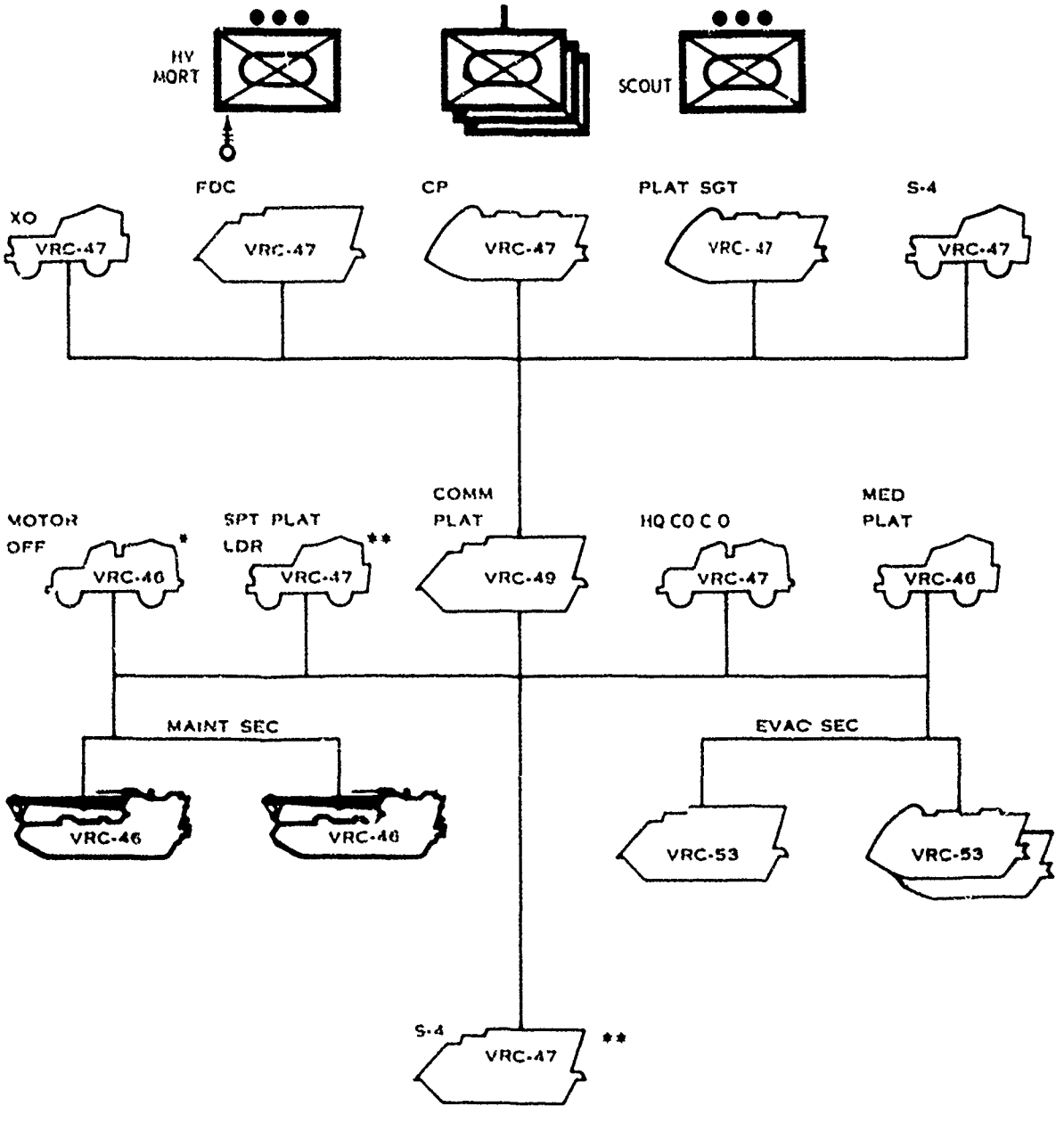

* SPEECH SECURITY EQUIPMENT INSTALLED

** ORGANIC TO COMMUNICATION PLATOON.

*** SEE FIGURE 15-23. (EMPLOYMENT AM RADIOS) FOR USE OF ALL EQUIPMENT

NOTE: LIAISON OFFICERS ENTER NET AS REQUIRED WITH AN VRC-46 MOUNTED IN 1/4 T TRUCKS.

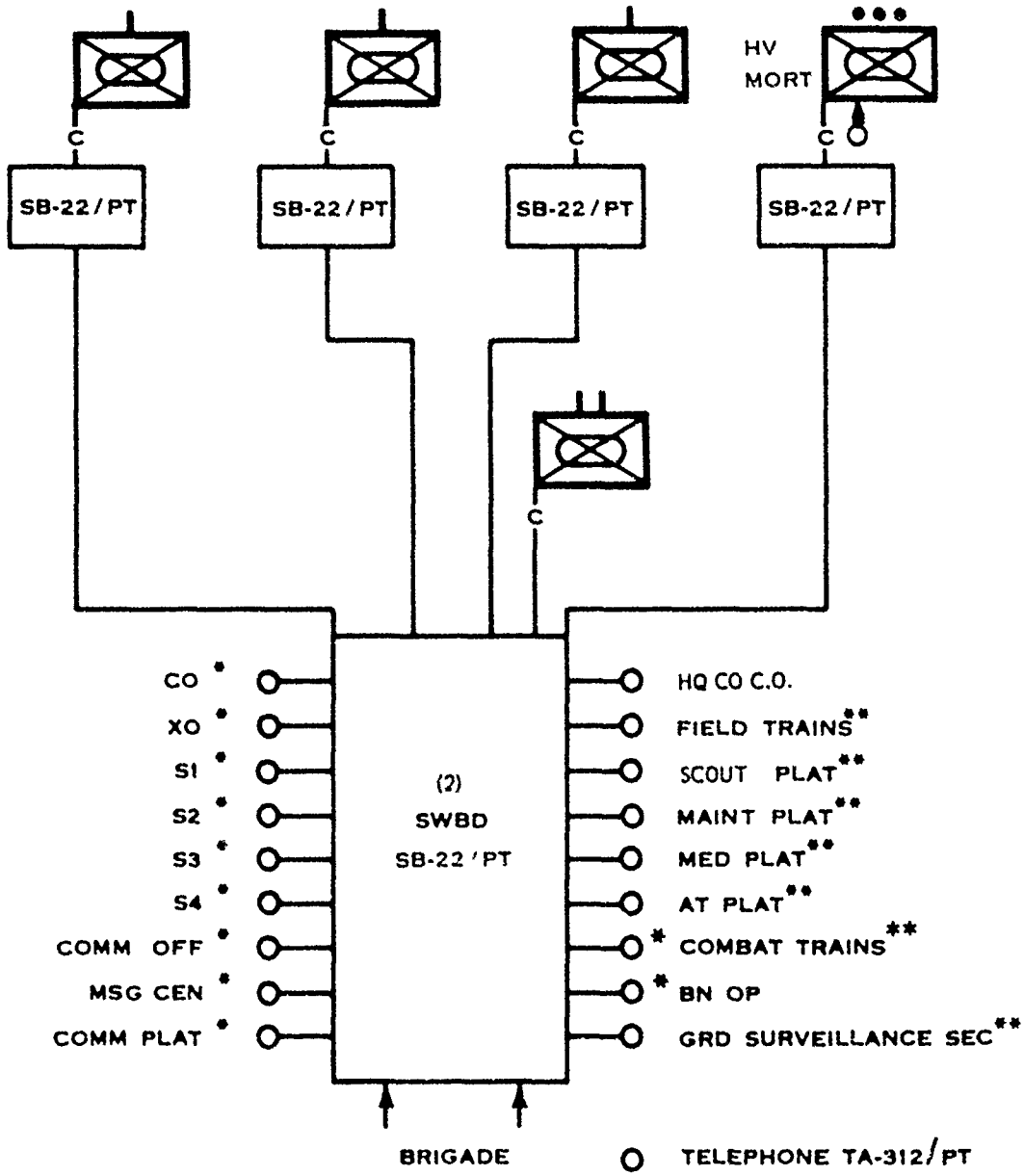
Figure 15-7. Type Command Net, Mechanized Infantry Battalion




*ORGANIC TO MAINTENANCE PLATOON

**ENTERS BRIGADE LOGISTICAL NET AS REQUIRED

Figure 15-8. Type Logistical Net, Mechanized Infantry Battalion.




*ORGANIC TO COMMUNICATION PLATOON
**TIE INTO BN WIRE SYSTEM
AT NEAREST SWITCHBOARD

Figure 15-9. Type Wire System, Mechanized Infantry Battalion




**PERSONNEL**

1 COMM CHIEF
1 RADAR MECHANIC
1 SR RADIO MECHANIC
1 PER CARRIER DVR
2 RADIO MECHANIC
1 SR MESSAGE CLERK
1 SENIOR WIREMAN
1 SWITCHBOARD OP
*2 MESSAGE CLERK
**2 MOTOR MESSENGER
*2 WIREMEN

**EQUIPMENT**

3 ANTENNA AT-784/PRC
3 ANTENNA AT-984/G
2 ANTENNA RC 292
1 REELING MACHINE CABLE HAND RL-27
2 RADIO SET CONTROL GROUP AN/GRA-39
1 CASE BC-5
2 CIPHER MACHINE TSEC KL-7
2 MODIFICATION KIT ELECTRONIC EQUIPMENT MX-898/GRC
1 MULTIMETER TS-352/U
3 MULTIMETER AN/URM-105
1 RADIO SET AN/VRC-47 MTD IN TRK 1/4 TON
1 RADIO SET AN/VRC-49 MTD IN M577
2 REELING MACHINE CABLE HAND RL-39
2 REELING MACHINE CABLE HAND RL-31
1 REELING MACHINE CABLE MOTOR DRIVEN PL-172/G
2 RETRANSMISSION CABLE KIT MK-126/G
2 SWITCHBOARD TELEPHONE MANUAL SB-22PT
12 TELEPHONE SET TA-312/PT
4 TERMINAL BOARD TM-184
2 TEST SET TV-7/U
3 TOOL KIT TK-115/U
1 TOOL KIT TK-87 ( )/U
2 INVERTER VIBRATOR PP-68/U
2 WIRE WD-1/TT ON DR-8 1/4 MI
12 WIRE WD-1/TT MX-306/G
6 WIRE WD-1/TT RL-159/U
2 REEL CABLE RL-159/U
1 SPLICING KIT TELEPHONE CABLE MK-356/G
1 TEST SET AN UPM-93
1 TEST SET AN/GRM-55
1 TEST SET RADIO AN VRM-1
1 CLOCK MESSAGE CENTER M-2

* 1 ALSO LT TRK DRIVER
** ALSO LT TRK DRIVER

Figure 15-10. Communication Personnel and Equipment, Communication Platoon, Mechanized Infantry Battalion.

GND
SURVL

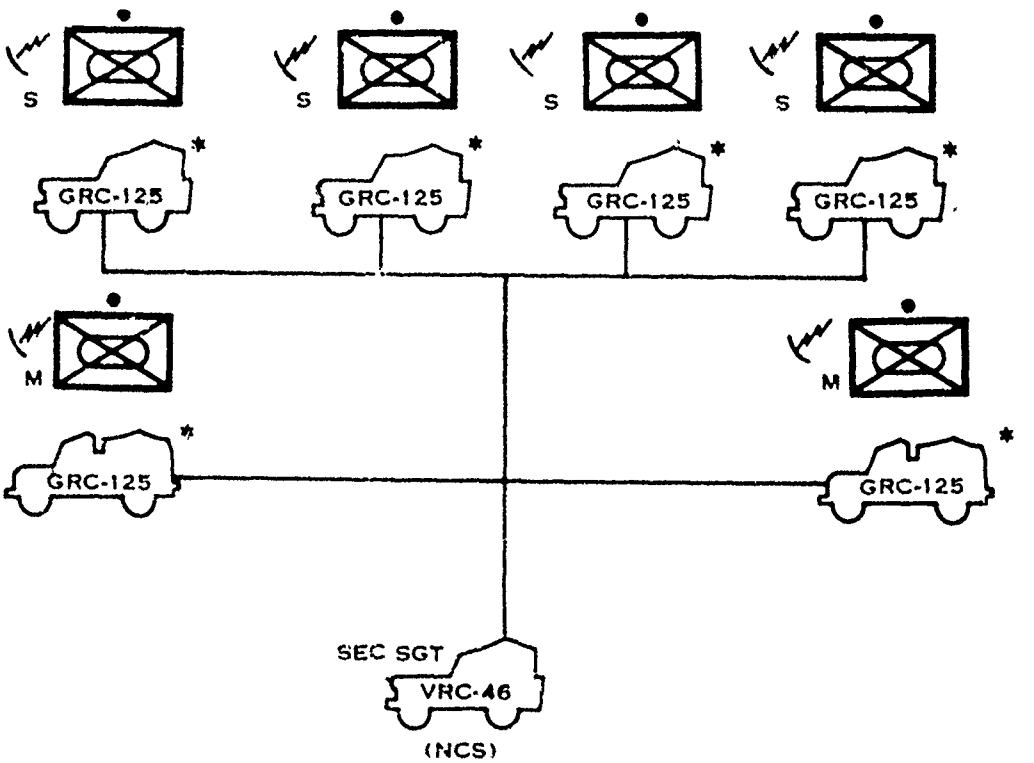
**PERSONNEL**

NONE

**EQUIPMENT**

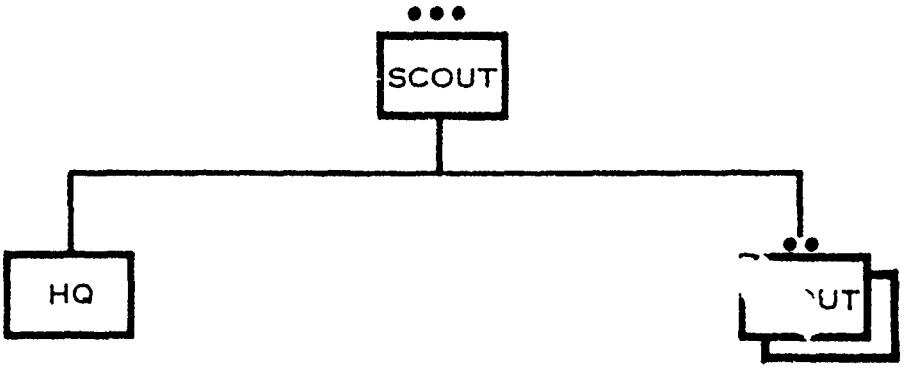
2 GENERATOR SET GAS ENG PU-442/U
4 GENERATOR SET GAS ENG PU/532/PPS-4
4 RADAR SET AN/PPS-4
2 RADAR SET AN/TPS-33
4 RADIO SET AN/GRC-125
MTD IN TRK ¼ TON
2 RADIO SET AN GRC-125
MTD IN TRK ¾ TON
1 RADIO SET AN VRC-46
MTD IN TRK ¼ TON
6 TELEPHONE SET TA-312/PT
1 TEST SET AN UPM-93
6 WIRE WD-1 TT ON DR-8 ½ MI

Figure 15-11. Communication Personnel and Equipment, Ground Surveillance Section, Mechanized Infantry Battalion




*ALSO HAS DISMOUNTED CAPABILITY.
NOTE: S2 ENTERS NET AS REQUIRED

Figure 15-12. Type Radio Net, Ground Surveillance Section, Mechanized Infantry Battalion.




**PERSONNEL**

1 RADIO TELEPHONE OPERATOR

**EQUIPMENT**

1 RADIO SET AN/VRC-12 IN M114
1 RADIO SET AN/VRC-47 IN M113
1 RADIO SET CONTROL GROUP AN/GRA-39
2 REELING MACHINE CABLE HAND RL-39
4 WIRE WD-1/TT ON DR-8 ¼ MI
2 REEL EQUIPMENT CE-11
1 TELEPHONE TA 312/PT
2 TOOL SETS TE33

**PERSONNEL**

NONE

**EQUIPMENT**

2 ANTENNA AT-784/PRC
2 RADIO SET AN/GRC-125 MTD IN CVR M-114
2 RADIO SET AN/VRC-46 MTD IN CVR M-114
4 REEL EQUIP CE-11
4 WIRE ON DR-8 ¼ MI
4 TOOL SETS TE 33

Figure 15-13. Communication Personnel and Equipment, Scout Platoon, Mechanized Infantry Battalion.

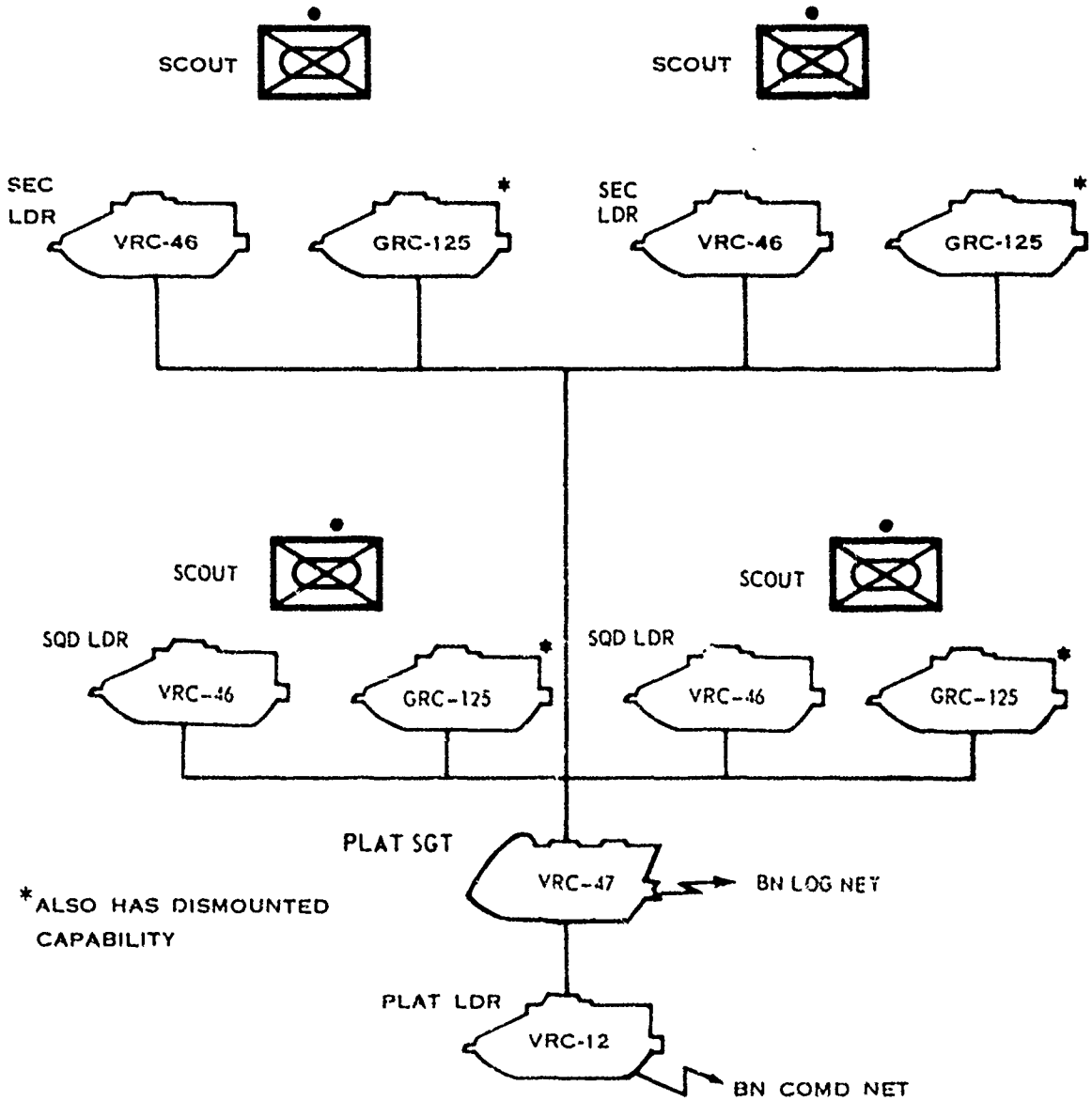



Figure 15-11. Type Radio Net Platoon, Mechanized Infantry Battalion

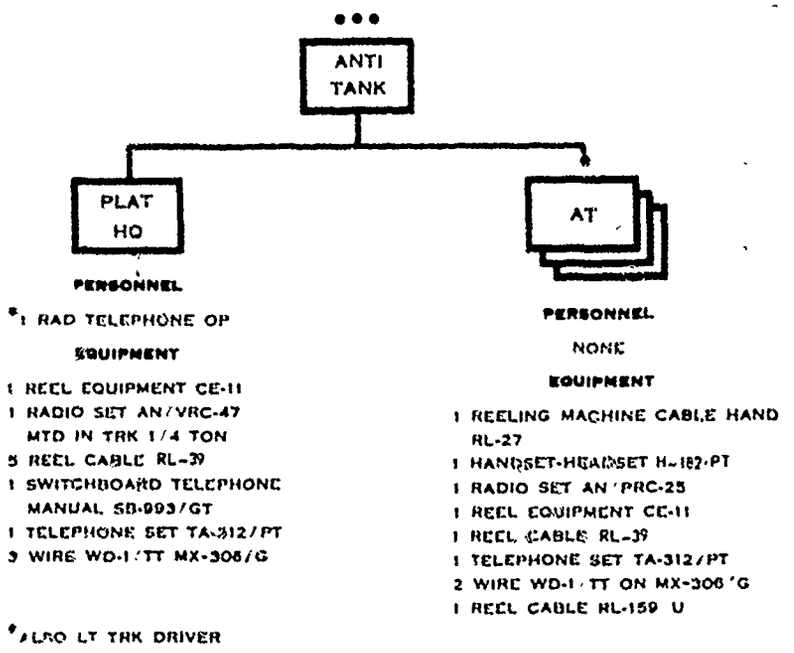



Figure 15-15. Communication Personnel and Equipment, Antitank Platoon, Mechanized Infantry Battalion

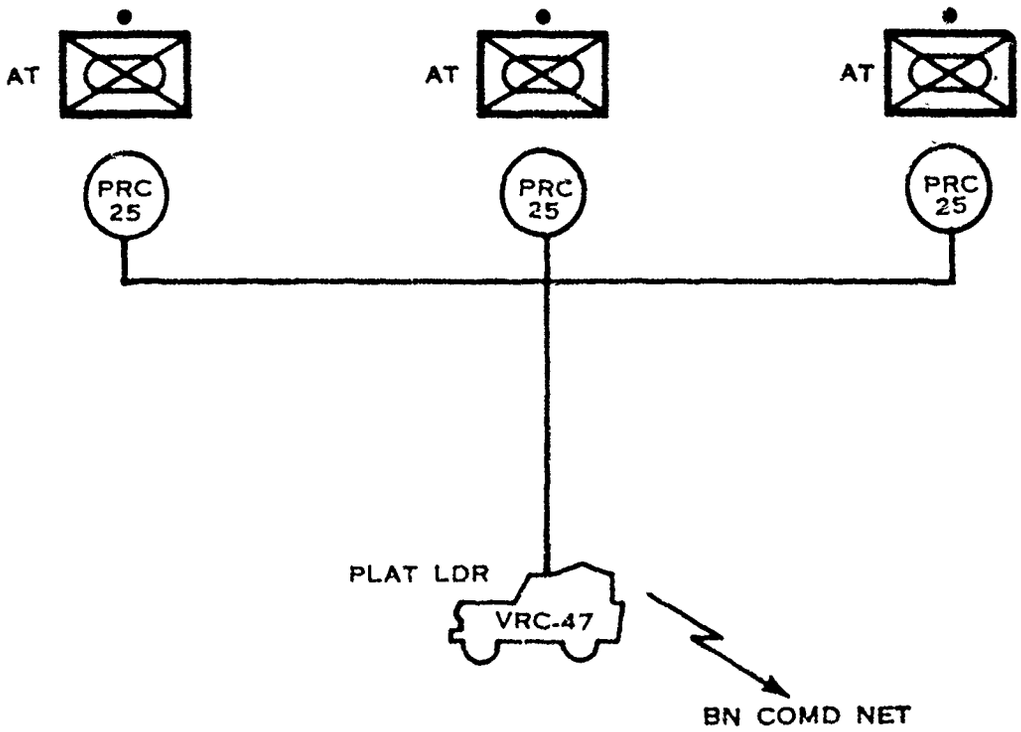
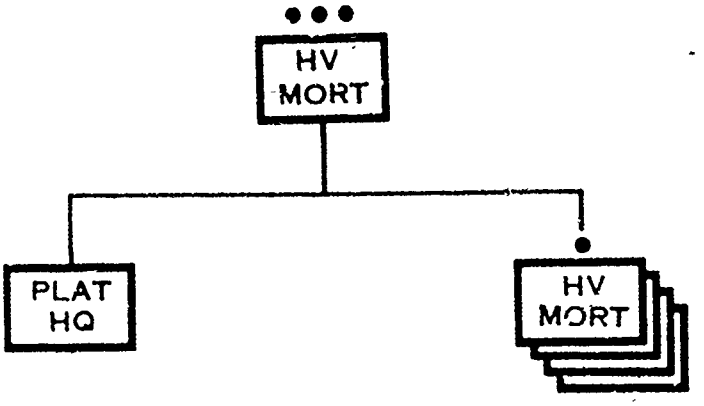



Figure 15-16. Type Radio Net, Antitank Platoon, Mechanized Infantry Battalion.




**PERSONNEL**

* 4 RAD TELEPHONE OP

**EQUIPMENT**

6 HANDSET-HEADSET H-182/U
3 RADIO SET AN/PRC-25
3 RADIO SET AN/VRC-46
MTD IN TRK ¼ TON
1 RADIO SET AN/VRC-47
MTD IN TRK ¼ TON
1 RADIO SET AN/VRC-47
IN M577
1 RADIO SET AN/VRC-53
IN M577
4 RADIO SET CONTROL GROUP
AN GRA-39
2 REELING MACHINE CABLE
HAND RL-39
1 SWITCHBOARD TELEPHONE
MANUAL SB-22/PT
1 TELEPHONE CONNECTING AND
SWITCHING GROUP MX-155/GT
11 TELEPHONE SET TA-312/PT
8 WIRE WD-1/TT ON DR-8 ¼ MI

**PERSONNEL**

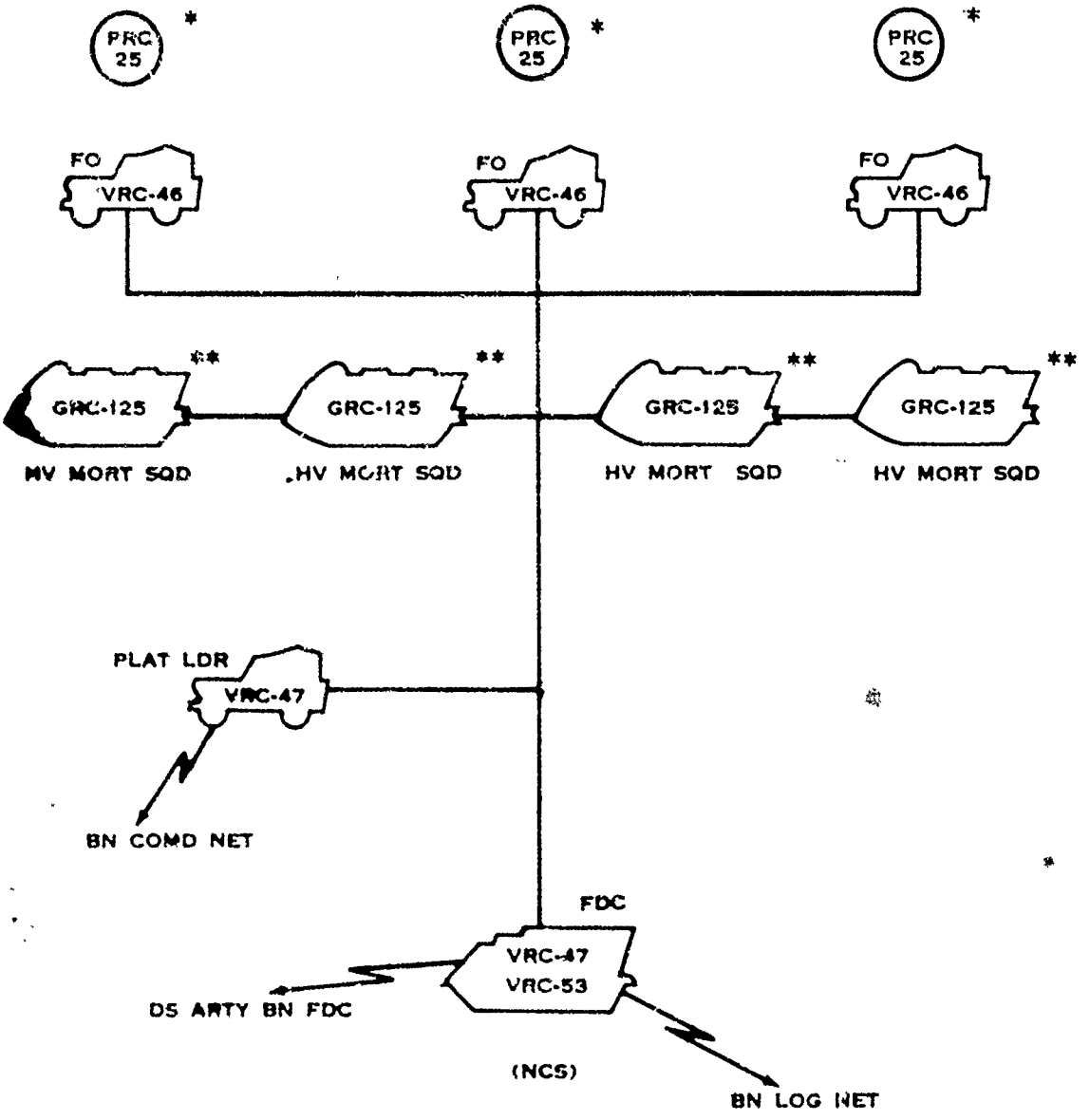
NONE

**EQUIPMENT**

1 RADIO SET AN/GRC-125 MTD
IN CARRIER MORTAR HEAVY
1 REEL EQUIPMENT CE-11
1 WIRE WD-1/TT ON DR-8
1/4 MI

*ALSO LT TRK DRIVER

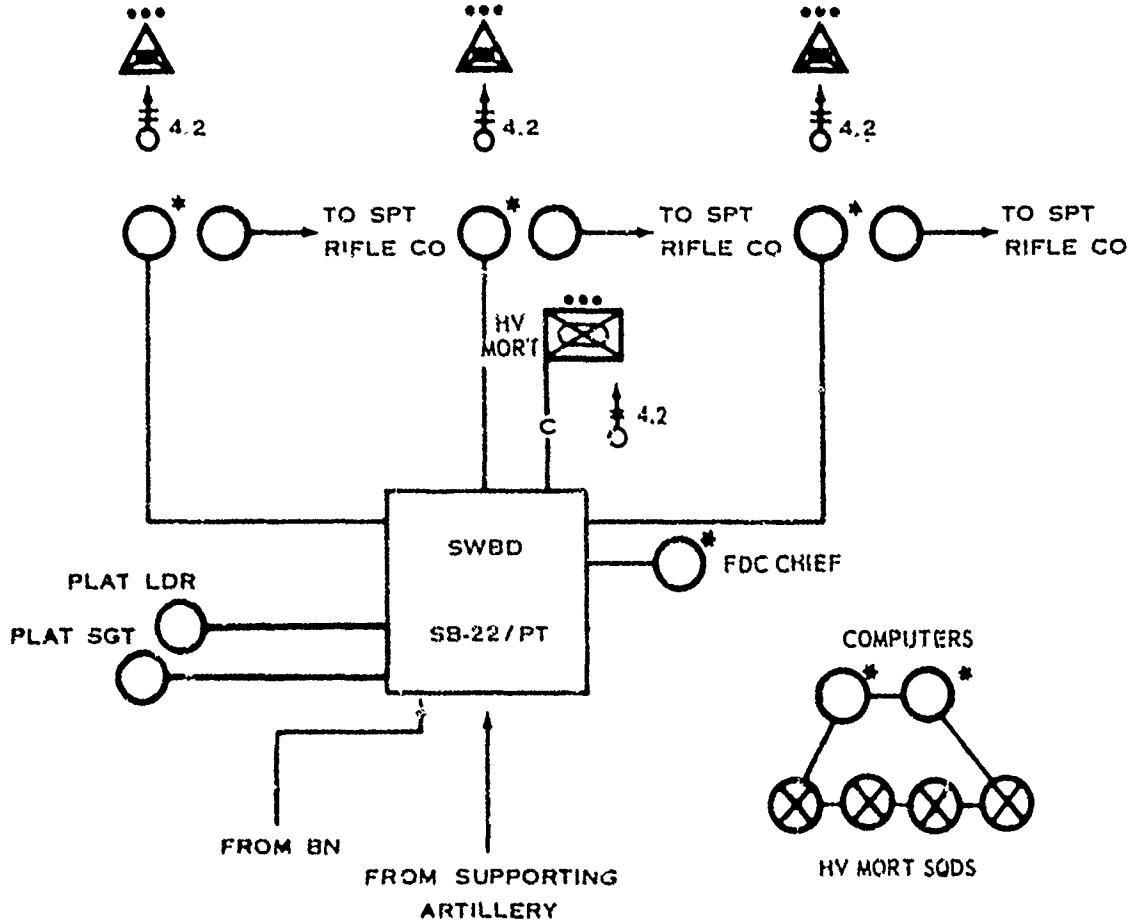
Figure 15-17. Communication Personnel and Equipment, Heavy Mortar Platoon, Mechanized Infantry Battalion.




*DISMOUNTED USE.

**ALSO HAS DISMOUNTED CAPABILITY.

Figure 15-18. Type Fire Direction Net, Heavy Mortar Platoon, Mechanized Infantry Battalion.




NOTE: LINES TO FO'S LAID ONLY WHEN TIME PERMITS.

TELEPHONE TA-312

REEL EQUIPMENT CE-11 (WITH TELEPHONE SET TA-1/PT)

* HANDSET-HEADSET H-182/PT

Figure 15-19. Type Wire System, Heavy Mortar Platoon Mechanized Infantry Battalion.




**PERSONNEL**

NONE

**EQUIPMENT**

3 AMPLIFIER-POWER SUPPLY OA-3633/PRC-25
2 RADIO SET AN/VRC-53 MTD IN CARR PER M-113
1 RADIO SET AN/VRC-53 MTD IN CARR CP M-577
1 RADIO SET AN/VRC-46 MTD IN TRK 1/4 TON
1 TELEPHONE SET TA-312/PT
3 INTERCOM SET AN/VIC-1

Figure 15-20. Communication Personnel and Equipment, Medical Platoon, Mechanized Infantry Battalion.



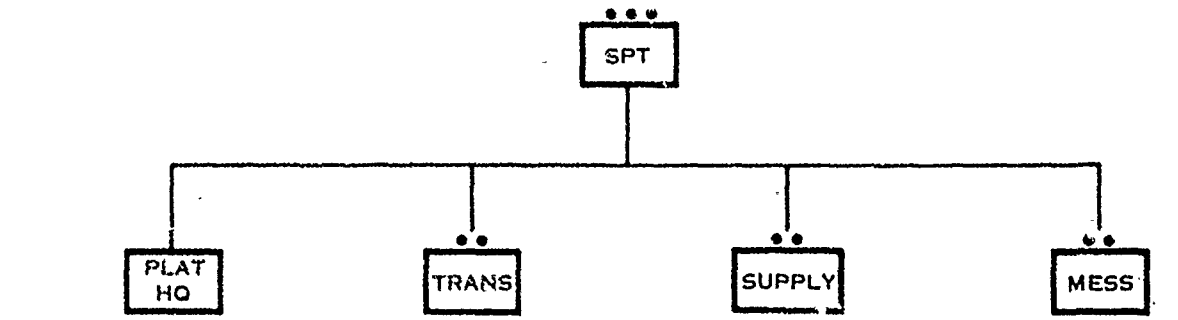

**PERSONNEL**

NONE

**EQUIPMENT**

2 RADIO SET AN/VRC-46 MTD IN RECOVERY VEHICLE FULL TRACKED
1 RADIO SET AN/VRC-46 MTD IN TRK 3/4 TON
1 REELING MACHINE CABLE HAND RL-39
1 TELEPHONE SET TA-312/PT
1 WIRE WD-1/TT ON DR-8 1/4 MI

Figure 15-21. Communication Personnel and Equipment, Maintenance Platoon, Mechanized Infantry Battalion.



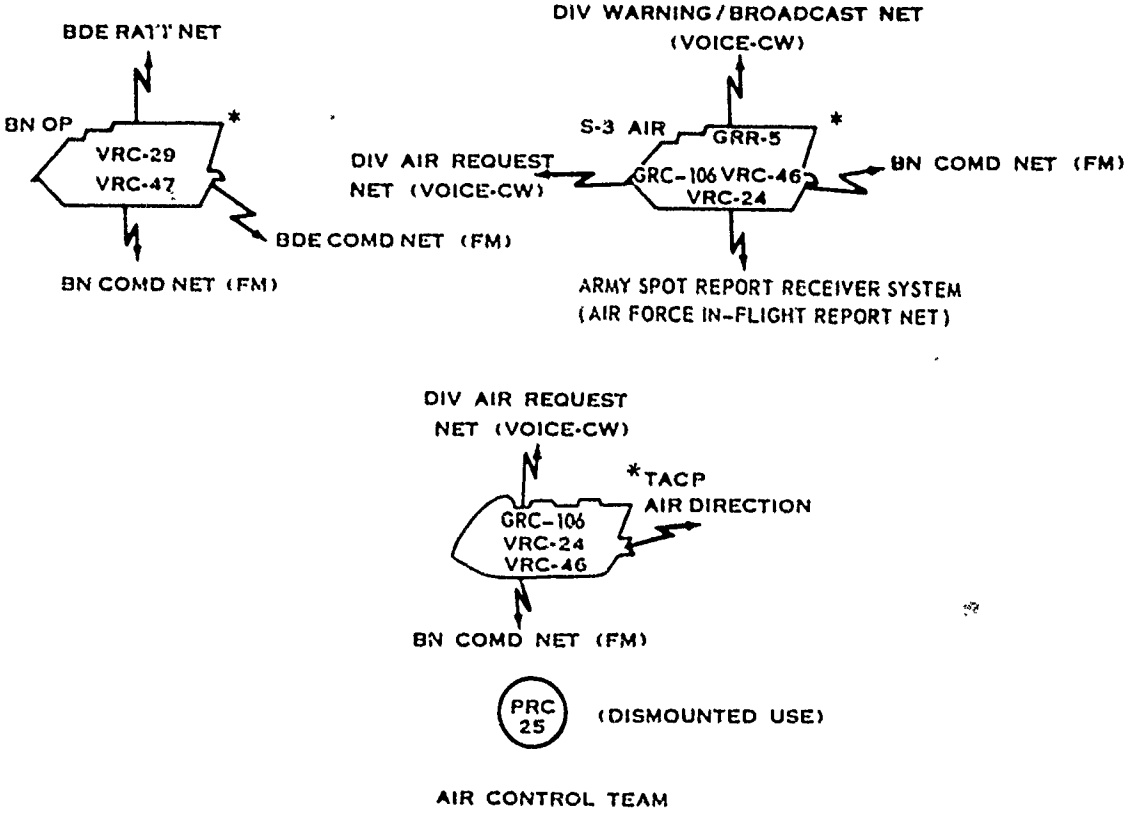

**PERSONNEL**
NONE
**EQUIPMENT**
1 RADIO SET AN/VRC-47 MTD IN TRK 1 4 TON
1 REELING MACHINE CABLE HAND RL-39
1 TELEPHONE SET TA-312/PT
1 WIRE WD-1/TT ON DR-8 1/4 MI

**PERSONNEL**
NONE
**EQUIPMENT**
NONE

**PERSONNEL**
NONE
**EQUIPMENT**
1 REELING MACHINE CABLE HAND RL-39
1 TELEPHONE SET TA-312/PT
1 WIRE WD-1/TT ON DR-8 1/4 MI

**PERSONNEL**
NONE
**EQUIPMENT**
NONE

Figure 15-22. Communication Personnel and Equipment, Support Platoon, Mechanized Infantry Battalion.




*SAME VEHICLE AS SHOWN IN FIGURE 15-7 BATTALION COMMAND NET

Figure 15-23. Type Employment, AM Radio Equipment, Mechanized Infantry Battalion.

