TECHNICAL MANUAL

OPERATORS MANUAL

RADIO RECEVING SET ANIR.30(VI1)

NSN 5820-00-358-0385

RADIO RECEMNG SET ANTR30(VZ)

NSN 5820-00-358-0388

RADIO RECEMIVING SET AN/ITR 41

NSN 5895-00-168-8282

HEADQUARTERS, DEPARTMENT OF THE ARMY

MAY 1982

WARNING

Dangerous chemicals are used to clean this equipment. DEATH or severe burns may result if personnel fail to observe safety precautions.

WARNING

High voltage is used in the operation of this equipment. DEATH ON CONTACT may result if personnel fail to observe safety precautions. Learn the areas containing high voltage in each piece of equipment. Be careful not to connect high-voltage connections when installing or operating this equipment. Before working inside the equipment, turn the power OFF and ground points of high potential before touching them.

TECHNICAL MANUAL

OPERATIONS MANUAL

RADIO RECEIVING SET AN/TRQ-30(V1)
NSN 5820-00-358-0385

RADIO RECEIVING SET A/TRQ-30(V2)
NSN 5820-00-358-0388

RADIO RECEIVING SET AN/TRQ-30(V4)
NSN 5895-00-168-8282

HEADQUARTERS, DEPARTMENT OF THE ARMY

20 MAY 1982

Technical Manual
32-5895-206-10

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D C , *20 May 1982*

OPERATOR'S MANUAL
FOR
RADIO RECEIVING SET ANITRI-30(V1)
NSN 5820-00-358-0385
RADIO RECEIVING SET AN/TRQ-30(V2)
NSN 5820-00-358-0388
RADIO RECEIVING SET AN/TRQ30(V4)
NSN 5895-00-168-8282

Current as of 13 January 1982

REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 (Recommended Changes to Equipment Technical Publications) direct to: Commander, US Army Electronics Materiel Readiness Activity, ATTN: SELEM-ME-E, Vint Hill Farms Station,

Warrenton, Virginia 22186. A reply will be furnished to you.

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS - Continued

LIST OF ILLUSTRATIONS - Continued

LIST OF TABLES

SAFETY SUMMARY

The following are general safety precautions that are not related to any specific procedures and therefore do not appear elsewhere in this publication. These are recommended precautions that personnel must understand and apply during many phases of operation and maintenance.

KEEP AWAY FROM LIVE CIRCUITS

Operating personnel must at all times observe all safety regulations. Do not replace components or make adjustments inside the equipment with the high voltage supply turned on. Under certain conditions, dangerous potentials may exist when the power control is in the off position due to charges retained by capacitors. To avoid casualties, always remove power and discharge and ground a circuit before touching it.

DO NOT SERVICE OR ADJUST ALONE

Under no circumstances should any person reach into or enter the enclosure for the purpose of servicing or adjusting the equipment except in the presence of someone who is capable of rendering aid.

RESUSCITATION

Personnel working with or near high voltages should be familiar with modem methods of resuscitation.

The following warnings and cautions appear in the text of this publication and are repeated here for emphasis.

WARNING

Battery leaks result in corrosive deposits that may cause skin injury. Be extremely careful not to contact deposits with bare hands. If contacted, wash hands immediately. Do not wipe eyes until hands are washed. (Pages 2-45, 2-49)

WARNING

The fumes of trichloroethane are toxic. Provide complete ventilation whenever used. DO NOT USE NEAR AN OPEN FLAME. Trichloroethane is not flammable, but exposure of the fumes to an open flame or hot metal forms highly toxic phosgene gas. (Pages 3-30, 3-34, 3-38, 3-39, 3-41, 3-42)

WARNING

Xylene is toxic and flammable. Do not ingest. Avoid breathing concentrated fumes. Do not use near fire or flame. (Pages 3-31, 3-36)

CAUTION

Failure to install the batteries with the proper polarity could result in damage to the recorder/reproducer. (Page 2-49)

CAUTION

Be sure that all components are clean and dry before packing them in their respective carrying cases. (Page 2-78)

CAUTION

Tripod assembly must be completely cleaned and collapsed before storing. Be sure that each tripod leg is telescoped together completely without any surface of the extension portions showing or the flange above the foot will damage the extensions during travel. Tighten

chucks so that leg extensions will not slide apart. (Page 2-79)

CAUTION

Do not press on clear meter, counter, and scale window faces. The faces are easily damaged. (Pages 3-31, 3-36, 3-38)

WARNING

SHOCK HAZARD

This equipment contains dangerous voltages which can cause injury or death by severe electrical shock. Be extremely careful when making voltage measurements or other checks with the equipment connected to the power source during troubleshooting. Always disconnect the power source before making any continuity tests.

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1 SCOPE. This manual provides installation, operation and operator's maintenance instructions for the Radio Receiving Sets AN/TRQ-30(V1), AN/TRQ30(V2), and AN/TRQ-30(V4) (figures 1-1 and 1-2). It also includes site selection and installation, operation under usual and unusual conditions, cleaning and inspection, and replacement of parts available to the operator.

1-2 MAINTENANCE FORMS AND RECORDS. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by TM 38-750, The Army Maintenance Management System (TAMMS).

1-3 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRs). If your AN/TRQ-30(V) needs improvement, let us know. Send us an EIR. You, the user, are

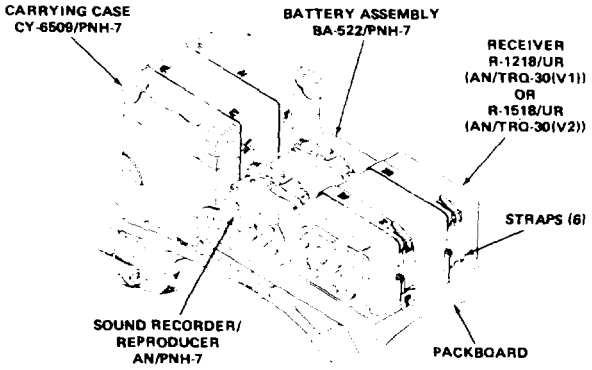

Figure 1-1. Radio Receiving Sets AN/TRQ-30(V1) and (V2)

the only one who can tell what you don't like about your equipment. Let us know why you don't like the design. Tell us why a procedure is hard to perform. Put it on a SF 368 (Quality Deficiency Report). Mail it to us at US Army Electronics Materiel Readiness Activity, ATTN: SELEM-ME-F, Vint Hill Farms Station, Warrenton, Virginia 22186. We'll send you a reply.

Section II. DESCRIPTION AND DATA

1-4 PURPOSE AND USE. The Radio Receiving Sets AN/TRQ-30(V1), AN/TRQ-30(V2), and AN/TRQ1-30(V4) are backpack

transportable radio direction finding (df) and communications intercept units. The three sets have different capabilities (refer to tables 1-1, 1-2, and 1-3). Each set is capable of receiving radio signals in a particular range, recording received keyed or audio range signals, and finding the azimuth of received signals. Each set is intended for independent single operator field operation and operator transport between operating points.

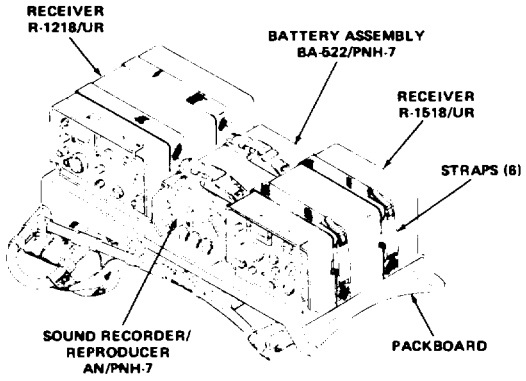

Figure 1-2. Radio Receiving Set AN/TRQ30(V4)

Table 1-1. Items Comprising A Field Operable Radio Receiving Set AN/TRQ30(V1)

NSN	Item	Qty	Height (in.)	Depth (in.)	Width (in.)	Weight (lb)
5820-00-013-8442	Receiver R-1218/UR	1	5.00	9.38	7.13	11 max
	Antenna AS-2887/UR	1	39	–	–	–
5895-00-507-8485	Antenna AS-1523/ TRQ-30(V1)	1	18.38	3.18	12.00	2
	Antenna Pedestal AB-1110	1				
6605-00-225-2383	Magnetic Compass MS-17983-	1	1			

Table 1-1. Items Comprising A Field Operable Radio Receiving Set AN/TRQ30(V1) - Continued

NSN	Item	Qty	Height (in.)	Depth (in.)	Width (in.)	Weight (lb)
5995-00-823-2976	RF Cable CG-409A/U	2	10 feet	–	–	–
	Null Meter (0099-1-3366)	1				
	HF Antenna Case CY-7331/TRQ-30(V)	1				
5965-00-892-3353	Headset H-216/U	1				10 oz
5995-00-681-8429	Cord Assembly CX4768/U	1				

Table 1-1. Items Comprising A Field Operable Radio Receiving Set AN/TRQ30(V1) - Continued

NSN	Item	Qty	Height (in.)	Depth (in.)	Width (in.)	Weight (lb)
5995-00-222-0423	Cord Assembly CD-307	1				
5965-00-560-1760	Microphone M-104	1				
5835-00-488-5347	Recorder AN/PNH-7	1	3.13	5.84	5.50	4.25
6135-00-192-6871	Battery Assembly BA-522/PNH-7	1	3	3.63	5.50	2.75
5935-00-930-7461	Adapter UG-641A/U	2				

Table 1-1. Items Comprising A Field Operable Radio Receiving Set AN/TRQ30(V1) - Continued

NSN	Item	Qty	Height (in.)	Depth (in.)	Width (in.)	Weight (lb)
	TNC Adapter	2				
8465-00-935-4732	Packboard	1				
8465-00-360-0233	Straps	6				
9320-00-935-9155	Rubber Sheet	1	0.13	36	36	
	Longwire Antenna	100 ft	–	–	–	–

Table 1-1. Items Comprising A Field Operable Radio Receiving Set AN/TRQ30(V1) - Continued

NSN	Item	Qty	Height (in.)	Depth (in.)	Width (in.)	Weight (lb)
6130-00-120-1020	Battery BA-30/U	20				
5835-00-106-0421	Tape Cartridge	AR	0.5	4.0	2.5	–

Table 1-2. Items Comprising A Field Operable Radio Receiving Set AN/TRQ30(V2)

NSN	Item	Qty	Height (in.)	Depth (in.)	Width (in.)	Weight (lb)
5820-00-013-9001	Receiver R-1518/UR	1	5.00	9.38	7.13	11 max
	Antenna AS-2887/UR	1	39	–	–	–
5895-00-510-1284	Antenna AS-1526/ TRQ-30(V)	1	14.00	3.25	8.50	18 oz
5895-00-507-8486	Antenna AS-1527/ TRQ-30(V)	1	10.50	2.25	5.00	14 oz
5895-00-510-1310	Antenna AS-1528/ TRQ-30(V)	1	9.13	2.75	3.63	13 oz

Table 1-2. Items Comprising A Field Operable Radio Receiving Set AN/TRQ30(V2) - Continued

NSN	Item	Qty	Height (in.)	Depth (in.)	Width (in.)	Weight (lb)
5985-01-022-9697	Antenna Pedestal AB1110	1				
6605-00-225-2383	Magnetic Compass MS-17983-1	1				
	Null Meter (0099-1-3366)	1				
5995-00-823-2976	RF Cable CG-409A/U	2	10 feet	–	–	–
	VHF Antenna Case CY-7332/TRQ-30(V)	1				

Table 1-2. Items Comprising A Field Operable Radio Receiving Set AN/TRQ30(V2) - Continued

NSN	Item	Qty	Height (in.)	Depth (in.)	4 (in.)	Weight (lb)
5965-00-892-3353	Headset H-216/U	1				10 oz
5995-00-681-8429	Cord Assembly CX4768/U	1				
5995-00-222-0423	Cord Assembly CD-307	1				
5965-00-560-1760	Microphone M-104	1				
5835-00-488-5347	Recorder AN/PNH-7	1	3.13	5.84	5.50	4.25

Table 1-2. Items Comprising A Field Operable Radio Receiving Set AN/TRQ30(V2) - Continued

NSN	Item	Qty	Height (in.)	Depth (in.)	Width (in.)	Weight (lb)
6135-00-192-6871	Battery Assembly BA-522/PNH-7	1	3.00	3.63	5.50	2.75
5935-00-930-7461	Adapter UG-641A/U	2				
	TNC Adapter	2				
8465-00-935-4732	Packboard	1				
8465-00-360-0233	Straps	6				

Table 1-2. Items Comprising A Field Operable Radio Receiving Set AN/TRQ30(V2) - Continued

NSN	Item	Qty	Height (in.)	Depth (in.)	Width (in.)	Weight (lb)
9320-00-935-9155	Rubber Sheet	1	0.13	36	36	
	Longwire Antenna	100 ft		–	–	–
6130-00-120-1020	Battery BA-30/U	20				
5835-00-106-0121	Tape Cartridge	AR	0.5	4.0	2.5	-

Table 1-3. Items Comprising A Field Operable Radio Receiving Set AN/TRQ30(V4)