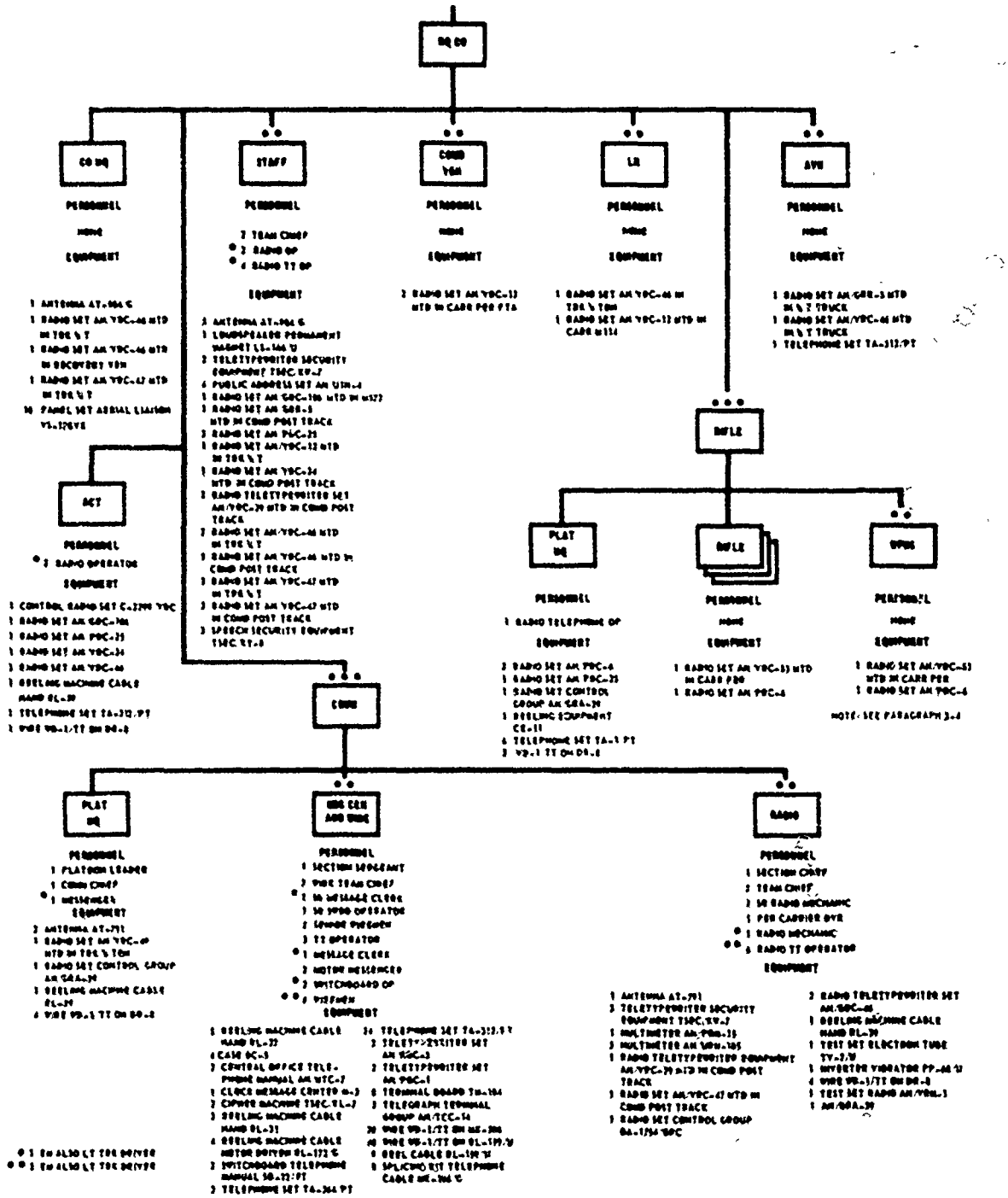
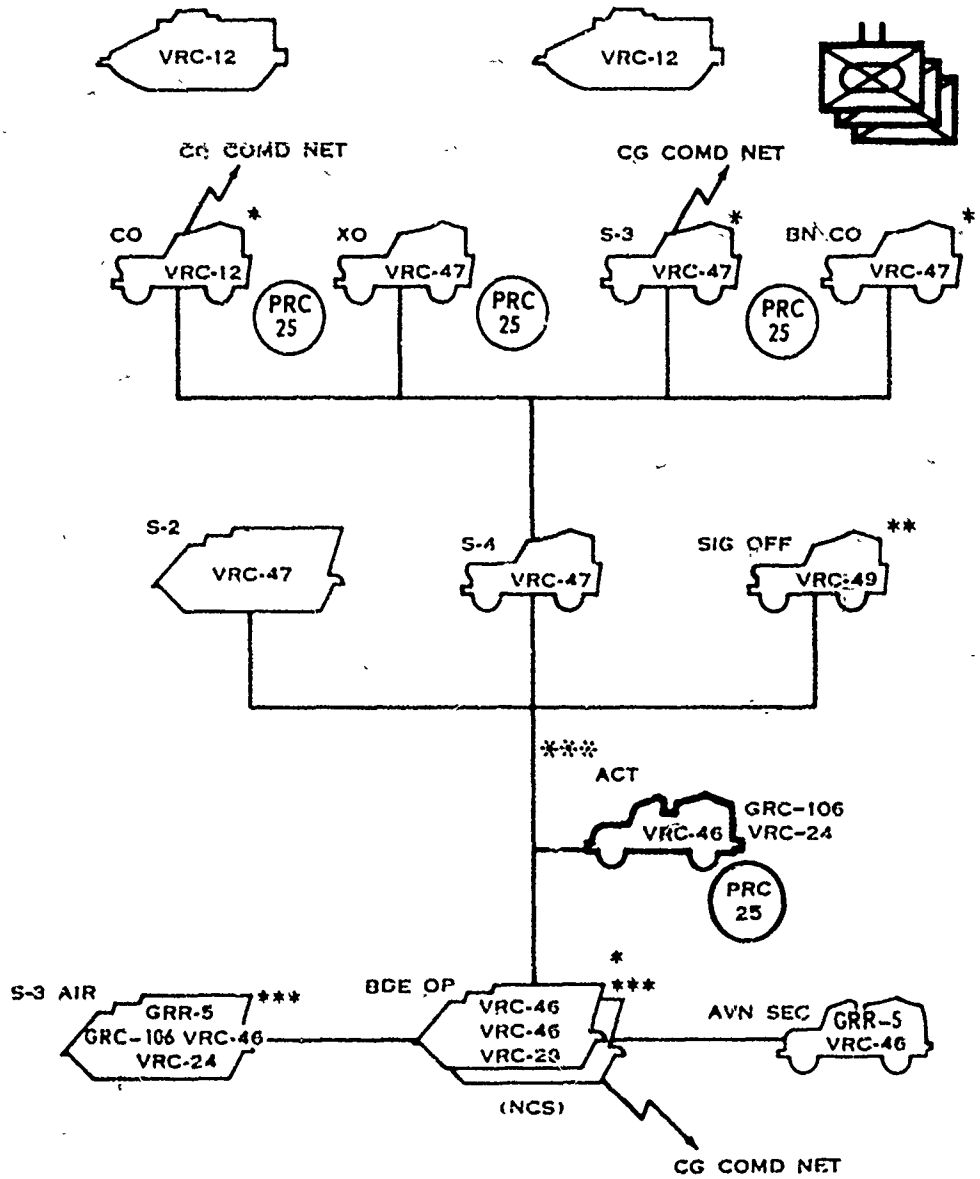
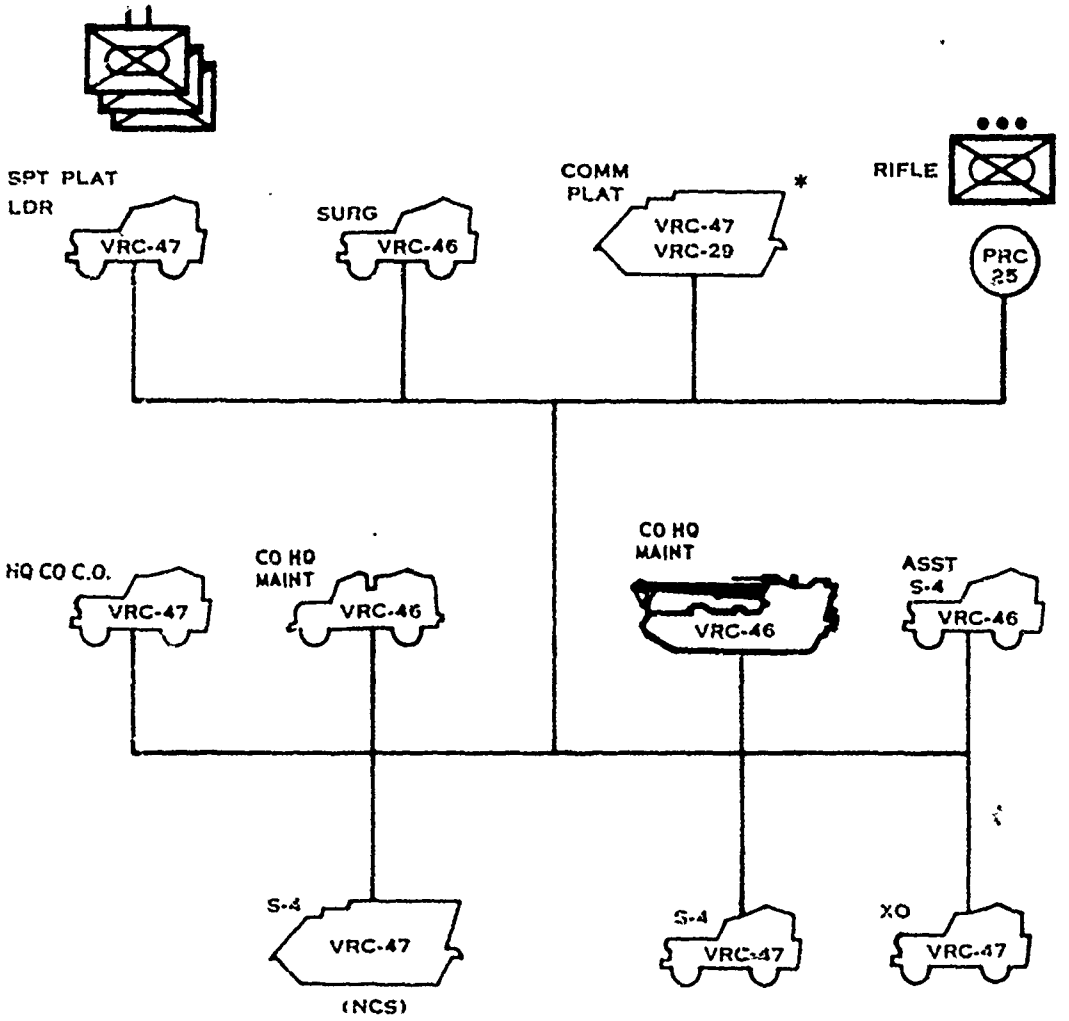


Figure 15-24. Communication Personnel and Equipment, Headquarters and Headquarters Company, Mechanized Brigade



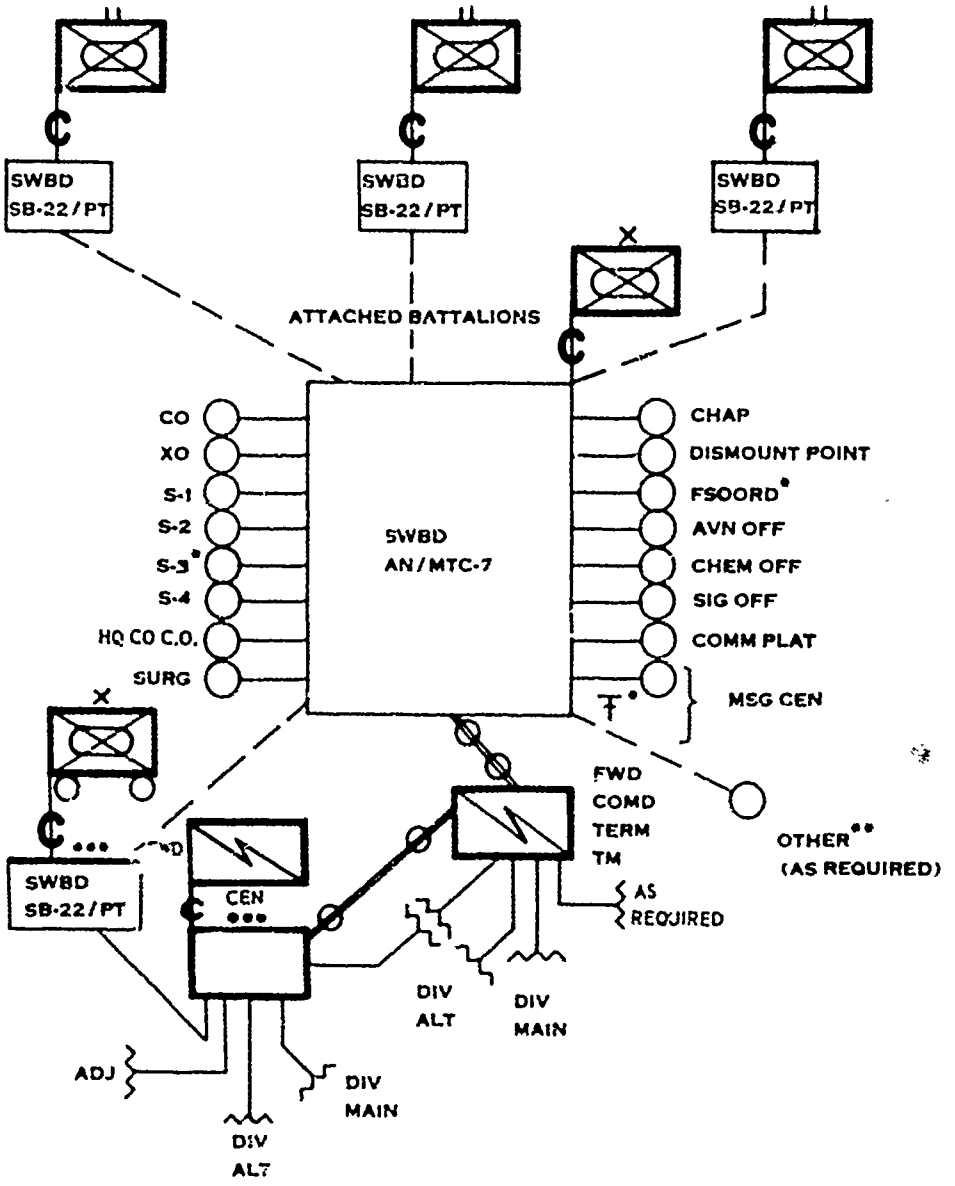

*SPEECH SECURITY EQUIPMENT INSTALLED. (1 EACH)
**ORGANIC TO COMMUNICATION PLATOON.
***SEE FIGURE 15-28 (EMPLOYMENT AM EQUIPMENT) FOR USE OF EQUIPMENT.
NOTE: LIAISON OFFICERS ENTER NET AS REQUIRED WITH AN/VRC-46 MTD IN 1/4 T TRUCK AND AN/VRC-12 MOUNTED IN M114.

Figure 15-25. Type Command Net, Mechanized Brigade.




*SEE FIGURE 15-28 (EMPLOYMENT, AM RADIO EQUIPMENT) FOR USE OF EQUIPMENT.

Figure 15-26. Type Logistical Net, Mechanized Brigade



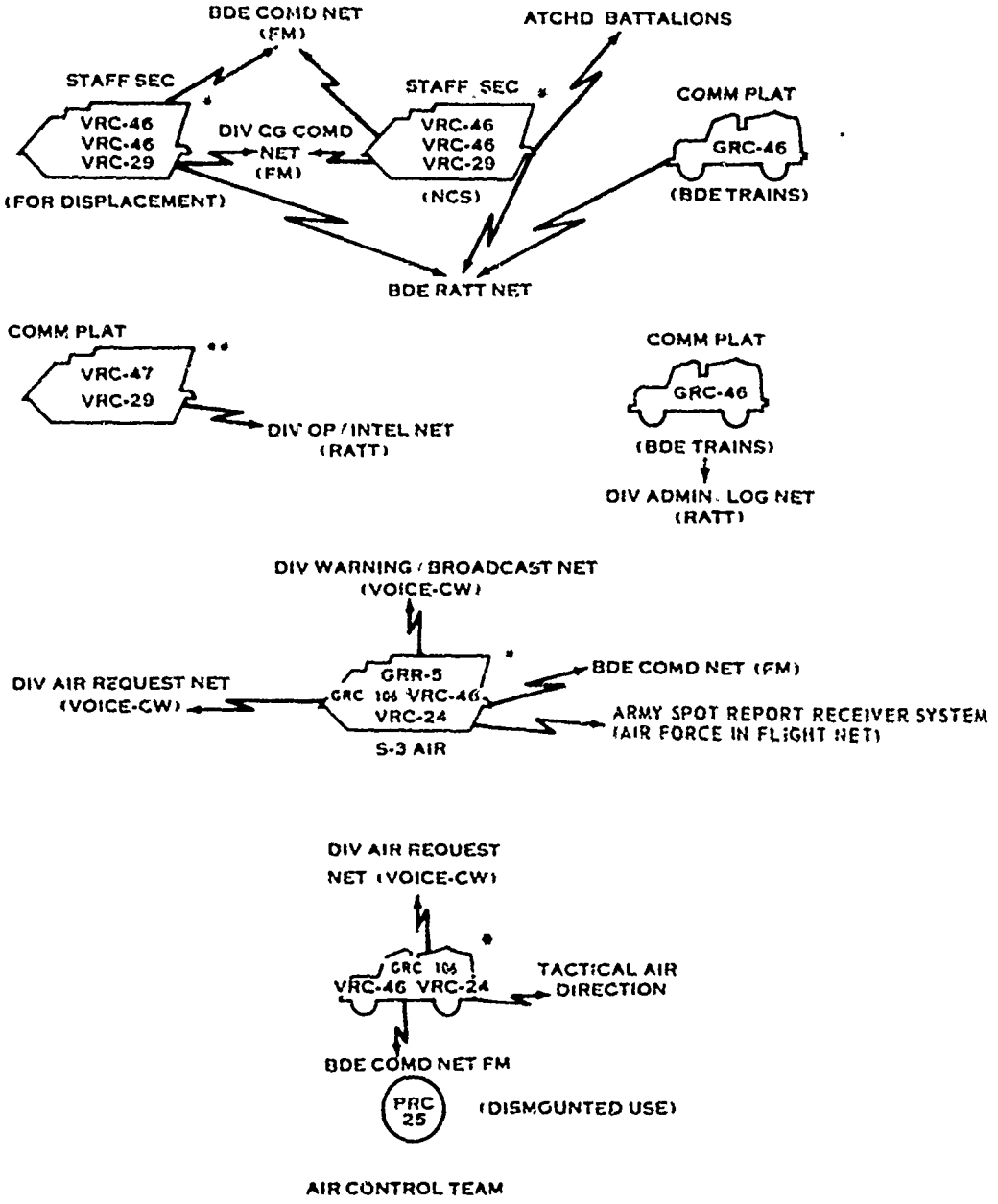

NOTES:

*HOTLINES WILL ALSO BE ESTABLISHED INTO AREA SYSTEM TO DIVISION.

**INCLUDES OTHER SUPPORT OR ATTACHED UNITS. RADIO TRUCKS, AND AUGMENTATIONS.

***INITIAL WIRE COMMUNICATIONS ESTABLISHED THROUGH AREA SYSTEM.

Figure 15-27. Type Wire System, Mechanized Brigade.




*SAME VEHICLES AND EQUIPMENT AS ON BRIGADE COMMAND NET (FIGURE 15-25).

**SAME VEHICLES AND EQUIPMENT AS ON BRIGADE LOGISTICAL NET (FIGURE 15-26)

Figure 15-28. Type Employment, AM Radio Equipment, Mechanized Brigade.

## NOTES

# CHAPTER 16

# COMMUNICATIONS

# SEPARATE LIGHT INFANTRY BATTALION AND BRIGADE

| | TOE |
|---|---|
| HHC BDE | 77-102T |
| HHC BN | 7-176T |
| RIFLE CO | 7-177T |
| CSC | 7-178T |

TAB HERE

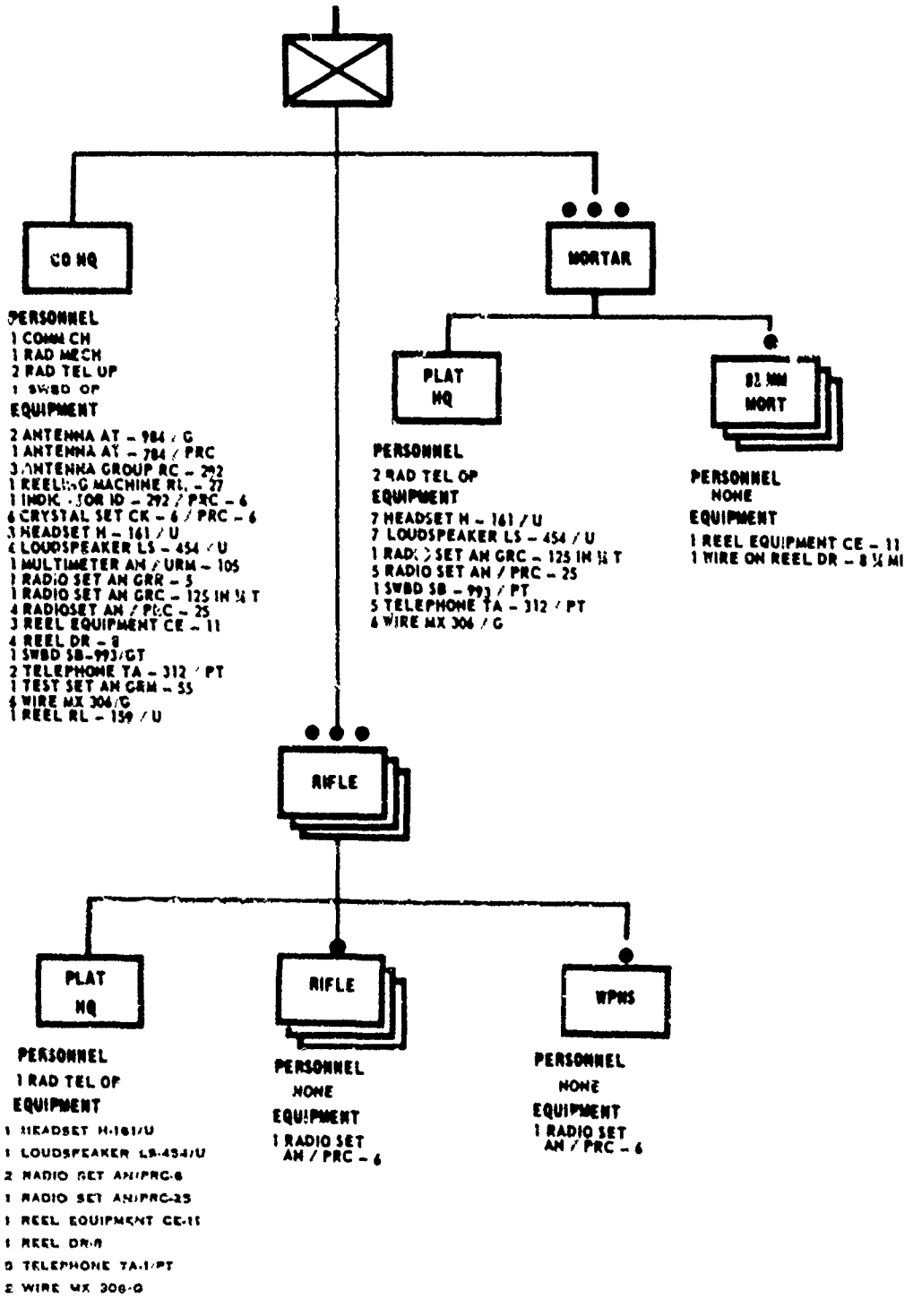



Figure 16-1. Communication Personnel and Equipment, Rifle Company, Infantry Battalion, Separate Light Infantry Brigade.

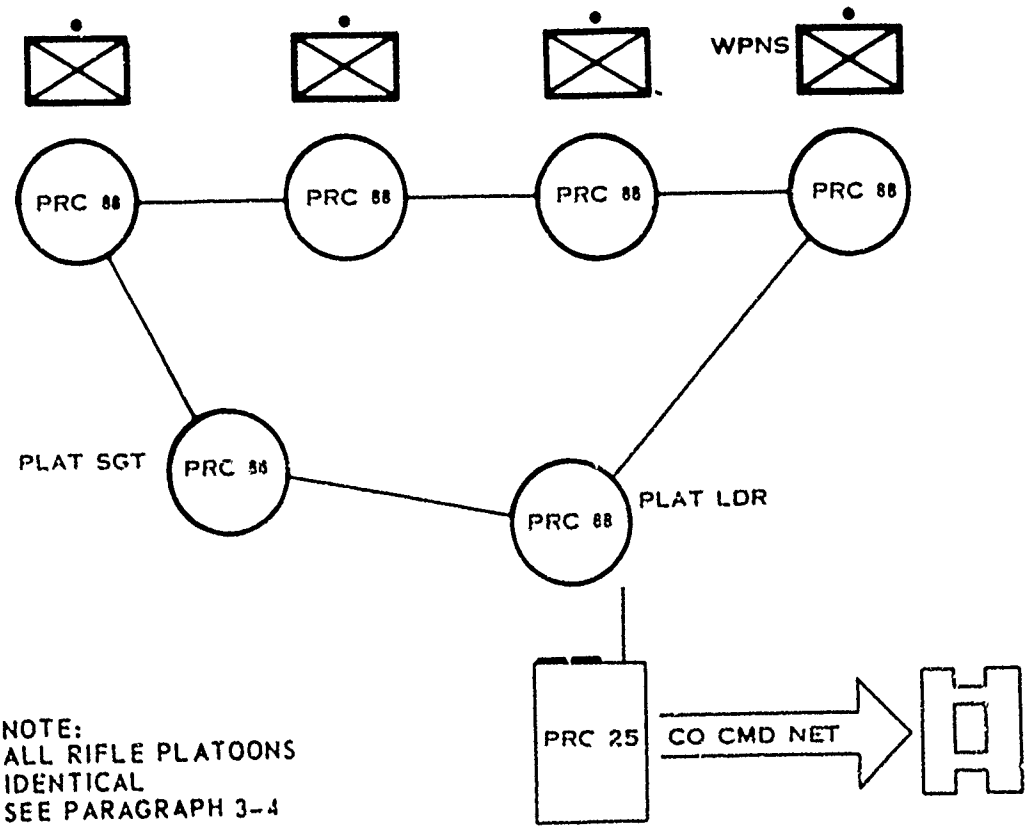



Figure 16-2. Type Rifle Platoon Command Net, Infantry Rifle Company.

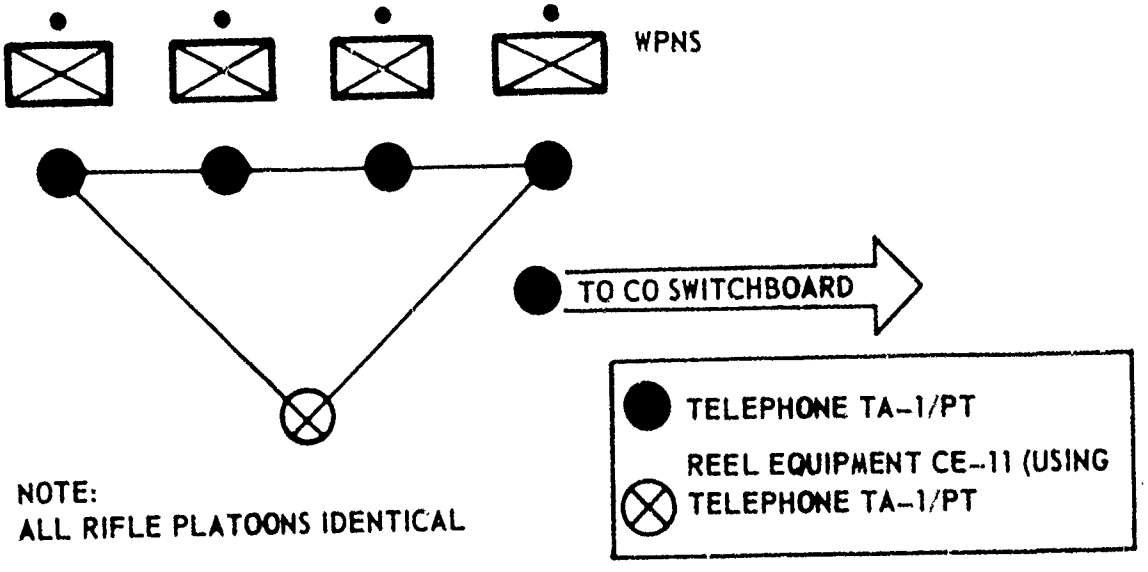



Figure 16-3. Type Rifle Platoon Wire System, Infantry Rifle Company, Separate Light Infantry Brigade.

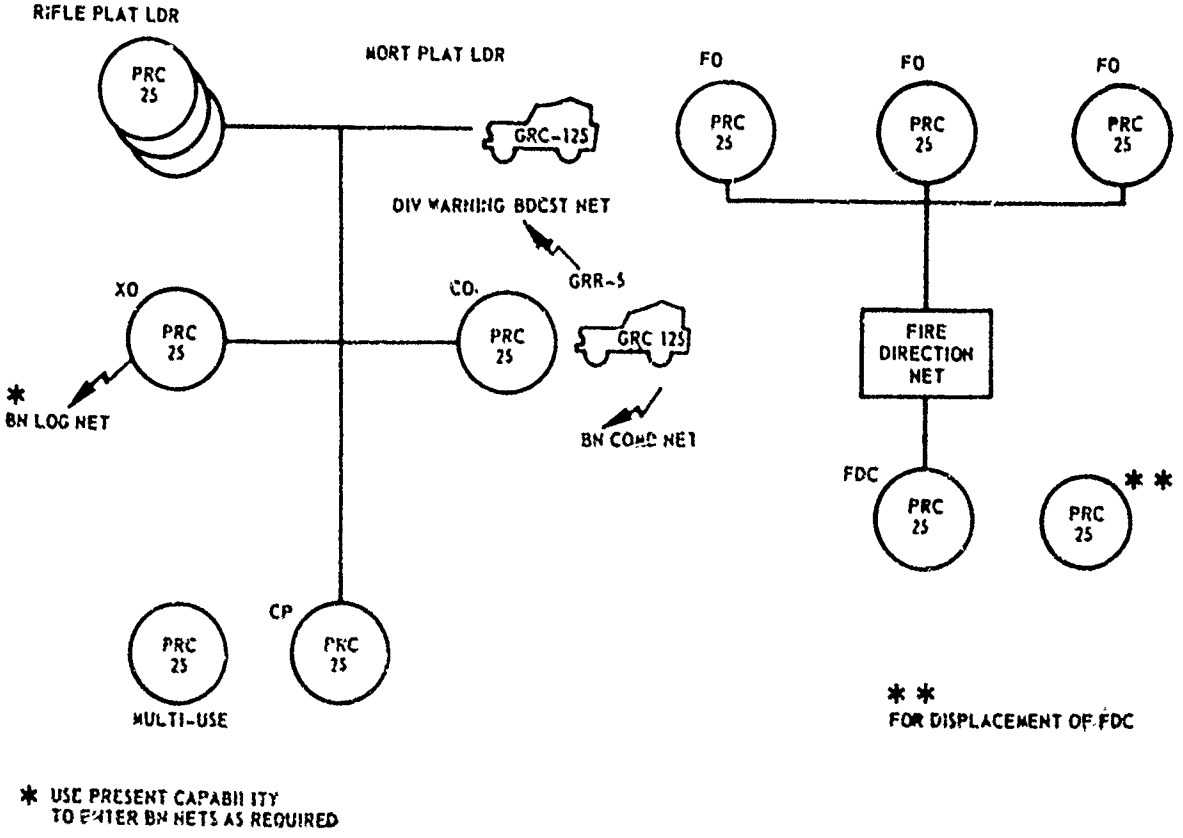



Figure 16-4. Type Radio Nets, Rifle Company, Infantry Battalion, Separate Light Infantry Brigade.

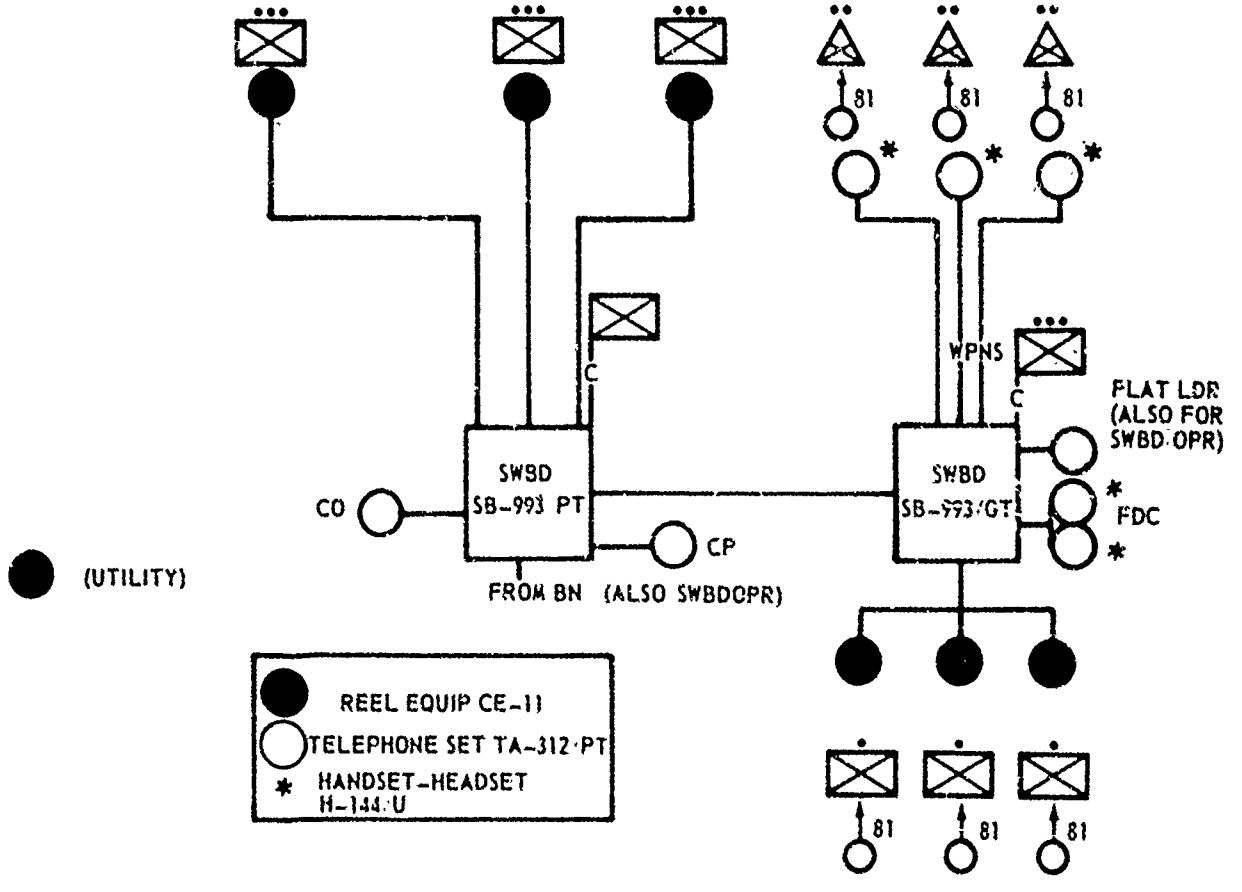



Figure 16-5. Type Wire System, Rifle Company, Infantry Battalion, Separate Light Infantry Brigade.

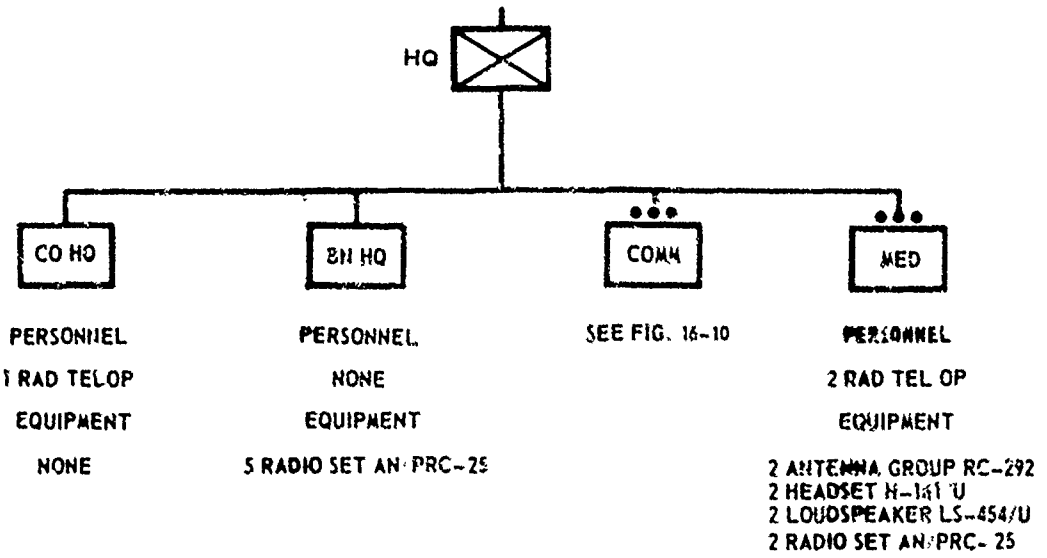
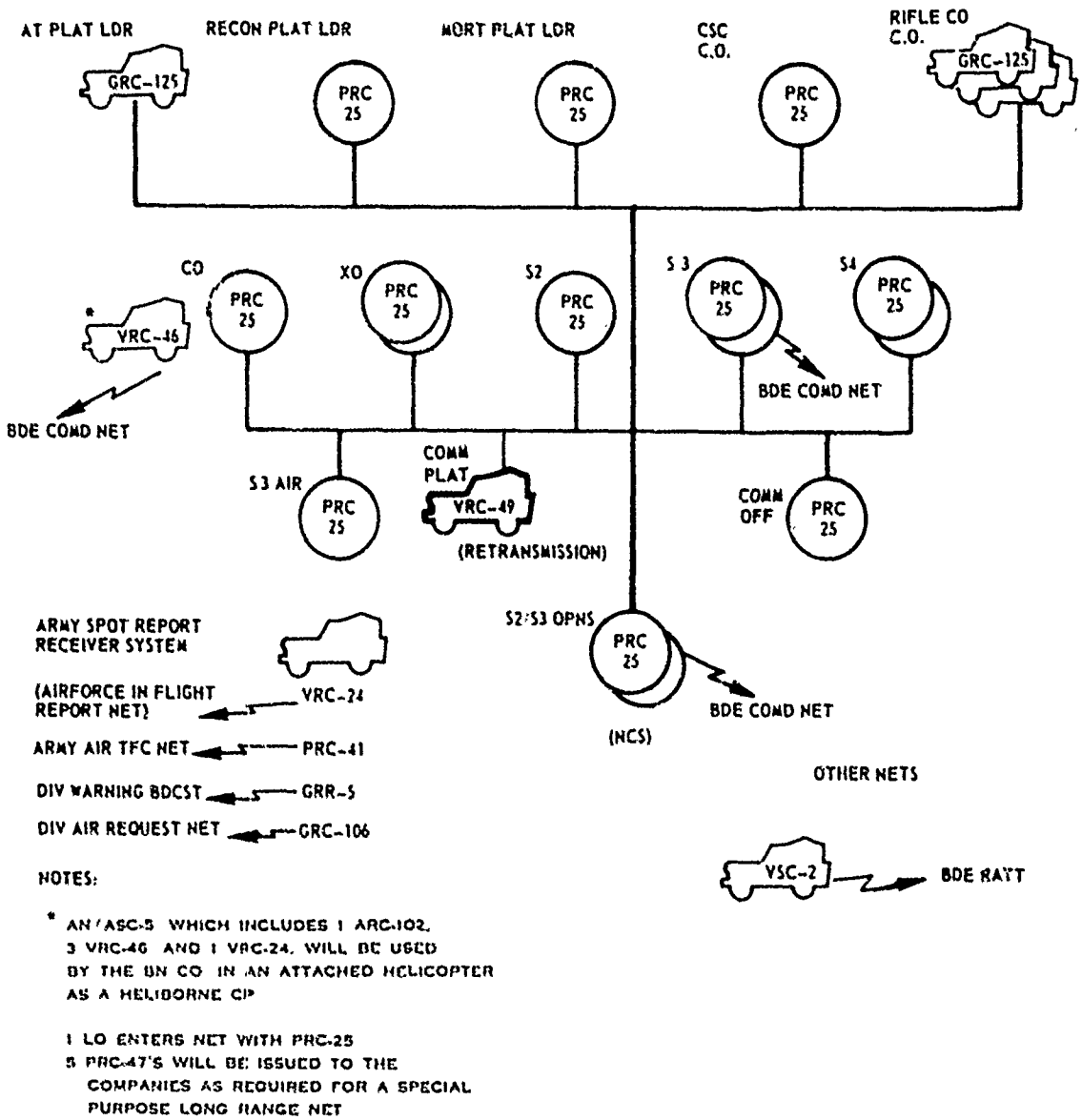



Figure 16-6. Communication Personnel and Equipment, Headquarters and Headquarters Company, Infantry Battalion, Separate Light Infantry Brigade.




NOTES:

* AN/ASC-5 WHICH INCLUDES 1 ARC-102, 3 VRC-46 AND 1 VRC-24, WILL BE USED BY THE BN CO IN AN ATTACHED HELICOPTER AS A HELIBORNE CP

1 LO ENTERS NET WITH PRC-25
5 PRC-47'S WILL BE ISSUED TO THE COMPANIES AS REQUIRED FOR A SPECIAL PURPOSE LONG RANGE NET

Figure 16-7. Type Command Net, Infantry Battalion, Separate Light Infantry Brigade.

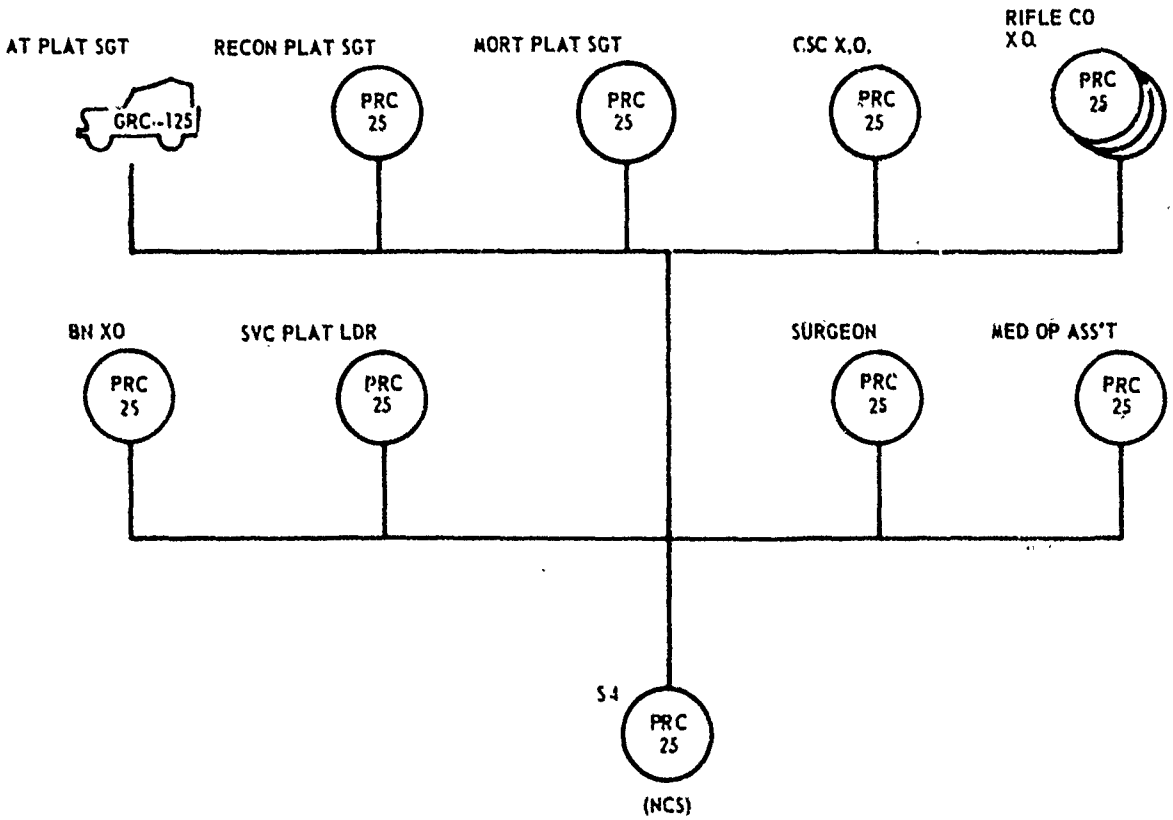
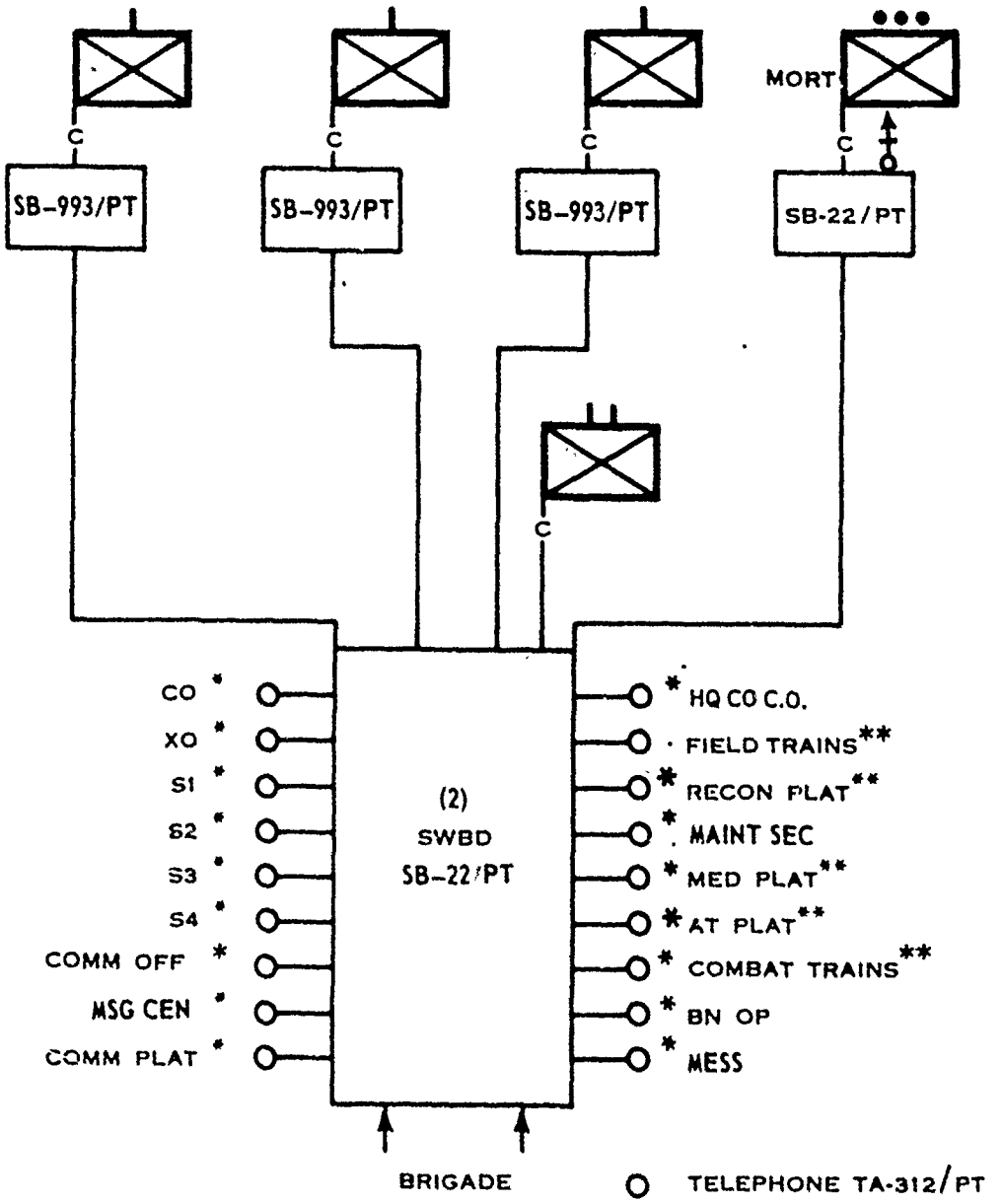



Figure 16-8. Type Logistical Net, Infantry Battalion, Separate Light Infantry Brigade.




*ORGANIC TO COMMUNICATION PLATOON
**TIE INTO BN WIRE SYSTEM
AT NEAREST SWITCHBOARD

Figure 16-9. Type Wire System, Infantry Battalion, Separate Light Infantry Brigade.




**PERSONNEL**

1 COMM CHIEF
1 CHIEF RADIO OP
1 RAD TT TEAM CHIEF
1 WIRE TEAM CHIEF
2 SR RADIO MECHANIC
2 RADIO MECHANIC
2 RADIO TT OP
1 SR MESSAGE CLERK
3 SR RADIO OPERATOR
1 SR SWITCHBOARD OP
1 SR WIREMAN
3 MESSAGE CLERK
1 MESSENGER
4 RADIO OPERATOR
1 SWITCHBOARD OP
3 WIREMAN
1 A MESSENGER

**EQUIPMENT**

1 ANTENNA AT-984/G
8 ANTENNA GROUP RC -292
2 ANTENNA GROUP AN/GRA-50
1 REELING MACHINE RL-27
1 INDICATOR ID 292/PRC-6
1 CONTROL GROUP AN/GRA-6
1 TT SECURITY EQUIP TSEC/KW-7
3 HEADSET H-161/U
4 MULTIMETER AN/URM-105
1 RADIO SET AN/GRR-5
1 RADIO SET AN/GRC-106 IN ¼T
9 RADIO SET AN/PRC-25
1 RADIO SET AN/PRC-41
5 RADIO SET AN/PRC-47
1 RADIO SET AN/VRC-24
1 RADIO SET AN/VRC-46 IN ¼ T
1 RADIO SET AN/VRC-49 IN ½ T
6 RADIO CONTROL GROUP AN/GRA-39
6 REELING MACHINE RL-39
2 REELING MACHINE RL-31
2 SWBD SB-22/PT
24 TELEPHONE TA-312/PT
4 TERMINAL STRIP TM-184
1 TEST SET AN/GRM-55
1 TEST SET AN/VRM-1
1 TEST SET TV-7/U
1 VIBRATOR PACK PP-68/U
6 WIRE REEL DR-8 ½ MI
20 WIRE MX 306/G
6 REEL RL-159/U
1 COMMUNICATIONS CENTRAL AN/ASC-5
2 RADIO SET CONTROL GROUP AN/GRA-74
1 RADIO TELETYPEWRITER SET AN/VSC-2

Figure 16-10. Communictions Personnel and Equipment, Communications Platoon, Infantry Battalion, Separate Light Infantry Brigade.



CSC

**PERSONNEL**

1 COMM CHIEF
2 RAD TEL OP

**EQUIPMENT**

3 ANTENNA GROUP RC-292
3 LOUDSPEAKER LS-454/U
1 MULTIMETER AN/URM-105
1 RADIO SET AN/GRR-5
3 RADIO SET AN/PRC-25
1 REELING MACHINE RL-39
2 REEL DR-8
3 TELEPHONE SET TA-312/PT
1 TEST SET AN/GRM-55
6 WIRE MX-306/G

Figure 16-11. Communication Personnel and Equipment, Company Headquarters Combat Support Company, Infantry Battalion, Separate Light Infantry Brigade.

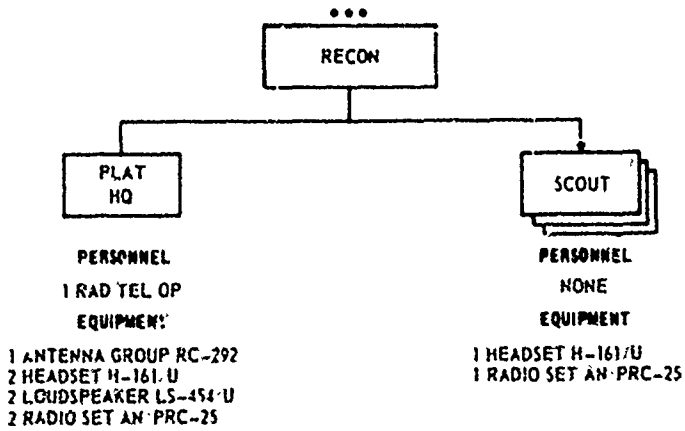



Figure 16-12. Communication Personnel and Equipment, Reconnaissance Platoon, Combat Support Company, Infantry Battalion, Separate Light Infantry Brigade.

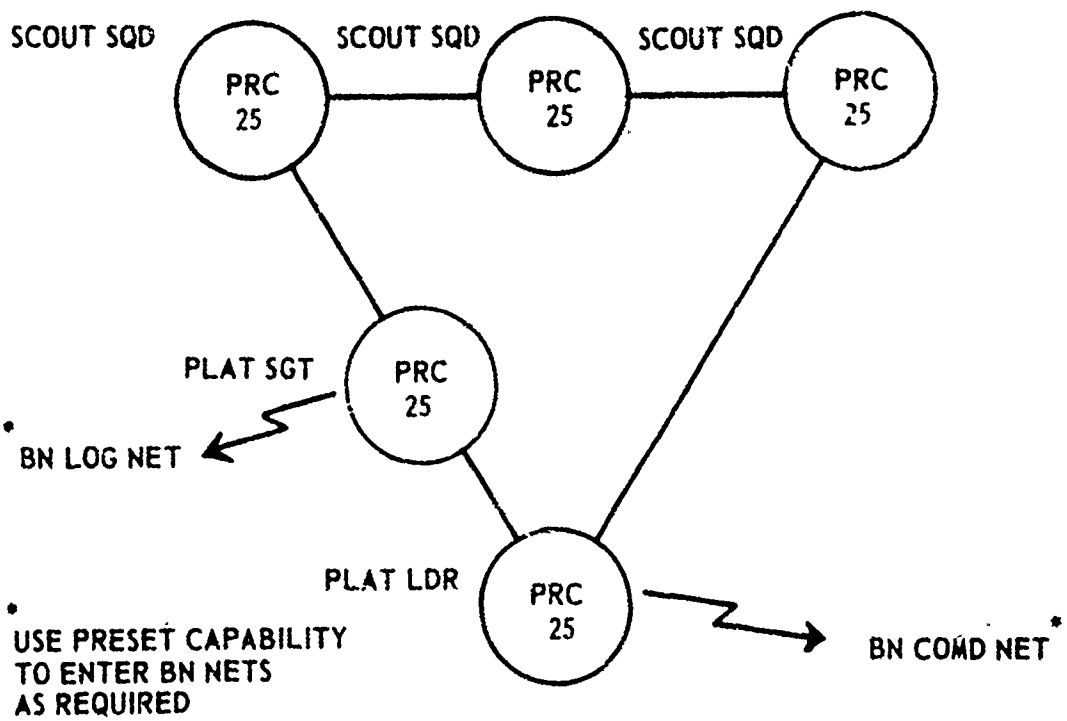



Figure 16-13. Type Radio Net, Reconnaissance Platoon, Combat Support Company, Infantry Battalion, Separate Light Infantry Brigade.

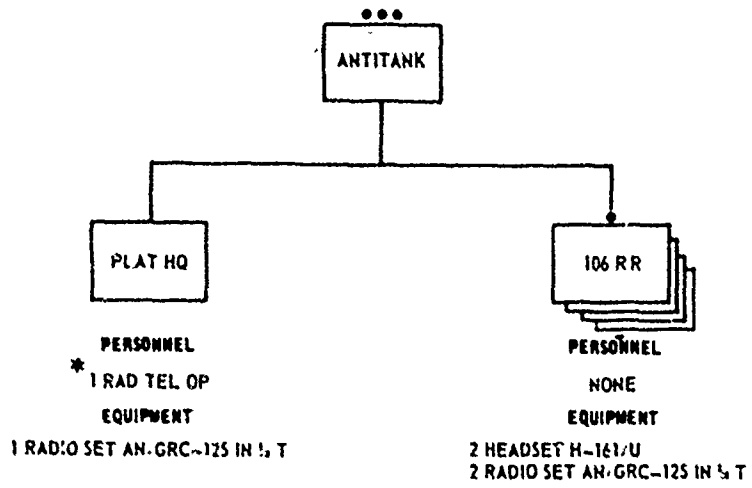



Figure 16-14. Communication Personnel and Equipment, Antitank Platoon, Combat Support Company, Infantry Battalion, Separate Light Infantry Brigade.

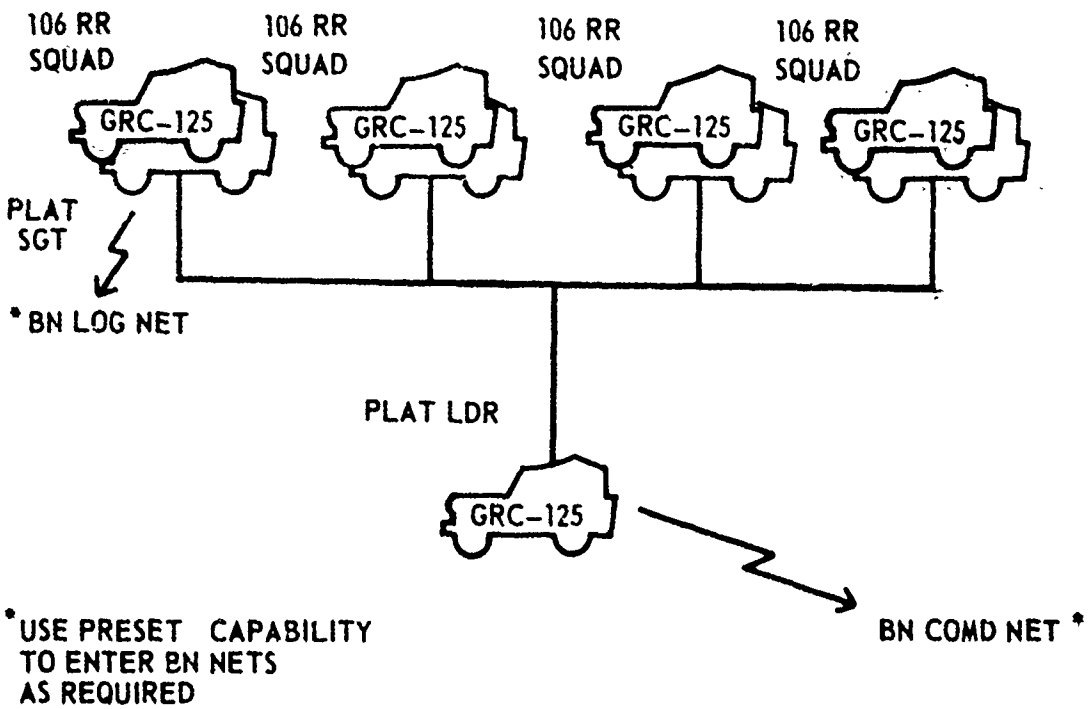
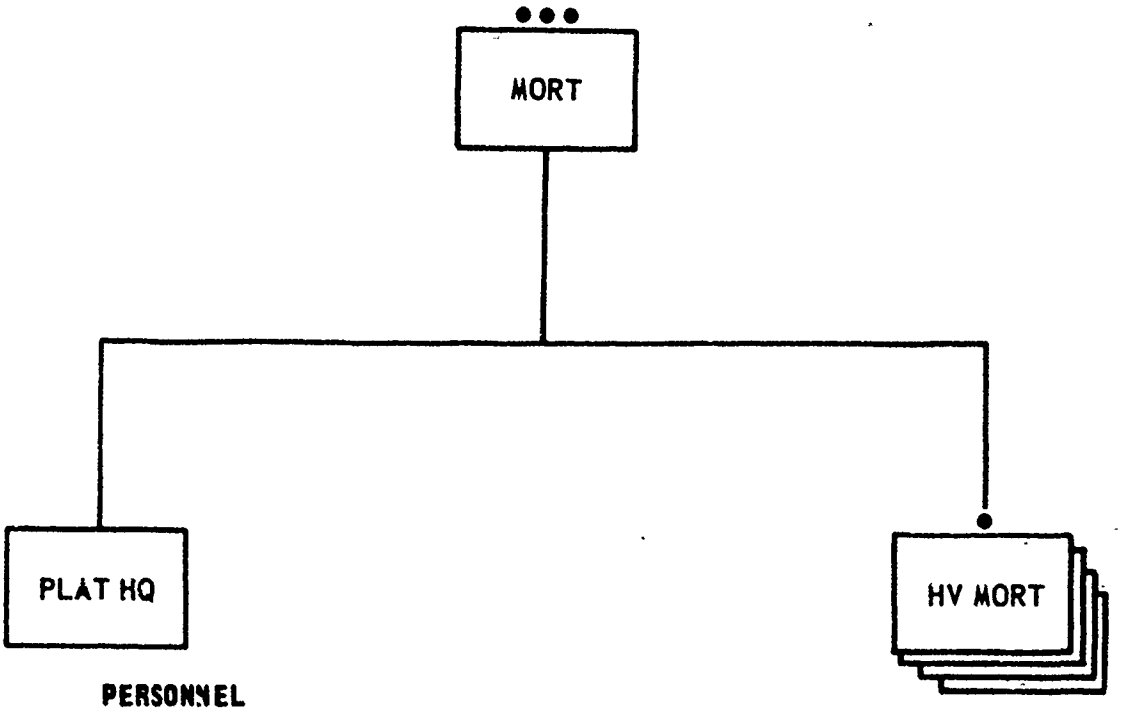



Figure 16-15. Type Radio Net, Antitank Platoon, Combat Support Company, Infantry Battalion, Separate Light Infantry Brigade.




**PERSONNEL**

7 RAD TELEPHONE OP

**EQUIPMENT**

2 ANTENNA GROUP RC-292
2 HEADSET H-161/U
4 LOUDSPEAKER LS-454/U
8 RADIO SET AN/PRC-25
6 REELING MACHINE RL-39
6 REEL DR-8
1 SWBD SB-22/PT
7 TELEPHONE SET TA-312PT
4 WIRE MX-306 /G

**PERSONNEL**

NONE

**EQUIPMENT**

NONE

Figure 16-16. Communication Personnel and Equipment, Mortar Platoon, Combat Support Company, Infantry Battalion, Separate Light Infantry Brigade.

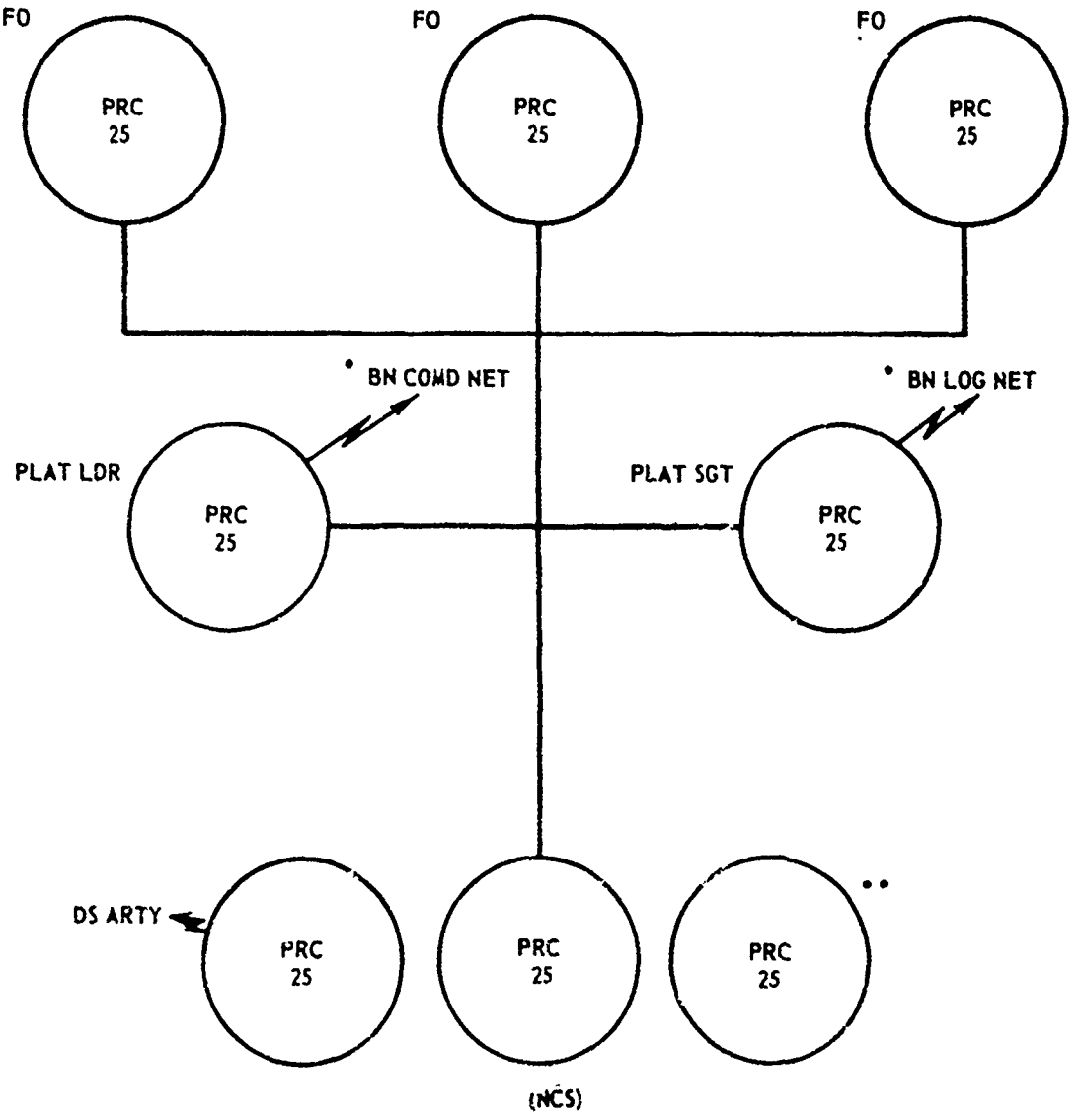



Figure 16-17. Type Fire Direction Net, Mortar Platoon, Combat Support Company, Infantry Battalion, Separate Light Infantry Brigade.

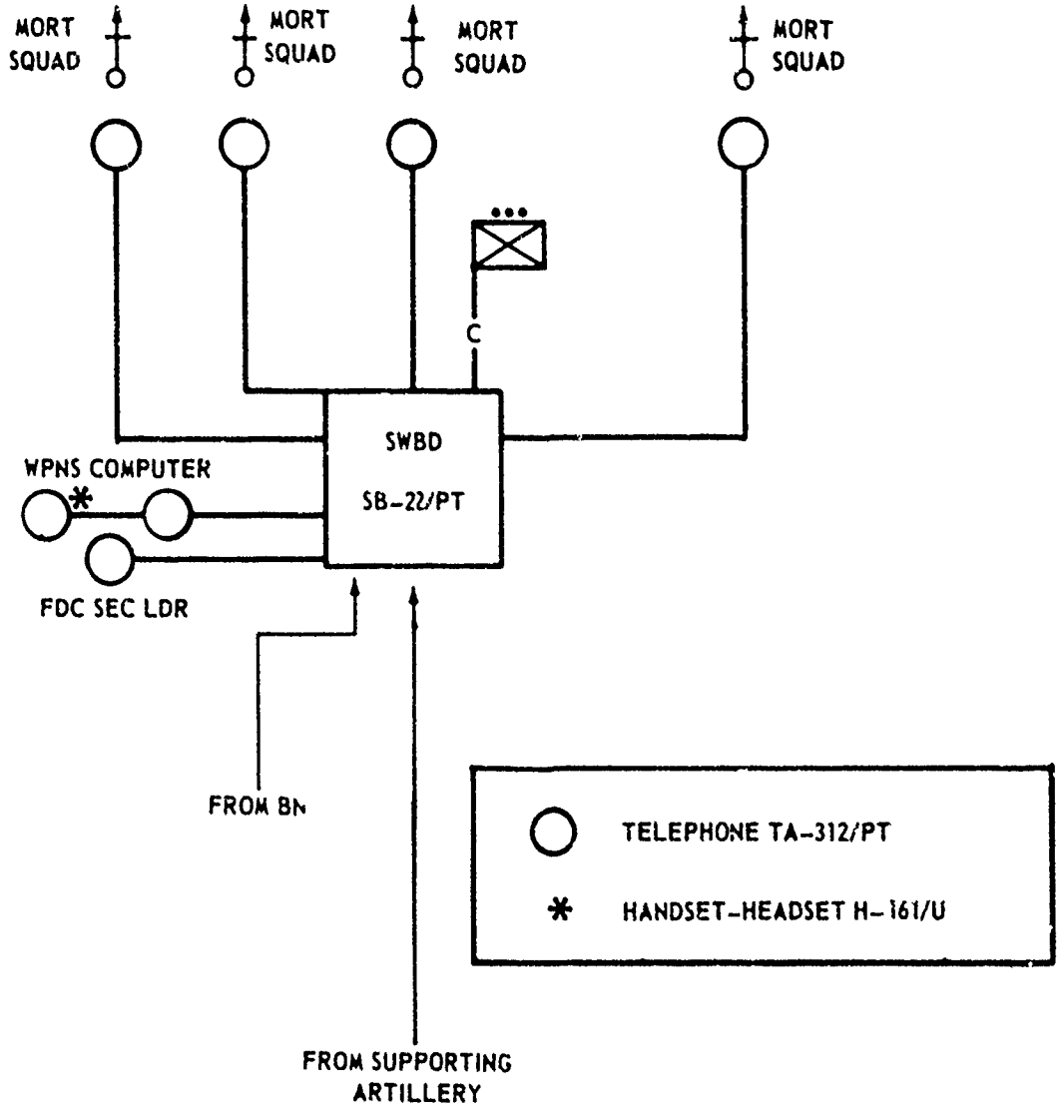



Figure 16-18. Type Wire System, Heavy Mortar Platoon, Infantry Battalion, Separate Light Infantry Brigade.

## NOTES

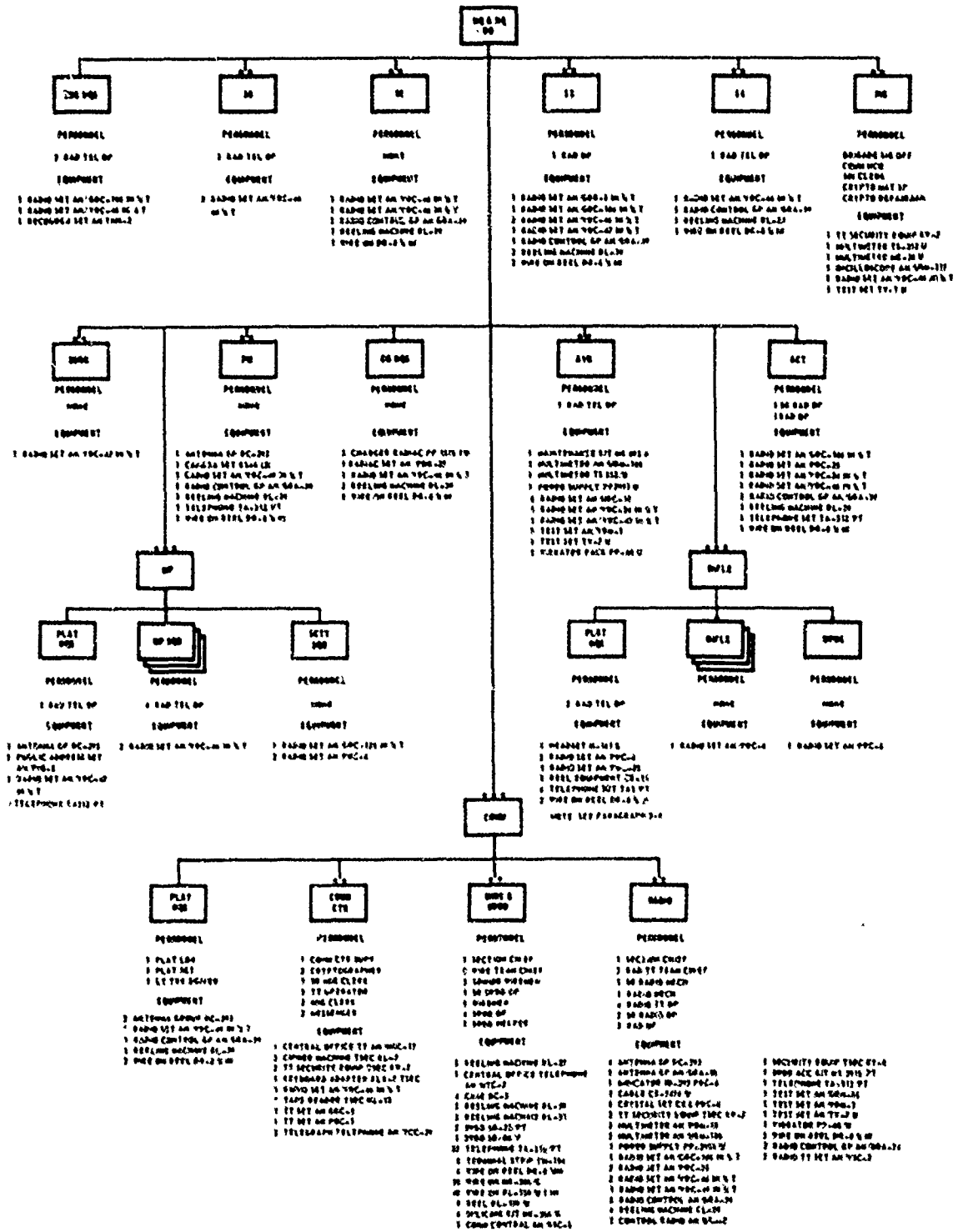
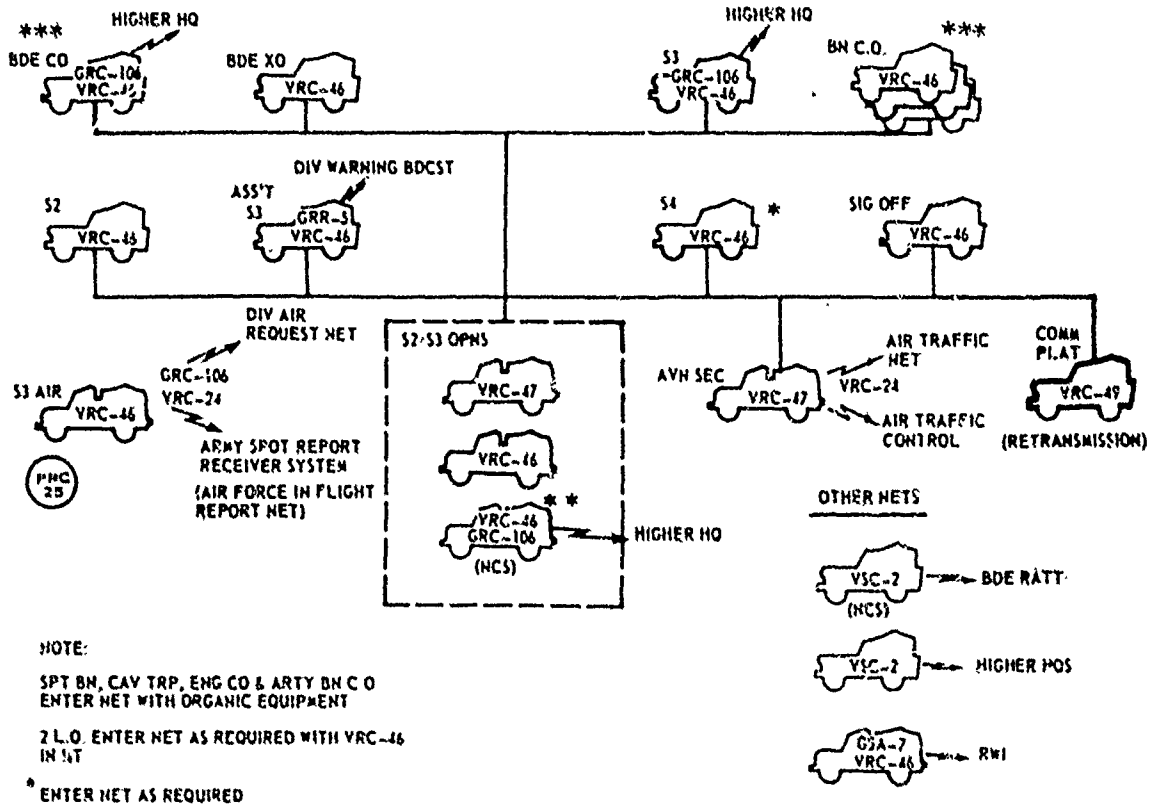


Figure 16-19. Communication Personnel and Equipment, Headquarters and Headquarters Company, Separate Light Infantry Brigade.




NOTE:

SPT BN, CAV TRP, ENG CO & ARTY BN C O ENTER NET WITH ORGANIC EQUIPMENT

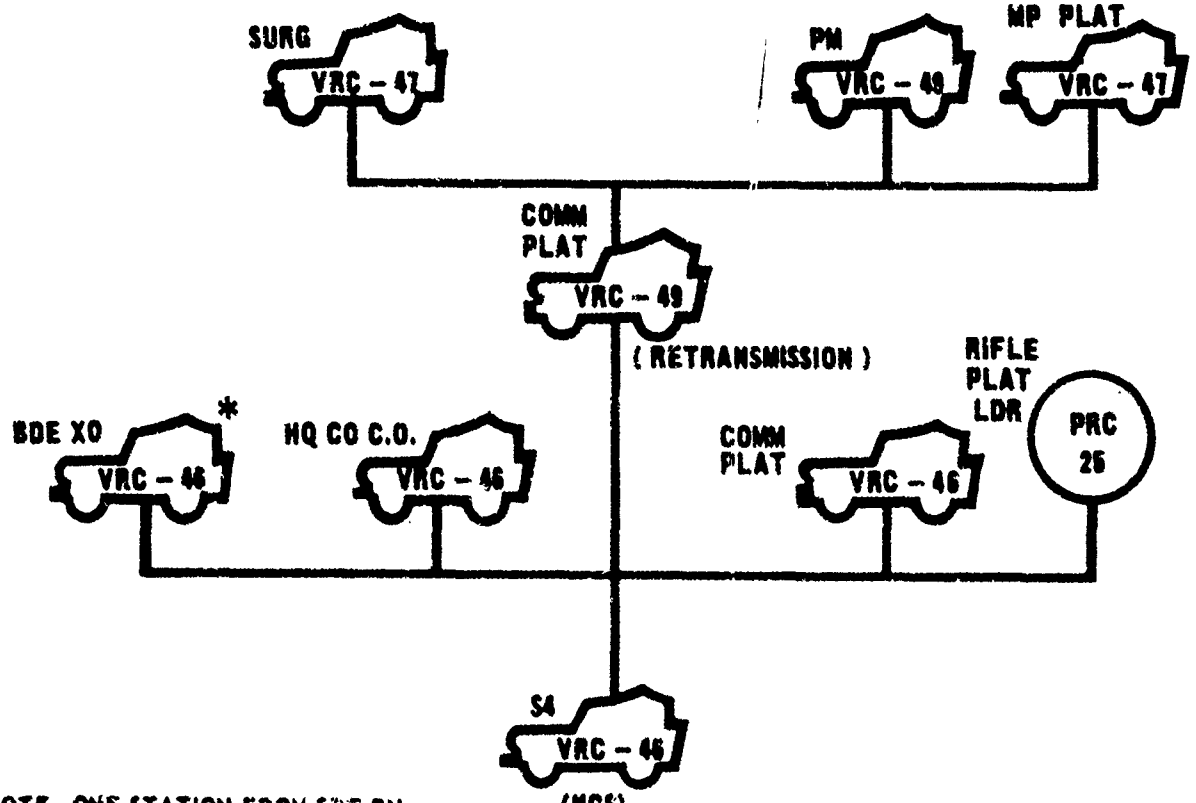
2 L.O. ENTER NET AS REQUIRED WITH VRC-46 IN SAT

* ENTER NET AS REQUIRED

** EQUIPMENT ORGANIC TO COMM PLAT

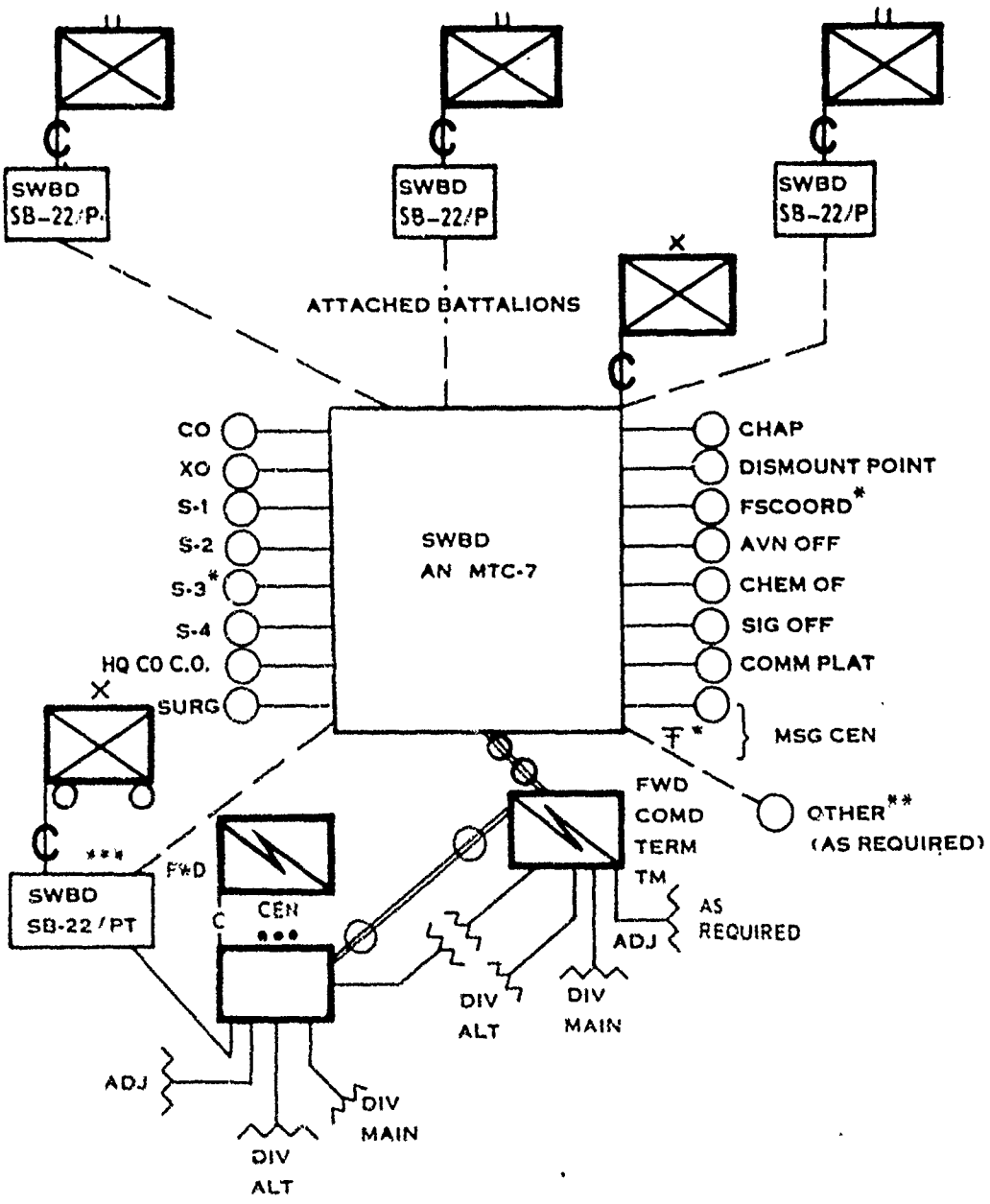
*** AN AGC-8 WHICH INCLUDES 1 ARC-102 3 VRC-46 AND 1 VRC-24 WILL BE USED BY THE BDE CO AND BN CO'S. IN AN ATTACHED HELICOPTER AS A HELIBORNE CP

Figure 16-20. Type Command Net, Separate Light Infantry Brigade.




NOTE: ONE STATION FROM SPT BN,
CAV TP, ENGCO & ARTY BN
ENTER NET WITH ORGANIC EQUIPMENT
*ENTER NET AS REQUIRED

Figure 16-21. Type Logistical Net, Separate Light Infantry Brigade.




NOTES:

* HOTLINES WILL ALSO BE ESTABLISHED INTO AREA SYSTEM TO DIVISION.

** INCLUDES OTHER SUPPORT OR ATTACHED UNITS, RADIO TRUCKS, AND AUGMENTATIONS.

*** INITIAL WIRE COMMUNICATIONS ESTABLISHED THROUGH AREA SYSTEM.

Figure 16-22. Type Wire System, Separate Light Infantry Brigade.

## NOTES

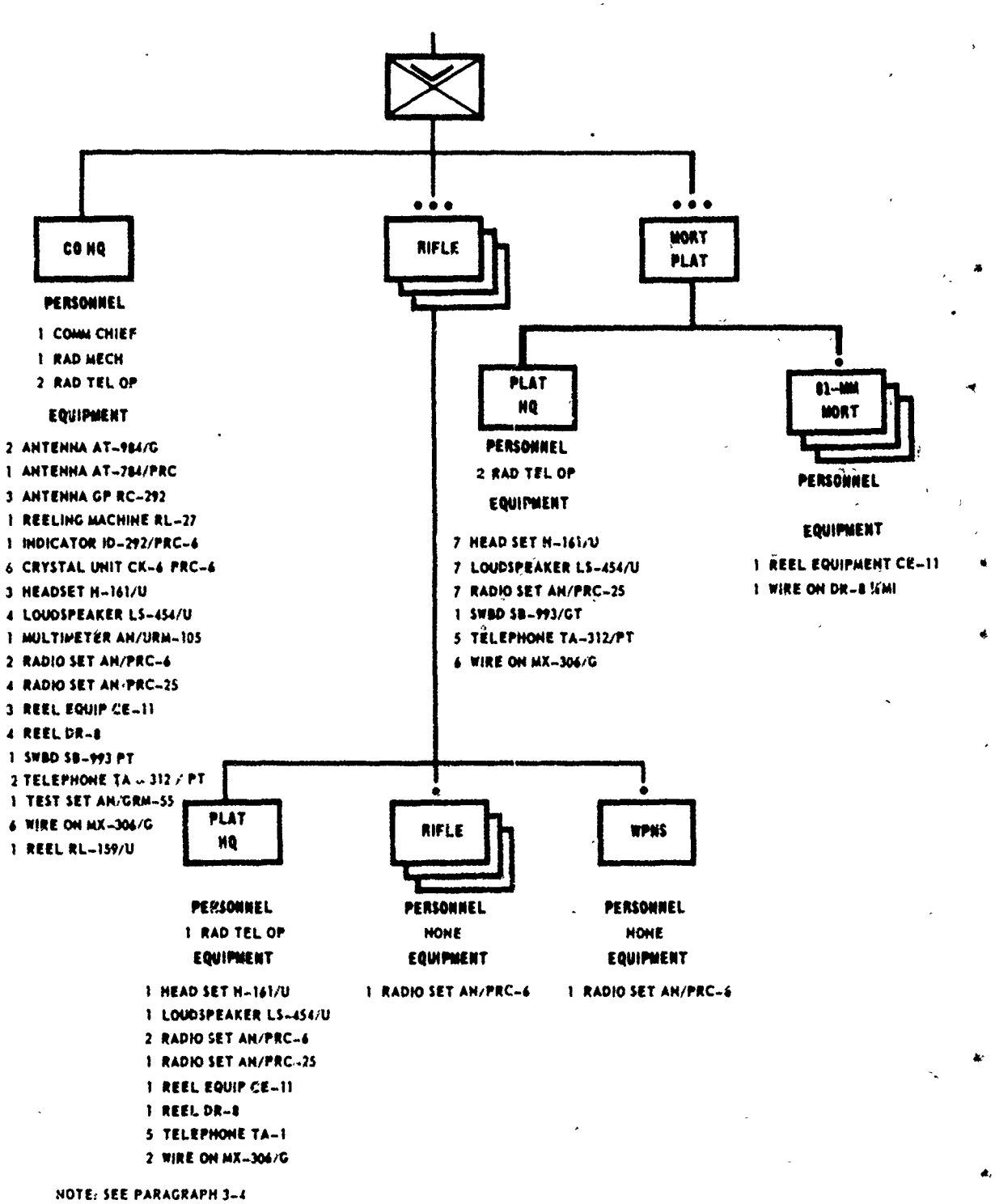
# CHAPTER 17

# COMMUNICATIONS

# INFANTRY BATTALION AND BRIGADE, AIRMOBILE DIVISION

| | TOE |
|---|---|
| HHC BDE | 67-42T |
| HHC BN | 7-56T |
| RIFLE CO | 7-57T |
| CSC | 7-58T |

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NOTE: SEE PARAGRAPH 3-4

Figure 17-1. Communication Personnel and Equipment, Rifle Company, Infantry Battalion, Airmobile Division.