NSN	Item	Qty	Height (in.)	Depth (in.)	Width (in.)	Weight (lb)
5820-00-013-8442	Receiver R-1218/UR	1	5.00	9.38	7.13	11 max
5820-00-013-9001	Receiver R-1518/UR	1	5.00	9.38	7.13	11 max
	Antenna AS-2887/UR	2	39	–	–	–
5895-00-507-8485	Antenna AS-1523/ TRQ-30(V)	1	18.38	3.18	12	2
5895-00-510-1284	Antenna AS-1526/ TRQ-30(V)	1	14	3.25	8.50	18 oz

Table 1-3. Items Comprising A Field Operable Radio Receiving Set AN/TRQ30(V4) - Continued

NSN	Item	Qty	Height (in.)	Depth (in.)	Width (in.)	Weight (lb)
5895-00-507-8486	Antenna AS-1527/ TRQ-30(V)	1	10.5	2.75	5.00	14 oz
5895-00-510-1310	Antenna AS-1528/ TRQ-30(V)	1	9.13	2.75	3.63	12 oz
	Antenna Pedestal AB-1110	1				
6605-00-225-2383	Magnetic Compass MS-17983-1	1				
	Null Meter (0099-1-3366)	1				

Table 1-3. Items Comprising A Field Operable Radio Receiving Set AN/TRQ30(V4) - Continued

NSN	Item	Qty	Height (in.)	Depth (in.)	Width (in.)	Weight (lb)
5995-00-823-2976	RF Cable CG-409A/U	2	10 feet	–	–	–
	VHF Antenna Case CY-8332/TRQ-30(V)	1				
	HF Antenna Case CY-7331/TRQ-30(V)	1				
5965-00-892-3353	Headset H-216/U	1				10 oz
5995-00-	Cord Assembly	1				

Table 1-3. Items Comprising A Field Operable Radio Receiving Set AN/TRQ30(V4) - Continued

NSN	Item	Qty	Height (in.)	Depth (in.)	Width (in.)	Weight (lb)
681-8429	CX-4768/U					
5995-00-222-0423	Cord Assembly CD-307					
5965-00-560-1760	Microphone M-104	1				
5835-00-488-5347	Recorder AN/PNH-7	1	3.13	5.84	5.50	4.25
6135-00-192-6871	Battery Assembly BA-522/PNH-7	1	3.00	3.63	5.50	2.75

Table 1-3. Items Comprising A Field Operable Radio Receiving Set AN/TRQ30(V4) - Continued

NSN	Item	Qty	Height (in.)	Depth (in.)	Width (in.)	Weight (lb)
5935-00-930-7461-	Adapter UG-641A/U	2				
	TNC Adapter	2				
8465-00-935-4732	Packboard	1				
8465-00-360-0233	Straps	6				
9320-00-935-9155	Rubber Sheet	1	0.13	36	36	

Table 1-3. Items Comprising A Field Operable Radio Receiving Set AN/TRQ30(V4) - Continued

NSN	Item	Qty	Height (in.)	Depth (in.)	Width (in.)	Weight (lb)
	Longwire Antenna	100 ft	–	–	–	–
6130-00-120-1020	Battery BA-30/U	32				
5835-00-106-0421	Tape Cartridge	AR	0.5	4.0	2.5	–

1-5 DESCRIPTION. Each Radio Receiving Set consists of a packframe, a recorder/reproducer, and one or two radio receivers. Each set also includes other items, such as a headset, microphone, antennas, and carrying cases. The recorder/reproducer consists of a magnetic tape cassette sound recorder/reproducer with an attached battery assembly. The receivers have internal battery compartments. A complete description of the equipment is listed below.

a. Receiver R-1218/UR. Refer to figure 1-3. Receiver R-1218/UR is a solid-state superheterodyne hf radio receiver with a frequency range of 0.5 to 20.5 MHz and is capable of operating in amplitude modulation (AM), lower sideband (LSB), or upper sideband (USB) modes. All operating controls, switches, and indicators are located on the front panel. An internal battery provides operating voltage. Refer to TM 11-5820-641-14 for additional information.

b. Receiver R-1518/UR. Refer to figure 1-4. Receiver R-1518/UR is a solid-state superheterodyne VHF radio receiver with a frequency range of 19.0 to 157.5 MHz and is capable of operating in AM, frequency modulated (FM), and continuous wave (CW) modes. All operating controls, switches, and indicators are located on the front panel. An internal battery provides operating voltage. Refer to TM 11-5820-770-14 for additional information.

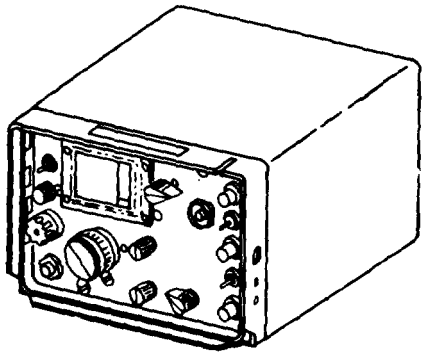

Figure 1-3. Receiver R-1218/UR

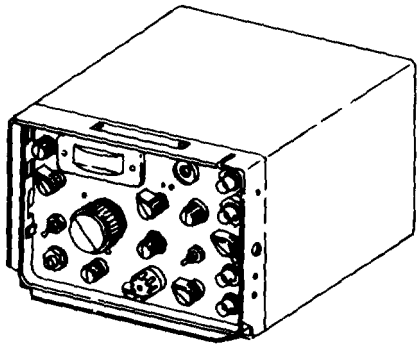

Figure 1-4. Receiver R-1518/UR

c. Antenna Group, Direction Finder Set AN/TRQ 30(V). Refer to figure 1-5. Antenna Group, Direction Finder Set AN/TRQ-30(V) consists of three different groups: HF Antenna Group AN/TRQ-30(VI), VHF Antenna Group AN/TRQ-30(V2), and HF/VHF Antenna Group AN/TRQ-30(V4). The antenna groups include interchangeable loop antennas and associated support equipment which are used in conjunction with the various configurations of the radio receiver set. Four loop antennas cover the 0.5 to 157 MHz frequency range and enable the operator to locate the position of transmitters, operating within these ranges, through detection and triangulation methods. The following paragraphs briefly describe the major components of the antenna groups.

(1) *Antenna AS-1523/TRQ-30(V).* Antenna AS1523/TRQ-30(V) is an HF loop antenna for direction finding in the 0.5 to 20.5 MHz range. The antenna contains circuitry for band switching and tuning. All operating controls and switches are located on the base of the antenna.

(2) *Antenna AS-1526/TRQ-30(V).* Antenna AS1526/TRQ-30(V) is an 11-inch diameter VHF loop antenna for direction finding in the 19 to 50 MHz range. The antenna contains frequency matching circuitry operated by a control mounted on the base of the antenna.

(3) *Antenna AS-1527/TRQ-30(V).* Antenna AS1527/TRQ-30(V) is a 4-inch diameter VHF loop antenna for direction finding in the 45 to 100 MHz range. The antennas contains frequency matching circuitry operated by a control mounted on the base of the antenna.

(4) *Antenna AS-1528/TRQ-30(V).* Antenna AS1528/TRQ-30(V) is a 7-inch diameter VHF loop antenna for direction finding in the 95 to 157.5 MHz range. The antenna contains frequency matching circuitry operated by a control mounted on the base of the antenna.

(5) *Antenna Pedestal AB-1110/TRQ-30(V).* The antenna pedestal assembly consists of an antenna mast, tripod, and ground anchors. Figure 1-6 shows the assembly.

(6) *Magnetic Compass MS-17983-1/Null Meter 0099-1-3366.* Magnetic Compass MS-17983-1/null meter is used to orient the azimuth scale.

(7) *VHF Antenna Case CY-7332/TRQ-30(V).* The VHF antenna case holds the AS-1526/TRQ-30(V), AS-1527/TRQ-300V), and AS-1528/TRQ-30(V) VHF loop antennas.

(8) *HF Antenna Case CY-7331/TRQ-30(V).* The HF antenna case holds the AS-1523/TRQ-30(V) HF loop antenna.

(9) *RF Cable CG409A/U.* The RF cable is 10 feet long and is used to connect the loop antenna to the receiver.

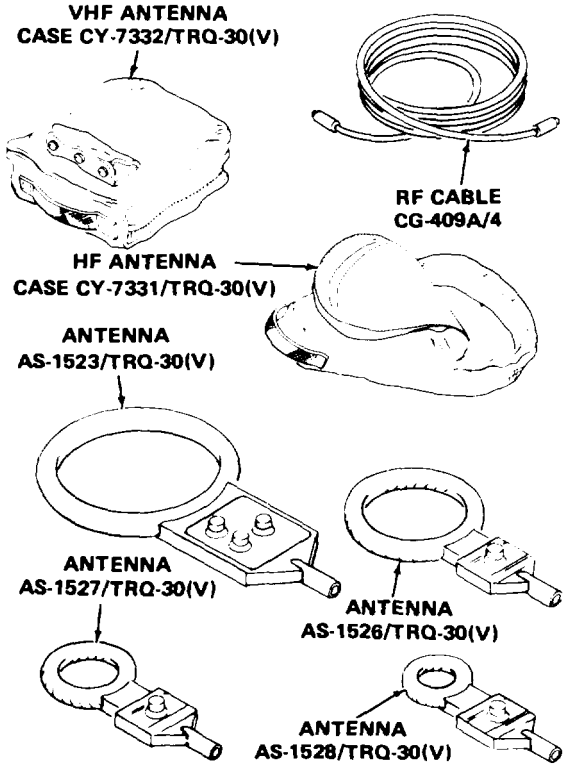

Figure 1-5. Antenna Group, Direction Finder Set AN/TRQ-30(V)

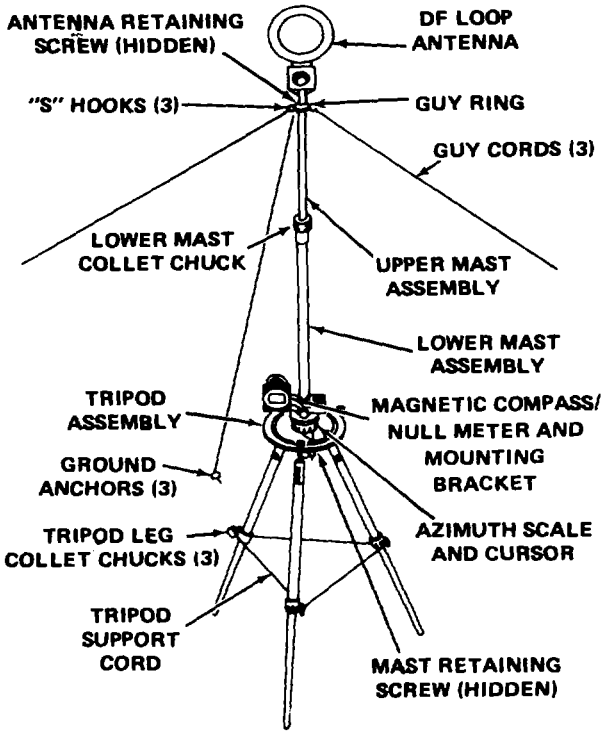

Figure 1-6. Antenna Pedestal AB-1110/TRQ-30(V)

d. Sound Recorder/Reproducer AN/PNH7. Refer to figure 1-7. Sound Recorder/Reproducer AN/PNH-7 is a miniature, portable, magnetic tape recorder/reproducer that records and plays back audio frequencies between 100 Hz and 4 kHz. Signal source may be operator comments, using a microphone, or signals from either radio receiver. The signal may be monitored by headphones or external equipment. All operating controls, switches, and indicators are located on the front panel. The recorder is powered by plug-in Battery Assembly BA-522/PNH-7 at the rear of the recorder. Refer to TM 32-5835-203-14&P for additional information.

e. Battery Assembly BA-522/PNH-7. Refer to figure 1-8. Battery Assembly BA-522/PNH-7 provides the required 10 to 12 Vdc to operate the sound recorder/ reproducer. It is plugged into the rear of the recorder/ reproducer. The assembly holds eight BA-30 batteries with an operating life of approximately 8 hours. Refer to TM 32-5835-203-14&P for additional information.

f. Other Items. There are several other items that are supplied as part of the radio receiving sets. Refer to figure 1-9.

(1) *Headset H-216/U.* Headset H-216/U monitors the received signal at the recorder and is attached to the front panel of the recorder/reproducer with Cord Assembly CD-307.

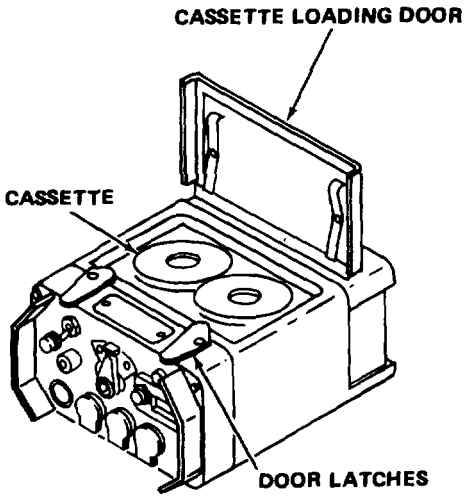

Figure 1-7. Sound Recorder/Reproducer AN/PNH- 7

(2) *Antenna AS-2887/UR*. Antenna AS-2887/UR is a whip antenna with a male TNC connector for receiver input connector #1.

(3) *Microphone M-104.* Microphone M-104 may be used to record operator's comments of the received signals.