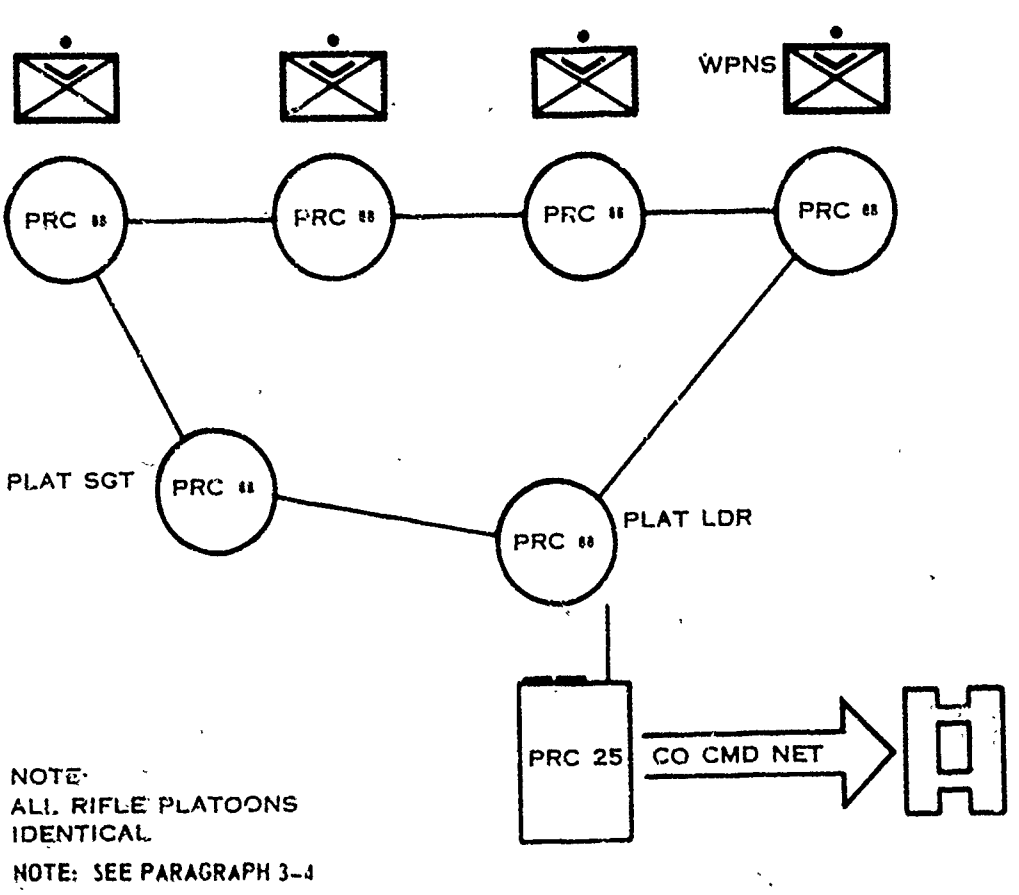



Figure 17-2. Type Rifle Platoon Command Net, Infantry Rifle Company, Airmobile Division.

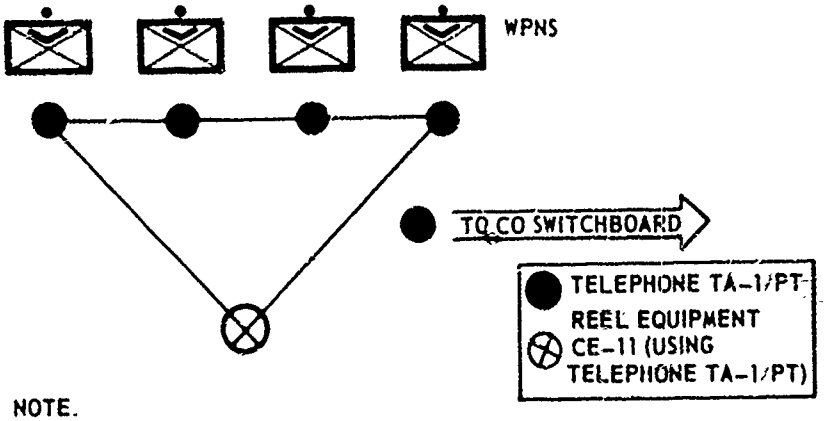



Figure 17-3. Type Rifle Platoon Wire System, Infantry Rifle Company, Airmobile Division.

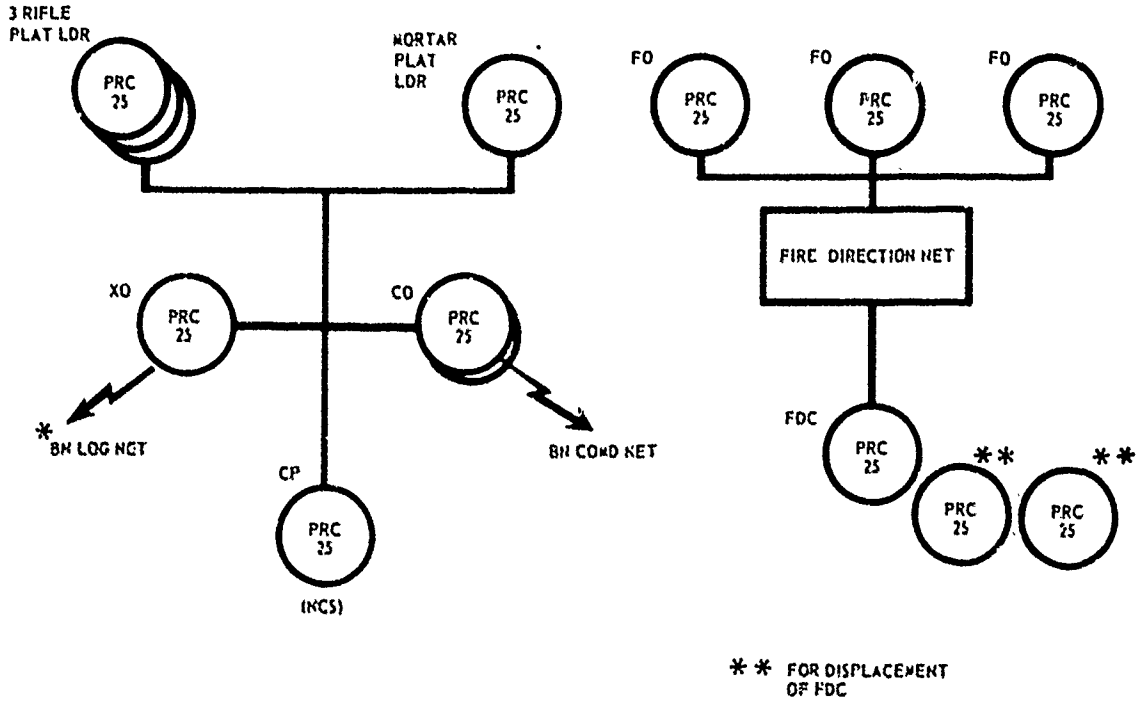



Figure 17-4. Type Radio Nets, Rifle Company, Infantry Battalion, Airmobile Division.

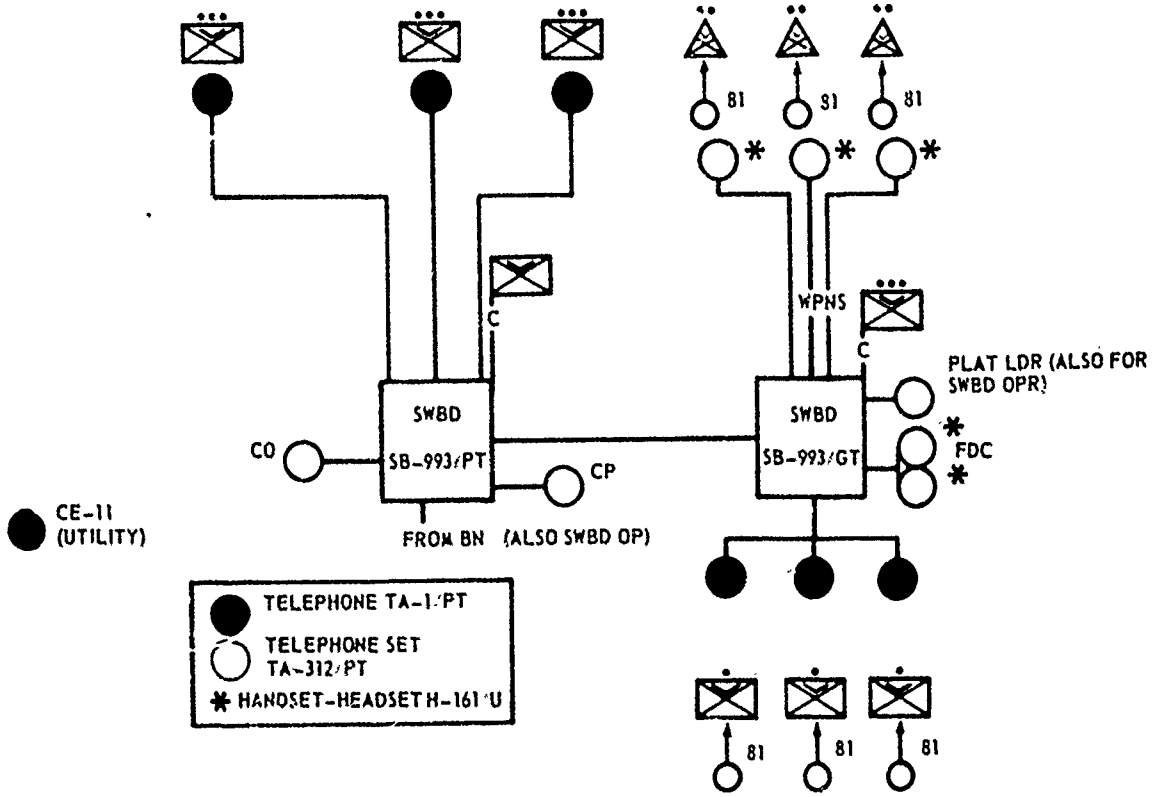



Figure 17-5. Type Wire System, Rifle Company, Infantry Battalion, Airmobile Division.

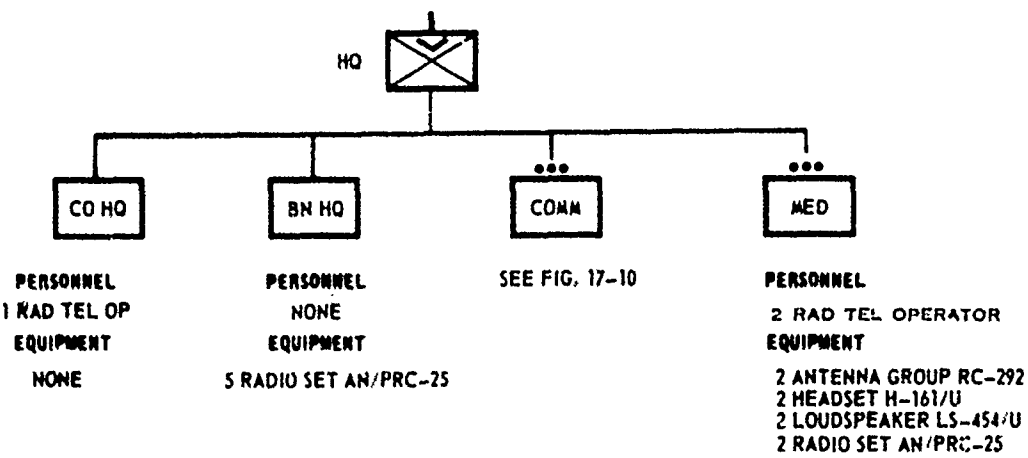
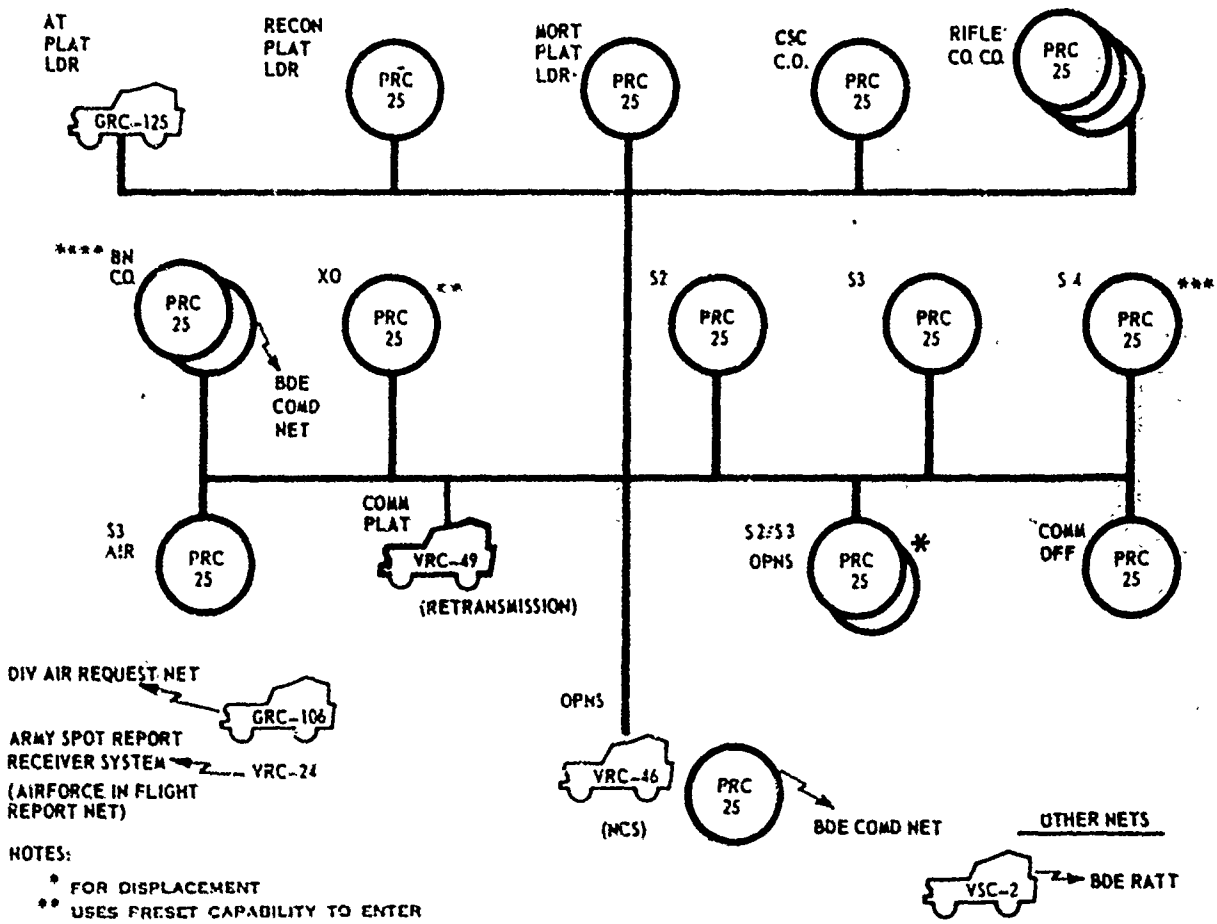



Figure 17-6. Communication Personnel and Equipment, Headquarters and Headquarters Company, Infantry Battalion, Airmobile Division.




NOTES:

* FOR DISPLACEMENT

** USES PRESET CAPABILITY TO ENTER BN LOG NET AS REQUIRED

*** USES PRESET CAPABILITY TO ENTER THIS NET AS REQUIRED

**** AN/ASC-5, WHICH INCLUDES 1 ARC-102, 3 VRC-46, AND 1 VRC-24 WILL BE USED BY THE BN CO IN AN ATTACHED HELICOPTER, AS A HELIBORNE CP

1 LO ENTERS NET WITH PRC-25

5 PRC-47'S WILL BE ISSUED TO THE COMPANIES AS REQUIRED FOR A SPECIAL PURPOSE LONG RANGE NET

Figure 17-7. Type Command Net, Infantry Battalion, Airmobile Division.

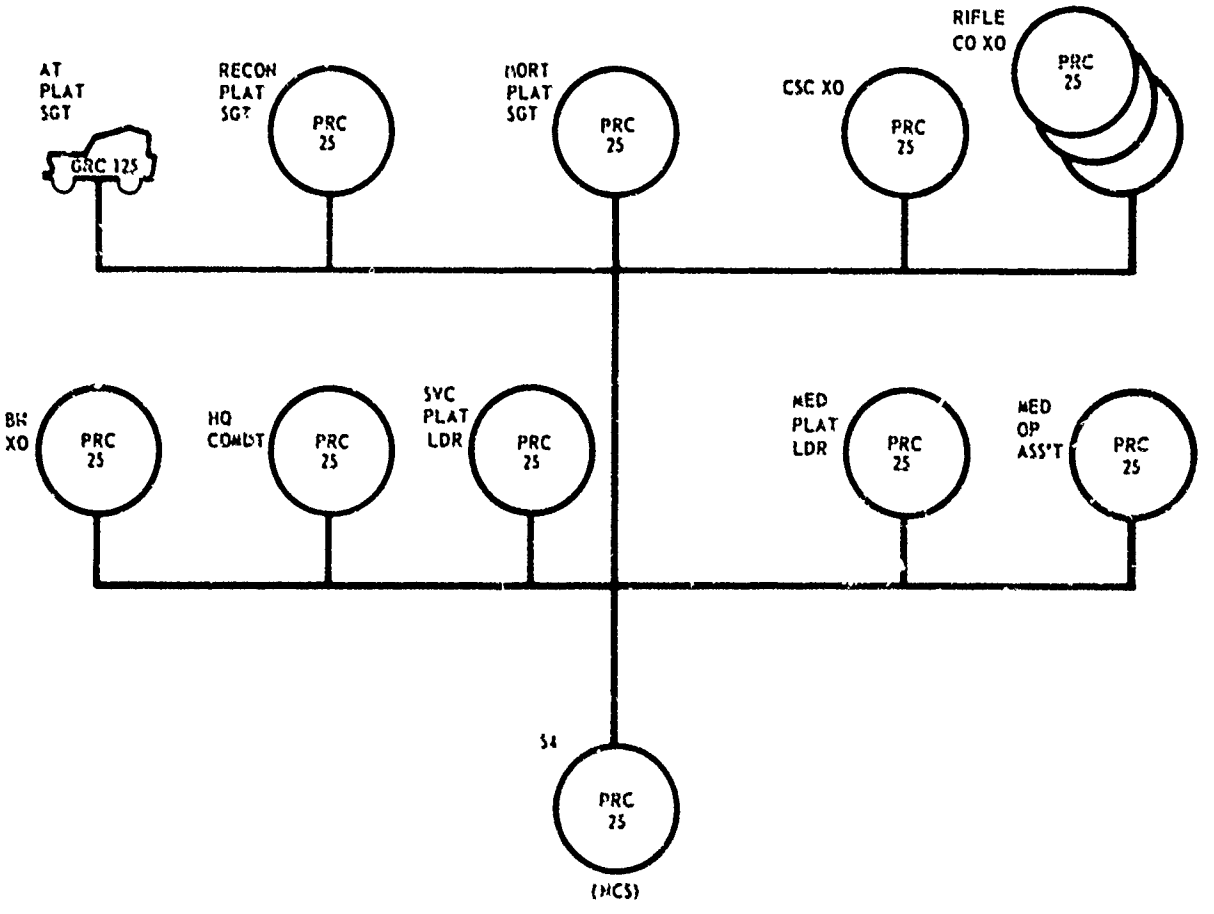
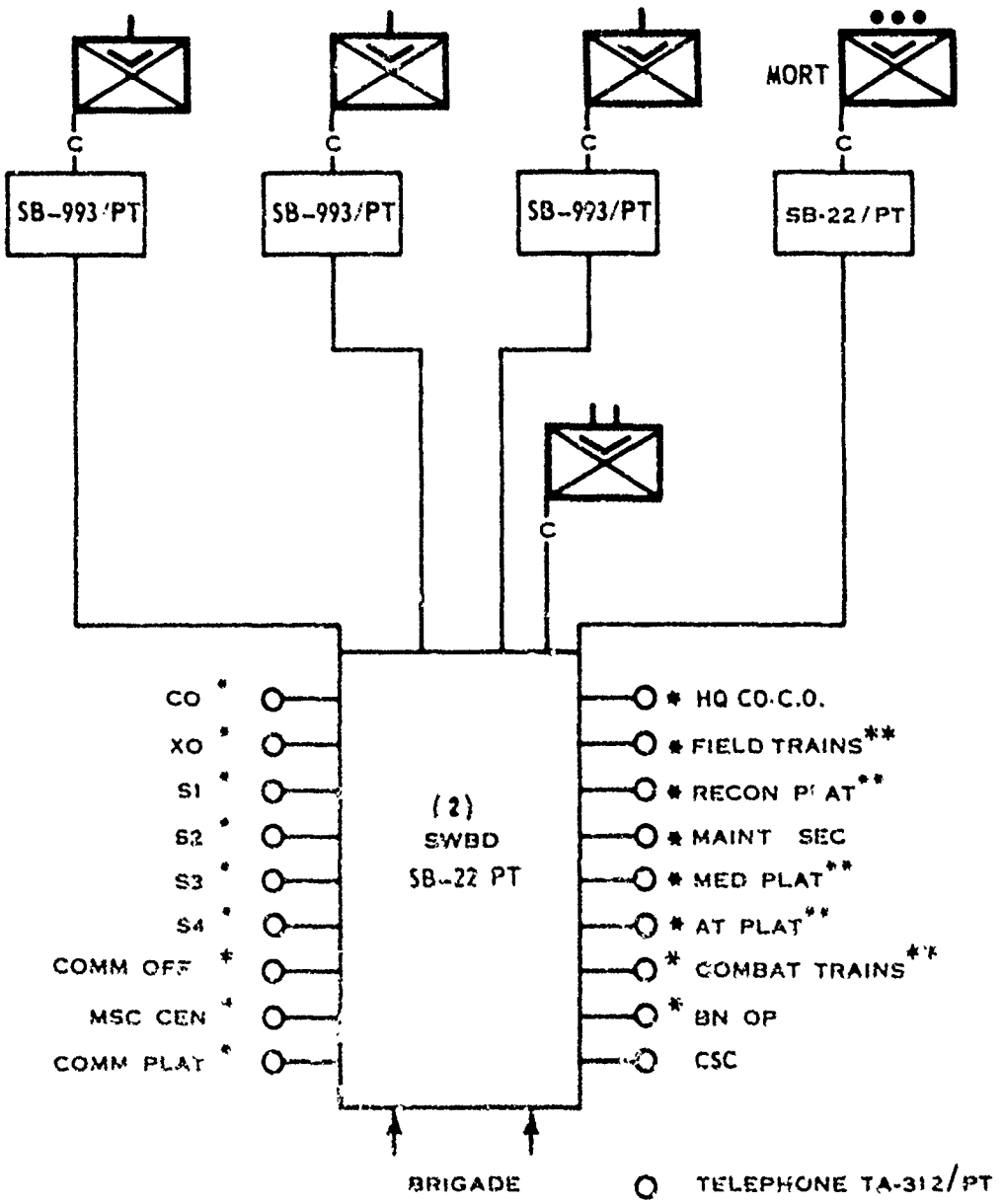



Figure 17-8. Type Logistical Net, Infantry Battalion, Airmobile Division.




*ORGANIC TO COMMUNICATION PLATOON
**TIE INTO BN WIRE SYSTEM
AT NEAREST SWITCHBOARD

Figure 17-7. Type Wire System, Infantry Battalion, Airmobile Division.



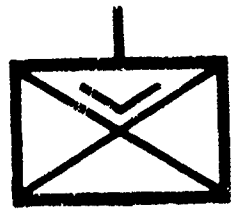

**PERSONNEL**

1 COMM CHIEF
1 CHIEF RADIO OP
1 RAD TT TEAM CHIEF
1 WIRE TEAM CHIEF
2 SR RAD MECHANIC
2 RADIO MECHANIC
2 RADIO TT OP
1 SR MESSAGE CLERK
3 SR RADIO OPERATOR
1 SR SWITCHBOARD OP
1 SR WIREMAN
3 MESSAGE CLERK
1 MESSENGER
4 RADIO OPERATOR
1 SWITCHBOARD OP
3 WIREMAN
1 A MESSENGER

**EQUIPMENT**

1 ANTENNA AT-984/G
8 ANTENNA GP RC-292
2 ANTENNA GP AN/GRA-50
1 REELING MACHINE RL-27
1 INDICATOR ID-292/PRC-6
5 CASE BC-5
1 CONTROL GP AN/GRA-6
3 HEADSET H-161/U
4 MULTIMETER AN/URM-105
1 RADIO SET AN/GRC-106 IN ¼ T
9 RADIO SET AN/PRC-25
1 RADIO SET AN/PRC-41
5 RADIO SET AN/PRC-47
1 RADIO SET AN/VRC-24
1 RADIO SET AN/VRC-46 IN ¼ T
1 RADIO SET AN/VRC-49 IN ¼ T
6 RADIO CONTROL GP AN/GRA-39
6 REELING MACHINE RL-39
2 REELING MACHINE RL-31
2 SWBD SB-22/PT
24 TELEPHONE TA-312/PT
4 TERMINAL STRIP TM-184
1 TEST SET AN/GRM-55
1 TEST SET AN/VRM-1
1 TEST SET TV-7/U
1 INVERTER PP-68/U
6 WIRE ON REEL DR-8 ¼ T
20 WIRE ON MX 306/G
6 REEL CABLE RL-159/U
1 COMMUNICATIONS CENTRAL AN/ASC-5
2 CONTROL GP AN/GRA-74
1 RADIO TT SET AN/VSC-2

Figure 17-10. Communication Personnel and Equipment, Communications Platoon, Infantry Battalion, Airmobile Division.



CSC

**PERSONNEL**

1 COMM CHIEF
2 RAD TEL OP

**EQUIPMENT**

3 ANTENNA GP RC-292
3 LOUDSPEAKER LS-454/U
1 MULTIMETER AN/URM-105
3 RADIO SET AN/PRC-25
1 REELING MACHINE RL-39
2 REEL DR-8
3 TELEPHONE SET TA-312/PT
1 TEST SET AN/GRM-55
6 WIRE ON MX-306/G

Figure 17-11. Communications Personnel and Equipment, Company Headquarters, Combat Support Company, Infantry Battalion, Airmobile Division

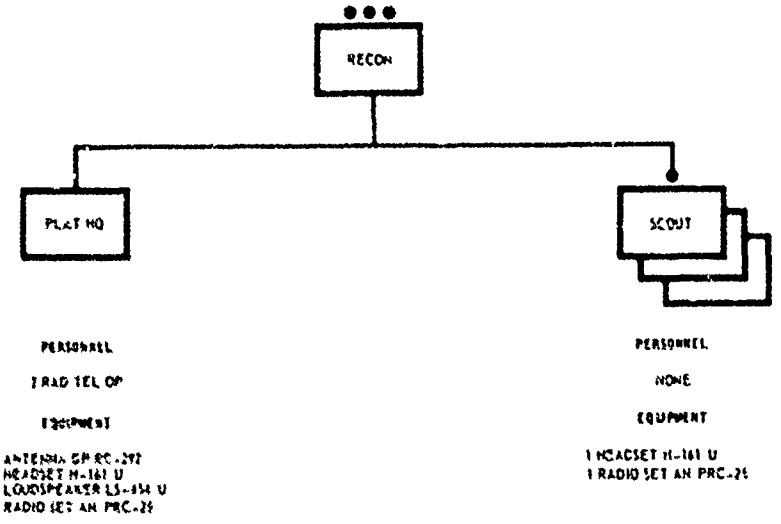



Figure 17-12. Communication Personnel and Equipment, Reconnaissance Platoon, Combat Support Company, Infantry Battalion, Airmobile Division.

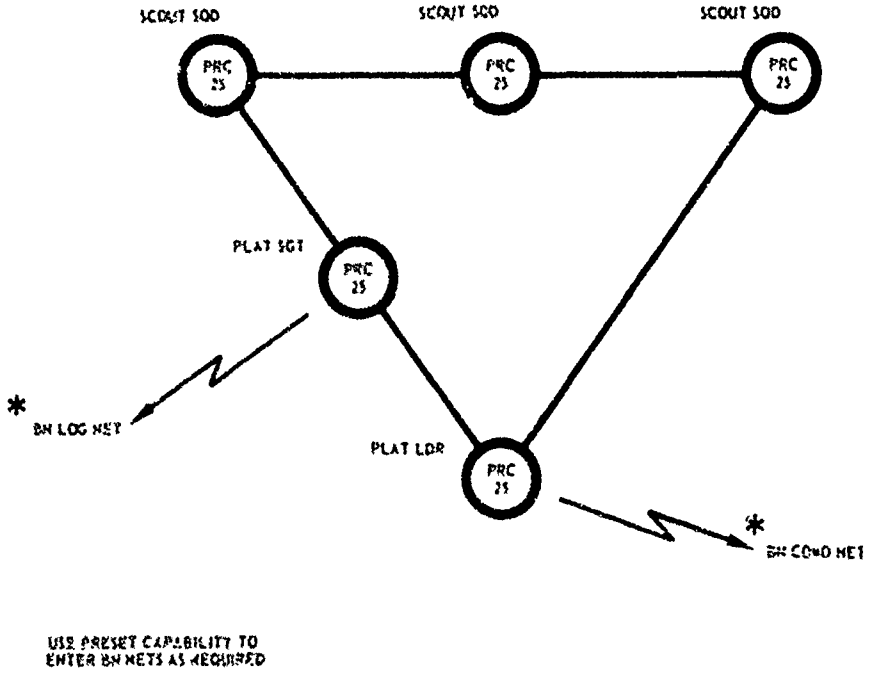



Figure 17-13. Type Radio Net, Reconnaissance Platoon, Combat Support Company, Infantry Battalion, Airmobile Division.

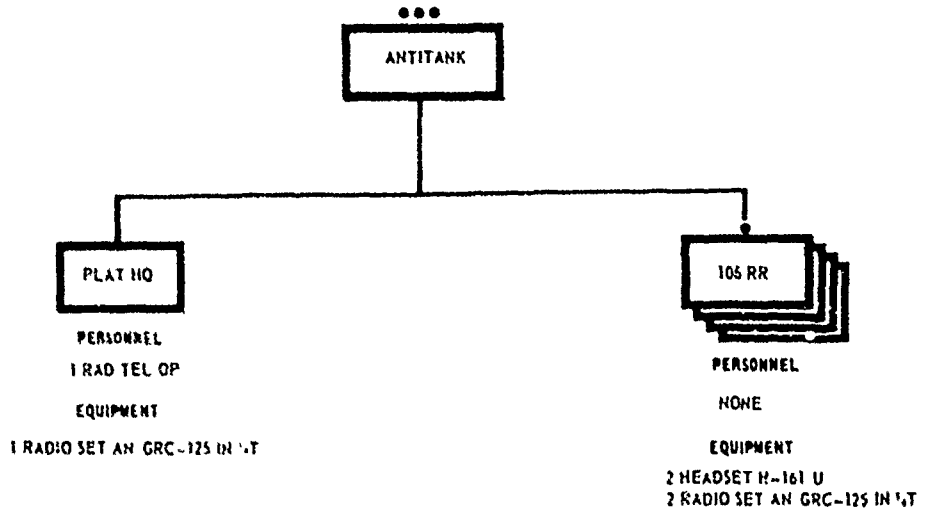



Figure 17-14. Communication Personnel and Equipment, Antitank Platoon, Combat Support Company, Infantry Battalion, Airmobile Division.

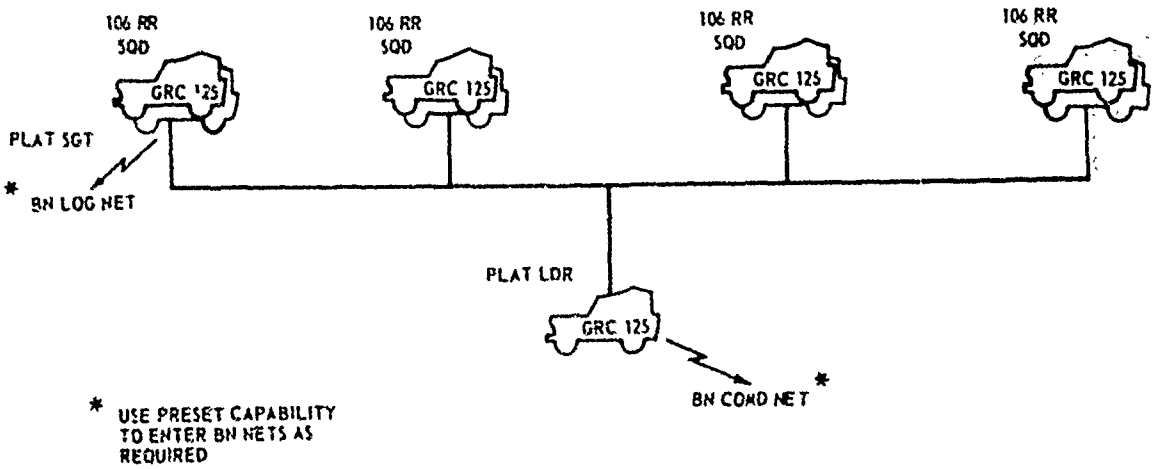
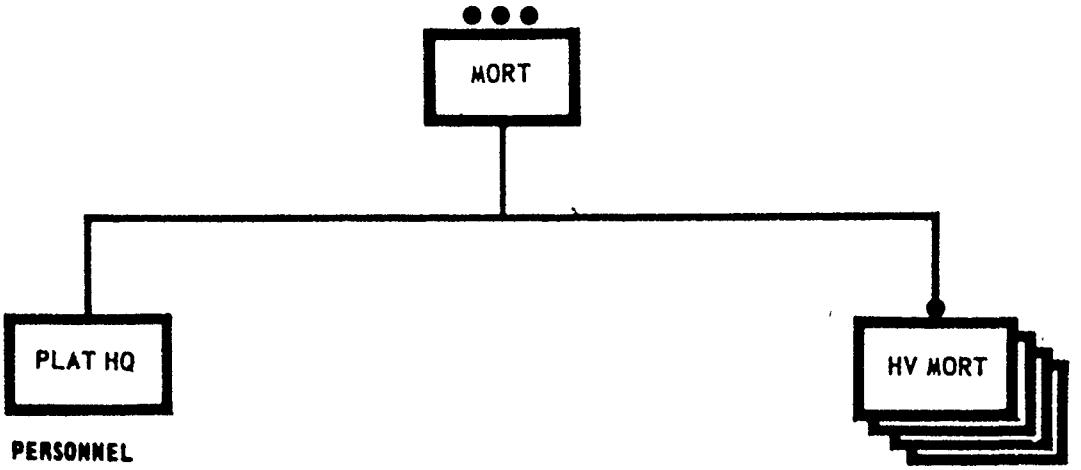



Figure 17-15. Type Radio Net, Antitank Platoon, Combat Support Company, Infantry Battalion, Airmobile Division.




**PERSONNEL**

7 RAD TELEPHONE OP

**EQUIPMENT**

2 ANTENNA GP RC-292
2 HEADSET H-161/U
4 LOUDSPEAKER LS-454/U
8 RADIO SET AN/PRC-25
6 REELING MACHINE RL-39
6 REEL DR-8
1 SWBD SB-22/PT
6 TELEPHONE TA-312/PT
4 WIRE ON MX-306/G

**PERSONNEL**

NONE

**EQUIPMENT**

NONE

Figure 17-16. Communication Personnel and Equipment, Mortar Platoon, Combat Support Company, Infantry Battalion, Airmobile Division.

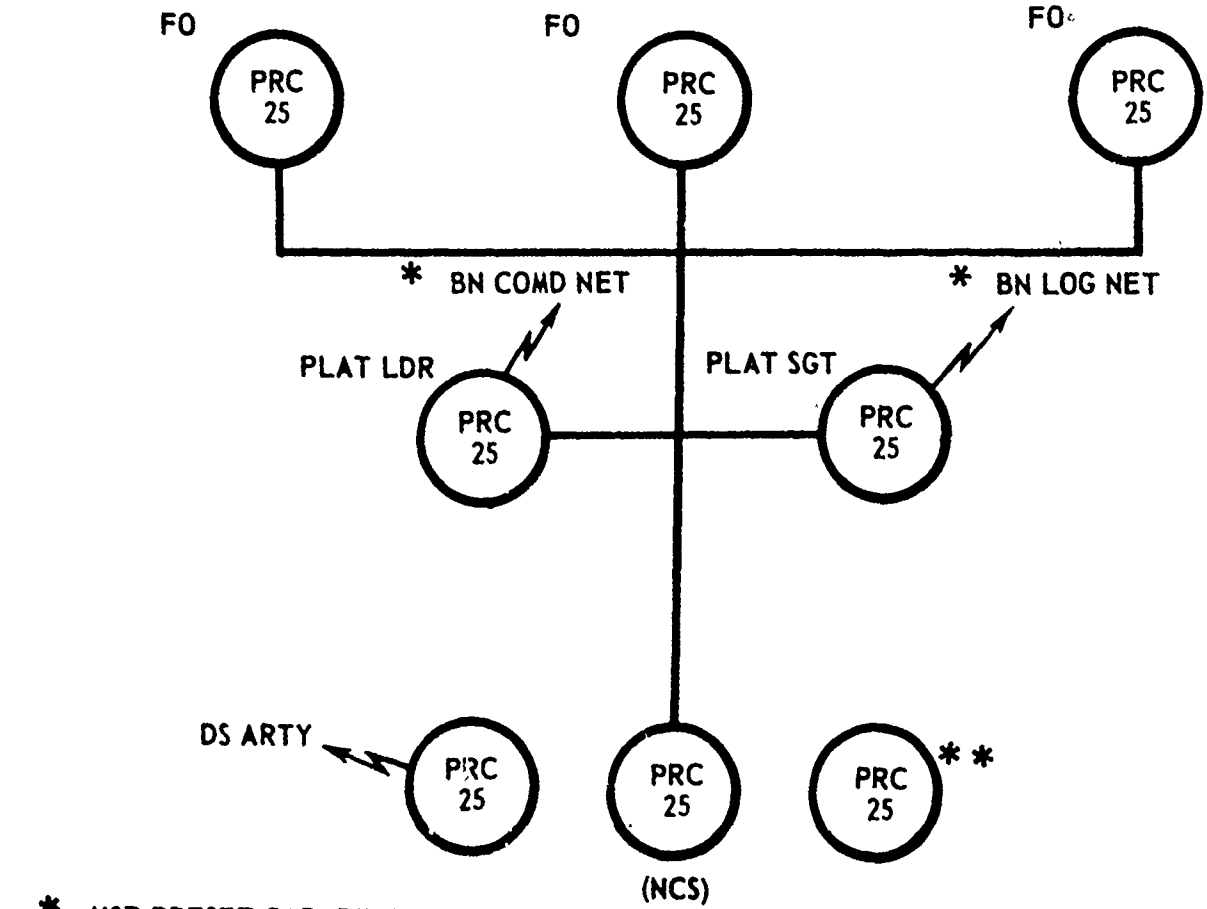



Figure 17-17. Type Fire Direction Net, Mortar Platoon, Combat Support Company, Infantry Battalion, Airmobile Division.

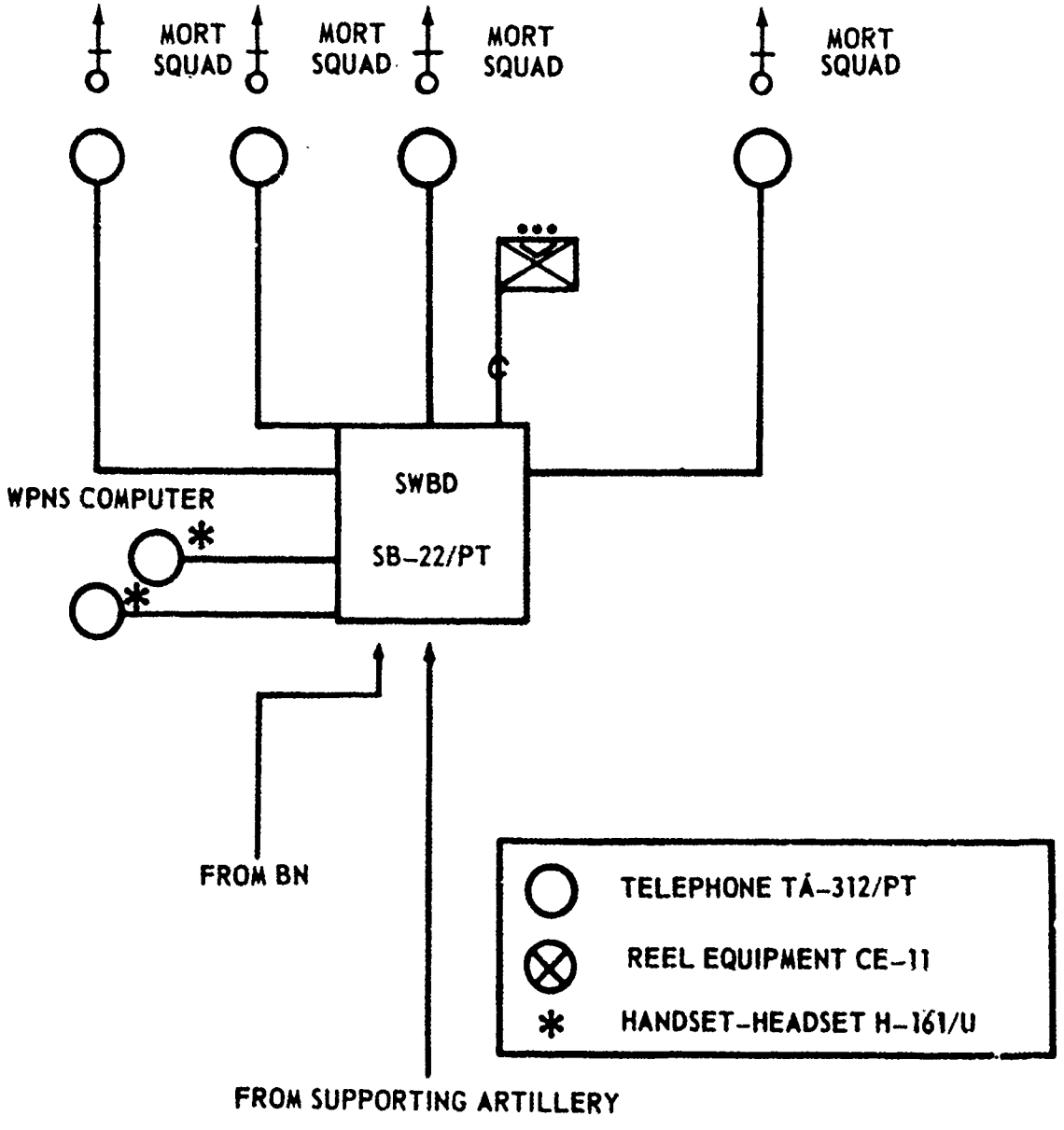
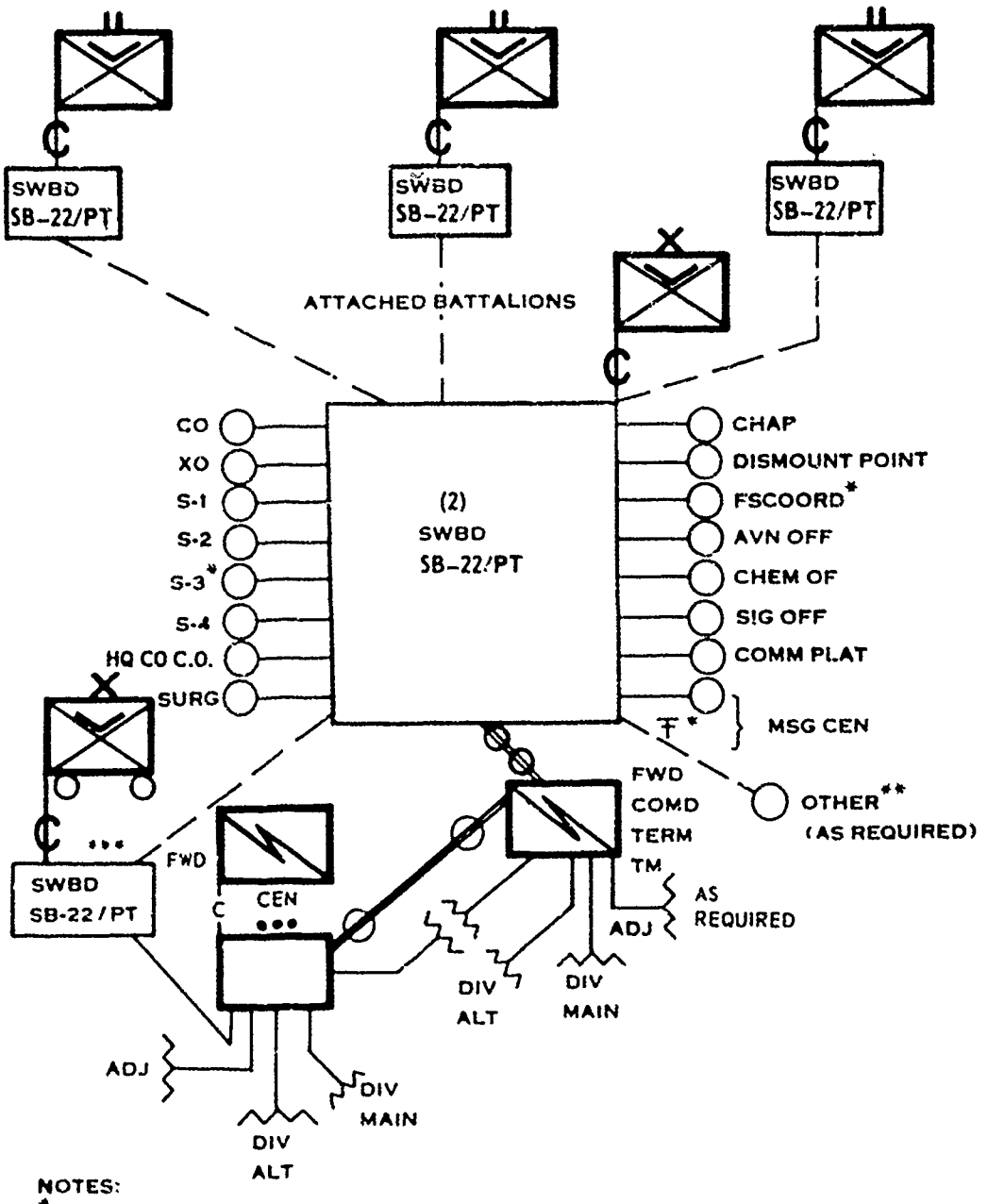



Figure 17-18. Type Wire System, Mortar Platoon, Infantry Battalion, Airmobile Division.




NOTES:

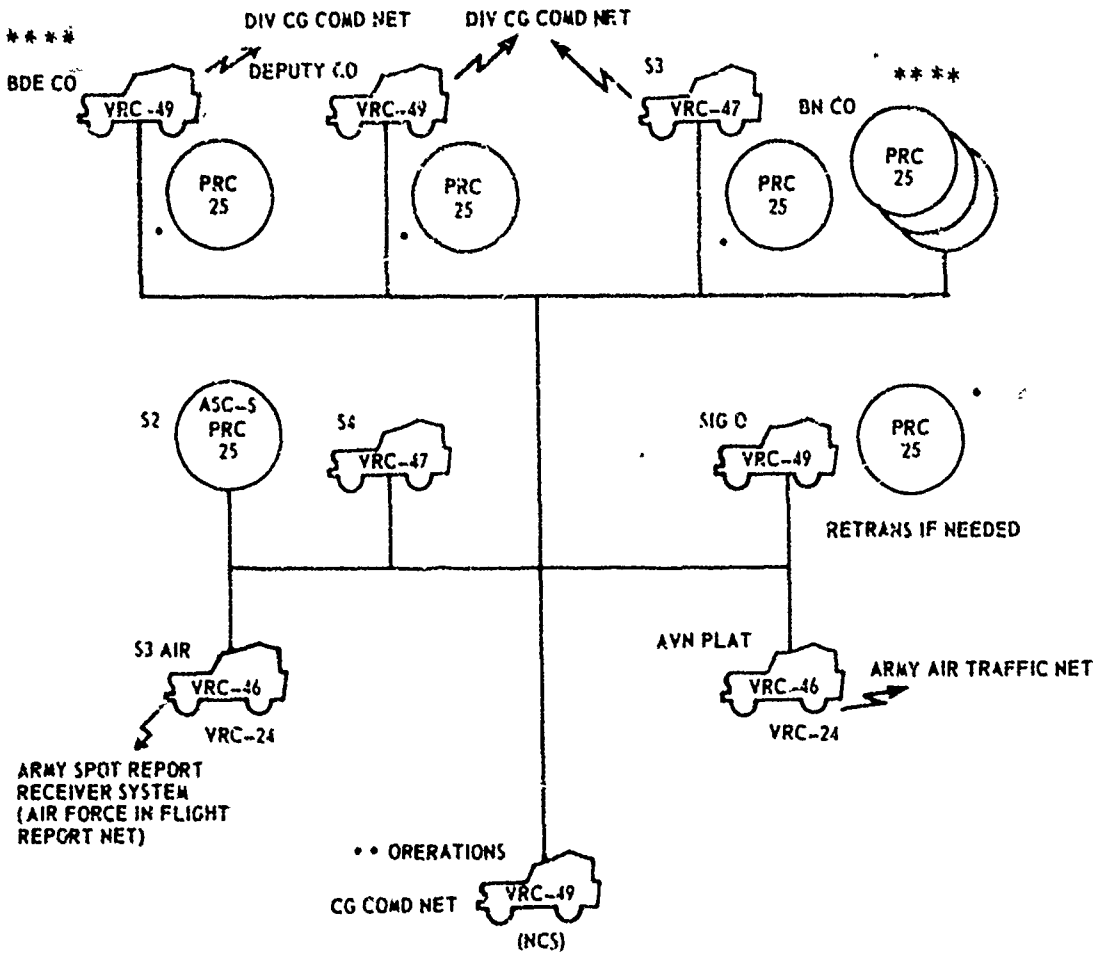
*HOTLINES WILL ALSO BE ESTABLISHED INTO AREA SYSTEM TO DIVISION.

**INCLUDES OTHER SUPPORT OR ATTACHED UNITS, RADIO TRUCKS, AND AUGMENTATIONS.

***INITIAL WIRE COMMUNICATIONS ESTABLISHED THROUGH AREA SYSTEM.

Figure 17-21. Type Wire System, Infantry Brigade, Airmobile Division.

Figure 17-19. Communication Personnel and Equipment, Headquarters and Headquarters Company, Infantry Brigade, Airmobile Division.




NOTES:

* DISMOUNTED USE
** EQUIPMENT ORGANIC TO RADIO SECTION
*** EQUIPMENT AND OPERATORS SUPPLIED BY DIV SIG BN
**** AN/ASC-5, WHICH INCLUDES 1 ARC-102, 3 VRC-46, AND 1 VRC-24, WILL BE USED BY THE BDE CO AND BN CO'S IN AN ATTACHED HELICOPTER AS A HELIBORNE CP

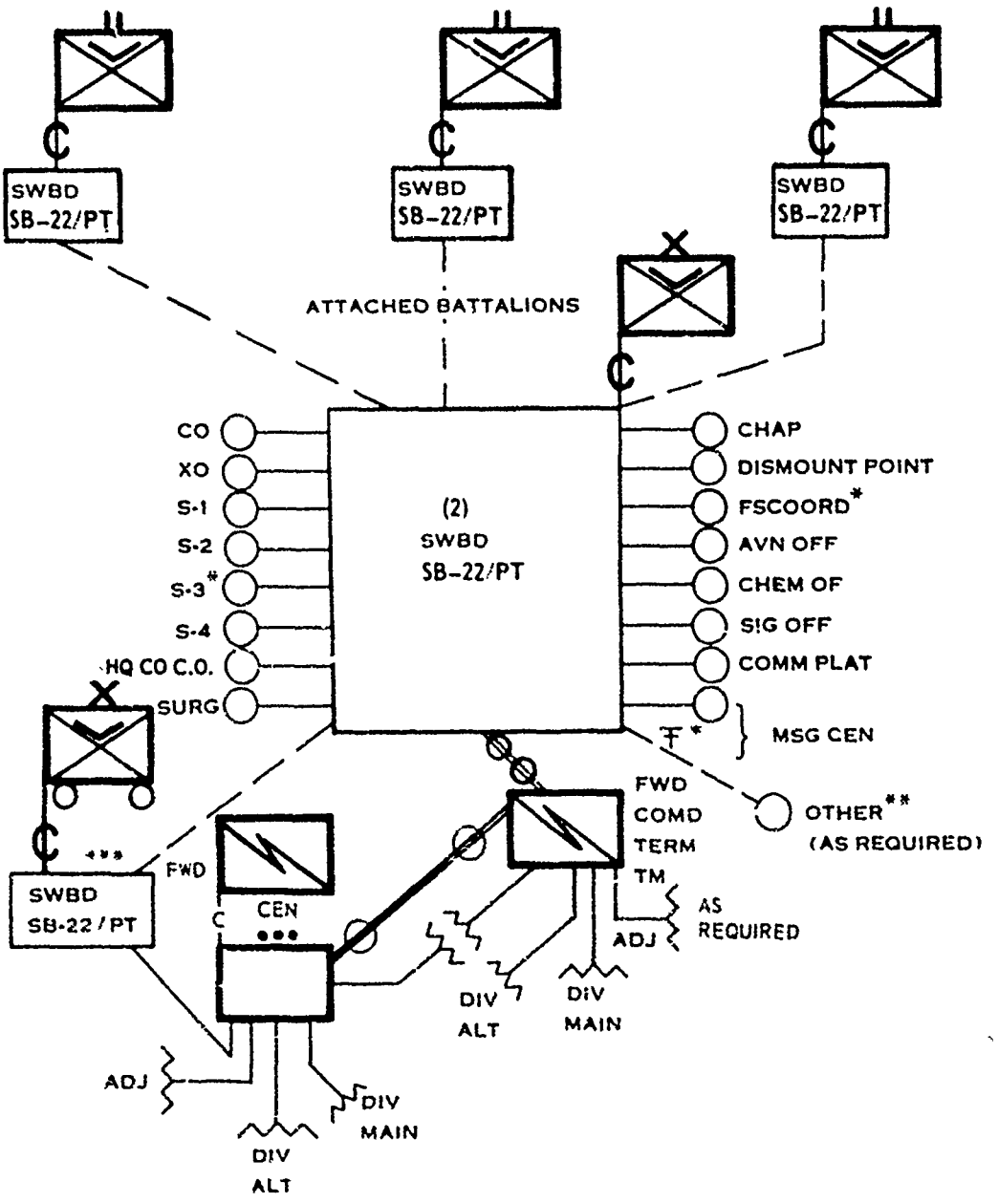
2 LO ENTER NET AS REQUIRED WITH PRC-25.

OTHER NETS

* * * DIVISION WARNING BDCST (SSB)
* * * DIVISION OP/INTER (FM-VOICE)
* * * DIVISION ADMIN LOG (SSB-RATT)
* * * DIVISION AIR REQUEST (SSB-VOICE)




Figure 17-20. Type Command Net, Infantry Brigade, Airmobile Division.




NOTES:

*HOTLINES WILL ALSO BE ESTABLISHED INTO AREA SYSTEM TO DIVISION.

**INCLUDES OTHER SUPPORT OR ATTACHED UNITS, RADIO TRUCKS, AND AUGMENTATIONS.

***INITIAL WIRE COMMUNICATIONS ESTABLISHED THROUGH AREA SYSTEM.

Figure 17-21. Type Wire System, Infantry Brigade, Airmobile Division.

## NOTES

# CHAPTER 18

## COMMUNICATIONS

## SEPARATE BRIGADES

## INFANTRY, AIRBORNE, INFANTRY (MECHANIZED)

| | TOE |
|---|---|
| INFANTRY | 7-102G |
| AIRBORNE | 57-102G |
| INFANTRY (MECH; | 37-102G |

TAB HERE

## COMMUNICATIONS

## SEPARATE INFANTRY BRIGADE

| | TOE |
|---|---|
| BDE | 7-100G |
| HHC BDE | 7-102G |
| BN | 7-15G, 7-45G |
| HPC BN | 7-16G, 7-46G |
| RIFLE CO | 7-18G, 7-47G |

NOTE: REFER TO CHAP 13 and 15 FOR BATTALION AND COMPANY NETS.

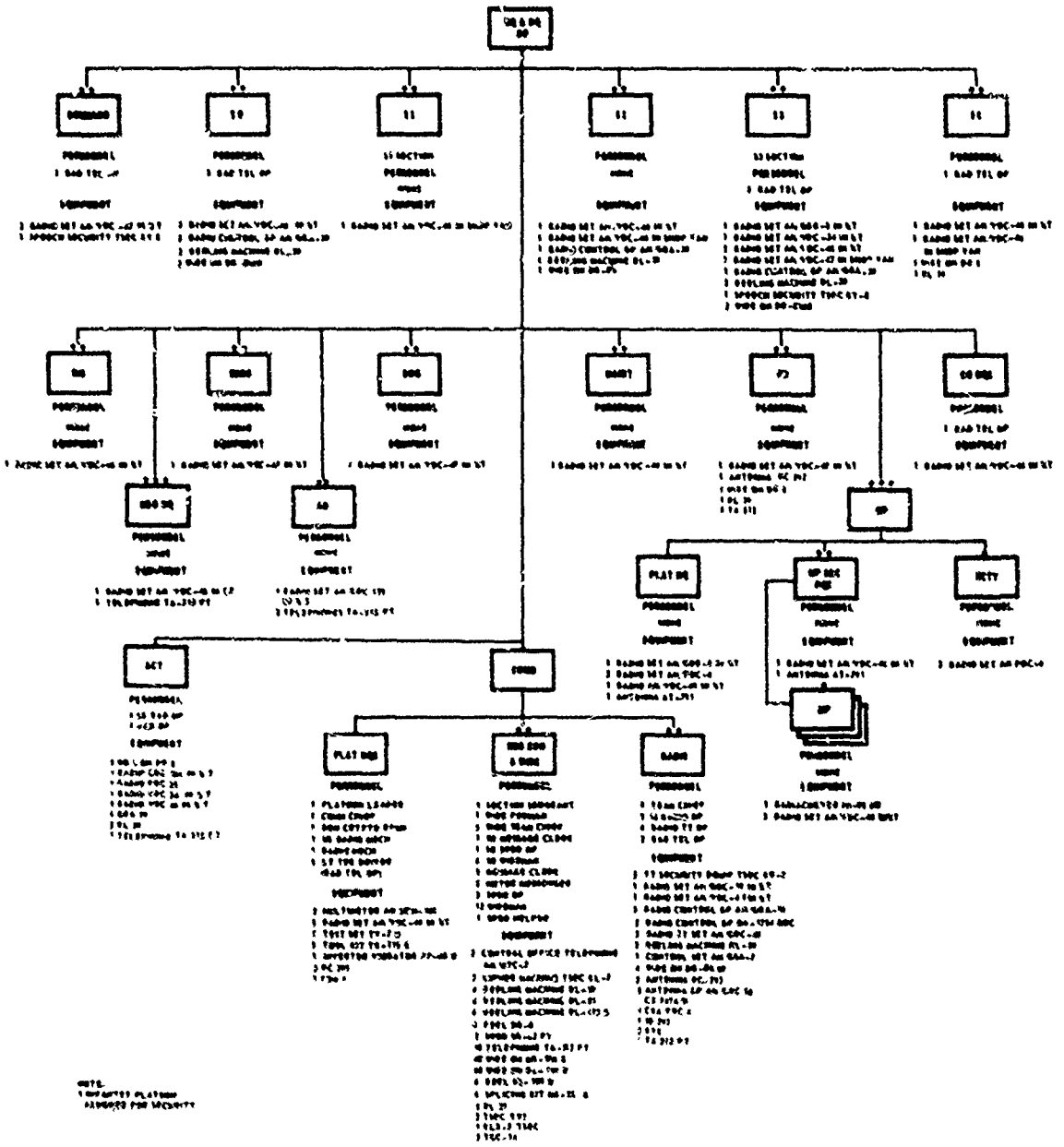


Figure 18-1. Communication Personnel and Equipment, Headquarters and Headquarters Company, Separate Infantry Brigade.

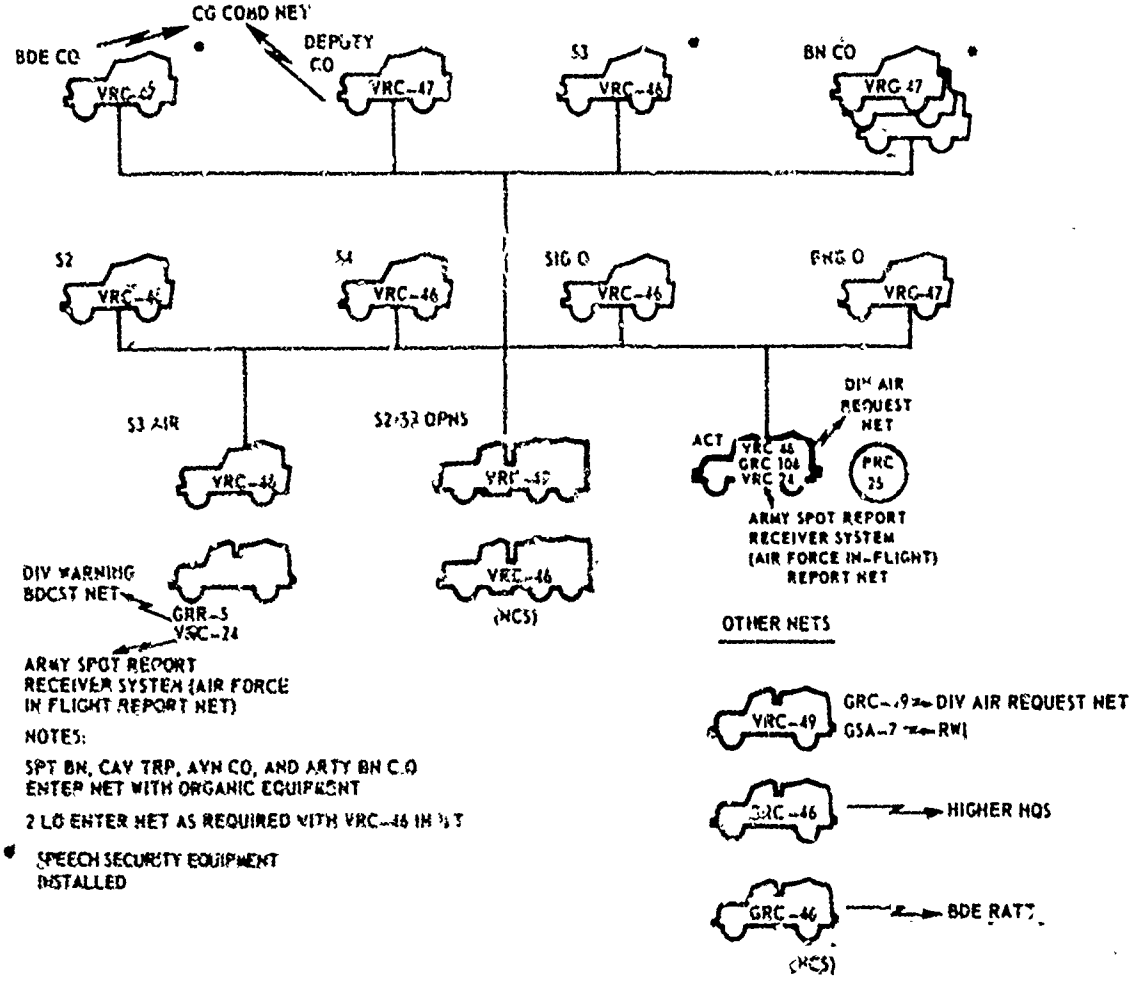
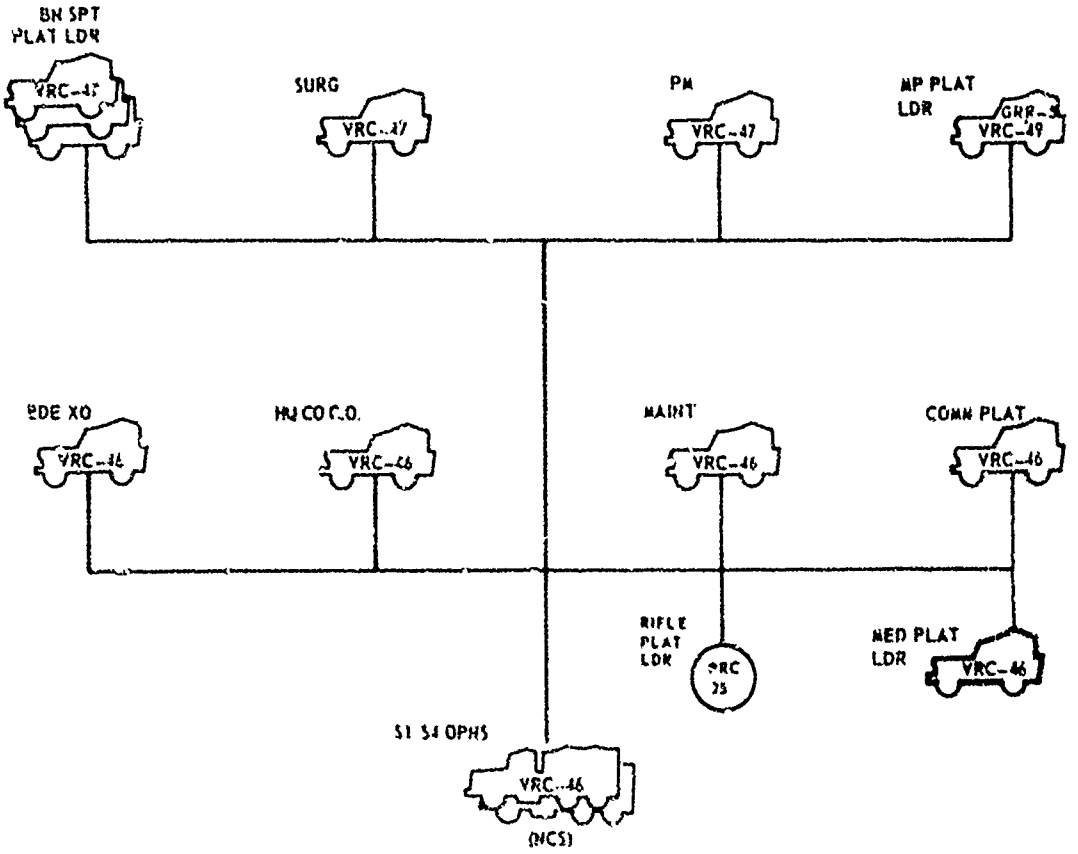


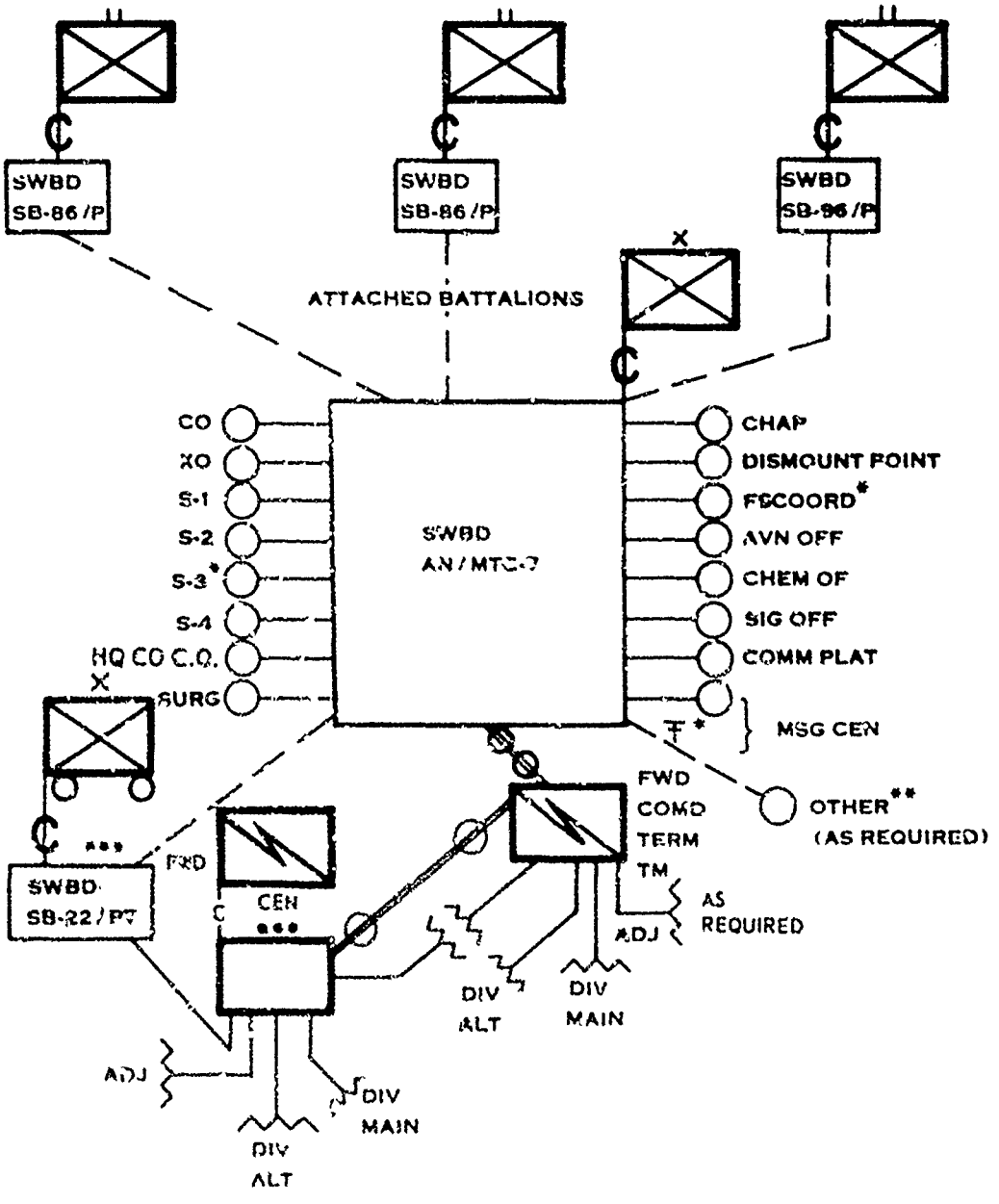

Figure 18-2. Type Command Net, Separate Infantry Brigade.




NOTE

ONE STATION FROM SPT BN, CAV TRP, ENG CO, AVN CO& ARTY ENTER NET WITH ORGANIC EQUIPMENT

Figure 18-3. Type Logistical Net, Separate Infantry Brigade.




NOTES:

*HOTLINES WILL ALSO BE ESTABLISHED INTO AREA SYSTEM TO DIVISION.

**INCLUDES OTHER SUPPORT OR ATTACHED UNITS, RADIO TRUCKS, AND AUGMENTATIONS.

***INITIAL WIRE COMMUNICATIONS ESTABLISHED THROUGH AREA SYSTEM

Figure 18-4. Type Wire System, Separate Infantry Brigade.

## COMMUNICATIONS

## SEPARATE AIRBORNE BRIGADE

| | TOE |
|---|---|
| | 57-100G |
| HHC BDE | 57-102G |
| BN | 7-35G |
| HHC BN | 7-36G |
| RIFLE CO | 7-37G |

NOTE:

REFER TO CHAP 14
FOR BATTALION AND COMPANY NETS.

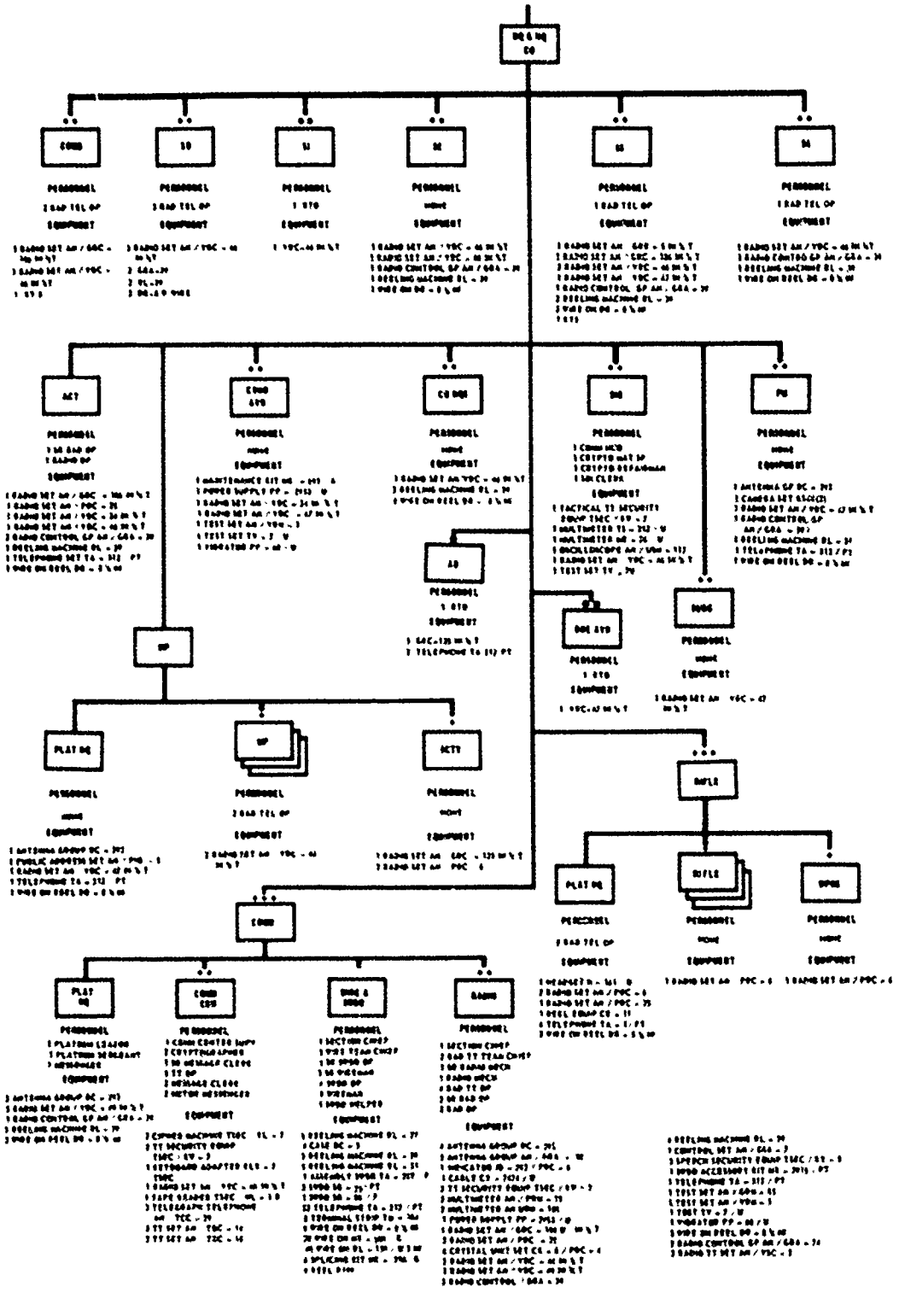


Figure 18-5. Communication Personnel and Equipment, Headquarters and Headquarters Company, Separate Airborne Brigade.

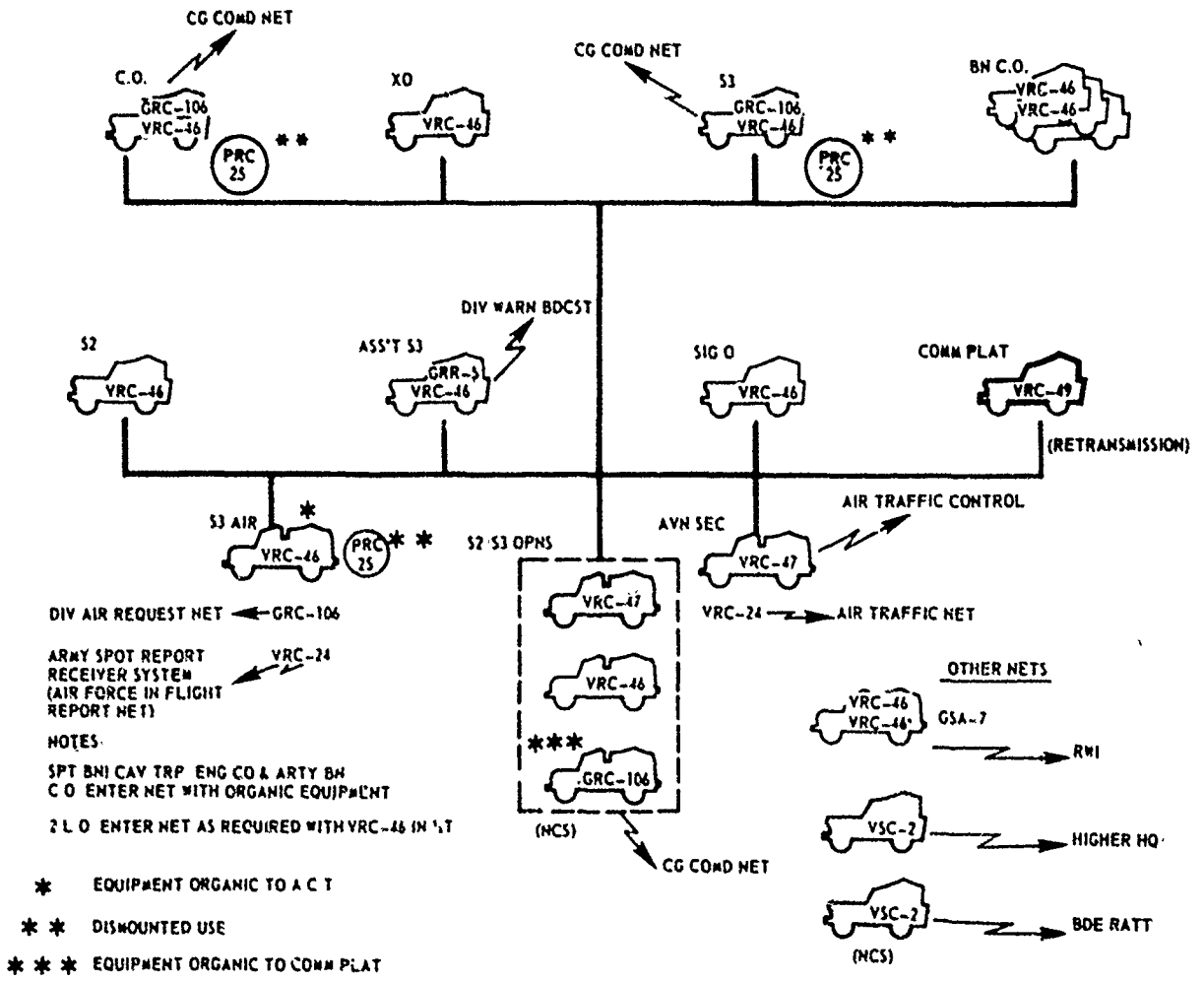
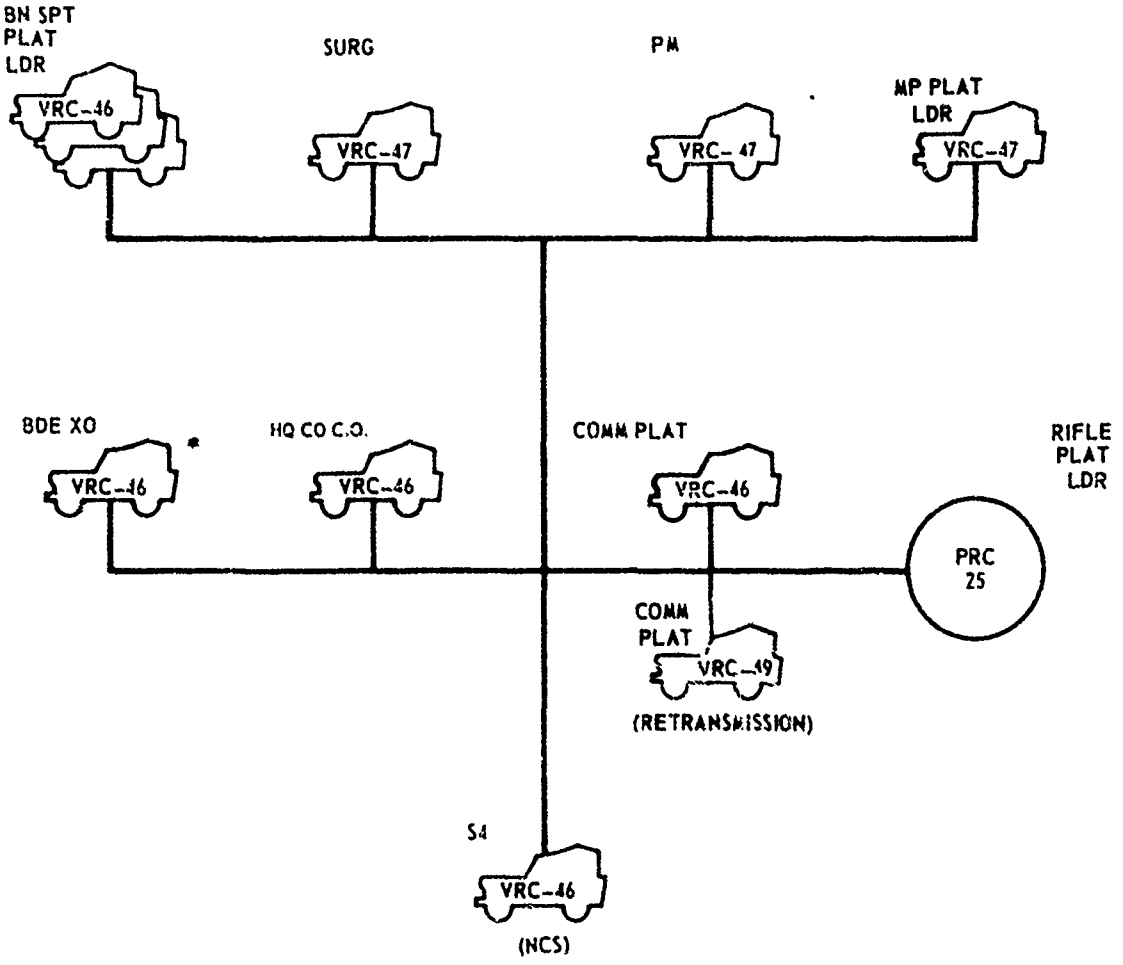



Figure 18-6. Type Command Net, Separate Airborne Brigade.