(4) *Cord Assembly CX-4768/U.* Cord Assembly CX4768/U connects the AUDIO output of the receivers to the RCVR input on the recorder/reproducer.

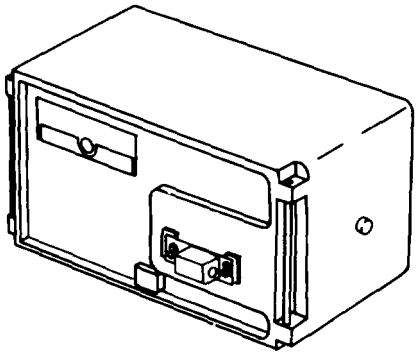

Figure 1-8. Battery Assembly BA-522/PNH-7

(5) *Cord Assembly CD-307.* Cord Assembly CD307 connects the HD PHONE output on the recorder/reproducer and Headset H-216/U.

(6) *Adapter UG-641/U.* Adapter UG-641/U connects the longwire antenna to the receiver.

1-6 DIFFERENCES BETWEEN MODELS. The various models of Radio Receiving Set AN/TRQ-30(V) differ in reception frequencies and signal type capabilities. There are also weight and storage space differences between models. Refer to tables 1-1, 1-2, and 1-3 for component differences. Refer to paragraph 1-8 for characteristic differences.

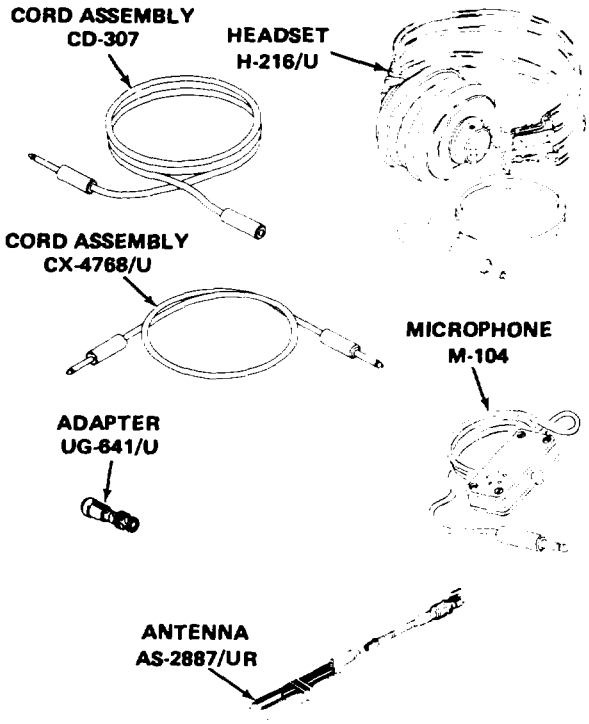

Figure 1-9. Additional Items that are Included with the Unit

1-7 SYSTEM APPLICATION. Radio Receiving Sets AN/TRQ-30(V) are versatile units capable of a broad range of applications, i.e., an HF radio receiving set, a VHF radio receiving set, and a combination HF and VHF radio receiving set (figures 1-10 and 1-11). However, the site requirements for df operation may restrict the use of these sets near other systems. Refer to Chapter 2 of TM 32-5895-206-14&P for systems planning and site requirements to evaluate system compatibility.

1-8 TABULATED DATA. The items comprising an operable equipment for the three models of the Radio Receiving Set are listed in tables 1-1, 1-2, and 1-3. The overall model characteristics and major component characteristics are listed below.

a Radio Receiving Sets.

AN/TRQ-30(VI).....HF Radio Receiving Set
Frequency range .....0.536 to 20.50 MHz
Reception modes.....Amplitude modulation (AM)
Single sideband:
Upper sideband (USB)
Lower sideband (LSB)
Continuous wave (CW) on LSB or USB

AN/TRQ-30(V2)	VHF Radio Receiving Set
Frequency range	19.0 to 157.5 MHz
Reception modes	Continuous wave (CW) Amplitude modulation (AM) Frequency modulation (FM)
AN/TRQ30(V4)	HF/VHF Radio Receiving Set
Overall frequency range	0.536 to 157.5 MHz
Reception modes	CW, AM LSB, USB (HF receiver) CW, AM, FM (VHF receiver)

b. Sound Recorder/Reproducer AN/PNH-7 with Battery Assembly BA-522/PNH- 7.

Recorder medium	Magnetic tape cassettes
Tape format	0.150-inch width tape, single channel, half track, 15/16 inches per second (ips)
Recording time	2 hours per cassette (one hour per side using recommended cassettes)

Frequency response	100 to 4000 Hz
Operator modes	Record, reproduce, fast forward, fast reverse
Power source	8 BA-30 batteries
Battery life	Approximately 8 operating hours
Input	600 Ω receiver and 250 Ω microphone unbalanced lines, telephone-type connectors
Output	Headphone, 600 Ω unbalanced lines, telephone-type connector

c. HF Radio Receiver R-1218/UR.

Receiver type	5-band, solid-state, superheterodyne radio receiver
Frequency range	0.536 to 20.50 MHz Band 1 0.536 to 1.16 MHz Band 2 1.10 to 2.37 MHz Band 3 2.26 to 4.87 MHz Band 4 4.63 to 10.00 MHz Band 5 9.50 to 20.5 MHz
Receiver modes	AM, USB, LSB (CW reception on USB or LSB) Calibrate (generates marker

	frequencies for dial adjustment)
Receiver sensitivity.....	CW, LSB, USB: 0.4 microvolts for 10 dB $\frac{S+N}{N}$ AM: 1.2 microvolts for 10 dB $\frac{S+N}{N}$ (1000 Hz 30% AM signal)
Inputs.....	Df, long-wire, whip, or random length antenna, TNC and BNC connectors, unbalanced inputs
Receiver bandwidth.....	Intermediate frequency stages: 3000 Hz Audio output: 300 to 2500 Hz
Power source.....	12 BA-30 batteries
Maximum power consumption	1 watt on internal batteries
Battery life.....	Approximately 12 hours
Outputs.....	Audio: 0 to 20 milliwatts, 600 Ω unbalanced line, telephone-type connector
	Diode: Supplies signal to the null meter.

d. VHF Radio Receiver R-1518/UR.

Receiver type	2-band, solid-state, superheterodyne radio receiver
Frequency range	19.0 to 157.5 MHz Band 1 19.0 to 52.5 MHz Band 2 47.5 to 157.5 MHz
Receiver modes	CW, AM, FM Calibrate (generates marker frequencies for dial adjustment)
Receiver sensitivity	CW: 0.4 microvolts for 10 dB $\frac{S+B}{N}$ at 10 KHz bandwidth AM: 1.2 microvolts for 10 dB $\frac{S+N}{N}$ at 10kHzband. width, 1 kHz 30% amplitude modulated signal FM: 1.2 microvolts for 20 dB $\frac{S+N}{N}$ at 74 kHz bandwidth and 15 kHz deviated 1 kHz frequency modulated signal
Inputs	Df, longwire, whip, or random length antenna, TNC (high impedance) and BNC

	(50 Ω) connectors, unbalanced inputs
Receiver bandwidth	Intermediate frequency stages: 10 or 75 kHz (switched) Audio output: 300 to 2500 Hz
Power source	12 BA-30 batteries
Maximum power consumption	1.5 watts on internal batteries
Battery life	Approximately 8 hours
Outputs	Audio: 0 to 20 milliwatts, 600 Ω unbalanced line, telephone-type connectors Diode: Supplies signal to the null meter.

e. DF Antenna Group.

AS-1523/TRQ-30(V)	HF df antenna
Frequency range	0.5 to 20.5 MHz (5 bands)
AS-1526/TRQ-30(V)	Lowband VHF df antenna
Frequency range	19 to 50 MHz (single band)
AS-1527/TRQ-30(V)	Midband VHF df antenna
Frequency range	45 to 100 MHz (single band

AS-1528/TRQ-30(V) ..... Highband VHF df antenna
Frequency range ..... 95 to 157.5 MHz (single band)

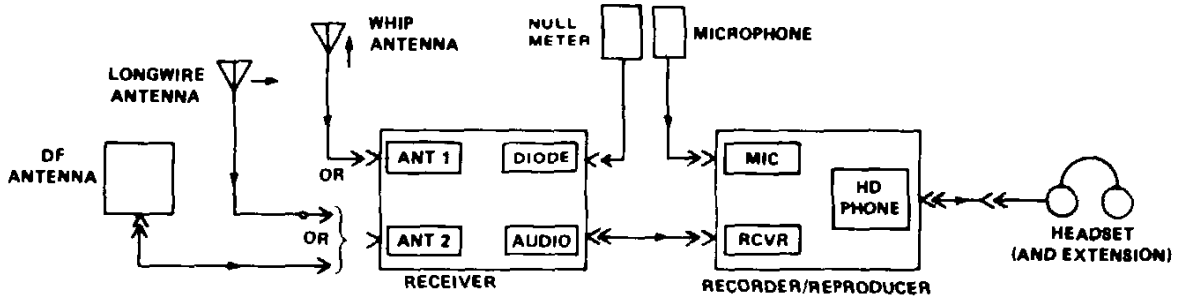

Figure 1-10. Configuration of Radio Receiving Sets AN/TRQ-30(V1) and (V2) HF Operation (V1) and VHF Operation (V2)

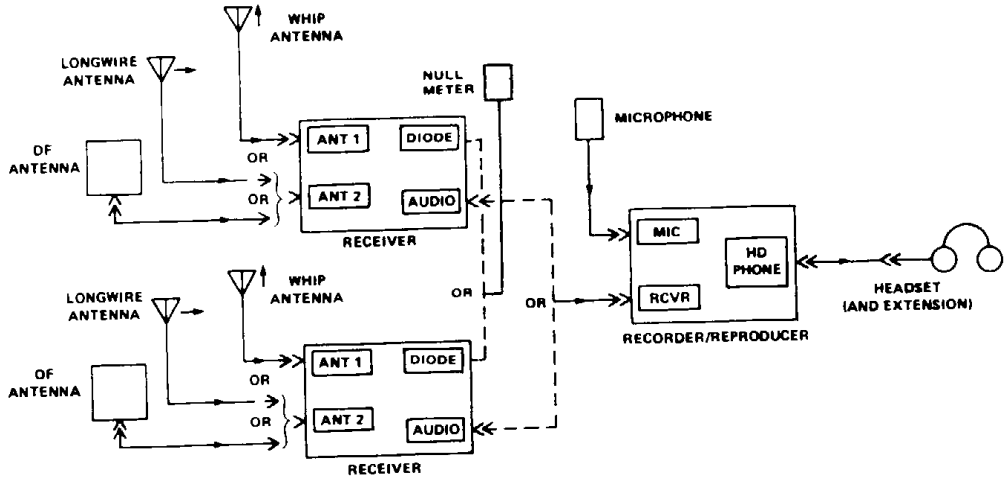

Figure 1-11. Configuration of Radio ReceivingSetAN/TRQ-30 (V4) Either HF or VHF Operation

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. CONTROLS AND INSTRUMENTS

2-1 DAMAGE FROM IMPROPER SETTINGS.

a. To prevent tape head magnetization, set the mode selector switch of the Sound Recorder/Reproducer AN/PNH-7 to the OFF position before making any connections.

b. To prevent complete battery discharge and leakage, set the mode or FUNCTION control of each component to OFF at any time the component is not in use.

c. No other damage or hazard will result due to improper control settings.

2-2 OPERATOR/CREW CONTROLS. The controls, indicators, and connections used when operating the various components of the Radio Receiving Sets AN/ TRQ-30(V1), AN/TRQ-30(V2), and AN/TRQ-30(V4) are described in table 2-1. Figures 2-1 through 2-4 show the controls of the various components.

Table 2-1. Operator's Controls

NOTE

This table covers only items used by the operator. Items used by higher level maintenance personnel are covered in instructions for the appropriate maintenance level.

Control, indicator, or connector	Function
a. Receiver R-1218/UR (figure 2-1)	
FUNCTION switch	Controls receiver power and selects operating mode. The switch positions have the following functions: OFF - disconnects receiver circuitry from internal

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
	and external power sources. AM - amplitude modulation reception. LSB - lower sideband reception. USB - upper sideband reception. CAL - enables internal calibration signal source for dial alignment.

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
PWR CK switch	When pressed down causes selected power source voltage to be displayed on lower scale of panel meter.
Panel meter	Upper scale displays received signal strength.
POWER switch (on rear of case)	Lower scale displays power source voltage when PWR CK switch is pressed. INT position selects internal battery power. EXT position selects external power from POWER connector.

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
POWER connector (on rear of case)	Connects receiver to 24 Vdc, 110 Vac, or 220 Vac external power. Desired type of power is selected by using a properly wired power cable.
LITE switch	Center position sets tuning scale lamp off. M ON position (momentary on, spring return) lights tuning scale lamp when held in position. ON position (snap on, manual return) lights tuning scale lamp until manually reset to center

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
	position. ON position does not function on internal battery power.
FUSE socket	Provides 1/8 amp, 110/220 Vac line current protection. Not used in battery or 24 Vdc applications.
ANT connectors	
1	TNC antenna input connector. Used with whip antenna.
2	BNC antenna input connector.