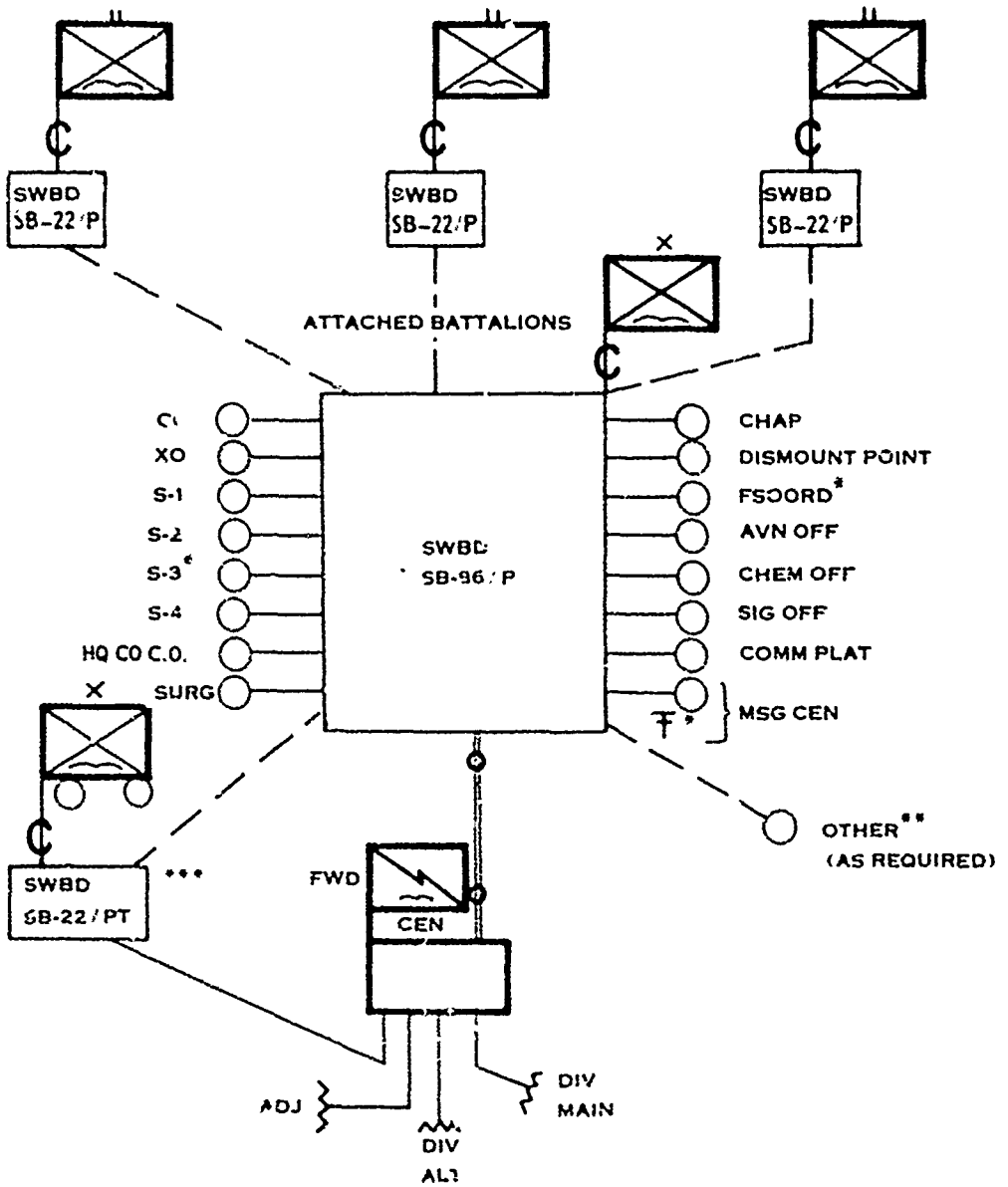



NOTE:

ONE STATION FROM SPT BN, CAV TRP, ENG CO, AND ARTY BN, ENTER NET WITH ORGANIC EQUIPMENT

* ENTER NET AS REQUIRED.

Figure 18-7. Type Logistical Net, Separate Airborne Brigade.




NOTES:

*HOTLINES WILL ALSO BE ESTABLISHED INTO AREA SYSTEM TO DIVISION.

**INCLUDES OTHER SUPPORT OR ATTACHED UNITS, RADIO TRUCKS, AND AUGMENTATIONS.

***INITIAL WIRE COMMUNICATIONS ESTABLISHED THROUGH AREA SYSTEM.

Figure 18-8. Type Wire System, Separate Airborne Brigade.

## COMMUNICATIONS

## SEPARATE INFANTRY BRIGADE (MECHANIZED)

| | TOE |
|---|---|
| | 37-100G |
| HHC BDE | 37-102G |
| BN | 7-45G |
| HHC BN | 7-46G |
| RIFLE CO | 7-47G |

NOTE:
REFER TO CHAP 15 FOR
BATTALION AND COMPANY NETS.

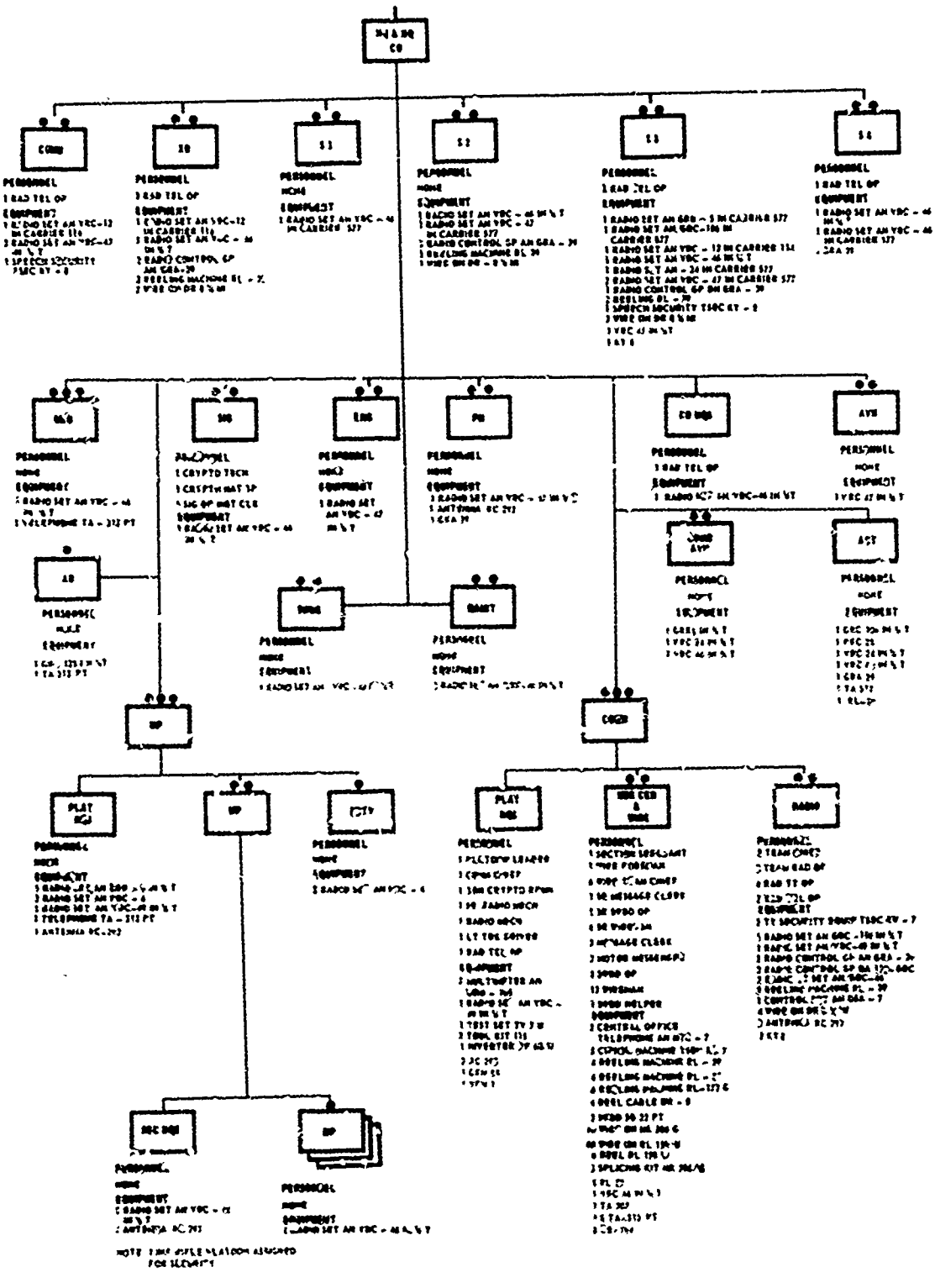


Figure 18-9. Communication Personnel and Equipment, Headquarters and Headquarters Company, Separate Mechanized Brigade.

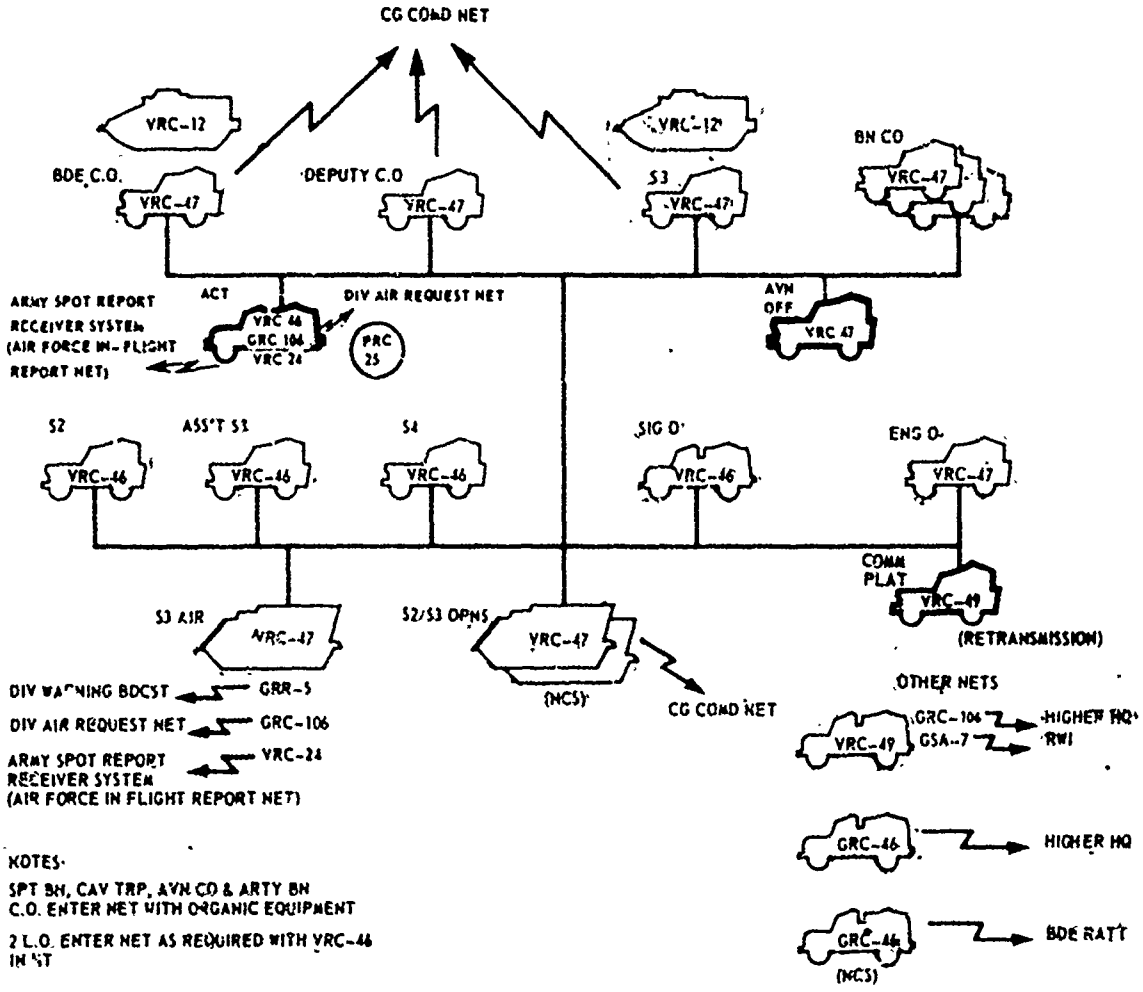
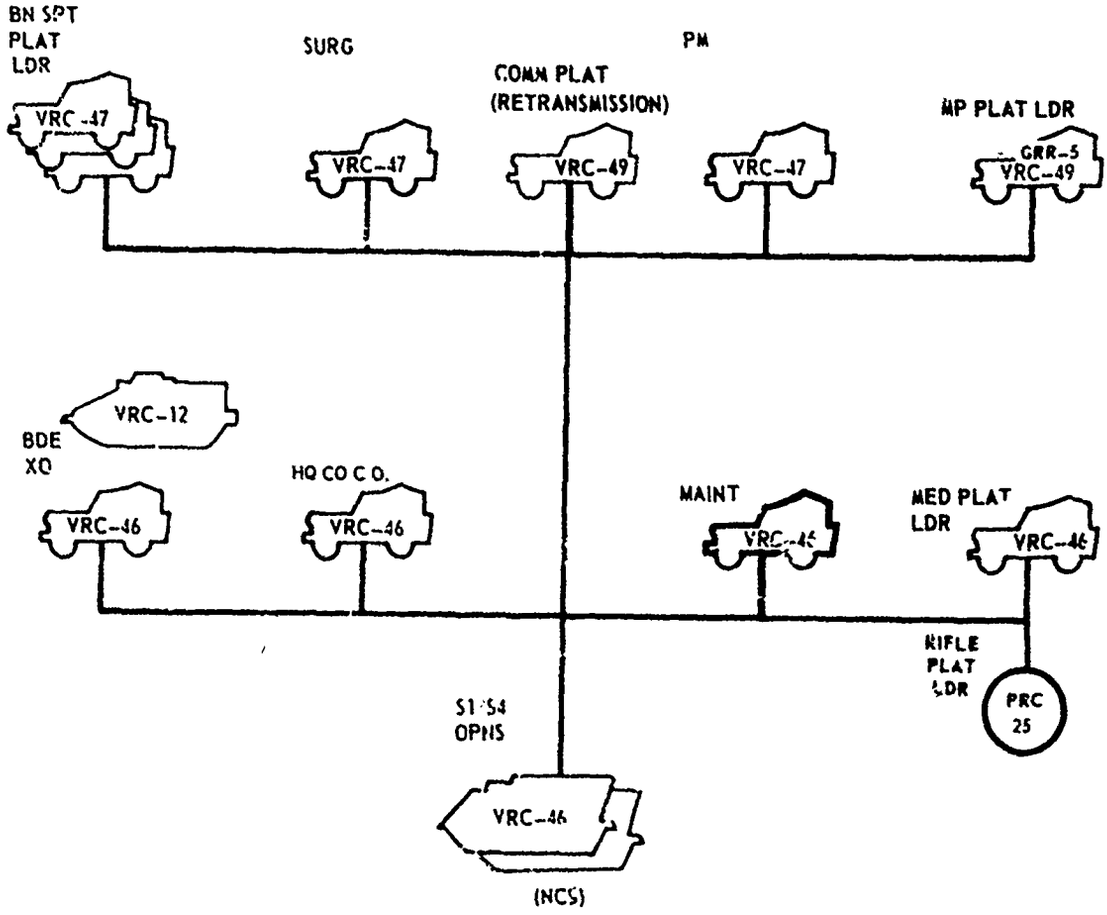
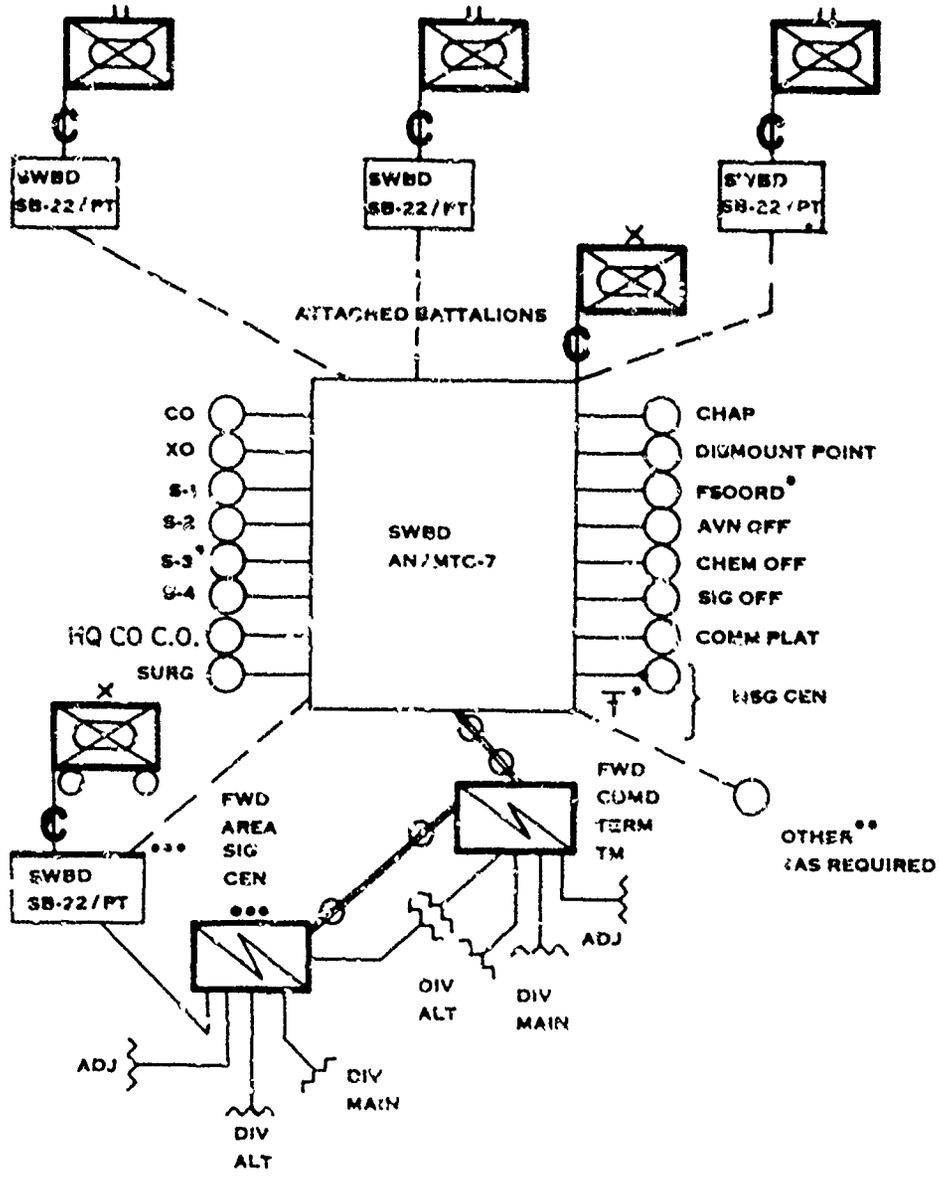



Figure 18-10. Type Command Net, Separate Mechanized Brigade.




NOTE:
ONE STATION FROM SPT BN, CAV TRP, AVN CO AND ARTY BN, ENTER NET WITH ORGANIC EQUIPMENT.

Figure 18-11. Type Logistical Net, Separate Mechanized Brigade.




NOTES:

*HOTLINES WILL ALSO BE ESTABLISHED INTO AREA SYSTEM TO DIVISION.

**INCLUDES OTHER SUPPORT OR ATTACHED UNITS, RADIO TRUCKS, AND AUGMENTATIONS

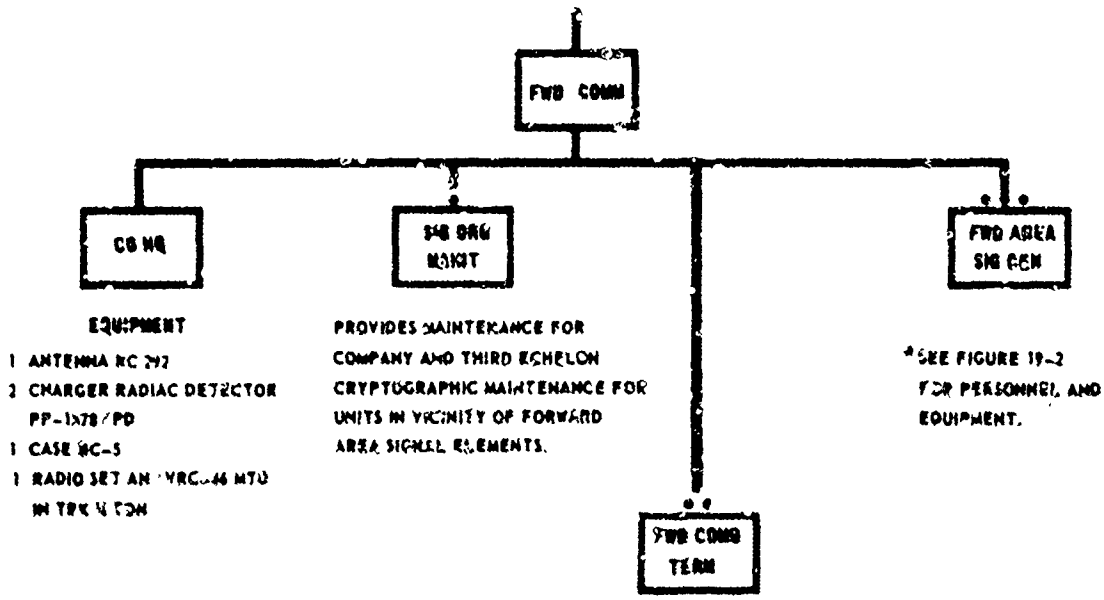
***INITIAL WIRE COMMUNICATIONS ESTABLISHED THROUGH AREA SYSTEM.

Figure 18-12. Type Wire System, Separate Mechanized Brigade.

# CHAPTER 19

# DIVISION COMMUNICATION SYSTEMS

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**EQUIPMENT**

1 ANTENNA RC 292
2 CHARGER RADIAC DETECTOR PP-1578/PD
1 CASE SC-5
1 RADIO SET AN/VRC-46 MTD IN TRK ¼ TON

PROVIDES MAINTENANCE FOR COMPANY AND THIRD ECHELON CRYPTOGRAPHIC MAINTENANCE FOR UNITS IN VICINITY OF FORWARD AREA SIGNAL ELEMENTS.

*SEE FIGURE 19-2 FOR PERSONNEL AND EQUIPMENT.

(NOTE: THIS SECTION HAS THE CAPABILITY OF BEING SPLIT TO PROVIDE THE THREE BRIGADE HQS ENTRY INTO THE DIVISION AREA SYSTEM.)

**PERSONNEL**

1 SECTION LEADER
1 SECTION SERGEANT
9 TEAM CHIEFS
3 POWERMEN
9 SR RADIO RELAY OP
9 RADIO RELAY OP

**EQUIPMENT**

3 ANTENNA RC 292
72 CABLE ASSEMBLY TELEPHONE CX-4566/G (250 FT)
18 CABLE ASSEMBLY TELEPHONE CX-4760/U
9 CASE SC-5
9 DISTRIBUTION BOX J-1077/U
3 MULTIMETER TS 352/U
3 RADIO SET AN/PRC-25
3 RADIO SET AN/VRC-47 MTD IN ¼ TON TRUCK
9 RADIO TERMINAL SET AN/MRC-69
4 REELING MACHINE CABLE HAND RL-39
1 TEST SET TELEPHONE TS-550/PT
18 WIRE WD-1/TT ON DR-8 ¼MI

Figure 19-1. Forward Communication Company, Infantry and Mechanized Division Signal Battalion.

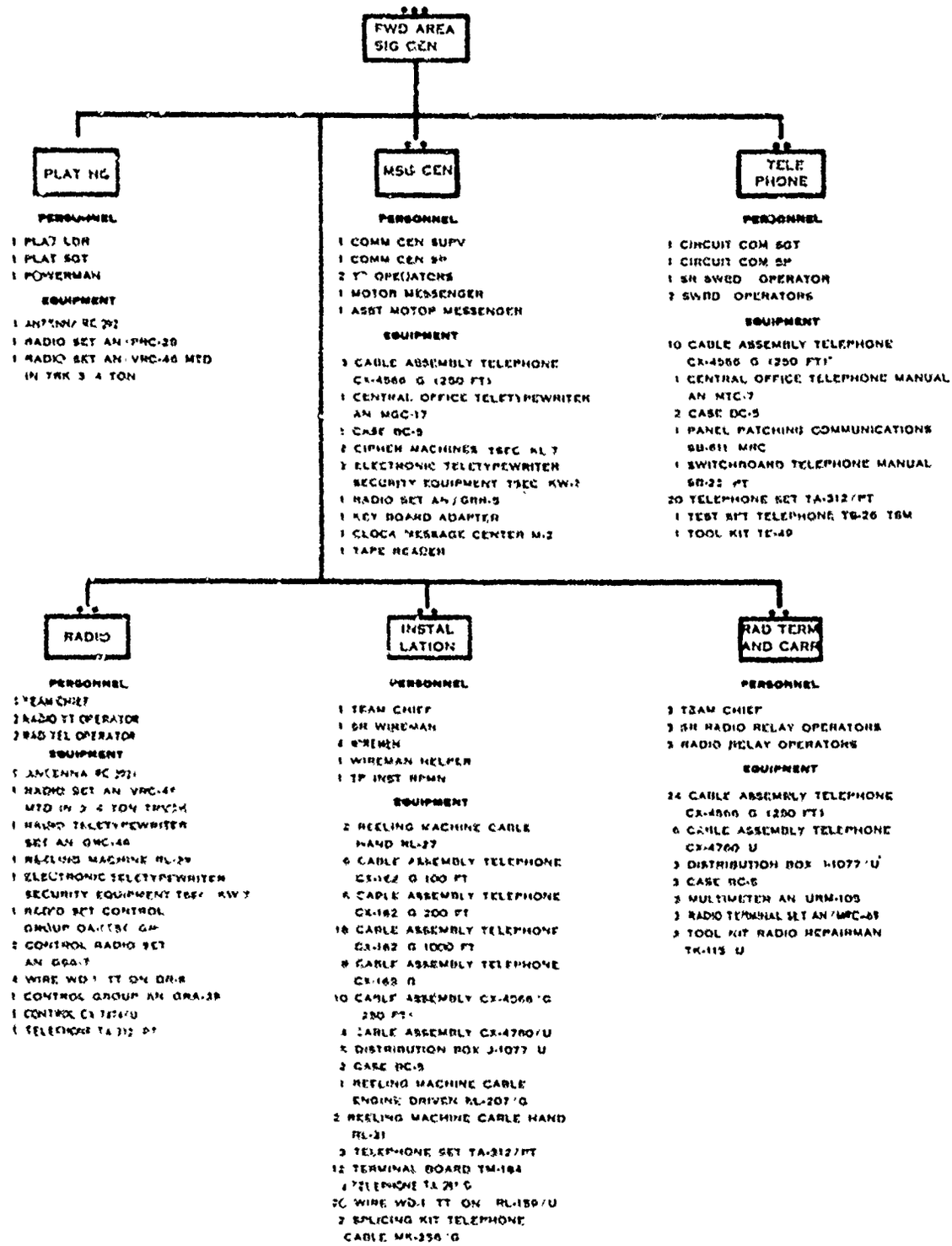



Figure 19-2. Communication Personnel and Equipment, Forward Area Signal Center Platoon, Infantry and Mechanized Divisions.

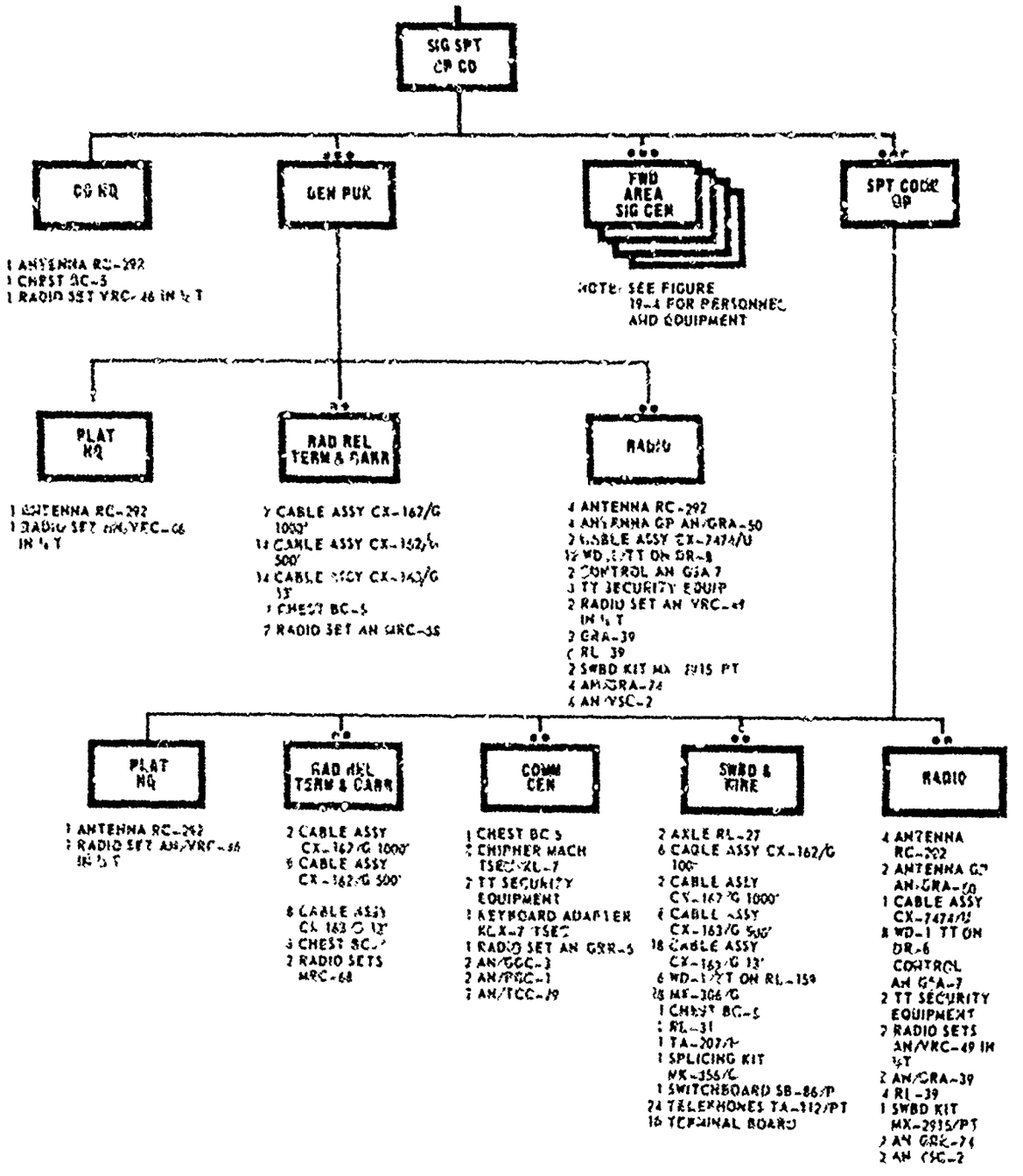



Figure 19-3. Signal Support Operations Company, Airborne Division Signal Battalion.

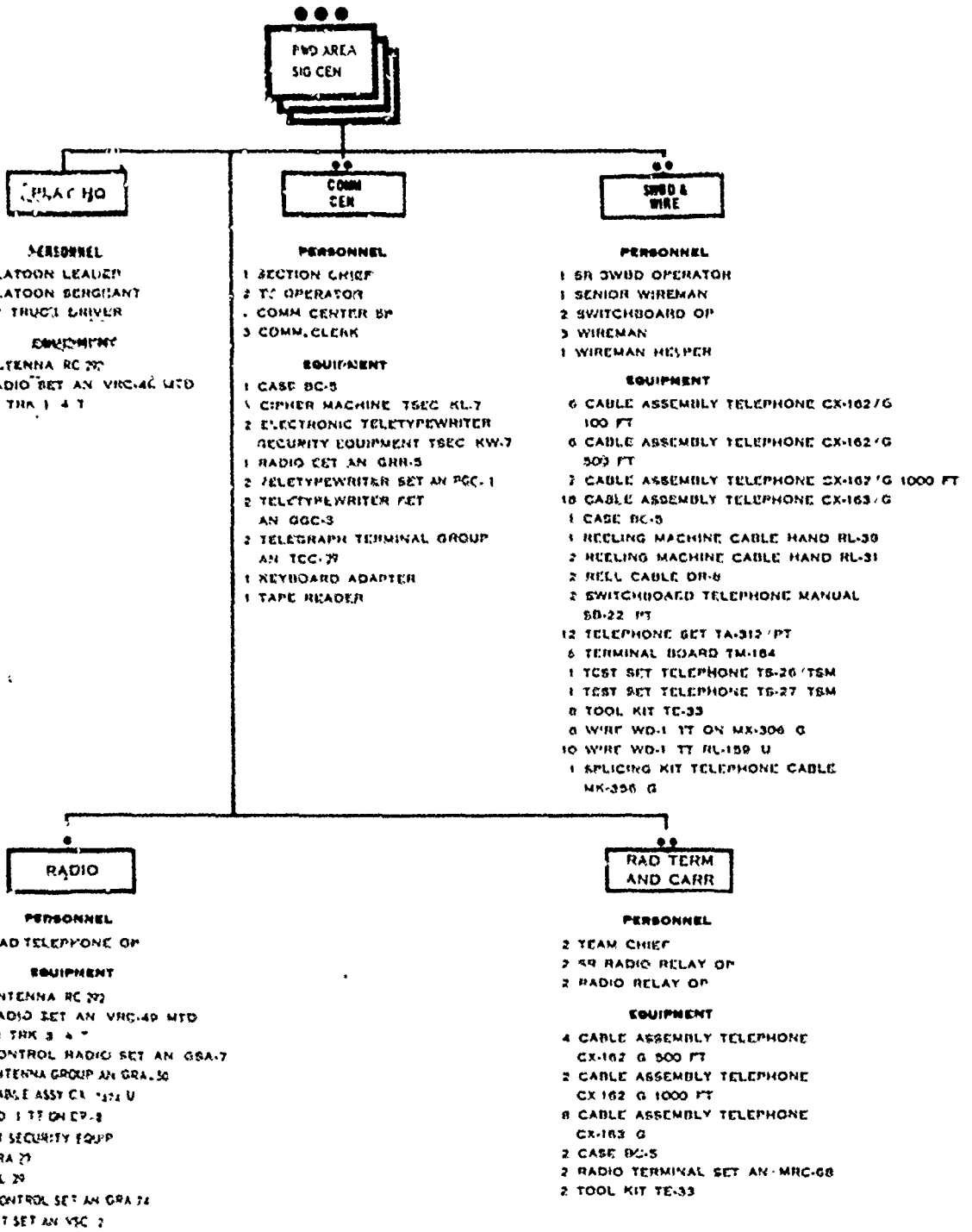



Figure 19-4. Communication Personnel and Equipment, Forward Area Signal Center Platoon, Airborne Division.

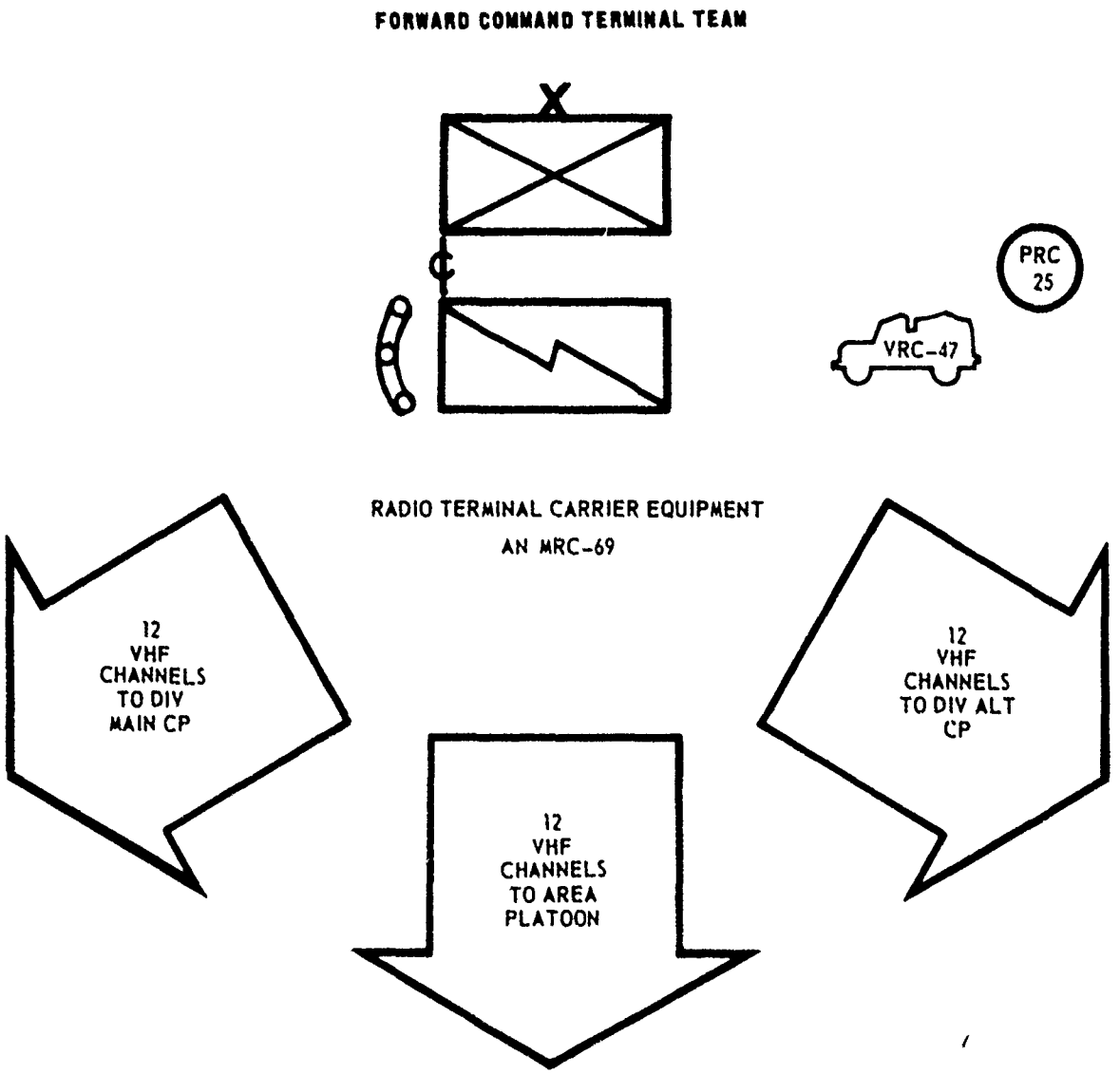



Figure 19-5. Type Brigade Support from Forward Command Terminal Team, Infantry and Mechanized Division Forward Communications Company.

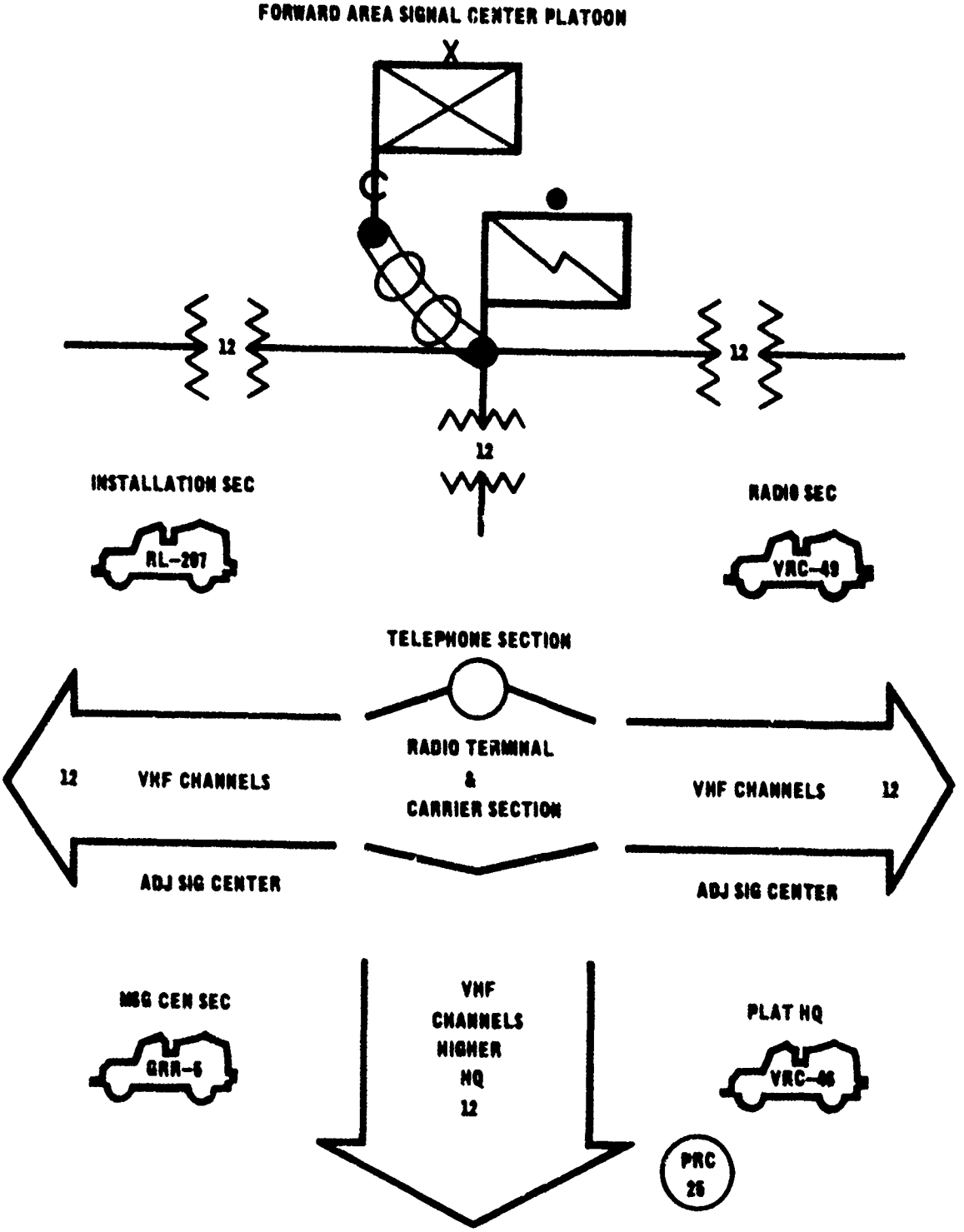



Figure 19-6. Type Services Provided by Forward Area Signal Center Platoon, Infantry and Mechanized Division.