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
	Used with direction finding antenna and longwire antenna adapter.
ANT switch	Position I inputs ANT I connector signal to receiver circuitry. Position 2 inputs ANT 2 connector signal to receiver circuitry.
Tuning scale	Receiver frequency is indicated by a hairline indicator (cursor) and a graduated scale. Shutter exposes scale for selected band.

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
CAL ADJ control	Moves cursor to align scale markings with calibration signal frequencies.
BAND switch	Selects operating frequency range as follows: 1 - 0.536 to 1.116 MHz 2 - 1.10 to 2.37 MHz 3 - 2.26 to 4.87 MHz 4 - 4.63 to 10.00 MHz 5 - 9.50 to 20.50 MHz

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
TUNE control	Coarse tuning - provides rapid tuning of receiving frequency when control is pressed in and turned. Fine tuning - provides precise tuning of receiving frequency when control is released and turned.

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
RF gain control	Controls receiver sensitivity to incoming signals. Sets signal strength for effective operation of entire receiver. Extreme clockwise position, AVC, engages automatic volume control.
VOL control	Controls gain of the receiver audio stages to adjust AUDIO output to a useable level.
AUDIO connector	Connector for output of sound signals to recorder/reproducer or headset.

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
DIODE connector	Connector for output of detected signals to external equipment such as an azimuth indicator. Not used in this application.
b. Receiver R-1518/UR(figure 2-2)	
FUNCTION switch	Controls receiver power and selects operating mode. The switch positions have the following functions: OFF - disconnects receiver circuitry from internal and external power sources.

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
	AM - amplitude modulation reception. FM - frequency modulation reception. CW - continuous wave (code) reception. CAL - enables internal calibration signal source for dial alignment.
PWR CHK switch	When pressed down causes selected power source voltage to be displayed on lower scale of panel meter.

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
Panel meter	Upper scale displays received signal strength. Lower scale displays power source voltage when PWR CHK switch is pressed.
POWER switch (on rear of case)	INT position selects internal battery power. EXT position selects external power from POWER connector.
POWER connector (on rear of case)	Connects receiver to 24 Vdc, 110 Vac, or 220 Vac external power. Desired type of power is

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
	selected by using a properly wired cable.
LITE switch	Center position sets tuning scale lamp off. M ON position (momentary on, spring return) lights tuning scale lamp when held in position. ON position (snap on, manual return) lights tuning scale lamp until manually reset to center position. ON position does not function on internal battery power.

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
FUSE socket	Provides 1/8 amp, 110/220 Vac line protection. Not used in battery or 24 Vdc applications.
ANT connectors	
1	TNC antenna input connector. Used with whip antenna.
2	BNC antenna input connector. Used with direction finding antenna and longwire antenna adapter.

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
ANT switch	Position 1 inputs ANT I connector signal to receiver circuitry. Position 2 inputs ANT 2 connector signal to receiver circuitry.
TRIM control	Adjusts receiver input impedance to give maximum antenna effectiveness.
Tuning scale	Received frequency is indicated by a hairline indicator (cursor) and a graduated scale. Shutter exposes scale for selected band.

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
CAL ADJ control	Moves cursor to align scale markings with calibration frequencies.
BAND switch	Selects operating frequency range as follows:
BANDWIDTH switch	1 - 19.0 to 52.5 MHz 2 - 47.5 to 157.5 MHz 10 kHz setting sets receiver to receive narrow bandwidth (usually AM and CW) signals. 75 kHz setting sets receiver to receive wide bandwidth (usually FM) signals.

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
TUNE control	Coarse tuning - provides rapid tuning of receiving frequency when control is pressed in and turned. Fine tuning - provides precise tuning of receiving frequency when control is released and turned.

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
RF GAIN control	Controls receiver sensitivity to incoming signals. Sets signal strength for effective operation of entire receiver. Extreme clockwise position, AVC, engages automatic volume control.
VOL control	Controls gain of the receiver audio stages to adjust AUDIO output to a useable level.
AUDIO connector	Connector for output of sound signals to recorder/reproducer or headset.

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
DIODE connector DISCR connector	Connectors for output of demodulated signals to external equipment such as an azimuth indicator. Not used in this application.
c. Sound Recorder/Reproducer AN/PNH-7 (figure 2-3)	
Mode selector switch	Switch permits manual selection of any one of four operating modes. Returning mode selector switch to OFF from any operational modes disables all functions and disconnects power source.

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
	RECORD: To select the record mode, push mode selector switch in toward control panel, depress latch and turn clockwise to RECORD position. The knob will remain in the RECORD position until latch is depressed and manually returned to OFF. REPRODUCE: To select reproduce mode, push mode selector switch in toward control panel, depress latch and turn clockwise to REPRODUCE position. The

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
	knob will remain in REPRODUCE position until latch is depressed and manually returned to OFF. F/F (fast forward): To select the fast forward mode, rotate the mode selector switch from OFF position in a clockwise direction to F/F position and hold. When released, switch will automatically return to OFF position. F/R (fast reverse): To select fast reverse (rewind) mode, rotate

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
	mode selector switch knob from OFF position in a counterclockwise direction to F/R position and hold. When released, switch will automatically return to OFF position.
BAT TEST switch	A push-to-test switch for checking appropriate level of battery or power supply voltage.

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
LEVEL meter	Color coded meter which is used in conjunction with BAT TEST switch to check supply voltage (batteries or power supply) or data signal level. A green scale is provided for indicating correct input power and a red scale for the proper record level.
AGC/MAN switch	Selects automatic control of the record/reproduce amplifiers gain

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
	(AGC), or manual (MAN) control of the signal level by use of the GAIN control.
GAIN control	Control permits adjusting record/ reproduce amplifier output signal level when AGC/MAN switch is in MAN position.
EJECT control	Pushbutton which disengages transport drive for easy removal of cassette tape. Cassette loading door on top of recorder/reproducer must be open and mode

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
	selector switch in OFF position before ejector is pressed.
Counter	A 3-digit counter which indicates tape position.
RESET control	Pushbutton control which resets counter to 000 when pressed.
RCVR (receiver connector)	Input connector on front panel for connecting radio receiver signal cord.
MIC (microphone connector)	Input connector for microphone.

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
HD PHONE (headphone connector)	Output connector for monitor headphone.
d. Antenna AS-1523 (figure 2-4)	
BAND switch Function	Selects one of five frequency bands for operation. BAND 1 - 0.515 to 1.20 MHz BAND 2 - 1.03 to 2.80MHz BAND 3 - 2.03 to 5.30 MHz BAND 4 - 3.83 to 9.40 MHz BAND 5 - 8.46 to 21.0 MHz

Table 2-1. Operator's Controls - Continued

Control, indicator, or connector	Function
FREQ IN MHZ switch	Coarse tunes loop antenna for selected frequency band increments; fine tuning is provided by the tuning control.
Tuning control	Fine tunes loop antenna for maximum signal.
e. Antennas AS-1526, AS-1527, and AS-1528 (figure 2-4)	
Tuning control	Fine tunes loop antenna for maximum signal.

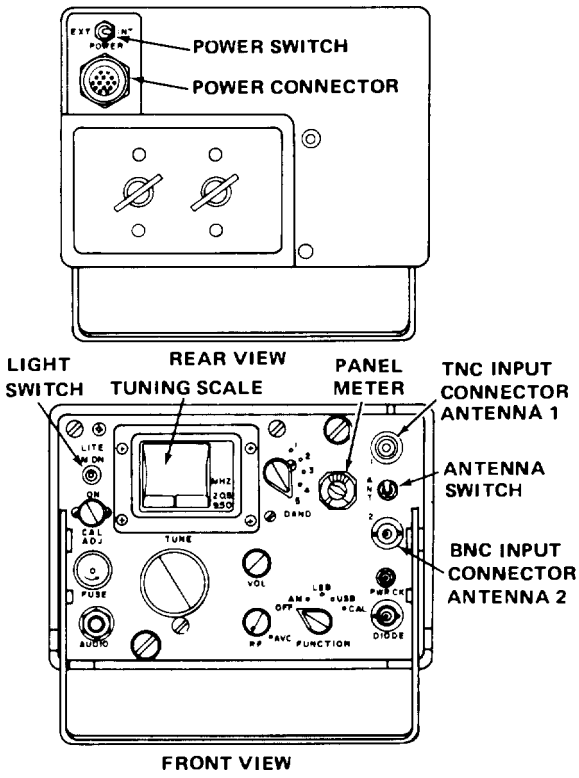

Figure 2-1. Radio Receiver R-1218/UR Controls and Instruments

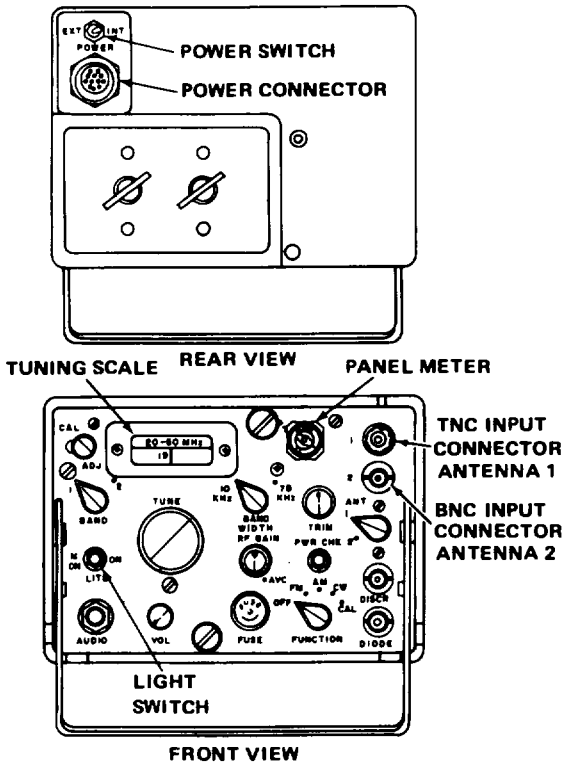

Figure 2-2. Radio Receiver R-1518/UR Controls and Instruments

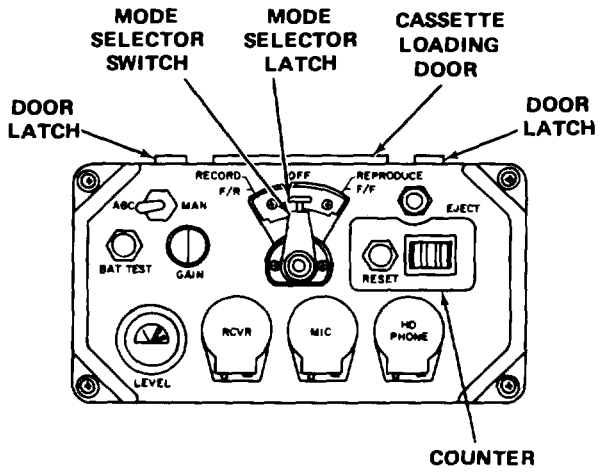

Figure 2-3. Sound Recorder/Reproducer AN/PNH-7 Controls and Instruments

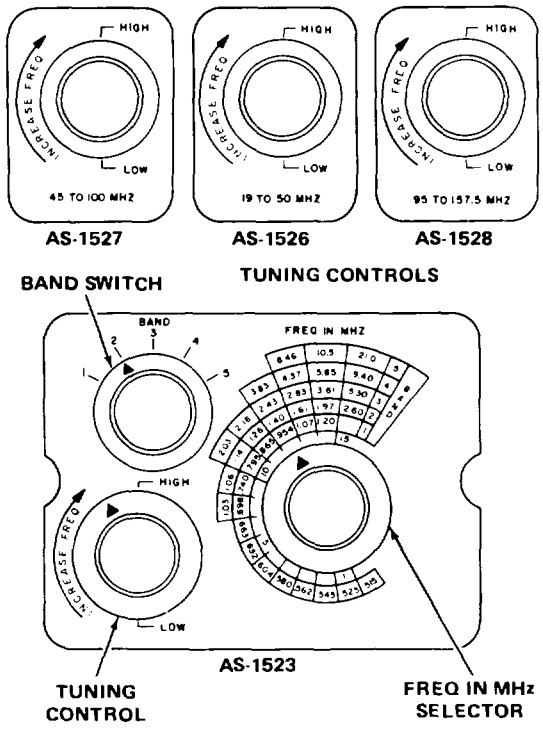

Figure 2-4. DF Antenna AS-1523, AS-1526, AS-1527, and AS-1528 Controls and Instruments

Section II. OPERATION UNDER USUAL CONDITIONS

2-3 GENERAL. This section contains operating procedures for the Radio Receiving Set AN/TRQ-30(V) and includes site selection, setup and preliminary starting procedures, initial adjustments, and operating and stopping procedures.

2-4 SITE SELECTION. The radio receiving sets are highly portable and most sites will be used only temporarily. Site selection depends on the tactical situation and the conditions listed below. If the tactical situation makes the use of an ideal site impossible, continue operation under the best conditions possible; note all shortcomings of the site. Two sets of conditions are listed below: the first set for general receiver operation; the second set for df operation.

a. Radio Signal Intercept Site. If no df operation is planned, the following conditions are sufficient:

(1) The site should be located on the highest point practical; the greater the elevation, the better the reception.

(2) The soil around the site should have high conductivity to improve reception. Reception of frequencies below 30 MHz will be greatly improved by high conductivity soil. Moist soil (not wet) has better conductivity than dry soil; rich earth has better conductivity than rocky or sandy soil.