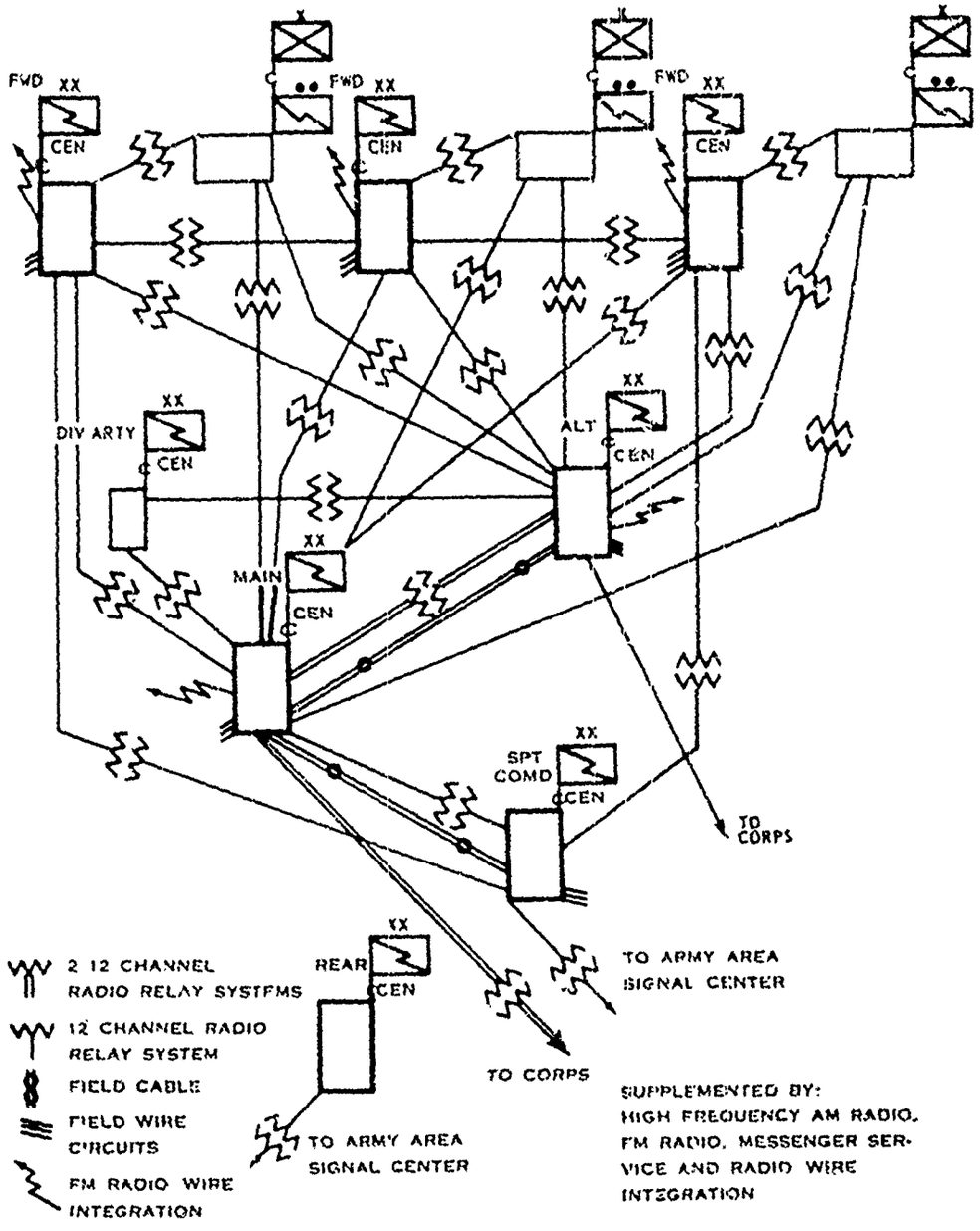



Figure 19-7. Type Division Area Communication System, Infantry and Mechanized Division.

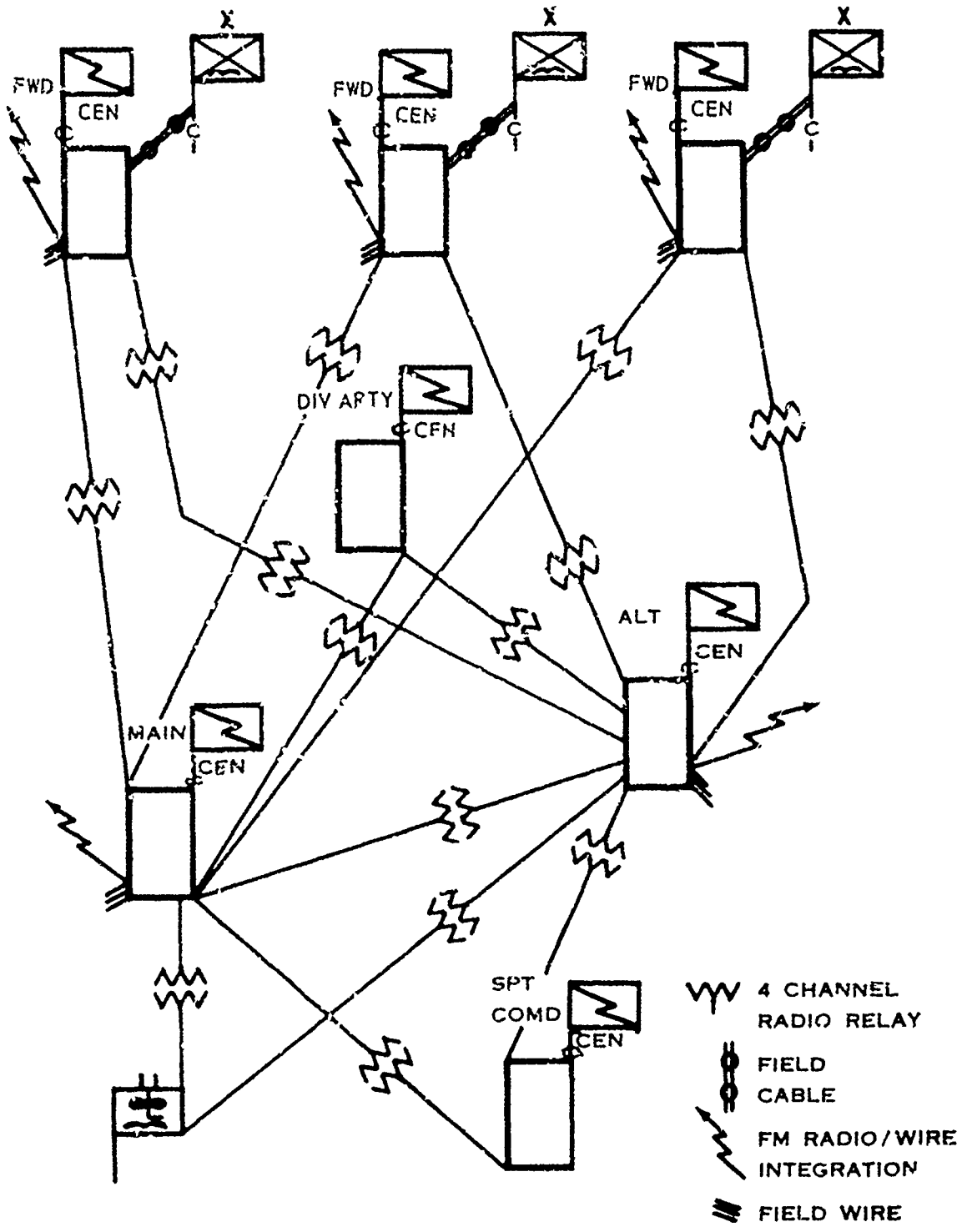



Figure 19-8. Type Division Area Communication System, Airborne Division.

## NOTES

# CHAPTER 20

# PREVENTIVE MAINTENANCE

TAB
HERE

## PREVENTIVE MAINTENANCE

20-1. THIS IS YOUR PROBLEM.

a. General: A soldier in combat realizes very quickly that his life depends on the manner in which he takes care of his weapon. In peace or war, the soldier's life depends also on the operation of his technical equipment. This section deals specifically with preventive maintenance of communication equipment--equipment that is a fighting tool of no less importance than rifles or tanks.

b. What Is the Problem? We who use this equipment, and our commanders, will not, for the most part, be communication specialists. Our problem, that of operators and commanders alike, is this:

WHAT MUST WE DO TO ASSURE OURSELVES THAT OUR COMMUNICATION EQUIPMENT WILL OPERATE WHEN NEEDED?

In this section, this problem will be discussed from the standpoint of the operator of the equipment and his commander. Many factors are involved in the solution to this problem.

c. Why Is the Problem Important? There are two reasons.

(1) The first and most obvious is that success or failure in battle depends a great deal on the condition of the equipment that we use. The loss of a tank in combat as a result of enemy fire is serious, but combat losses are expected, and we prepare for them. A commander cannot command and control his unit without communication. He must have the required communication when he needs it, and the loss of a tank because its radio could not maintain communication due to the lack of proper preventive maintenance is inexcusable. Good communication equipment makes our forces stronger and saves the lives of our men.

(2) The first reason is sufficient to make the problem vital. However, there is another very important reason. Faulty, inoperative equipment is useless, and is nothing but dead expense. It hits us right in the billfold, and it hurts. The cost of most of the items that the Army buys now is double or triple the cost of 10 years ago. We must not slip into a careless, spendthrift attitude that existed during World War II. We cannot regard our resources as an endless, bottomless pool into which we can dip whenever we desire. We are dipping into our own pockets, and they are far from bottomless.

(a) If you had a new $3,000 automobile, would you be concerned about such things as checking the oil, balancing the wheels, and checking the water in the radiator and battery? Do you think you would drive it with just a little more care than you would a jalopy? Of course you would. Compare the price of that car with the price of some of the communication equipment listed below. These are basic prices that do not cover the cost of installing the equipment--you pay for this too.

| | |
|---|---|
| Radio Set AN/GRC-106 . . . . . | $15,000.00 |
| Radio Set AN/VRC-47 . . . . . | 3,356.00 |
| Radio Set AN/PRC-25 . . . . . | 868.00 |
| Switchboard SB-22/PT . . . . . | 602.00 |
| Switchboard SB-86/P . . . . . | 2,726.00 |
| Telephone Set TA-1/PT . . . . . | 38.73 |
| Telephone Set TA-312/PT . . . . . | 48.00 |
| Telephone set TA-264/PT . . . . . | 174.00 |

(b) Now that we have discussed the reasons that make the problem important, let us restate the problem:

WHAT MUST WE DO TO ASSURE OURSELVES THAT OUR COMMUNICATION EQUIPMENT WILL OPERATE WHEN NEEDED?

There is no magic solution. However there is an answer that must stick firmly in our minds, and it is:

PREVENTIVE MAINTENANCE

THE SYSTEMATIC CARE, SERVICING, AND INSPECTION OF EQUIPMENT FOR THE PURPOSE OF MAINTAINING IT IN SERVICEABLE CONDITION AND DETECTING AND CORRECTING FIRST-STAGE FAILURES.

MAINTENANCE

ANY ACTION TAKEN TO KEEP MATERIEL IN SERVICEABLE CONDITION OR RESTORE IT TO SERVICEABILITY WHEN UNSERVICEABLE.

(c) Preventive maintenance is the scheduled care and servicing of equipment to prevent it from going bad. It is the "stitch in time" that saves lives, time, and money.

20-2. THE PROBLEM:

a. Improper or Careless Maintenance of Equipment or Materiel. A radio operator stationed with a unit in Europe used high-pressure compressed air to clean his radio. It took radio mechanic six hours to repair the damage caused by this careless act.

b. Lack of Lubrication, Overlubrication, or Use of Unauthorized Lubricants: A unit supplying power for communication equipment was rigged up with a 55-gallon drum of gasoline so that it would operate through the night without servicing. The unit ran out of oil, caught fire, and was destroyed.

c. Inadequate Inspection of Organization Equipment: During an inspection of a combat unit, the inspectors observed that an unusual amount of radio equipment was deadlined. Upon checking to see what was causing this, they found not only a lack of proper preventive maintenance, but that the unit commander had not inspected the equipment for over three months.

d. Deferred Maintenance: An infantry regiment was on maneuvers near Tokyo. During the last few days of this maneuver it rained constantly. When the exercise ended, personnel loaded signal equipment on vehicles without cleaning or drying it. No one thought that any harm would come from deferring this maintenance. While the unit was returning to its home station, the Korean hostilities began, and the regiment went directly to Pusan without a chance to service the equipment. Eight days later the unit was in combat with communication equipment only 50 percent operational, although it had been 95 percent operational during the maneuvers.

e. Repairs by Unqualified Personnel: A radio operator replaced what he thought was a burned-out resistor with a resistor of the wrong size. This caused serious damage to other parts of the equipment.

f. Failure to Assign Maintenance Responsibility: In Korea, a power unit was installed in a signal company area. All sections of the company used power from the unit, but no section was assigned maintenance responsibility. As a result, the unit was not lubricated and other preventive maintenance was not performed. The power unit quickly broke down from lack of maintenance.

(1) We can all think of many other cases of improper or inadequate preventive maintenance from our own experience that will illustrate the point just as well as those examples above. In the cases mentioned, we can see instances of neglect of duty and poor judgment on the part of the responsible officers and the men who were using the equipment. If each man concerned had used common-sense maintenance techniques, these failures would not have occurred.

(2) To conserve equipment does not mean not to use it. Fair wear and tear is to be expected, but not waste.

(3) Every training program includes training in organizational preventive maintenance. This training must be applied continuously, or we will lose a war without ever engaging the enemy.




Figure 20-1. Keep the equipment operative--you are going to need it.

20-3. THE COMMANDER'S RESPONSIBILITIES AND DUTIES.

a. What Are the Commander's Responsibilities?

(1) Commanders are required to ensure that all equipment issued or assigned to their command is maintained in a serviceable condition and is properly cared for and used, that personnel under their command comply with technical instructions.

(2) Preventive maintenance is the responsibility of commanders at all echelons. It is the cornerstone of efficient and economical maintenance. Commanders are responsible for compliance with instructions and procedures for preventive maintenance operations, the training of their command in preventive maintenance of equipment, and allocation of sufficient time for the performance of preventive maintenance services. Training in preventive maintenance is equal in importance to other functional military training.

(3) It is the responsibility of the commanding officer to prevent the abuse of material under his control--evidence of abuse will be investigated and corrective action taken.

(4) These command responsibilities are clearly stated in regulations. There is no doubt as to each commander's responsibility for correcting any weakness in the maintenance chain. Any commander can have good organizational maintenance if he really wants it.

b. What is the Army Maintenance System? According to the established Army system of maintenance categories and echelons, the responsibility of the unit commander centers around organizational, or first- and second-echelon maintenance. The chart below shows the categories and echelons of the entire Army maintenance system. The first 2 links in the system are the responsibility of the unit commander--the 2 most important links.

MAINTENANCE OF SUPPLIES AND EQUIPMENT

| CATEGORY | ORGANIZATIONAL | DIRECT SUPPORT | GENERAL SUPPORT | DEPOT |
|---|---|---|---|---|
| WHO | User<br>Wearer<br>Operator<br>Using Unit | Division and Army units | Army Units | Logistical Command level |
| WHERE | At equipment<br>At Unit | Mobile shop | Semifixed shop | Depot shop |
| WHAT | Minor repair and "Keep it operating" | Repair, replace and return to user | Repair, overhaul | Repair or rebuild for stock |
| HOW | Inspecting<br>Cleaning<br>Servicing<br>Lubricating<br>Adjusting<br>Minor replacement | Inspecting<br>Major replacement<br>Major repair | Inspecting<br>Major replacement<br>Major repair | Inspecting<br>Major replacement<br>Complete rebuilding |
| WHY | Combat effectiveness | | Support - supply | |

Figure 20-2. Maintenance of Supplies and Equipment.

CATEGORIES

ORGANIZATIONAL

Who: The using organization.

What: Inspecting, cleaning, servicing, preserving, and lubricating; minor parts replacement; and required adjustments.

Responsibility: The unit commander.

DIRECT SUPPORT

Who: Maintenance activities in direct support of using organizations.

What: Repair or replacement of end items or assemblies.
Equipment repaired will be returned to using organization.
Also handle repair parts supply for using organizations.

Responsibility: In a division, the division commander; non-divisional units, the army commander.

GENERAL SUPPORT

Who: Maintenance activities in support of army supply system.

What: Repair or overhaul material to a ready-to-issue condition based upon army area supply requirement.

Responsibility: The army commander.

DEPOT

Who: Fixed or semifixed shops with extensive equipment.

What: Complete rebuilding of parts, subassemblies, assemblies, or entire major items. Equipment rebuild is usually returned to depot stocks for reissue.

Responsibility: Commodity Commands

Figure 20-3. Categories of Maintenance.

ECHELONS

USER

Maintenance performed by the man or crew using the equipment. This is the heart of preventive maintenance and the critical link in the entire Army maintenance system. It must be regular and systematic. At the first sign of trouble, the operator or user must inform the organizational mechanic.

ORGANIZATIONAL

Maintenance requiring skill, performed by trained organizational mechanics. They use tools, test equipment, and subassemblies and perform periodic inspections and lubrications. Their activities constitute the vital second half of preventive maintenance.

DIRECT SUPPORT

Maintenance requiring more skill and special tools, performed by specially trained maintenance units or mobile repair crews in direct support of the using organization. This echelon includes repair and replacement of subassemblies and assemblies.

GENERAL SUPPORT

Maintenance requiring tools and skills not available in third echelon, performed in maintenance units that often combine direct and general support work. This echelon includes repair of major assemblies for return to lower echelons, or supply system.

DEPOT

Complete rebuilding performed in a fixed installation. Normally, items repaired at this echelon are returned to stock. Production and assembly-line methods are employed whenever possible.

Figure 20-4. Echelons of Maintenance.

20-4. COMMAND RESPONSIBILITIES DEMAND ACTION.

Effective preventive maintenance consists of doing many small things consistently and well. The following paragraphs are guidelines for:

CONDUCTING YOUR PREVENTIVE MAINTENANCE PROGRAM

a. Create Proper Attitude:

(1) To develop a really successful preventive maintenance program, the commander must create the proper attitude in his command and instill in each individual the incentive to do his part in the program. The attitude of subordinates can make or break the whole preventive maintenance program.

(2) Too frequently preventive maintenance is shoved into the background while other, seemingly more important, projects occupy our attention.

(3) As a commander, your interest and example in conducting your preventive maintenance program will go far to develop the same interest in all subordinates.

THIS ALONE WILL NOT GUARANTEE EFFECTIVE PREVENTIVE MAINTENANCE, BUT IT WILL, IN MOST CASES, DO MORE THAN ANY OTHER SINGLE STEP IN THE PROGRAM.

b. Provide the Best Facilities Possible: Working conditions have a lot to do with the quality of maintenance in any unit. Not only is it harder for a man to do a good job in rain, snow, or wind, it's harder to get him to do the job at all. Tropical and arctic temperatures will destroy a man's best intentions. When possible, comfortable indoor facilities should be provided. When that can't be done, some protection can always be provided by a tent or tarpaulin. Whatever your facilities, they must include adequate tools and test equipment.

c. Train Your Operators.

(1) Poor operating procedures can destroy the usefulness of your equipment. A good piece of equipment without a trained operator is the same as no equipment at all.

(2) Three methods of training are available, service schools, unit schools, and on-the-job training.

(a) Service schools can be used to train only a few key personnel. The men you send will instruct the rest of the men, so carefully select the men for service school training.

(b) Most of your operators will be trained in your own unit schools. You can get help in the form of lesson material and training aids from the service schools and local service personnel. Whenever possible, classes should be held during regular duty hours.

(c) On-the-job training must follow the formal schooling. The graduate will increase his skill by practical work with good supervision. When possible, team new school graduates with experienced men.

GOOD OPERATING PROCEDURES COME FROM: PRACTICAL EXPERIENCE
ON-THE-JOB TRAINING
UNIT SCHOOLS
SERVICE SCHOOLS

d. Allot Time:

(1) Time means two things in a preventive maintenance program. It means time to train operators and organizational mechanics to perform maintenance. It means time for actual preventive maintenance work on equipment.

(2) Training time for an operator at most service schools is 2-8 weeks; for an organizational mechanic it is 8-12 weeks. On-the-job training will take two or three times as long and will require the time of good instructors.

(3) Maintenance time will vary with the equipment and the extent of the maintenance. A man can clean a telephone in 5 minutes but may need half an hour to clean a vehicular radio. Daily maintenance on Radio Set AN/GRC-26 requires 30-45 minutes per crew member, but monthly servicing will take several hours.

(4) The following chart indicates a cross section of communication equipment found in an armored division and the suggested minimum time for maintenance of this equipment under normal conditions. Under operations in the field these time elements will vary.

SUGGESTED MINIMUM TIME FOR PREVENTIVE MAINTENANCE
(IN MINUTES AND HOURS)

| ITEM | DAILY | | WEEKLY | | MONTHLY | |
|---|---|---|---|---|---|---|
| | OPERATIVE | INOPERATIVE | OPERATIVE | INOPERATIVE | OPERATIVE | INOPERATIVE |
| Antenna Group RC-292 | 05" | None | 15" | 15" | 15" | 15" |
| Camera Set, Still Picture KS-4A | 15" | do | 30" | 30" | 45" | 30" |
| Camera Set, Still Picture KS-6 | 15" | do | 30" | 30" | 45" | 30" |
| Camera Set, Motion Picture KS-5 | 15" | do | 30" | 30" | 45" | 30" |
| Detector, Mine AN/PRS-3 | 15" | do | 15" | 15" | 15" | 15" |
| Detector, Mine AN/PRS-4 | 15" | do | 15" | 15" | 15" | 15" |
| Projector Set, Motion Picture, Sound AS-2 | 15" | do | 15" | 15" | 1' 00" | 30" |
| Radar Set AN/PPS-4 | 30" | do | 1' 00" | 1' 00" | 1' 00" | 1' 00" |
| Charger, Radiac Detector PP-630/PD | 15" | do | 15" | 15" | 15" | 15" |
| Radio Set AN/GRR-5 | 15" | do | 15" | 15" | 15" | 15" |
| Radiac Set PDR-27 | 15" | do | 15" | 00" | 15" | 15" |
| Radiac Set PDR-39 | 15" | do | 15" | 15" | 15" | 15" |
| Radio Set AN/GRC-3 | 30" | do | 30" | 30" | 45" | 30" |
| Radio Set AN/GRC-19 | 30" | do | 30" | 30" | 45" | 30" |
| *Radio Set AN/GRC-26D | 1' 30" | do | 4' 30" | 4' 30" | 6' 00" | 6' 00" |
| Radio Set AN/GRC-46 | | | | | | |
| Radio Set AN/PRC-6 | 10" | do | 15" | 15" | 15" | 15" |
| Radio Set AN/PRC-8, -9, or -10 | 15" | do | 30" | 30" | 30" | 30" |
| Radio Set AN/TRC-24 | 1' 00" | do | 2' 00" | 1' 00" | 2' 00" | 2' 00" |
| Radio Teletypewriter Set AN/VRC-29 (same as AN/GRC-19) | | | | | | |
| Reeling Machine, Cable, Hand RL-31 | 15" | do | 15" | 15" | 15" | 15" |
| Switchboard, Telephone Manual SB-993/GT | 15" | do | 15" | 15" | 15" | 15" |
| Switchboard, Telephone Manual SB-22/PT | 15" | do | 15" | 15" | 30" | 15" |
| Telephone Set TA-1/PT | 10" | do | 10" | 10" | 10" | 10" |
| Telephone Set TA-312/PT | 15" | do | 15" | 15" | 15" | 15" |
| Terminal, Telephone AN/TCC-3 | 30" | do | 1' 00" | 1' 00" | 1' 00" | 1' 00" |
| Teletypewriter TT-98/FG | 20" | do | 1' 10" | 1' 10" | 2' 00" | 1' 10" |
| Test Set IE-9-C | 15" | do | 30" | 30" | 1' 00" | 30" |
| Tool Kit TE-41 | 15" | do | 15" | 15" | 30" | 15" |
| Tool Kit TE-113 | 15" | do | 30" | 30" | 45" | 30" |
| Cable, Telephone WD-1/TT on MX-306/G | 00" | do | 15" | 15" | 15" | 15" |
| Cable, Telephone WD-1/TT on RL-159/U | 00" | do | 15" | 15" | 15" | 15" |
| Telegraph Terminal Group AN/TCC-14 | 15" | do | 30" | 30" | 30" | 30" |

Notes: 1. In planning the maintenance program for communication equipment a 5-day week and 4-week month may be used as a suggested guide as follows:
a. Four days for daily maintenance and one day for weekly maintenance.
b. Three weeks for weekly maintenance and one monthly.
2. "Do" in the "daily inoperative" column means to perform maintenance on the equipment as in the operative column before turning in equipment for repair.

Figure 20-5. Suggested Minimum Time for Preventive Maintenance.

e. Supervise Work:

(1) Close supervision is essential when preventive maintenance is performed. Section leaders should monitor the work of operators and mechanics and assist them as necessary.

(2) Commissioned and noncommissioned officers should always be present--actively present--during preventive maintenance periods. They should have no compunction about getting their hands dirty or crawling into or under equipment to make proper checks. There is something called "paper maintenance." It looks good on the unit records, but it has never fooled an enemy for one instant. Constant and competent supervision is a good way to keep "paper maintenance" out of your command.

f. Check on the Flow of Parts:

(1) Adequate parts supply is one of the greatest single factors influencing the maintenance system. Special attention is necessary to make sure that proper administrative procedures are followed.

(2) Ignorance of proper procedures, resulting in failure to enforce proper requisitioning, accounting, storing, and issuing of parts at command level, has been the greatest contributing factor to waste and loss of equipment in recent years.

(3) Commanders can prevent improper supply practices only by insisting on strict adherence to prescribed administrative procedures.

g. Request Modification When Necessary:

(1) Changes are often required in equipment to reduce or simplify maintenance and to improve operation. Though equipment is extensively field-tested before it is produced, these tests often do not reveal all defects.

(2) Commanders play a dual role in these modifications. When the same trouble develops repeatedly in equipment, it should be reported to the appropriate technical service. When the condition is to be corrected by a modification work order (MWO), the modifications must be made as soon as possible.

(3) Repetitive troubles usually are not spotted by the operator because they do not recur in the same piece of equipment. It is necessary to review checklists from many pieces of equipment to detect those cases of poor design or manufacture that require reporting.

(4) Make sure by inspections and other means that modification work orders reach the using personnel and that the changes called for are made.

h. Distribute Information to the Operator: Field and technical manuals, modification work orders, and lubrication orders pertinent to the equipment in use must reach the lowest using echelon. First, consult DA pamphlets of the 310 series to determine what publications are needed. Proper signal publications give needed information. Second, requisition them. Third, follow up to make certain these publications reach the using personnel. If they do not, your communication will suffer, and the effort expended in the preparation and distribution of this material will have been wasted. Lack of this reference material means groping in the dark.

i. Conduct Organizational Inspections:

(1) There is no mystery involved in the inspection of signal equipment to determine its condition. For the most part, and certainly for the purpose of organizational inspections, you are concerned primarily with outward appearances. You inspect to detect deficiencies, then ensure that corrective action is taken. Effective organizational inspection of signal equipment requires only the application of the human senses.

LISTEN! LOOK! FEEL! COMMON SENSE--THAT'S ALL!

(2) The most critical single element of effective unit maintenance is personal inspection by the commander at all levels of command. When you inspect, start by operating the equipment. For radio sets, have one set far enough away to approximate the working range of the set under existing terrain conditions. Pick up the handset and talk to the operator. Listen for clear, intelligible signals.

(3) In the case of telephones or switchboards, pick up a handset and talk to another station. Listen for clear, intelligible, and noise-free signals, without cross-talk.

(4) After satisfying yourself that a piece of equipment operates, continue with the remainder of the inspection. Look for dirt, moisture, excessive oil, rust, corrosion, broken or missing components, and abuse--just as you would for any other piece of equipment.

(a) Does it show signs of physical abuse?
(b) Are repair parts missing or depleted?
(c) Are cables intact and in good condition?
(d) Are dial and meter windows clean?
(e) Are dial and meter calibrations legible?

(5) Feel for loose knobs and switches, dried-out or defective shock mounts, deteriorated or broken insulation on cables.

(a) Do switches have positive action?
(b) Is there backlash in gear trains?
(c) Are equipments mounted firmly on their supports?
(d) Do rotating parts move freely?
(e) Is there dampness from moisture condensation?

(6) Check for characteristic odors--the pungent smell of burnt or overheated insulating materials, the damp, sour smell of mold and fungus growth, the waxy smell of leaking, overheated capacitors, the burning paint smell of overheated resistors, the tarry smell of potting compounds; the smell of ozone from high-voltage arcing or corona.

(7) Remember that all your signal equipment requires power that, in some cases, is obtained from motor-generator power units. These should be inspected as part of your signal equipment.

(a) Does the power unit deliver rated power?
(b) Is the oil level adequate?
(c) Are ignition wires clean and dry?
(d) Are there signs of coolant leaks around gaskets?
(e) Do fan and generator belts have proper tension?
(f) Are generator brushes seated correctly?
(g) Are generator brushes worn excessively or unevenly?
(h) Are commutator or sliprings polished?

(8) Look for signs of poor housekeeping at the equipment. If you do this, the word will get around.

(9) TOE's authorize specific signal tools and test equipment for your unit. Are these items available to the using personnel? Have appropriate TOE changes been initiated to provide additional equipment needed but not authorized?

(10) TA's provide the authority for requisitioning expendable preventive maintenance materials, such as cleaning fluids, rags, tape, and solder. Are these materials available to the user? Are there additional materials required that are not authorized, and has action been initiated to obtain authorization for these items?

(11) The technical manual on the equipment incorporates a list of repair parts (running spares and organizational maintenance stock guides) for each item of Signal Corps equipment. SIG 7 & 8 catalogs containing this information are being discontinued but are still applicable to some equipment for which revised technical manuals have not been prepared. Does the unit maintenance section have copies of appropriate TM's (and SIG 7 & 8's where applicable) for each type of equipment it is servicing? Are authorized parts available?

(12) Are unit facilities--shelter, heat, light, and power--adequate for the job?

(13) In conducting your inspection, remember that supply bulletins in the 11-100 series will describe the serviceability standards of signal equipment for you. These standards are the basis on which your unit is judged in the course of a technical or preparation-for-overseas-movement inspection. Maintenance men and operators must have these publications readily available. They provide a series of checks that can be made by nontechnical personnel, as well as those test and performance measurements that must be made by technical personnel. The majority of these checks can be part of a normal organizational inspection. Your communication officer can prepare an abstract of standards that are deemed appropriate for such an

inspection. These bulletins also list certain of the technical publications applicable to specific sets. Your preventive maintenance program is effective if your signal equipment consistently meets the SB 11-100 series requirements.

(14) Preventive maintenance inspections are required by Army regulations. The purpose of these inspections is to determine the deficiencies and state of combat readiness of various categories of signal equipment. Commanding officers will conduct first- and second-echelon maintenance inspections on all items of signal equipment and will ensure that the appropriate DA forms have been properly completed in accordance with the instructions contained thereon.

So Remember:

GIVE TIME FOR TRAINING
GIVE TIME FOR PREVENTIVE MAINTENANCE
GIVE TIME FOR FREQUENT INSPECTIONS
GIVE PROPER LITERATURE, INTEREST, AND SUPERVISION

and you will have an effective preventive maintenance program.

20-5. THE OPERATOR'S RESPONSIBILITIES AND DUTIES.

a. The commander must depend upon his subordinates for the proper operation and care of the equipment for which he, the commander, is responsible. The operator of the equipment, at the first-echelon level, is the key link in the entire Army maintenance system. Let us consider some of the reasons why this statement is true.

(1) Who had daily contact with the equipment, and is therefore in the best position to stop trouble before it starts? The operator of the equipment.

(2) Who is the first man to know when any particular radio or switchboard is not operating properly? The operator of the equipment.

(3) Who knows better than anyone else whether minor trouble is being taken care of by qualified personnel? The operator of the equipment.

(4) Who is in a position to damage the equipment by improper operation? The operator of the equipment.

In other words, the operator is an important individual.

b. Just as a commander will be a better commander if he understands the problems and duties of the operator, the operator himself will more readily accept supervision if he understands the commander's responsibility for communication. Teamwork is required. The commander cannot do the job by himself. A good radio or switchboard operator will take care of the equipment that is entrusted to him. In practicing good preventive maintenance he will gain the respect of his superiors.

c. Most of us are not electronic technicians. What can we, the operators, do to keep our equipment operating? There is a word that can help us in our efforts to keep our equipment functioning, this word is FITCAL. What does it mean? It means:

| | |
|---|---|
| F E E L | For loose connections.<br>For excessive heat.<br>For smooth operation of controls.<br>For moisture, dirt, or excessive lubricants in hidden areas of the equipment. |
| I N S P E C T | For cleanliness; for corrosion.<br>For discoloration of areas (often indicating overheating).<br>For proper placement of all leads and cables.<br>For bent, cracked, scratched, or chipped parts.<br>For fungus growth or mildew.<br>For frayed cords and cables, poor insulation. |

| | |
|---|---|
| TIGHTEN | All loose parts:<br>Screws or bolts.<br>Antenna connections.<br>Cable connections.<br>(Apply fungiproofing in connections wherever necessary.) |
| CLEAN | All dirty parts thoroughly. Use the proper cleaning agents. These might be:<br>Abrasives.<br>Soap and water.<br>Mineral spirits or kerosene.<br>SD solvent. |
| ADJUST | Calibration.<br>All controls for correct operation. |
| LUBRICATE | All moving (nonelectrical) parts.<br>Keep motor oil at proper level in power generating equipment.<br>Use proper lubricants and greases. |

d. It is the duty of the operator to report to his supervisor or organizational mechanic any technical failure of the equipment, regardless of how insignificant.

e. Proper operating procedures should be observed, particularly with radio equipment. The following points should be observed in order to keep from damaging the radio set.

(1) Allow equipment to warm up before calibrating or keying the set.

(2) Turn off the radio set before starting vehicle engines.

(3) Connect the radio sets only to voltages indicated on the power supply.

(4) Where applicable, be sure grounding wires or cables are properly attached. (This is also for the protection of the operator.)

SAMPLE MAINTENANCE SOP

HEADQUARTERS
1ST BATTALION __TH INFANTRY
Fort Benning, Georgia

DATE_____

Subject: Standing Operating Procedure for Preventive Maintenance

TO. See Distribution

## SECTION I. GENERAL

1. INTRODUCTION.

a. Purpose: This SOP prescribes responsibilities and policies for the maintenance of equipment.

b. Scope: This SOP applies to the maintenance of all equipment and supplies issued according to TOE's, TA's or by special authority.

c. Objective: To insure a high standard of maintenance and repair of all equipment in the 1st BN, __th Inf, by strict application of PM program.

d. Index:


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| SECTION II - COMMAND AND STAFF RESPONSIBILITIES | (1)-(3) |
| SECTION III - OPERATIONS | (3)-(4) |
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| SECTION V - MAINTENANCE TRAINING | (5) |
| SECTION VI - INSPECTIONS | (5)-(6) |


## SECTION II. COMMAND AND STAFF RESPONSIBILITIES

2. General. Organizational maintenance is a command responsibility and is that maintenance authorized for, performed by, and the responsibility of a using unit on its own equipment. This maintenance will consist of inspecting, cleaning, servicing, preserving, lubricating and adjusting as required, it may also include minor parts replacement authorized by the appropriate technical service agency.

a. First echelon is that maintenance performed by the user, or operator of the equipment, and includes the proper care, use, operation, cleaning, preservation, lubrication, adjustment and inspection authorized by technical publications.

b. Second echelon is that maintenance performed by specially trained personnel provided for that purpose in the using organization. It includes inspection, testing, minor repair, and parts replacement authorized by technical publications.

3. Command Responsibilities: Unit commanders are responsible for the maintenance of all equipment in their units.

4. Unit Staff Responsibilities.

a. BN Executive Officer is responsible for coordinating the maintenance programs for the 1st BN, - Inf.

b. BN S1 is responsible for procuring and assigning all maintenance specialist personnel in coordination with the S3 and S4.

(1) Provides continuous accounting of the maintenance personnel situation, to include availability by MOS and grade and projected gains and losses.

(2) Consolidates request for publications and forward re-requisitions in accordance with procedures prescribed by the Adjutant General.

c. BN S2 processes and expedites the security clearance of operators and maintenance inspection personnel who deal with classified material and information pertaining thereto.

(1) Informs the BN Commander, staff, and unit commanders of weather and terrain factors which may affect maintenance operations and projected maintenance supply requirements.

d. BN S3 is responsible for the integration of maintenance activities, tactical operations and training operations in coordination with the BN S4.

(1) Procures quotas for courses at service and division schools.

(2) Allocates adequate time for maintenance and maintenance training in unit training and operational schedule in accordance with the maintenance requirement.

e. BN S4 is assigned staff responsibility for maintenance within the Battalion.

(1) Coordinate the maintenance functions of the S1, S2, and S3; exercises staff responsibility in directing the maintenance activities of Special Staff Officers.

5. Responsibilities of Special Staff Officers. (Signal, Engineer, Motor, Medical)

a. Informs BN Commander and S4 of the status of maintenance and evacuation.

b. Submits weekly status report prior to 1700 hours Friday to include the following information:

(1) Major items of equipment in higher echelon repair.

(2) Major items of equipment deadlined for repair parts at the organizational level.

(3) Major items which have a record of excessive operational failure.

(4) Status of repair parts and running spares.

(2)

c. Maintenance:

(1) Garrison: Qualified Technical personnel under the supervision of BN S4 will establish an organizational contact team according to the requests of subordinate units and desires of the BN Commander.

(2) Field: Contact teams will continue to function when possible. The normal procedure however, will require that equipment be evacuated to the BN maintenance area by the unit. When either a vehicle or an item of signal equipment, which are normally operated together, is evacuated every effort will be made to evacuate them together.

d. Collects necessary information from unit Commanders and submits, unsatisfactory equipment reports through S4 as required.

e. Insures that all user and organizational maintenance is performed before equipment is evacuated to higher headquarters.

f. Coordinates with unit commanders to assure that operators of equipment are present when it is being serviced by organizational personnel, when possible.

g. Insures that no modifications are made on equipment other than those directed by modification work orders.

h. Notifies the S4 in case maintenance requirements exceed the capabilities of BN personnel so that necessary assistance may be obtained from higher HQ.

i. Arrangements for visits by technical representatives between higher HQ and BN will be coordinated through the S4.

## SECTION III. OPERATIONS

6. Policy.

a. Unit commanders are responsible for compliance with instructions and procedures for preventive maintenance operations. PM training of their command and proper use of equipment. (Training in preventive maintenance is equal in importance to other functional military training.)

b. It is the responsibility of all commanders to prevent the abuse of equipment under their control. Evidence of abuse will be investigated and corrective action taken. Some common abuses are:

(1) Improper or careless use or operation of material.

(2) Lack of lubrication, over-lubrication, or use of unauthorized lubricants.

(3) Inadequate maintenance inspections of organizational equipment.

(4) Deferred maintenance, including lack of proper servicing and adjustment.

(5) The attempted repair of equipment by unqualified personnel or use of improper or inadequate tools and equipment.

(6) Failure to assign direct maintenance responsibility for organizational equipment.

7. Direct Support Technical Service Units:

a. Battalion S4 and Special Staff Officers will effect close liaison by frequent personal visits, with direct support units.

b. Normally, after equipment has been deadlined for lack of repair parts for a period of one week, it will be evacuated to the applicable direct support units. (Time element based on Division SOP.)

8. Minimum Time Requirements: Time allocated for maintenance on training schedules will be in accordance with the stated division policy.

9. Equipment exceeding maintenance capability: Unit commanders will report to S4 when they are unable to maintain equipment assigned them with the personnel, time and facilities provided.

10. Internal Shop Operations:

a. Skilled and unskilled personnel will work as teams so that training of maintenance personnel will be a continuous operation.

b. Maintenance will be scheduled in accordance with current regulations on all equipment and the proper maintenance form will accompany equipment at all times.

c. The individual in charge of a particular maintenance activity will be prepared at all times, to render a status report of all items located in the activity for maintenance.

11. Performance of Maintenance Services:

a. All maintenance services will be scheduled as required by Department of the Army.

b. Personnel required to operate organizational maintenance facilities will be required to attend mandatory training only. Shop operations take priority over all other training.

## SECTION IV. SUPPLY

12. Responsibilities. S4 is responsible for all supply activities. Special staff officers and unit commanders will keep the S4 informed of the status of maintenance items by direct contact and frequent informal reports. (Also see 5b(2).)

13. Requisition and Control of Repair Parts:

a. Requisitions will be submitted daily or as required. Only correct stock numbers will be used. The S4 will establish a system of checking to determine that all stock numbers and nomenclatures are correct on requisitions being forwarded. Appropriate command action will be taken if receipt of repair parts is unduly delayed.

b. All organizational maintenance items will be stocked at the battalion level.

c. The minimum of repair parts, based on a usage factor will be maintained. Hoarding in excess of the needs of the unit will not be permitted.

d. Organizational maintenance facilities will maintain a record of all parts on hand.

e. Direct exchange items will not be turned in until it is determined that they are unserviceable. These components will be protected until turn-in is accomplished.

## SECTION V. MAINTENANCE TRAINING

14. Unit Maintenance:

a. All personnel will receive on-the-job training in user maintenance under the supervision of qualified personnel.

b. Appropriate special staff officers will conduct periodic schools on maintenance of equipment at the direction of the S4.

15. Organizational Maintenance:

a. Unit mechanics will receive on-the-job training in organizational maintenance under the supervision of qualified personnel while awaiting attendance at service schools.

b. Service school quotas will be applied for in accordance with present and projected needs of the Battalion. Quotas, when procured will be met. Only personnel qualified in accordance with DA Pamphlet 20-21 will attend service schools.

16. Maintenance Training in the Field. When the Battalion is in the field BN staff officers will plan and carry out PM checks and maintenance activities under blackout conditions. An informal record of proficiency of sections operating under adverse conditions will be maintained and coordination effected with S3 for further training when deemed necessary.

## SECTION VI. INSPECTIONS

17. General. Minimum inspection requirements are stated in division policy.

18. Formal Inspections: Command maintenance inspections will be announced in advance and will be conducted as follows:

a. Displays. Equipment normally mounted in a vehicle will be installed in operating condition with all necessary components for operation. All other components will be displayed neatly beside the vehicle. Equipment not normally mounted will be displayed in a neat manner with all components readily visible.

b. Facilities. Organizational maintenance shops will be arranged for inspection to clearly display all tools, test equipment and maintenance parts. The physical plant will be inspected with a view towards adequacy of the facilities.

c. Record and Publication.

(1) PM rosters and equipment status and deadline reports will be readily available to inspecting officers.

(2) Publications will be complete and up-to-date.

19. Informal Inspections: Staff officers will make frequent unannounced nontechnical inspections of equipment in operation or in store rooms to determine the adequacy of the maintenance program.

20. Inspection Reports:

a. Battalion headquarters will make a formal report of each command maintenance inspection. One copy of this report will be forwarded to the unit concerned within forty-eight (48) hours of the inspection. Follow up inspections will be made after one week when necessary.

b. Staff officers will call to the unit commanders attention deficiencies noted during nontechnical inspections. Where it is deemed necessary, inspecting officers will make a report to the BN Commander of the condition of maintenance within the unit inspected.

FOR THE COMMANDER:

2 Incl
1. Record of Maintenance Items (Omitted)
2. Commander's Communication Checklist

TYPE COMMANDER'S COMMUNICATION CHECKLIST.

a. Operation.

(1) Do I ensure that "command interests" in communication is maintained by my personal example?

(2) Does my communication system fit my task organization?

(3) Do I have enough organic communication equipment to support this operation, or must I request additional equipment and/or personnel?

(4) Are all my fire support communication systems integrated so that I may influence the distribution of artillery and mortar fires?

(5) Do I and my subordinates know all the means of communication we have available?

(6) Do I require that as many means of communication as possible be utilized in order not to overload one means or depend on one means too much?

(7) Do my subordinates have the current signal operation instructions?

(8) Do I ensure that my communication officer is kept informed of the tactical situation and operational planning?

(9) Do the communication procedures and operating instructions within my command conform with current directives?

(10) Do I require all my commanders to make a personal check to satisfy themselves that their communication system is functioning?

(11) Have I enforced the maximum communication security measures consistent with the accomplishment of my mission?

(12) Is my communication system integrated with communication systems of higher and lower headquarters and adjacent units?

(13) Have my communication advisory specialists visited my units and attachments and offered their services?

(14) Do I satisfy myself through personal spot checks that my communications are functioning?

b. Communication Personnel.

(1) How many communication personnel are authorized by TOE?

(2) Is each specialist qualified in his MOS?

(3) Have I taken advantage of available schools to train my communication personnel?

(4) Am I training sufficient communication personnel to fill future losses, as well as meet my immediate requirements?

(5) Does each radio set have an assigned radio operating team?

(6) What is the status of communication personnel in my attachments?

c. Maintenance.

(1) Are daily preventive maintenance forms being kept on each major item of signal equipment?

(2) Is maintenance of communication equipment supervised?

(3) What is the status of repair of signal equipment?

(a) How much of my equipment is deadlined for repair?

(b) Is the out-of-service time required for repair excessive?

d. Signal Supply.

(1) Are appropriate technical manuals, signal catalogs, technical bulletins, modification work orders, and unsatisfactory equipment report forms on hand?

(2) Are all entries pertaining to signal equipment properly posted in property records?

(3) Are substitute items of signal equipment entered in property records?

(4) If required, are component parts listed on the property records or in a separate file?

(5) Do I have an adequate followup system on signal requisitions?

(1)

(6) Is unserviceable property being salvaged periodically?

(7) Are reports of survey, statements of charges, or combat loss certificates being initiated as soon as loss or damage becomes known?

(8) Is spare parts stock level in accordance with SIG 7 and 8 or other appropriate directives?

(9) Do I have any excess signal equipment on hand which should be turned in?

# CHAPTER 21

# RECAPITULATION OF COMMUNICATION EQUIPMENT AND PERSONNEL

TAB HERE

## NOTES

| DESIGNATION | INFANTRY BATTALION | | | | | | AIRBORNE BATTALION | | | | | | MECHANIZED BATTALION | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hq & Hq Co | | | Rifle Co | | | Hq & Hq Co | | | Rifle Co | | | Hq & Hq Co | | | Rifle Co | | |
| | MOS | GR | AUTH | MOS | GR | AUTH | MOS | GR | AUTH | MOS | GR | AUTH | MOS | GR | AUTH | MOS | GR | AUTH |
| Communications Officer | 0200 | Capt | 1 | | | | 70200 | Capt | 1 | | | | 0200 | Capt | 1 | | | |
| Communications Chief | 31G40 | E7 | 1 | 31G40 | E5 | 1 | 31G4P | E7 | 1 | 31G4P | E5 | 1 | 31G40 | E6 | 1 | 31G40 | E5 | 1 |
| Wire Foreman | 36K40 | E6 | 1 | | | | 36K4P | E6 | 1 | | | | | | | | | |
| Wire Team Chief | 36K40 | E5 | 2 | | | | 36K4P | E5 | 2 | | | | | | | | | |
| RATT Team Chief | 05C40 | E5 | 1 | | | | 05C4P | E5 | 1 | | | | 05C40 | E5 | 1 | | | |
| Sr Radio Mechanic | 31B20 | E5 | 1 | | | | 31B2P | E5 | 1 | | | | 31B20 | E5 | 1 | 31B20 | E5 | 1 |
| Radio Mechanic | 31B20 | E4 | 2 | 31B20 | E4 | 1 | 31B2P | E4 | 2 | 31B2P | E4 | 1 | 31B20 | E4 | 2 | 31B20 | E4 | 1 |
| Radar Mechanic | 26C20 | E4 | 1 | | | | | | | | | | 26C20 | E4 | 1 | | | |
| Sr IS Radio Operator | | | | | | | 05B2P | E4 | 1 | | | | | | | | | |
| IS Radio Operator | 05B20 | E4 | 2 | | | | 05B2P | E3 | 1 | | | | 05B20 | E4 | 4 | | | |
| Sr Message Clerk | 36K20 | E4 | 1 | | | | 36K2P | E4 | 1 | | | | 36K20 | E4 | 1 | | | |
| Sr Wireman | 36K20 | E4 | 2 | | | | 36K2P | E4 | 2 | | | | 36K20 | E4 | 1 | | | |
| Sr Switchboard Operator | 36K20 | E4 | 1 | | | | 36K2P | E4 | 1 | | | | | | | | | |
| Switchboard Operator | 36K20 | E3 | 2 | | | | 36K2P | E3 | 2 | | | | 36K20 | E3 | 1 | | | |
| Radio Teletype Operator | 05C20 | E4 | 2 | | | | 05C2P | E4 | 2 | | | | 05C20 | E4 | 2 | | | |
| Message Clerk | 36K20 | E3 | 3 | | | | 36K2P | E3 | 3 | | | | 36K20 | E3 | 2 | | | |
| Motor Messenger | 36K20 | E3 | 2 | | | | 36K2P | E3 | 2 | | | | 36K20 | E3 | 2 | | | |
| Wireman | 36K20 | E3 | 4 | 36K20 | E3 | 4 | 36K2P | E3 | 4 | 36K2P | E3 | 2 | 36K20 | E3 | 2 | | | |
| Radio Telephone Operator | | | | 11B10 | E3 | 5 | 11B1P | E3 | 1 | 11B1P | E3 | 5 | | | | 11B10 | E3 | 5 |
| Radio Telephone Operator | 11C10 | E3 | 4 | 11C10 | E3 | 4 | 11C1P | E3 | 3 | 11C1P | E3 | 1 | 11C10 | E3 | 4 | 11C10 | E3 | 2 |
| Radio Telephone Operator | 11H10 | E3 | 1 | | | | 11H1P | E3 | 1 | | | | 11H10 | E3 | 1 | | | |
| Radio Telephone Operator | | | | | | | 36K2P | E3 | 4 | | | | 11D10 | E3 | 1 | | | |
| Messenger | | | | | | | | | | 11B1P | E3 | 4 | | | | | | |
| Lt Truck Driver | 36K20 | E3 | 1 | | | | | | | | | | | | | | | |
| Chief Radio OP | | | | | | | | | | | | | | | | | | |
| Per Carr Driver | | | | | | | | | | | | | 36K20 | E4 | 1 | | | |
| A. Messenger | | | | | | | | | | | | | | | | | | |
| Aggregate | | | 35 | | | 13 | | | 37 | | | 14 | | | 29 | | | 10 |

| DESIGNATION | LT INF BATTALION | | | | | | | | | AIR MOBILE BATTALION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hq & Hq Co | | | Rifle Co | | | Cbt Spt Co | | | Hq & Hq Co | | | Rifle Co | | | Cbt Sp Co | | |
| | MOS | GR | AUTH | MOS | GR | AUTH | MOS | GR | AUTH | MOS | GR | AUTH | MOS | GR | AUTH | MOS | GR | AUTH |
| Communications Officer | 0200 | 03 | 1 | | | | | | | 0200 | 03 | 1 | | | | | | |
| Communications Chief | 31G40 | E7 | 1 | 31G40 | E5 | 1 | 31G40 | E5 | 1 | 31G40 | E7 | 1 | 31G40 | E5 | 1 | 31G40 | E5 | 1 |
| Wire Foreman | | | | | | | | | | | | | | | | | | |
| Wire Team Chief | 36K40 | E5 | 1 | | | | | | | 36K40 | E5 | 1 | | | | | | |
| RATT Team Chief | 05C40 | E5 | 1 | | | | | | | 05C40 | E5 | 1 | | | | | | |
| Sr Radio Mechanic | 31B20 | E5 | 2 | | | | | | | 31B20 | E5 | 2 | | | | | | |
| Radio Mechanic | 31B20 | E4 | 2 | 31B20 | E4 | 1 | | | | 31B20 | E4 | 2 | 31B20 | E4 | 1 | | | |
| Radar Mechanic | | | | | | | | | | | | | | | | | | |
| Sr IS Radio Operator | 05B20 | E4 | 3 | | | | | | | 05B20 | E4 | 3 | | | | | | |
| IS Radio Operator | 05B20 | E3 | 4 | | | | | | | 05B20 | E3 | 4 | | | | | | |
| Sr Message Clerk | 36K20 | E4 | 1 | | | | | | | 36K20 | E4 | 1 | | | | | | |
| Sr Wireman | 36K20 | E4 | 1 | | | | | | | 36K20 | E4 | 1 | | | | | | |
| Sr Switchboard Operator | 36K20 | E4 | 1 | | | | | | | 36K20 | E4 | 1 | | | | | | |
| Switchboard Operator | 36K20 | E3 | 1 | 36K20 | E4 | 1 | | | | 36K20 | E3 | 1 | 36K20 | E4 | 1 | | | |
| Radio Teletype Operator | 05C20 | E4 | 2 | | | | | | | 05C20 | E4 | 2 | | | | | | |
| Message Clerk | 36K20 | E3 | 3 | | | | | | | 36K20 | E3 | 3 | | | | | | |
| Motor Messenger | | | | | | | | | | | | | | | | | | |
| Wireman | 36K20 | E3 | 3 | | | | | | | 36K20 | E3 | 3 | | | | | | |
| Radio Telephone Operator | 11D10 | E4 | 1 | 11B10 | E3 | 5 | 11B10 | E3 | 4 | 11D10 | E3 | 1 | 11B10 | E3 | 5 | 11B10 | E3 | 4 |
| Radio Telephone Operator | 91A10 | E3 | 2 | 11C10 | E3 | 2 | 11C10 | E3 | 7 | 91A10 | E3 | 2 | 11C10 | E3 | 2 | 11C10 | E3 | 7 |
| Radio Telephone Operator | | | | | | | 11H10 | E3 | 1 | | | | | | | 11H10 | E3 | 1 |
| Radio Telephone Operator | | | | | | | | | | | | | | | | | | |
| Messenger | 36K20 | E3 | 1 | | | | | | | 36K20 | E3 | 1 | | | | | | |
| Lt Truck Driver | | | | | | | | | | | | | | | | | | |
| Chief Radio OP | 05B40 | E5 | 1 | | | | | | | 05B40 | E5 | 1 | | | | | | |
| Per Carr Driver | | | | | | | | | | | | | | | | | | |
| A. Messenger | 36K20 | E2 | 1 | | | | | | | 36K20 | E2 | 1 | | | | | | |
| Aggregate | | | 33 | | | 10 | | | 13 | | | 33 | | | 10 | | | 13 |

Figure 21-1. Recapitulation Communication Personnel, Infantry, Airborne Infantry and Mechanized Infantry Battalions.

| DESIGNATION | INF BDE Hq & Hq Co MOS | GR | AUTH | ABN BDE Hq & Hq Co MOS | GR | AUTH | MECH BDE Hq & Hq Co MOS | GR | AUTH | L° INF BDE Hq & Hq Co MOS | GR | AUTH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal Officer | 0210 | Maj | 1 | 70210 | Maj | 1 | 0210 | Maj | 1 | 0210 | Maj | 1 |
| Crypto Officer | | | | | | | | | | | | |
| Communications Plat Ldr | 0200 | Lt | 1 | 70200 | Lt | 1 | 0200 | Lt | 1 | 0200 | Lt | 1 |
| Communications NCO | | | | | | | | | | 31G30 | E6 | 1 |
| Communications Chief | 31G30 | E6 | 1 | 31G30 | E6 | 1 | 31G30 | E6 | 1 | 31G30 | E6 | 1 |
| Section Sergeant | 31G40 | E6 | 1 | 31G40 | E6 | 1 | 31G40 | E6 | 1 | 31G40 | E6 | 1 |
| Ass't Section Sergeant | | | | 31G40 | E5 | 1 | | | | | | |
| Wire Team Chief | 31G40 | E5 | 2 | 31G40 | E5 | 2 | 31G40 | E5 | 2 | 31G40 | E5 | 3 |
| Radio Section Sergeant | 05C40 | E5 | 1 | 05C40 | E5 | 1 | 05C40 | E5 | 1 | 05C40 | E6 | 1 |
| RATT Team Chief | 05C40 | E5 | 4 | 05C40 | E5 | 1 | 05C40 | E5 | 4 | 05C40 | E5 | 2 |
| Sr Radio Mechanic | 31K30 | E5 | 1 | 31K30 | E5 | 1 | 31K30 | E5 | 1 | 31K30 | E5 | 1 |
| RATT Operator | 05C20 | E4 | 19 | 05C20 | E4 | 2 | 05C20 | E4 | 10 | 05C20 | E4 | 4 |
| Sr 13 Radio Operator | | | | 05B20 | E4 | 2 | | | | 05B20 | E4 | 3 |
| 13 Radio Operator | 05B20 | E4 | 2 | 05B20 | E3 | 4 | 05B20 | E4 | 4 | 05B20 | E3 | 4 |
| Radio Mechanic | 31K30 | E4 | 1 | 31K30 | E4 | 2 | 31K30 | E4 | 1 | 31K30 | E4 | 1 |
| Crypto Repairman | | | | | | | | | | 31K20 | E4 | 1 |
| Cryptographer | | | | 72B20 | E4 | 2 | | | | 72B20 | E4 | 2 |
| Communication Supv | | | | | | | | | | 72B40 | E5 | 1 |
| Crypto Mat SP | | | | | | | | | | 72B30 | E4 | 1 |
| SOI Clerk | | | | | | | | | | 72B20 | E4 | 1 |
| Sr Message Clerk | 36A30 | E4 | 1 | 36A30 | E4 | 1 | 36A30 | E4 | 1 | 36A30 | E4 | 1 |
| Sr Switchboard Op | 36A30 | E4 | 1 | 36A30 | E4 | 1 | 36A30 | E4 | 1 | 36A30 | E4 | 1 |
| Sr Wireman | 36A30 | E4 | 2 | 36A30 | E4 | 2 | 36A30 | E4 | 2 | 36A30 | E4 | 3 |
| Teletype Operator | 72B20 | E4 | 3 | 72B20 | E4 | 3 | 72B20 | E4 | 3 | 72B20 | E4 | 3 |
| Message Clerk | 36A10 | E3 | 1 | 36A10 | E3 | 2 | 36A10 | E3 | 1 | 36A10 | E3 | 2 |
| Messenger | 36A10 | E3 | 1 | 36A10 | E3 | 1 | 36A10 | E3 | 1 | 36A10 | E3 | 2 |
| Motor Messenger | 36A10 | E3 | 2 | 36A10 | E3 | 1 | 36A10 | E3 | 2 | | | |
| Switchboard Operator | 36A10 | E3 | 3 | 36A10 | E3 | 2 | 36A10 | E3 | 2 | 36A10 | E3 | 4 |
| Switchboard Helper | | | | | | | | | | 36A10 | E2 | 1 |
| Wireman | 36A10 | E3 | 4 | 36A10 | E3 | 4 | 36A10 | E3 | 6 | 36A10 | E1 | 4 |
| Ass't Motor Messenger | | | | 36A10 | E2 | 1 | | | | | | |
| Radio Tel Op | 11B10 | E3 | 8 | 11B10 | E3 | 1 | 36A10 | E4 | | 64C20 | E5 | 1 |
| Radio Tel Op | 63A10 | E3 | 1 | | | | 11B10 | E3 | 1 | 11B10 | E3 | 5 |
| Radio Tel Op | 71B20 | E4 | 1 | | | | | | | 95B10 | E3 | 4 |
| Radio Tel Op | | | | | | | | | | 71B20 | E4 | 1 |
| Radio Tel Op | | | | | | | | | | | | |
| AGGREGATE | | | 55 | | | 43 | | | 48 | | | 70 |

| DESIGNATION | AIR MOB BDE Hq & Hq Co MOS | GR | AUTH | SEP INF BDE Hq & Hq Co MOS | GR | AUTH | SEP ABN BDE Hq & Hq Co MOS | GR | AUTH | SEP MECH BDE Hq & Hq Co MOS | GR | AUTH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Signal Officer | 0210 | Maj | 1 | 0210 | Maj | 1 | 0210 | Maj | 1 | 0210 | Maj | 1 |
| Crypto Officer | | | | 0221 | Lt | 1 | | | | 70A40 | WO | 1 |
| Communications Plat Ldr | 0200 | Lt | 1 | 0200 | Lt | 1 | 0200 | Lt | 1 | 0200 | Lt | 1 |
| Communications NCO | | | | | | | 31G30 | E6 | 1 | | | |
| Communications Chief | 31G30 | E6 | 1 | 31G30 | E6 | 1 | 31G30 | E6 | 1 | 31G30 | E6 | 1 |
| Section Sergeant | 31G40 | E6 | 3 | 31G40 | E7 | 1 | 31G40 | E7 | 1 | 31G40 | E7 | 1 |
| Ass't Section Sergeant | | | | 31G40 | E6 | 1 | | | | 31G40 | E6 | 1 |
| Wire Team Chief | 31G40 | E5 | 3 | 31G40 | E5 | 6 | 31G40 | E5 | 3 | 31G40 | E5 | 6 |
| Radio Section Sergeant | 05C40 | E6 | 1 | | | | 05C40 | E6 | 1 | | | |
| RATT Team Chief | 05C40 | E5 | 1 | 05C40 | E5 | 2 | 05C40 | E5 | 2 | 05C40 | E5 | 2 |
| Sr Radio Mechanic | 31K30 | E5 | 1 | 31K30 | E5 | 1 | 31K30 | E5 | 1 | 31K30 | E5 | 1 |
| RATT Operator | 05C20 | E4 | 3 | 05C20 | E4 | 4 | 05C20 | E4 | 4 | 05C20 | E4 | 4 |
| Sr 13 Radio Operator | 05B20 | E4 | 1 | 05B20 | E4 | 2 | 05B20 | E4 | 3 | 05B20 | E4 | 2 |
| 13 Radio Operator | 05B20 | E3 | 7 | | | | 05B20 | E3 | 4 | | | |
| Radio Mechanic | 31K30 | E4 | 1 | 31K30 | E4 | 1 | 31K30 | E4 | 1 | 31K30 | E4 | 1 |
| Crypto Repairman | | | | 31K20 | E5 | 1 | 31K20 | E4 | 1 | 31K20 | E5 | 1 |
| Cryptographer | 72B20 | E4 | 1 | | | | 72B20 | E4 | 2 | | | |
| Communication Supv | 72B40 | E5 | 1 | | | | 72B40 | E5 | 1 | | | |
| Crypto Mat SP | | | | 72B30 | E4 | 1 | 72B30 | E4 | 1 | 72B30 | E4 | 1 |
| SOI Clerk | | | | 72B20 | E4 | 1 | 72B20 | E4 | 1 | 72B20 | E4 | 1 |
| Sr Message Clerk | 36A30 | E4 | 1 | 36A30 | E4 | 1 | 36A30 | E4 | 1 | 36A30 | E4 | 1 |
| Sr Switchboard Op | 36A30 | E4 | 1 | 36A30 | E4 | 1 | 36A30 | E4 | 1 | 36A30 | E4 | 1 |
| Sr Wireman | 36A30 | E4 | 1 | 36A30 | E4 | 6 | 36A30 | E4 | 3 | 36A30 | E4 | 6 |
| Teletype Operator | 72B20 | E4 | 2 | | | | 72B20 | E4 | 3 | | | |
| Message Clerk | 36A10 | E3 | 2 | 36A10 | E3 | 3 | 36A10 | E3 | 2 | 36A10 | E3 | 3 |
| Messenger | 36A10 | E3 | 2 | | | | 30A10 | E3 | 1 | | | |
| Motor Messenger | | | | 36A10 | E3 | 2 | 36A10 | E3 | 2 | 36A10 | E3 | 2 |
| Switchboard Operator | 36A10 | E3 | 2 | 36A10 | E3 | 3 | 36A10 | E3 | 3 | 36A10 | E3 | 3 |
| Switchboard Helper | | | | 36A10 | E2 | 1 | 36A10 | E2 | 1 | 36A10 | E2 | 1 |
| Wireman | 36A10 | E3 | 4 | 36A10 | E3 | 12 | 36A10 | E3 | 9 | 36A10 | E3 | 12 |
| Ass't Motor Messenger | 36A10 | E2 | 1 | | | | | | | | | |
| Radio Tel Op | 11B10 | E3 | 6 | 36A10 | E3 | 3 | 11B10 | E3 | 9 | 36A10 | E3 | 3 |
| Radio Tel Op | 71B20 | E3 | 1 | 11B10 | E3 | 9 | 64C20 | E5 | 1 | 11B10 | E3 | 6 |
| Radio Tel Op | | | | 72A10 | E3 | 1 | 71B20 | E4 | 1 | 71B20 | E3 | 1 |
| Radio Tel Op | | | | | | | 95B10 | E3 | 4 | 76A10 | E3 | 1 |
| Radio Tel Op | | | | | | | | | | | | |
| AGGREGATE | | | 50 | | | 63 | | | 51 | | | 61 |

Figure 21-2. Recapitulation Communication Personnel, Infantry, Airborne, and Mechanized Brigades.

| COMMUNICATIONS EQUIPMENT | BRIGADES | | | | | BATTALIONS | | | | | RIFLE CO | | | | | CSC | | SEP BDE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INF | ABN | MECH | AM | LT INF | INF | ABN | MECH | AM | LT INF | INF | ABN | MECH | AM | LT INF | AM | LT INF | INF | ABN | MECH |
| AMPLIFIER OA-3653/PRC-25 | | | | | | | | 3 | | | | | | | | | | | | |
| ANTENNA AT-784/PRC | | | | | | 3 | 6 | 7 | | | 2 | 2 | | 1 | 1 | | | | | |
| ANTENNA AT-984/G | 1 | | 4 | | | 4 | | 3 | 1 | 1 | 1 | | 1 | 2 | 2 | | | | | |
| ANTENNA GP RG-292 | 3 | 8 | 5 | 14 | 8 | 6 | 14 | 6 | 10 | 10 | 1 | | 2 | 3 | 3 | 6 | 6 | 17 | 8 | 7 |
| ANTI INTRUSION AN/GSS-9 | | | | | | | | | | | | | | | | | | | | |
| ANTENNA GP AN/GRA-50 | | | | 1 | 3 | | | | 2 | 2 | | | | | | | | 3 | 3 | |
| AXLE CABLE REEL RL-27 | 4 | 2 | 5 | 2 | 5 | 8 | 3 | 4 | 1 | 1 | 1 | 1 | | 1 | 1 | | | 8 | 5 | 18 |
| CABLE ASSEMBLY CX-7474/U | | | | | 1 | | | | | | | | | | | | | 1 | 1 | |
| CABLE TEL WD-1/TT DR-8 1320 FT | 9 | 13 | 11 | 1 | 27 | 34 | 51 | 42 | 6 | 6 | 12 | 19 | 20 | 3 | 3 | | | 34 | 30 | 11 |
| CABLE TEL: WD-1/TT RL-159 5280 FT | 40 | | 40 | 10 | 40 | 16 | 16 | 6 | | | | | | | | | | 60 | 40 | 60 |
| CABLE TEL WD-1/TT MX-306 | 20 | 22 | 20 | 20 | 20 | 45 | 36 | 21 | 20 | 20 | 15 | 18 | 18 | 18 | 18 | 10 | 10 | 40 | 20 | 40 |
| CENTRAL OFFICE TEL AN/MTC-7 | 2 | | 2 | | 1 | | | | | | | | | | | | | 2 | | 2 |
| CENTRAL OFFICE TT: AN/MGC-17 | | | | | 1 | | | | | | | | | | | | | | | |
| CHARGER BATTERY PP-1578 | 2 | 3 | 2 | 5 | 3 | 6 | 3 | 6 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 4 | 3 | 3 |
| CHARGER BATTERY PP-1659 | | | | | | | 1 | 1 | | | | | | | | | | | | |
| CHEST BC-5 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 1 | 5 | 5 | | | 1 | | | | | 4 | 18 | |
| CIPHER MACHINE TSEC/KL-7 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | | | | | | | | | | 2 | 2 | 2 |
| CONTROL RADIO SET: AN/GSA-7 | | | | | 1 | | | | | | | | | | | | | 1 | 1 | 1 |
| CONTROL RADIO SET: C-2299/VRC | 1 | | | | | 1 | 1 | 1 | | | | | | | | | | | | |
| COMMUNICATION CENTRAL ASC-5 | | | | 1 | | | | | 1 | 1 | | | | | | | | | | |
| CRYSTAL UNIT SET CK-6/PRC | | 6 | | | 6 | 6 | 9 | | | | | | | 6 | 6 | | | 6 | 6 | |
| GENERATOR PU-422/PP | | | | | | 2 | | 2 | | | | | | | | | | | | |
| GENERATOR PU-532/PP | | | | 2 | | 4 | 2 | 4 | | | | | | | | | | | | |
| HANDSET-HEADSET H-144/U | | | | | | 5 | | | | | 5 | | | | | | | | | |
| HEADSET-MICROPHONE H-161/U | | | | | 1 | | 5 | | 5 | 5 | | 7 | | 13 | 13 | 15 | 15 | 1 | 1 | |
| HEADSET-MICROPHONE H-182/PT | | | | | | | | 9 | | | | | 2 | | | | | | | |
| INDICATOR ID-292/PRC-6 | | 1 | | | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | 1 | 1 | 1 |
| INVERTER VIBRATOR PACK PP-68/U | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | | | 1 | | | | | 1 | 2 | 1 |
| KEYBOARD ADAPTER KLN-7/TSEC | | 1 | | | 1 | | 1 | | | | | | | | | | | 1 | 1 | 1 |
| LOUDSPEAKER LS-166/U | | | 1 | | | 3 | | 1 | | | | | | | | | | | | |
| LOUDSPEAKER LS-454/U | | | | | | | 1 | | 2 | 2 | | 1 | | 14 | 14 | 9 | 9 | | | |
| MODIFICATION KIT MX-898/GR | | | | | | | | 2 | | | | | | | | | | | | |
| MULTIMETER: AN/PRM-15 | 1 | 1 | 1 | | 2 | | | | | | | | | | | | | 2 | 2 | 2 |
| MULTIMETER AN/URM-105 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 4 | 4 | | | 2 | 1 | 1 | 1 | 1 | 2 | 4 | 3 |
| MULTIMETER: ME-26/U | | | | | 1 | | | | | | | | | | | | | 1 | 1 | |
| MULTIMETER: TS-352/U | | 1 | | | 2 | | | 1 | | | | | | | | | | 1 | 2 | 1 |
| POWER SUPPLY PP-2953 | | 1 | | | 2 | | 2 | | | | | | | | | | | 1 | 2 | 1 |
| RADAR SET AN/PPS-4 | | | | 2 | | 4 | 2 | 4 | | | | | | | | | | | | |
| RADAR SET AN/TPS-33 | | | | | | 2 | | 2 | | | | | | | | | | | | |
| RADIO AN/GRC-106 IN 1/4-T | | 1 | | | 2 | | | | 1 | 1 | | | | | | | | | 2 | |
| RADIO AN/GRC-106 IN 3/4-T | 2 | 3 | 1 | | 2 | 2 | 1 | | | | | | | | | | | 2 | 2 | 1 |
| RADIO AN/GRC-106 IN M113 | | | | | | | | 1 | | | | | | | | | | | | |
| RADIO AN/GRC-106 IN M114 | | | | | | | | | | | | | | | | | | | | 1 |
| RADIO AN/GRC-106 IN M577 | | | 1 | | | | | 1 | | | | | | | | | | | | |
| RADIO AN/GRC-125 IN 1/4-T | | | | | 1 | 6 | 16 | 4 | | | 3 | 2 | | | 1 | 9 | 9 | 18 | 2 | 1 |
| RADIO AN/GRC-125 IN 1/2-T | | | | | | | | | | | | | | | | | | | | |
| RADIO AN/GRC-125 IN 3/4-T | | | | | | | 3 | 2 | | | | | 1 | | | | | | | |
| RADIO AN/GRC-125 IN M113 | | | | | | | | | | | | | | | | | | | | |
| RADIO AN/GRC-125 IN M114 | | | | | | | | 4 | | | | | 3 | | | | | | | |
| RADIO AN/GRC-125 IN CARR HV MORT | | | | | | | | 4 | | | | | | | | | | | | |
| RADIO AN/GRR-5 | | | | | | | | | | 1 | | | | | 1 | | 1 | | | |
| RADIO AN/GRR-5 IN 1/4-T | | | | | 1 | | | | | | | | | | | | | 1 | 1 | 1 |
| RADIO AN/GRR-5 IN 3/4-T | 2 | 1 | 1 | | | 1 | 1 | | | | | | | | | | | 1 | | 1 |
| RADIO AN/GRR-5 IN M577 | | | 1 | | | | | 1 | | | | | | | | | | | | 1 |
| RADIO AN/PRC-6 | 6 | 6 | 6 | | 8 | | | | | | 18 | 18 | 18 | 20 | 18 | | | 17 | 8 | 10 |
| RADIO AN/PRC-25 | 5 | 4 | 5 | 21 | 4 | 16 | 16 | 10 | 16 | 16 | 10 | 13 | 12 | 14 | 12 | 16 | 16 | 14 | 4 | 2 |
| RADIO AN/PRC-41 | | | | | 1 | | | | 1 | 1 | | | | | | | | | | |
| RADIO AN/PRC-47 | | | | | 3 | | | | 5 | 5 | | | | | | | | | | |
| RADIO AN/VRC-12 IN 1/4-T | 1 | | 1 | | | | | | | | | | | | | | | | | 3 |
| RADIO AN/VRC-12 IN M114 | | | 3 | | | | | 3 | | | | | | | | | | | | |
| RADIO AN/VRC-24 IN 1/4-T | | | | 2 | | | | | 1 | | | | | | | | | | | |
| RADIO AN/VRC-24 IN 3/4-T | 2 | 3 | 1 | | 2 | 2 | 1 | | | 1 | | | | | | | | 2 | 2 | 2 |
| RADIO AN/VRC-24 IN M113 | | | | | | | | 1 | | | | | | | | | | | | |
| RADIO AN/VRC-24 IN M577 | | | 1 | | | | | 1 | | | | | | | | | | | | 1 |

Figure 21-3. Recapitulation Communication Equipment. (Continued on Next Page)

| COMMUNICATIONS EQUIPMENT | BRIGADES | | | | | BATTALIONS | | | | | RIFLE CO | | | | | CSC | | SEP BDE | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INF | ABN | MECH | AM | LT INF | INF | ABN | MECH | AM | LT INF | INF | ABN | MECH | AM | LT INF | AM | LT INF | INF | ABN | MECH |
| RADIO AN/VRC-46 | | | | 4 | | | | 4 | | | | | 1 | | | | | | | |
| RADIO AN/VRC-46 IN 1/4-T | 4 | 7 | 3 | 2 | 17 | 7 | 11 | 7 | 1 | 1 | | 2 | | | | | | 20 | 18 | 20 |
| RADIO AN/VRC-46 IN 3/4-T | 3 | 3 | 3 | | 4 | 5 | 3 | 1 | | | | | | | | | | 12 | 4 | 3 |
| RADIO AN/VRC-46 IN M113 | | | | | | | | | | | | | 1 | | | | | | | |
| RADIO AN/VRC-46 IN M577 | | | 5 | | | | | 1 | | | | | | | | | | | | 2 |
| RADIO AN/VRC-46 IN RECOVERY VEH | | | 1 | | | | | 2 | | | | | | | | | | | | |
| RADIO AN/VRC-46 IN SHOP VAN | 4 | | | | | 2 | | | | | | | | | | | | 3 | | |
| RADIO AN/VRC-47 IN 1/4-T | 8 | 1 | 4 | 2 | 2 | 14 | 2 | 8 | | | 2 | | 2 | | | | | 5 | 4 | 7 |
| RADIO AN/VRC-47 IN 3/4-T | 1 | 1 | | | 2 | 5 | | | | | | | | | | | | | 2 | |
| RADIO AN/VRC-47 IN M113 | | | | | | | | 2 | | | | | 4 | | | | | | | |
| RADIO AN/VRC-47 IN M114 | | | | | | | | | | | | | 1 | | | | | | | |
| RADIO AN/VRC-47 IN M577 | | | 3 | | | | | 3 | | | | | | | | | | | | 3 |
| RADIO AN/VRC-47 IN SHOP VAN | 0 | | | | | | | | | | | | | | | | | 1 | | |
| RADIO AN/VRC-49 IN 1/4-T | 1 | 1 | 1 | 4 | 3 | 1 | 1 | | 1 | 1 | | | | | | | | 1 | 2 | 2 |
| RADIO AN/VRC-49 IN 3/4-T | | | | | | | | 1* | | | | | | | | | | 1 | | 1 |
| RADIO AN/VRC-53 IN 1/4-T | | | | | | 1 | | | | | | | | | | | | | | |
| RADIO AN/VRC-53 IN 3/4-T | | | | | | 2 | | | | | | | | | | | | | | |
| RADIO AN/VRC-53 IN M113 | | | 4 | | | | | 2 | | | | | 10 | | | | | | | 4 |
| RADIO AN/VRC-53 IN M577 | | | | | | | | 2 | | | | | | | | | | | | |
| RADIO CONTROL GP AN/GRA-6 | | | | 2 | 1 | | | | 1 | 1 | | | | | | | | | | |
| RADIO CONTROL GP AN/GRA-39 | 5 | 8 | 3 | 11 | 9 | 17 | 6 | 12 | 6 | 6 | 2 | 2 | 6 | | | | | 8 | 11 | 10 |
| RADIO CONTROL GP AN/GRA-74 | | 4 | | 1 | | | 1 | | 2 | | | | | | | | | | 2 | |
| RADIO CONTROL GP CA-1754/GRC | 3 | | 1 | | | | | | | | | | | | | | | 2 | | 2 |
| RADIO TT SET AN/GRC-46 | 5 | | 2 | | | 1 | | | | | | | | | | | | 2 | | 2 |
| RADIO TT SET AN/VRC-29 | | | 3 | | | | | 1 | | | | | | | | | | | | |
| RADIO TT SET AN/VSC-2 | | 1 | | | | | 1 | | 1 | 1 | | | | | | | | | 2 | |
| REEL CABLE DR-8 | 4 | 4 | | 1 | | 11 | 2 | 8 | | | 4 | | | 7 | 7 | 8 | 8 | 4 | | 4 |
| REEL CABLE RL-159 | 6 | 6 | 9 | 6 | 9 | 7 | 4 | 5 | 6 | 6 | 1 | 4 | 7 | 1 | 1 | | | 6 | 9 | 6 |
| REEL EQUIPMENT CE-11 | 5 | 1 | 1 | 1 | 1 | 17 | 10 | 18 | | | 3 | 9 | 2 | 9 | 9 | | | 1 | 1 | 1 |
| REELING MACHINE RL-31 | 2 | 4 | 2 | 2 | 5 | 2 | 3 | 2 | 2 | 2 | | | | | | | | 6 | 5 | 6 |
| REELING MACHINE RL-39 | 3 | 8 | 3 | 2 | 16 | 20 | 19 | 15 | 6 | 6 | 11 | 5 | 14 | | | 7 | 7 | 15 | 18 | 12 |
| REELING MACHINE RL-172/G | 4 | | 4 | | | 3 | | 1 | | | | | | | | | | 6 | | 6 |
| RETRANSMISSION CABLE MK-126/G | | | | | | | | 2 | | | | | | | | | | | | |
| SPLICING KIT MK-356/G | 4 | 4 | 6 | | 6 | 9 | 2 | 1 | | | 2 | 2 | | | | | | 6 | 6 | 6 |
| SPEECH SECURITY EQUIP TSEC/KY-8 | 3 | 3 | 3 | | 1 | 2 | | 2 | | | | | | | | | | 2 | 5 | 4 |
| SWITCHBOARD KIT MX-2915/PT | | | | | 1 | | | | | | | | | | | | | 1 | 1 | |
| SWITCHBOARD SB-22/PT | 2 | 1 | 2 | 4 | 2 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | | | 1 | 1 | 2 | 2 | 2 |
| SWITCHBOARD SB-86/P | | 2 | | | 1 | 1 | | | | | | | | | | | | | 1 | |
| SWITCHBOARD SB-993/GT | | | | | | 2 | 2 | 1 | | | 2 | 1 | 2 | 2 | 2 | | | | | |
| TELEGRAPH TERM GP AN/TCC-14 | 2 | | 2 | | | | | | | | | | | | | | | | | |
| TEL SWITCHING GP MX-155/GT | | | | | | | | 1 | | | | | | | | | | | | |
| TELEPHONE TA-1/PT | 6 | 6 | 6 | 6 | 6 | | | | | | 25 | 20 | 26 | 15 | 15 | | | 6 | 6 | 6 |
| TELEPHONE TA-264/PT | 2 | | 2 | | | | | | | | | | | | | | | | | |
| TELEPHONE TA-312/PT | 26 | 22 | 26 | 28 | 36 | 55 | 57 | 46 | 24 | 24 | 8 | 5 | 4 | 7 | 7 | 9 | 10 | 25 | 38 | 23 |
| TT SET AN/GGC-1 (TGC-14) | 2 | 2 | 2 | 1 | 1 | | | | | | | | | | | | | | 2 | |
| TT SET AN/PGC-1 (TGC-15) | 2 | 2 | 2 | 1 | 1 | | | | | | | | | | | | | | 2 | |
| TT SECURITY EQUIP TSEC/KW-7 | 7 | 4 | 5 | 1 | 5 | 1 | 1 | 1 | | 1 | | | | | | | | 5 | 5 | 2 |
| TERMINAL BOARD TM-184 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 4 | 4 | 4 | | | | | | | | 8 | 8 | 8 |
| TERMINAL TELEGRAPH TH-5/GT | | 1 | | | | | | | | | | | | | | | | | | |
| TERMINAL TELEGRAPH TH-22/GT | | | | 1 | | | | | | | | | | | | | | | | |
| TERMINAL TELEGRAPH AN/TCC-29 | | 2 | | | 2 | | | | | | | | | | | | | 2 | 2 | |
| TEST SET AN/UPM-93 | | | | | | 1 | | 2 | | | | | | | | | | | | |
| TEST SET TV-7/U | 1 | 1 | 1 | 3 | 3 | 1 | 2 | 2 | 1 | 1 | 1 | | 1 | | | | | 22 | 3 | 1 |
| TEST SET AN/GRM-55 | | 1 | | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| TEST SET AN/VRM-1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | 1 | 2 | 2 |
| TEST SET AN/URM-98 | | | | | | 1 | | | | | | | | | | | | | | |
| TOOL KIT TK-115/G | 2 | | | | | | | | | | | | | | | | | 3 | 3 | 1 |

*Mounted in M577

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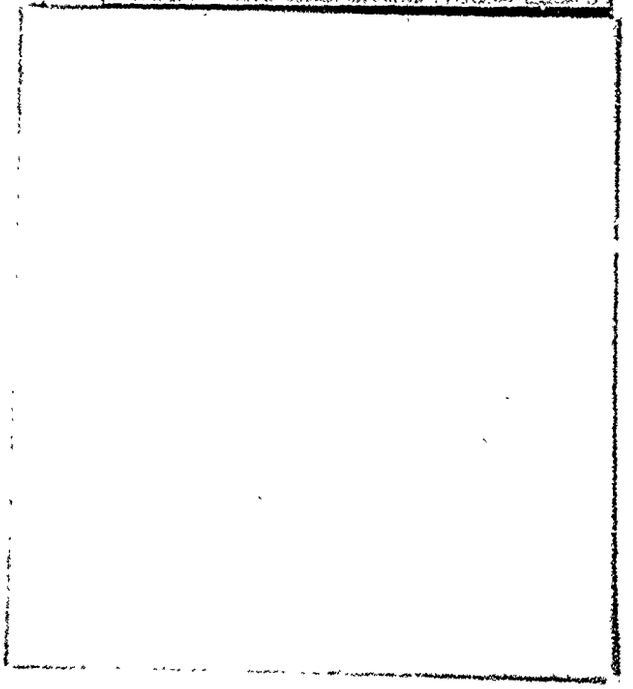

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INFANTRY COMMUNICATION DATA

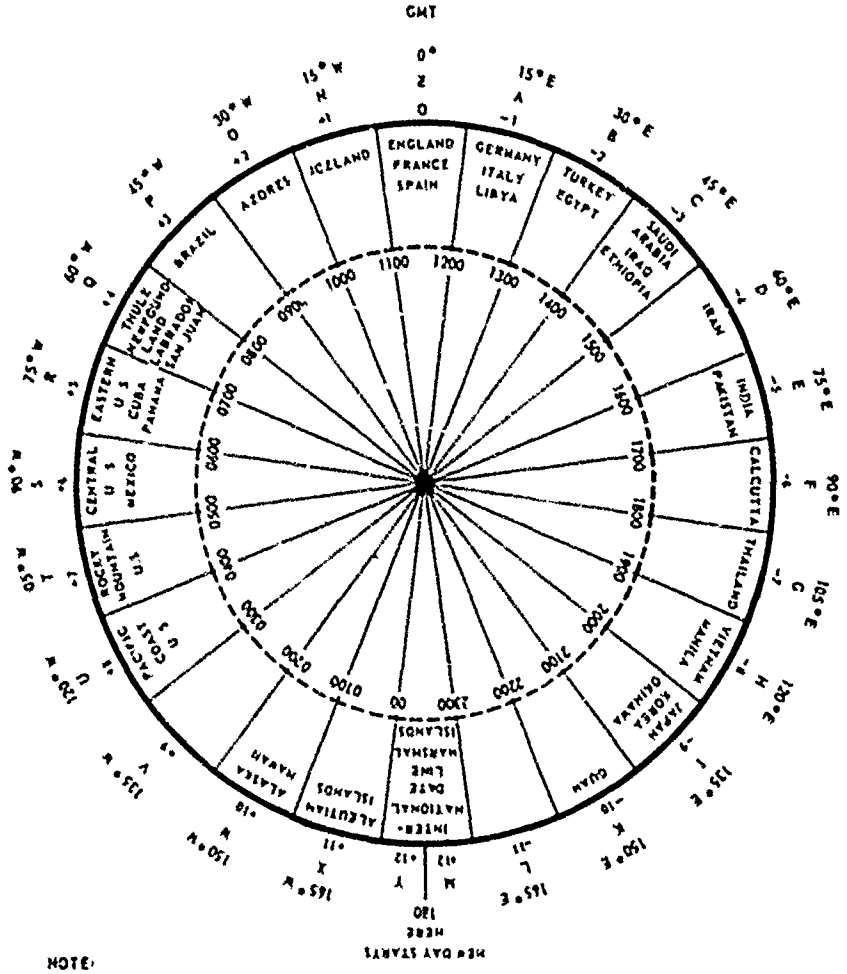
US Army Infantry School

Instructional Material
January 1968





54239 Army-Ft. Benning, Ga. 16 July 68




NOTE:

1. CUT OUT INNER CIRCLE
2. LOCATE YOUR GEOGRAPHICAL POSITION ON THE OUTER CIRCLE
3. ROTATE THE INNER CIRCLE TO SHOW LOCAL TIME FOR YOUR POSITION
6. "Y" TIME ZONE IS 24 HOURS BEHIND "M" TIME ZONE
   EXAMPLE: IF IT IS 0500 MONDAY IN "Y" ZONE
   IT IS 0500 TUESDAY IN "M" ZONE
4. KEEP INNER CIRCLE IN PLACE AND READ LOCAL TIME FOR ANY AREA YOU DESIRE
5. TO COMPUTE YOUR LOCAL TIME TO "Z" TIME FOLLOW STEPS 2 & 3 THEN READ TIME AT Z AREA
7. USE STANDARD TIMES ONLY