(3) The site selected should be clear of sources of electrical interference (e.g., high voltage lines, operating electric motors, etc.).

(4) The immediate area should not have a large number of obstructions. Locations near metal fences, buildings, vehicles, or in dense forests may impair reception.

b. Radio Direction Finder Site. When using the radio receiving set as a direction finder, choose a site which will give uniform reception and which will cut down reception or reflected signals. For accurate df bearings, the following conditions should be satisfied whenever possible:

(1) The site should be a field which is flat for at least 150 yards in all directions from the set. Gentle downward slopes are allowable for several times that distance.

(2) The site should be located on the highest level area available in the general vicinity. A site in a sharply defined valley is usually not satisfactory.

(3) Mountainous or hilly terrain should be avoided.

(4) The site should be located as far inland from large bodies of water as possible. Radio signals may bend or reflect when passing over a shoreline at an angle. Errors are smallest when signals cross a shoreline at right angles.

(5) The soil around the site should have uniform conductivity. Non-uniform conductivity will cause HF radio ground waves to bend and VHF radio space waves to reflect.

(a) Moisture increases conductivity. Pick an area with uniformly moist soil. Moist soil gives stronger reception, but for df accuracy uniformly dry soil is better than patchy wet soil.

(b) Soil type affects conductivity. Pick an area with uniform soil type. Rich earth gives a stronger reception than sandy soil, but for df accuracy uniformly sandy soil is better than patchy rich earth.

(c) Areas evenly covered with grass or short vegetation are usually suitable for df operation.

(d) Areas showing scattered bare spaces or green spaces should be avoided. Such spaces usually indicate rocks, mineral outcroppings, or underground streams. Such areas have non-uniform conductivity.

(6) The site should be as far as possible from tall trees, buildings, wire fences, power lines, telephone lines, radio antennas, railroad tracks, sharp ground contours (mountains, cliffs, and ravines), buried conductors (cables and pipelines), chimney stacks, water towers, rivers, lakes, streams, or other obstructions.

(7) Radio waves in the VHF range have very short wavelengths and bend or reflect off small objects. A radio signal at 150 megahertz will react with an object a few feet long.

(8) Recommended minimum distances between the antenna and various obstructions are listed in table 2-2. Maintaining these distances will reduce errors in df bearings.

Table 2-2. Minimum Distances to Typical Obstructions

Obstruction	Distance to be maintained
Scattered trees, small single buildings, vehicles	200 yards
Wire fences (barbed wire, etc.)	300 yards
Buried cables, pipelines, or other conductors, trenches or deep ditches	300 yards

Table 2-2. Minimum Distances to Typical Obstructions - Continued

Obstruction	Distance to be maintained
Chimney stacks, water towers, overhead conductors (power lines, telephone lines, and antennas), railroad tracks, masonry walls	500 yards
Rivers, streams, lakes, and swamps	600 yards
Forests, large metal structures, chain link or similar fences	500 to 1000 yards
Cliffs or ravines	More than 1 mile
Mountains, plateaus, and very large bodies of water	5 to 25 miles

c. VHF Operation. Upper band VHF operation is generally very nearly line of sight between transmitter and receiver. This may affect the operating site choice.

2-5 INSTALLATION INSTRUCTIONS (FIELD SETUP). Place the carrying kit on firm, level ground. Remove the weather cover. Set up the radio receiving set for radio intercept or df operation as described in the following paragraphs.

NOTE

The whip antenna is the easiest to set up and should generally be tried first. The longwire antenna is generally best for weak signals. The df antennas work in all modes of operation. Avoid having other antennas set up when taking df bearings.

a. Radio Intercept Operation. Remove the accessory carrying cases from the kit and set them aside. Select the antenna to be used and follow the appropriate instructions below.

(1) To set up whip antenna, remove retaining band, unfold antenna, and attach to ANT 1 jack of receiver. The wing of antenna plug fits into slot on receiver case above ANT 1 jack. Flex base of antenna to make antenna vertical.

(2) To set up longwire antenna, select two supporting points, such as trees, to support antenna as far above ground as is practical. (Antenna pedestal may be used as one support.)

(3) Attach longwire antenna to one support. Run longwire antenna horizontally. Attach loose end to second support using nylon cord. Leave enough wire on loose end to reach receiver.

(4) Strip any insulation from loose end of longwire antenna. Connect loose end of longwire antenna to receiver's ANT 1 or ANT 2 connector using appropriate adapter.

(5) Horizontal longwire antennas are directional and usually work poorly when set up in line with the direction of transmission. Change antenna position during operation if necessary. The appropriate df antenna, hand held, may be used to roughly find the best position for the longwire antenna. Figure 2-5 illustrates the relationship between the position of the antenna and the incoming radio signal direction. If possible, align the longwire antenna perpendicular to the incoming radio signal.

(6) Figure 2-6 shows a typical field installation with both longwire and whip antennas.

b. Direction Finding Operation. Remove the antenna pedestal from its carrying case and follow the instructions below (refer to figure 1-6).

(1) Swing tripod assembly legs out as far as they will go. Place tripod on firm level ground.

(2) Loosen upper tripod leg chucks. Extend tripod legs to roughly level tripod. Tighten chucks. Final leveling will be done later.

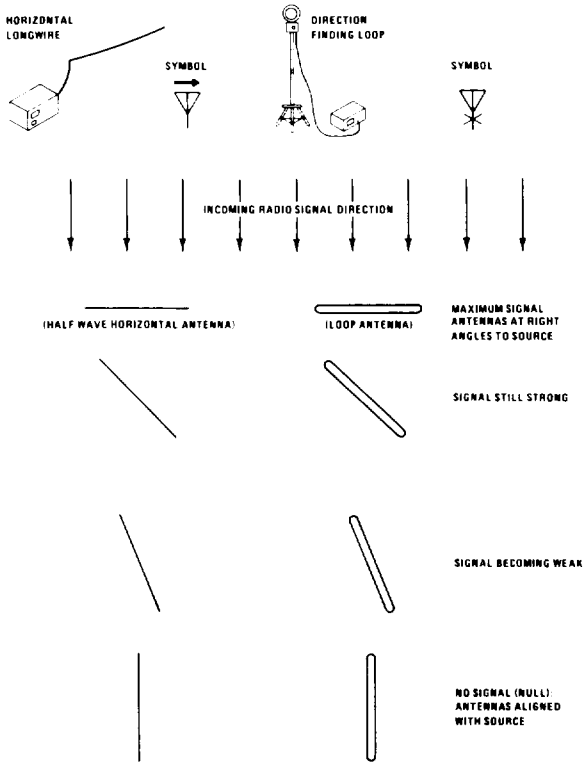

Figure 2-5. Directional Antenna Properties, Longwire and Loop

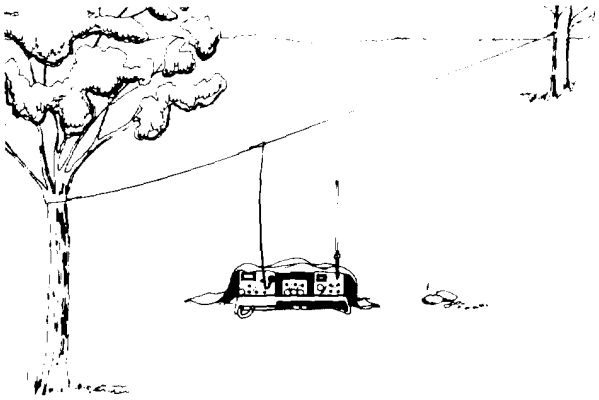

Figure 2-6. Typical Radio Intercept Setup Using Longwire Antenna

(3) Loosen mast retaining screw on tripod assembly. Insert lower mast assembly into tripod assembly. Do not tighten mast retaining screw at this time.

(4) Loosen chuck on lower mast section. Insert upper mast assembly into lower mast assembly. Be sure tapered end of upper mast assembly aligns properly with lower mast assembly. Tighten lower mast assembly chuck.

(5) Remove magnetic compass, null meter, and bracket assembly from antenna carrying case. Install compass on lower mast assembly using bracket retaining screw.

(6) Connect S hooks of three ground anchor assemblies to guy ring of upper mast assembly.

(7) Level and secure antenna pedestal. Use air bubble level indicator on compass bracket to level pedestal. Adjust leg extensions of tripod as necessary. Implant ground anchor assembly stakes at 1200 locations around pedestal to secure pedestal in level position.

NOTE

The packframe mounted equipment contains magnets. If packframe is placed close to compass, some error may be introduced. Keep other equipment away from compass during antenna mast alignment.

(8) Align azimuth indicator with magnetic north as follows:

(a) Rotate lower mast assembly until the magnetic compass indicates north. Gently tighten mast retaining screw.

(b) Loosen azimuth scale retaining screw. Rotate the azimuth scale until zero line aligns with mast pointer (cursor). Tighten azimuth scale retaining screw.

NOTE

This completes antenna mast orientation. Do not change position of azimuth scale unless antenna mast is moved. Movement of mast requires reorientation.

(9) If operating frequency is approximately known, select df antenna using guide below:

Frequency	Loop Antenna	Used in Set
0.5 to 20.5 MHz	AS-1523/TRQ-30(V)	V1, V4
19 to 50 MHz	AS-1526/TRQ-30(V)	V2, V4
45 to 100 MHz	AS-1527/TRQ-30(V)	V2, V4
95 to 157.5 MHz	AS-1528/TRQ-30(V)	V2, V4

(10) Remove desired antenna from carrying case. Loosen retaining screw at antenna base. Align retaining screw with slot in top of mast. Install antenna on mast and tighten retaining screw. Be sure screw seats in slot in mast.

(11) Connect radio frequency (RF) cable to connector in antenna base. Connect other end of RF cable to radio receiver which will be used. Use ANT 2 connector of receiver.

(12) Loosen mast retaining screw to allow mast and antenna to rotate.

(13) Check setup to be sure that all steps have been done properly.

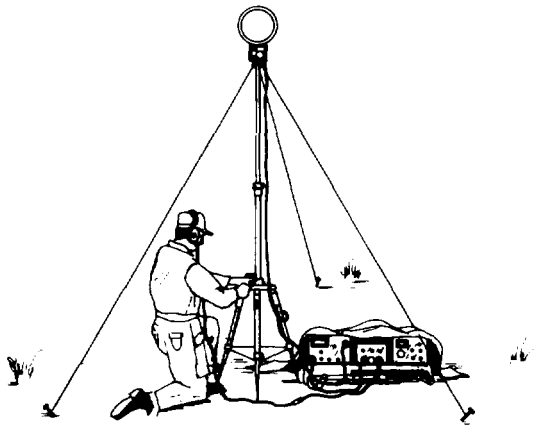

Figure 2-7. shows typical df setup.

2-6 BATTERY CHECK AND REPLACEMENT PROCEDURES. Before operating the equipment, check the 2-44

battery condition of the components as indicated below. Replace or install the batteries as needed. Battery life may vary widely, depending on use conditions.

a. Radio Receiver R-1218/UR or R-1518/UR. Approximate battery life: R-1218/UR, 12 operating hours; R-1518/UR, 8 operating hours. Set the POWER switch to INT. Set the FUNCTION switch to AM. Depress the PWR CHK switch and read the battery condition on the panel meter. If the meter reads in the red (REPLACE) range, replace the batteries as follows:

(1) Set the FUNCTION switch to OFF. Remove rear battery compartment cover as shown in figure 2-8.

(2) Remove discharged batteries. Dispose of discharged nonrechargeable BA-30 batteries. Save discharged rechargeable batteries (not normally used).

WARNING

Battery leaks result in corrosive deposits that may cause skin injury. Be extremely careful not to contact deposits with bare hands. If contacted, wash hands immediately. Do not wipe eyes until hands are washed.

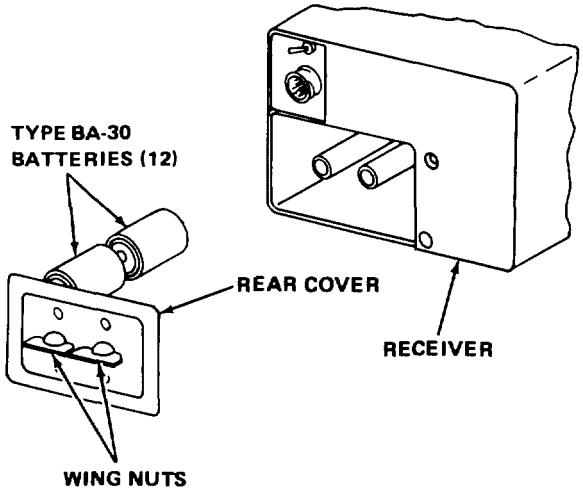

Figure 2-8. Radio Receiver R-1218/UR and R-1518/UR Battery Compartment (Typical Rear View)

(3) Inspect battery compartment for leakage or corrosion. If leakage is found, carefully remove with an expendable cloth or tissue. If corrosion is found, gently remove enough to allow operation. Continue operation as normal if necessary. As soon as possible, submit the damaged receiver for repairs.

(4) Install 12 fresh BA-30 batteries. Be sure to observe polarity markings on battery compartment cover.

(5) Reinstall battery compartment cover. Be sure to align pins properly.

b. Recorder/Reproducer AN/PNH-7 with Battery Assembly BA-522/PNH-7. Approximate battery life: 8 operating hours. Set the mode selector switch to the REPRODUCE position. Press the BAT TEST switch and observe the LEVEL meter. If the meter does not read in the green (GOOD) range, replace the batteries as follows:

(1) Set the mode selector switch to OFF. Disconnect cords from recorder/reproducer.

(2) Unlatch two straps holding recorder/reproducer and attached battery assembly to packboard.

Remove complete assembly.

(3) Remove battery compartment cover from battery assembly as shown in figure 2-9.

(4) Remove discharged batteries. Dispose of discharged nonrechargeable BA-30 batteries. Save discharged rechargeable batteries (not normally used).

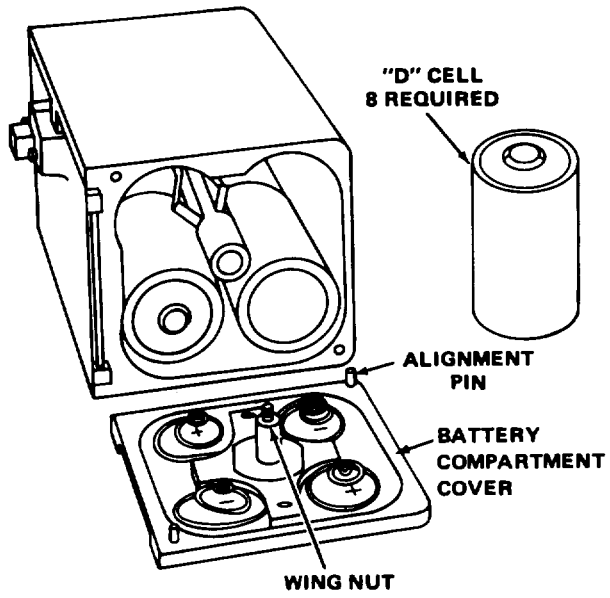

Figure 2-9. Battery Assembly BA-522/PNH- 7 for Recorder/Reproducer AN/PNH- 7

WARNING

Battery leaks result in corrosive deposits that may cause skin injury. Be extremely careful not to contact deposits with bare hands. If contacted, wash hands immediately. Do not wipe eyes until hands are washed.

(5) Inspect battery compartment for leakage or corrosion. If leakage is found, carefully remove it with an expendable cloth or tissue. If corrosion is found, gently remove enough to allow operation. Continue operation as normal. As soon as possible, submit damaged battery assembly for repairs.

CAUTION

Failure to install the batteries with the proper polarity could result in damage to the recorder/reproducer.

(6) Install 8 fresh BA-30 batteries. Be sure to observe polarity markings on battery compartment cover.

(7) Reinstall battery compartment cover. Be sure to align pins properly.

(8) Place recorder/reproducer with attached battery assembly on packboard and secure them with two straps. If recorder/reproducer will be used immediately, only fasten strap over battery assembly. Reconnect cords to recorder/reproducer.

2-7 PRELIMINARY STARTING PROCEDURES. Before operation, perform the following procedures.

a. Receiver Control Settings. Set the controls of the receiver(s) as follows:

Control	Settings
FUNCTION switch	OFF
VOL control	Midrange
BAND switch	Desired band
TUNE control	Desired frequency (approximately)
LITE switch	OFF
RF GAIN control	Fully clockwise
POWER switch (rear)	INT

b. Receiver Calibration. Perform this procedure when the receiver dial must be accurately set or the exact operating frequency must be known. Set the ANT switch to an unused antenna input. Attach the headset to the AUDIO connector. Set

the FUNCTION switch to CAL. Turn the TUNE control to the calibration mark nearest the desired operating frequency. Tune in the calibration signal by turning the TUNE control slightly to either side of the calibration mark. Use the headset and panel meter to detect the signal. Turn the CAL ADJ control to realign the tuning scale cursor with the calibration mark. Turn the FUNCTION switch to OFF. Turn the ANT switch to the desired antenna input. Turn the TUNE control to the exact operating frequency. Disconnect the headset.

Calibration Frequencies

R-1218/UR: 0.6 to 4.8 MHz, 0.1 MHz intervals,
5.0 to 20.5 MHz, 0.5 MHz intervals
R-1518/UR: 2.0 MHz intervals

c. Recorder/Reproducer. Be sure the mode selector switch is in the OFF position. Release the strap over the cassette loading door, release the door latches, and open the cassette loading door. If a cassette is in the cassette compartment, push the EJECT button and remove the cassette. Install a fresh cassette with the full spool to the left of the cassette compartment. (The side marked 1 should face up.) Close the loading door and secure the latches. The strap may

remain loose until the set is moved. Set the counter to 000 by pressing the RESET button.

2-8 EQUIPMENT INTERCONNECTION PROCEDURES. Be sure that the recorder/reproducer mode selector switch is in the OFF position. Be sure that the receiver FUNCTION switches are set to OFF. Connect the equipment for the type of operation desired using the guides below.

a. HF Radio Receiving Set AN/TRQ-30(V1). Connect the equipment as shown in figure 2-10. For df operation, only the df antenna should be set up. The headset may be connected to the recorder/reproducer through the extender cord.

b. VHF Radio Receiving Set AN/TRQ-30(V2). Connect the equipment as shown in figure 2-11. For df operation only the appropriate df antenna should be set up. The headset may be connected to the recorder/reproducer through the extender cord.

c. HF/VHF Radio Receiving Set AN/TRQ30(V4). Connect the equipment as shown in figure 2-12. Only one receiver is used at a time. For df operation, only the appropriate df antenna should be set up. The headset may be connected to the recorder/reproducer through the extender cord.

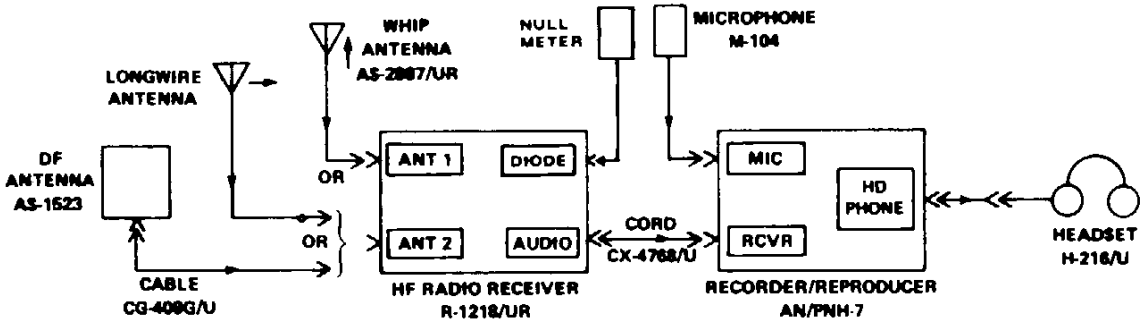

Figure 2-10. Connections of Radio Receiving Set AN/TRQ-30(V1)

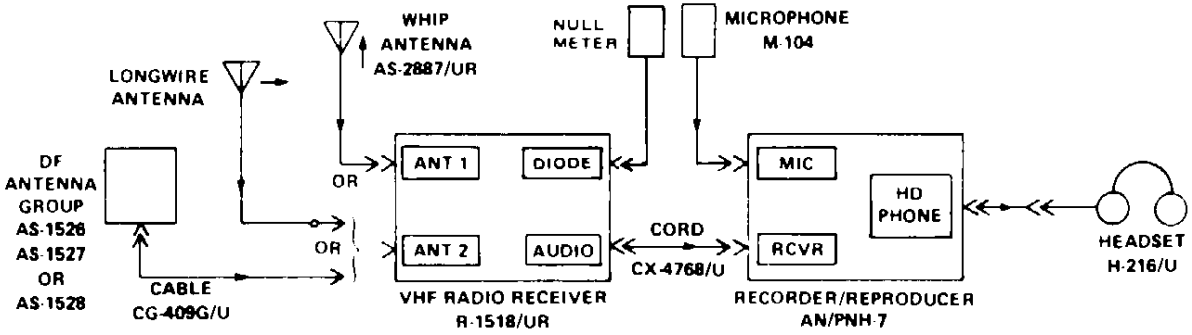

Figure 2-11. Connections of Radio Receiving Set AN/TRQ-30(V2)

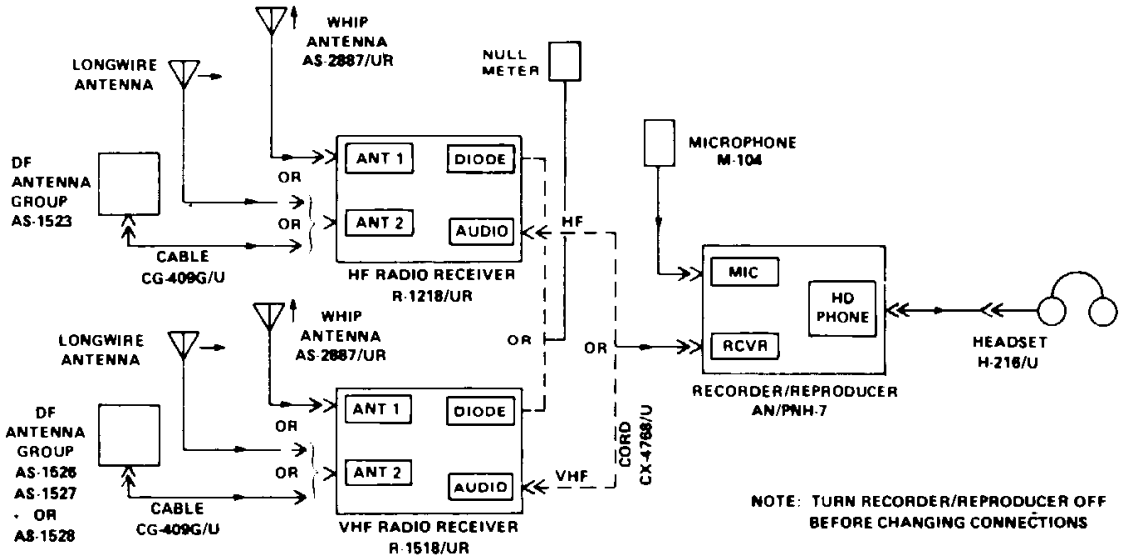

Figure 2-12. Connections of Radio Receiving Set AN/TRL30(V4)

2-9 OPERATING PROCEDURES. The operating procedures are broken down into procedures for several component groups. Use the procedures that apply to the components of your set.

NOTE

The receiver signal can be heard with the headset connected through the recorder/ reproducer and the recorder/reproducer mode selector switch set to OFF.

a. HF Radio Receiver R-1218/UR Signal types are: amplitude modulation (AM), single sideband (LSB and USB), and continuous wave (CW).

(1) Check to see that the components are properly connected as shown in figure 2-10 or 2-12. Check the control settings.

(2) Select antenna which works best. Move antenna as necessary for best reception.

(3) Set the FUNCTION switch to AM, LSB, or USB as required.

(a) Tune in CW or modulated continuous wave (MCW code) on LSB or USB.

(b) LSB or USB signals will sound garbled on AM.

(4) Adjust TUNE control to tune in desired signal. Press tuning control for fast scan tuning. Do not press tuning control for fine tuning. Fine tune receiver for best sound quality.

(5) Set VOL and RF gain controls as follows:

(a) LSB and USB settings. If incoming signal strength is stable, set VOL control about 3/4 clockwise and vary sound level using RF gain control.

(b) LSB and USB settings. If incoming signal strength is varying, set RF gain control to AVC (fully clockwise) and vary sound level using VOL control.

(c) AM setting. Set RF gain control to AVC (fully clockwise) and vary sound level using VOL control.

(6) If it is necessary to switch bands or frequencies during operation, it may be necessary to recalibrate tuning dial for maximum accuracy.

(7) Use good tactical judgment to avoid detection and conserve batteries when using receiver dial light. Hold LITE switch to M ON for momentary use. Set LITE switch to ON for continuous use (external power only). Set LITE switch to OFF when light is not needed.

b. VHF Radio Receiver R-1518/UR. Signal types are: amplitude modulation (AM), frequency modulation (FM), and continuous wave (CW).

(1) Check to see that components are properly connected as shown in figure 2-11 or 2-12. Check control settings.

(2) Select antenna which works best. Move antenna as necessary for best reception. Adjust TRIM control for maximum signal strength.

(3) Set FUNCTION switch to FM, AM, or CW as required.

(a) It may be possible to tune in single sideband signals on CW.

(b) FM signals usually require that BANDWIDTH switch be set to 75 kHz.

(c) AM and CW signals are usually best received with BANDWIDTH switch set to 10 kHz.

(4) Adjust TUNE control to tune in desired signal. Press tuning control for fast scan tuning. Do not press tuning control for fine tuning. Fine tune receiver for best sound quality. Readjust TRIM control for maximum signal strength.

(5) Set VOL and RF GAIN controls as follows:

(a) *CW setting.* If level of incoming signal is stable, set VOL control at about 3/4 clockwise and vary sound level using RF GAIN control. If level is varying, use (b) below.

(b) *FM and AM setting.* Set the RF GAIN control to AVC (fully clockwise) and vary sound level using VOL control.

(6) Use good tactical judgment to avoid detection and conserve batteries when using receiver dial light. Hold LITE switch to M ON for momentary use. Set LITE switch to ON for continuous use (external power only). Set LITE switch to OFF when light is not needed.

c. Sound Recorder/Reproducer AN/PNH7.

(1) Be sure mode selector switch is set to OFF before making or removing connections or loading or removing cassettes. Be sure recorder/reproducer is ready as described above.

(2) Listen to signal with headset during record and reproduce modes of operation. When end of tape is reached in those modes, recorder/reproducer will stop and make a signal tone in headset.

(3) To make a recording of a received radio signal, set AGC/MAN switch to AGC. Press in mode selector switch. Press

down latch, and turn to RECORD position. Cassette spools should begin to turn. Set level as follows:

(a) If LEVEL meter needle is deflecting between red and green portions of scale, level is correct.

(b) If needle is not deflecting between red and green portions of scale, signal from radio receiver is too weak. Either increase level from receiver or set AGC/ MAN switch to MAN and adjust GAIN control for a proper signal.

(c) Check headset for a usable level.

(4) To make voice notes over received signal while recording, press microphone switch and speak into microphone. It may be necessary to adjust gain or voice loudness to obtain proper LEVEL meter deflection.

(5) Stop record operation by pressing down latch of mode selector switch, turning mode selector switch to OFF, and releasing it.

(6) When end-of-tape tone sounds in headset, set mode selector switch to OFF. To use second side of tape in the cassette, proceed as follows. Unlatch and open cassette loading door. Press eject button, flip cassette over right to left, and reinsert cassette into compartment. (Side marked 2 should face

up.) Close loading door, secure latches, and set recorder/ reproducer to desired mode.

(7) Rewind tape in cassette by turning mode selector switch to F/R (fast reverse). Hold switch until desired portion of tape is reached, then release switch.

(8) Advance tape in cassette by turning mode selector switch to F/F (fast forward). Hold switch until the desired portion of the tape is reached, then release switch.

(9) To reproduce a previously recorded tape, proceed as follows. Rewind or advance cassette to desired portion. Push in mode selector switch, press down latch, and turn mode selector switch to REPRODUCE position.

(10) Set sound level during reproduce operation by adjusting GAIN control.

(11) To stop reproduce operation, press down latch of mode selector switch and turn mode selector to OFF position.

(12) Mark used cassettes if required by mission.

d. HFDF Antenna AS-1523/TRQ30(V).

NOTE

During df operation, the operator should not stand near the antenna loop. Bearing accuracy is best when the operator sits or kneels next to the equipment on the ground.

(1) Install and connect antenna as described above. Be sure to align setscrew with the slot in mast.

(2) Connect null meter to diode from the receiver with cable assembly CG-406H/U.

(3) Set antenna BAND switch to same band as HF receiver. Set FREQ in MHZ selector to frequency nearest desired operating frequency.

(4) Tune HF receiver to desired signal. It may be easier to tune receiver with vertical antenna. Remove vertical antenna before taking directional reading indicated below.

(5) Set receiver ANT switch to the 2 position.

Adjust HF df antenna tuning control to give strongest signal. It may be necessary to rotate antenna mast to get a good signal.

(6) Locate target transmitter using direction finding operation steps below.

(7) To monitor or record incoming signal, turn antenna mast for a strong signal or switch to another antenna.

e. VHF DF Antennas AS-1526/TRQ-30(V), AS-152 7/TR Q30(V) and AS-1528/TRQ-30(V).

(1) Select antenna which covers desired frequency. Install and connect antenna as described above. Be sure to align setscrew with slot in mast.

(2) Turn VHF receiver to desired signal. It may be easier to fine tune receiver with vertical antenna. Remove vertical antenna before taking directional reading indicated below.

(3) Set receiver ANT switch to the 2 position. Adjust VHF antenna tuning control to give strongest signal. It may be necessary to rotate antenna mast to get a good signal.

(4) Adjust TRIM control of receiver to give strongest signal. Repeat step 3 to peak adjustments.

(5) Locate target transmitter using direction finding operation steps below.

(6) To monitor or record incoming signal, turn antenna mast for a strong signal or switch to another antenna.

2-10 DIRECTION FINDING OPERATION. Use the following procedure to find the location of a target transmitter.

a. After receiver and df antenna have been tuned for maximum signal, adjust RF or RF GAIN control of the receiver for approximately a two-thirds full scale reading on receiver panel meter. Adjust VOL control as needed to set headset sound level.

b. Find null (antenna position for minimum signal) as follows. Rotate antenna pedestal mast to give minimum signal in headset and null meter. As minimum is approached, adjust RF or RF GAIN control to increase the signal strength to a useable level. Do not set gain control to AVC position.

c. Read bearing of null under antenna mast cursor on azimuth scale. Notice that two nulls 'can be found for every signal. Nulls are exactly opposite each other on azimuth scale. Target transmitter lies in the direction of one of the nulls.

d. Find location of target transmitter by taking a second reading at another site. Location of second site will depend on many conditions, which include tactical situation, available terrain, and distance to target transmitter. Bearing of reading at second site should be different enough from bearing at first site to allow accurate plotting. Generally, second site should be located at least 1000 yards from first site and at an angle of 900 from target bearing taken at first site.

NOTE

The second bearing may be taken by moving the set to a second location or by using a second unit with similar capabilities at the second site. If the set is moved, follow the instructions for movement indicated below. Select the second site by the guide in paragraph 2-4.

e. Plot location of target transmitter on an area map or chart by triangulation method which follows. Plot location of each receiving site on map. Note direction of magnetic north from each site. Draw a straight line through each site at bearing angle taken at that site. Lines will cross at target transmitter location. Figure 2-13 shows a typical triangulation plot.

f. Plot accuracy is affected by bearing accuracy, distance to target transmitter, and difference between bearing angles. Best accuracy is obtained with ideal terrain and site conditions, at close range to target transmitter, and with large differences between bearings.

2-11 RADIO COMPASS OPERATION. Under emergency conditions, as an aid to other navigating techniques or as a training exercise, it is possible to find the approximate location of the df receiving set as follows.

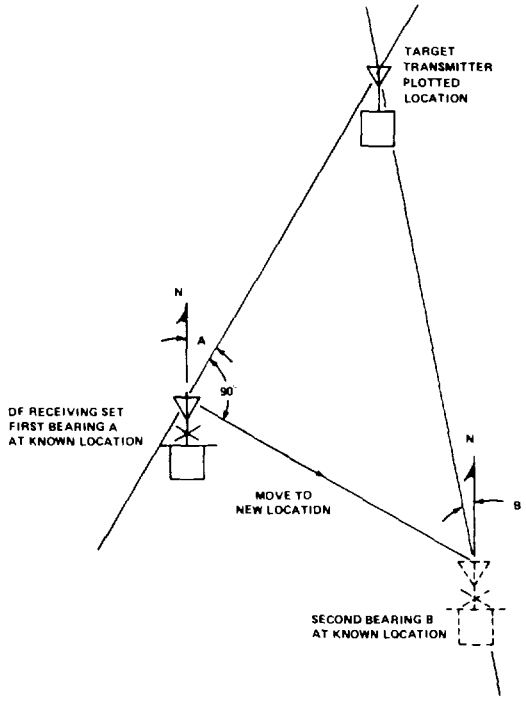

Figure 2-13. Triangulation Technique for Locating a Target Transmitter

At one site, take bearings to two known fixed position transmitters. Plot those transmitters on an area map or chart. Plot a straight line through each transmitter location at the bearing taken to each transmitter. The lines cross at the approximate location of the receiving set. Figure 2-14 shows an example of radio compass triangulation.

2-12 STOPPING PROCEDURES FOR STANDBY CONDITION. Set the recorder/reproducer mode selector switch to OFF. Set each receiver FUNCTION switch to OFF. Be sure each receiver LITE switch is in the OFF (center) position.

2-13 STOPPING PROCEDURES FOR SHUTDOWN.

If the set will not be used again soon, remove the batteries from each unit and store the batteries separately. Store batteries so that they cannot short circuit against metal objects. Dispose of any batteries showing leakage, corrosion, or other damage.

Section III. OPERATION UNDER UNUSUAL CONDITIONS

2-14 OPERATION UNDER EXTREME CLIMATIC CONDITIONS. It may be necessary to operate the radio receiving set under conditions of extreme cold,

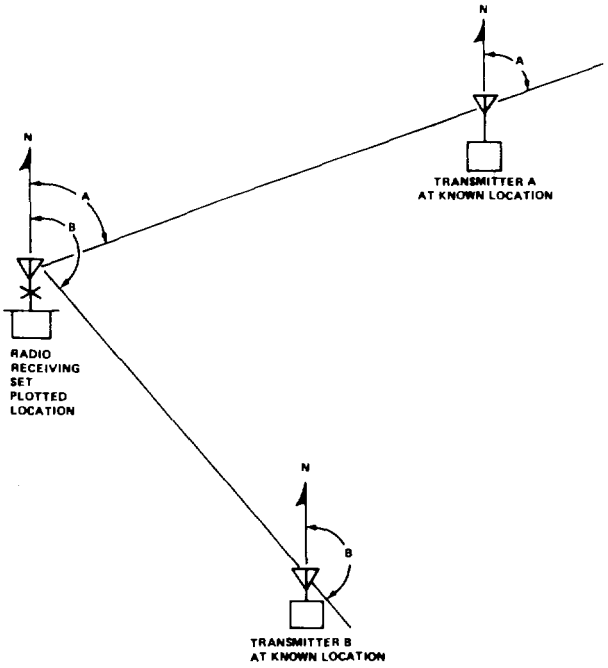

Figure 2-14. Radiocompass Operation for Finding Approximate Receiving Set Location

heat, humidity, moisture, sand, or dust. Note and report adverse operating conditions, and continue operation under the best conditions possible. Instructions for minimizing the effects of these unusual conditions are given below.

a. Operation in Extreme Moist Heat. When the equipment is operated in hot damp climates, moisture conditions are severe. Poor ventilation, high relative humidity, and rain cause moisture to gather on the equipment. Protect the equipment from rain. Dry the equipment at the first signs of moisture. Keep the canvas clean and dry to avoid rot. If shelter is required, see the instructions below.

b. Operation in Extreme Dry Heat. When the equipment is operated in hot dry climates, the primary problem is dust. Avoid letting dust enter the equipment or cassettes. Clean and inspect the equipment often. If possible, leave the weather cover over the equipment during operation to keep the equipment clean. If shelter is required, see the instructions below. To avoid condensation under the equipment, do not leave the equipment lying flat on the ground at night.

c. Operation in Extreme Cold. Sub-zero temperatures and conditions affect efficient operation of the equipment. Keep the equipment as warm and dry as possible. Handle the equipment carefully. Plastic parts and cable

insulation may become brittle in extreme cold. Battery life may be short or new batteries may seem weak when cold. Spare batteries and the headset may be kept warm and ready for operation by carrying them under the operator's outer clothing. When possible, keep the equipment operating to help keep it warm. When cold equipment is exposed to warmer moist air, moisture will condense or freeze on and in the equipment. Dry the equipment completely. If shelter is required, see the instructions below.

d. Operation in Sea Spray or Salt Air. If transport or operation in salt air or sea spray are expected, be sure the finish and seals on the equipment are in excellent condition. As soon as possible after operation in sea spray or salt air, submit the equipment for organizational preventive maintenance. If the equipment must be used near salt water, avoid exposure to spray. Avoid opening the equipment or letting salt or spray enter the equipment. Avoid exposure of cassettes, batteries, and connectors to salt air and sea spray. Keep the equipment covered whenever possible. Shelter which satisfies the instructions below may be used. Clean and dry the equipment after operation. (A cloth dampened with fresh water is the best way to remove salt.) Remove the equipment from the packboard when cleaning to avoid leaving salt between the equipment and packboard. Clean and dry the antenna pedestal completely during

disassembly to prevent corrosion.

e. Operation in Rainstorms, Windstorms, Duststorms, Sandstorms, and Similar Conditions. Avoid letting water, dirt, sand, dust, or other foreign material enter the equipment. Keep the equipment, cassettes, and batteries clean and dry. Avoid opening the equipment. Plugs of tissue or cloth in the receiver jacks will help prevent contamination. Keep the equipment covered with the weather cover whenever possible. Shelter which satisfies the instructions below may be used. Completely clean and dry the equipment after operation. Nearby weather fronts may affect df operation. Used accepted field practices during severe storms to avoid lightning, flash floods, and other hazards.

f. Shelter for Unusual Conditions If severe climate or weather conditions cause a need for shelter, use the guide below.

(1) *Radio Intercept Operation*. If no df operation is required, any shelter which allows satisfactory operation may be used.

(2) *DF Operation*. Permanent or semipermanent structures interfere with df operation. If shelter is required, a small tent or similar shelter may be used. The shelter should be nonmetallic with no metal poles or

wires. The shelter must not interfere with the antenna. The shelter must allow the operator to adjust the antenna mast and the packframe mounted equipment at the same time.

2-15 OPERATION UNDER EMERGENCY CONDITIONS.

a. Operation on Low Batteries To conserve batteries, set the receiver LITE switch to its center (off) position. Receiver operation on external 24 Vdc, 110 Vac, or 220 Vac is possible using cables from the MK1517/UR accessories kit. This may interfere with df operation.

b. Operation with Random-Length Antennas In radio intercept operation in an emergency, the receivers may be operated using practically any random length of wire as an antenna. Connect the random-length antenna through the appropriate adapter to the ANT 1 or ANT 2 connector. Set the ANT switch to the 1 or 2 position as appropriate. Use the connection which works best. During battery operation, if no wire is available, even the operator can serve as a crude temporary antenna.

a. Equipment Substitution. Some overlap of capabilities may exist between some components of the radio receiving set. If one item fails, another may be able to

substitute for it.

d. Recorder/Reproducer Bypass If the recorder/ reproducer is not required, the headset can be directly connected to the receiver AUDIO connector.

2-16 RECOGNITION AND IDENTIFICATION OF JAMMING. Under real or simulated tactical conditions the receiver can be jammed by the enemy. Enemy jamming is done by transmitting a strong signal on the same frequency as that used by the receiver for communication, making it difficult or impossible to receive the desired signal. Unusual noises or strong interference heard on the receiver may be enemy jamming, signals from a friendly station, noise from a local source, or the receiver may be defective. To determine if the interference is originating in the receiver, disconnect and remove the antenna leads, or short the ANT post to the chassis. If the interference continues, the receiver is defective. Enemy jamming signals may be typed as continuous wave or modulated. A jamming signal may be intended to block a single frequency. This is called spot jamming. The enemy may use one or several transmitters to jam a block or band of frequencies. This method is called barrage jamming.

a. Continuous-Wave Jamming. CW jamming is transmitted as a steady carrier. This signal beats with another

signal and produces a steady tone in the headset. CW jamming signals may also be keyed by using a random on-and-off signal or using actual code characters keyed to the same rate or a little faster than the signal being received.

b. Modulated Jamming. Modulated jamming signals may consist of noise, laughter, singing, music, various tones, or most any unusual sound, or it may be a combination of these sounds. Various types of modulated jamming signals are explained below.

(1) *Spark.* This is one of the simplest, most effective, and most easily produced jamming signals. This type of signal sounds very rough, raspy, and sometimes like an operating electric motor with sparking brushes. The signal is very broad; therefore it will interfere with a large number of communication channels.

(2) *Sweep-through*. This signal is the result of sweeping or moving a carrier back and forth across your frequency at a slow or rapid rate. The numerous signals of varying amplitude and frequency produce a sound like that of a low-flying airplane passing overhead. This type of jamming is effective over a broad range of frequencies. When it is varied rapidly, it is effective against all types of voice signals.

(3) *Stepped tones or bagpipes*. This signal usually consists of several separate tones.

The tones are transmitted in the order of first increasing and then decreasing pitch, repeated over and over. The audible effect is like the sound of a Scottish bagpipe.

(4) *Noise.* Noise is random both in amplitude and frequency. It produces a sound similar to that heard when a receiver is not tuned to a station and the VOL control is turned to maximum.

(5) *Gulls*. This signal consists of quick rise and slow fall of a variable audio frequency. The sound is similar to the cry of the sea gull.

(6) *Tone*. This signal consists of a single audio frequency of unvarying tone. It produces a steady howl in the headset. Another use of tone is to vary it slowly. This produces a howling sound of varying pitch.

2-17 ANTI-JAMMING/INTERFERENCE PROCEDURES.

a. Locating Jamming Transmitters. If the radio receiving set is being used to locate a jamming or interfering transmitter, use normal df procedures and any applicable procedures below. Select the receiver control settings which best fit the signal type.

b. Operation Under Jamming or Interfering Conditions Report jamming or interfering conditions, and continue operation under the best conditions possible.

To obtain the best signal possible, use one or more of the procedures below in addition to normal procedures. Notice that some procedures can be used only in certain modes of operation or with a particular receiver.

(1) (All modes and models.) Detune the receiver's TUNE control slightly to either side of the desired signal. This may help to separate the desired signal from the unwanted signal.

(2) (VHF Radio Receiver R-1518 only.) Set the BANDWIDTH control to the setting which gives the best results. Often a narrow (10 kHz) setting will help to separate signals.

(3) (All modes and models.) Try using different settings of the FUNCTION switch. This may help to reject the unwanted signal. Adjust the TUNE control slightly for the best reception.

(4) (Radio intercept operation only.) Change antennas or antenna position. The proper df antenna may be used to null the unwanted signal while still keeping the desired signal. The longwire antenna may be moved with a similar effect. Changing from a vertical antenna to a horizontal antenna (or vice-versa) may help separate signals.

(5) (Direction finding only.) Jamming or interfering conditions make it difficult to find a null. The best accuracy may be had by ignoring the null meter

and listening to the headset. Listen for a null of the desired signal.

(6) (All modes and models.) Vary the RF (or RF GAIN), VOL, and TRIM (R-1518 only) controls. This may allow the desired signal to be heard over the unwanted signal.

(7) (All modes and models.) It may be possible to improve reception of the desired signal by moving to a different site. Generally a site closer to the desired signal's source but further from the unwanted signal's source will improve conditions, but tactical, terrain, and atmospheric radio conditions may affect the choice of a new site.

(8) (Radio intercept operation only.) When the best possible conditions have been achieved but the signal is still not clear, make a recording of the signal. Recording analysis may be possible later.

(9) (All modes and models.) If an alternate frequency is available which will allow satisfactory mission completion, change to it.

Section IV. PREPARATION FOR MOVEMENT

2-18 PREPARATION FOR MOVEMENT. When a mission is completed or it becomes necessary to move to a new location,

disassemble and repack the equipment as follows. (Table 2-3 is a packing list for items normally removed from the set.)

CAUTION

Be sure that all components are clean and dry before packing them in their respective carrying cases.

NOTE

Follow the instructions below which apply to the antennas used.

a. Store compass and bracket in an antenna carrying case.

b. Disconnect RF cable assembly connected between loop antenna connector and receiver and store cable in an antenna carrying case.

c. Loosen retaining screw on pedestal mounted loop antenna, remove antenna from upper mast assembly, and store antenna in its antenna carrying case.

d. Pull out ground stakes and disconnect S hooks from guy ring on the upper mast assembly.

NOTE

Radio Receiving Set AN/TRQ-30(V4) does not have a large carrying case. Carefully store all small items in the antenna carrying cases.

e. Clean ground stakes and wrap guy cords around their respective ground stakes before storing in a carrying case.

f. Loosen lower mast chuck, remove upper mast assembly, and temporarily set it aside in a safe place.

g. Loosen mast retaining screw, remove lower mast assembly from tripod assembly and set it aside. Gently tighten mast retaining screw.

CAUTION

Tripod assembly must be completely cleaned and collapsed before storing. Be sure that each tripod leg is telescoped together completely without any surface of the extension portions showing or the flange above the foot will damage the extensions during travel. Tighten chucks so that leg extensions will not slide apart.

h. Loosen chucks on tripod leg assemblies, lift tripod assembly from ground, and telescope leg sections together completely. Tighten all three leg chucks.

i. Fold tripod assembly legs for storage.

j. Clean all components of antenna mast assembly and dry with a clean cloth.

k. Store antenna pedestal components in tripod case. Store azimuth scale first so that it will be inserted in padded end of tripod case. Snap tripod case cover closed.

l. Secure tripod case and contents to carrying kit frame (figure 1-1) with two tripod case retaining straps.

m. Disconnect whip antenna, fold blade, and secure blade with a band. Store whip antenna in a carrying case.

n. Disconnect longwire antenna and antenna adapter. Store antenna adapter in a carrying case. Roll and secure longwire antenna and supporting cord.

o. If radio receiving set will not be used soon, remove batteries from receivers and recorder/reproducer. Store batteries away from metal objects or wire to prevent short circuits. Be sure battery covers are reinstalled securely.

p. Secure cassette loading door latches of recorder/ reproducer. Secure both straps which retain recorder/ reproducer.

q. Load microphone, headset, adapters, cables, spare cassettes, and other items in a carrying case. Close

and mount carrying case CY-6510/PHN-7 (models V1 and V2 only). Secure carrying case to packboard with two straps.

r. Close antenna carrying cases. Attach antenna carrying cases on top of packboard mounted equipment and secure cases.

s. Check all straps for tightness. Attach weather cover over assembled carrying kit.

t. Lift kit onto your shoulders and secure waist strap. Carry weight on your shoulders or hips as suits the carrying conditions.

Table 2-3. Packing Checklist, Loose Items

Item	Quantity in set		
	V1	V2	V4
Null Meter	1	1	1
Magnetic Compass	1	1	1
RF Cable	2	2	2
Loop Antenna	1	3	4
Ground Anchor Assemblies	3	3	3
Antenna Pedestal	1	1	1
Whip Antenna	I	1	2
Longwire Antenna	100 ft	100 ft	100 ft
Antenna Support Cord	100 ft	100 ft	100 ft
Antenna Adapter, BNC	2	2	2

Table 2-3. Packing Checklist, Loose Items - Continued

Item	Quantity in set		
	V1	V2	V4
Antenna Adapter, TNC	2	2	2
Batteries	AR	AR	AR
Headset	1	1	1
Microphone	1	1	1
Patch Cord	1	1	1
Extender Cord	1	1	1
Cassettes	AR	AR	AR

NOTE: AR means "as required".

CHAPTER 3

OPERATOR/CREW MAINTENANCE INSTRUCTIONS

Section I. TOOLS AND EQUIPMENT

3-1 ITEMS REQUIRED FOR OPERATOR'S MAINTENANCE. No tools or test equipment are required to perform operator's maintenance. Repair parts and accessories issued with or authorized for use with Radio Receiving Set AN/TRQ-30(V) models are listed in the Components of End Item List (COEIL) and Additional Authorization List (AAL) in appendixes B and C of this manual. The materials required for operator's maintenance are listed below.

Item	Use
Trichloroethane	Clean metal surfaces
Lint-free cloth	Clean and dry metal surfaces
1-inch bristle brush	Clean metal and canvas surfaces
Camel's hair brush	Clean glass surfaces, microphone, and headset

Xylene	Clean tape recorder magnetic heads, capstan shafts, and tape guiding elements
Cotton swabs	Clean tape recorder magnetic heads, capstan shafts, and tape guiding elements

Section II. LUBRICATION INSTRUCTIONS

No operator/crew lubrication is authorized.

Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

3-2 GENERAL. To ensure that the radio receiving sets are always ready for operation, they must be

systematically inspected, tested, and serviced. Table 3-1 gives a list of operator's Preventive Maintenance Checks and Services (PMCS). The numbered items are specified to be done as combat readiness checks (C); checks before (B), during (D), or after (A) normal operation; or periodically. Each time the equipment is operated, follow the procedure below.

a. Before You Operate. Remember the WARNING S and CAUTIONS. Perform your before operation (B) PMCS.

b. While You Operate. Remember to turn off the recorder/reproducer before making or removing connections to that unit. Perform your during operation (D) PMCS.

c. After You Operate. Remember to turn the equipment completely off. Perform your after operation (A) PMCS.

d. If Your Equipment Fails to Operate Properly. Troubleshoot with the procedures indicated in the next section. Report any problems using the proper forms as instructed in TM 38-750.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services

NOTE

The Item Number of each step in the PMCS table will be used in the TM Number column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, when recording PMCS results.

NOTE

If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

NOTE

Within designated interval, these checks are to be performed in the order listed.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services - Continued

B-Before D- During			A- After W- Weekly		M- Monthly C- Combat Operability Check		
Item No.	Interval B	D	W	M	C	Item to be inspected	Procedures	Equipment will be reported Not Ready (Red) if:
1	•				•	EQUIPMENT COMPLETE-NESS	Check the equipment for completeness against the COEIL and AAL in appendixes B and C.	One or more items which are required for mission effectiveness are missing.
2	•				•	EXTERNAL CONNECTORS	Check connectors for cracks, breaks, corro-sion, or other damage. Check for tightness. Check for signs of dirt. Clean as necessary.	Connectors are significantly - damaged. Loose connectors cannot be tightened.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services - Continued

Item No.	Interval					Item to be inspected	Procedures	Equipment will be reported Not Ready (Red) if:
	B	D	W	M	C			
3	•				•	BATTERIES (see figure 2-9)	a. Recorder/Reproducer: Set mode selector switch to REPRODUCE. (Push in and press latch.) Press BAT TEST button. LEVEL meter should deflect into green area. If not, replace batteries and try again. Use 8 BA-30 type.	Discharged batteries cannot be replaced, or green reading cannot be obtained.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services - Continued

Item No.	Interval B	D	W	M	C	Item to be inspected	Procedures	Equipment will be reported Not Ready (Red) if:
							Remove unit from packboard. Open battery compartment. Check for corrosion, leakage, or damage to batteries or compartment. Clean up minor contamination. Replace all batteries if any are damaged. Close compartment and secure recorder/reproducer.	Significant damage exists in battery compartment.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services - Continued

Item No.	Interval B	D	W	M	C	Item to be inspected	Procedures	Equipment will be reported Not Ready (Red) if:
						(see figure 2-8)	b. Receivers: Open battery compartment. Check for corrosion, leakage, or damage to batteries or compartment. Clean up minor contamination. Replace all batteries if any are damaged. Close compartment.	Significant damage exists in battery compartment.
							Turn unit on. Press PWR CHK switch.	Discharged batteries cannot be replaced

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services - Continued

Item No.	Interval B	D	W	M	C	Item to be inspected	Procedures	Equipment will be reported Not Ready (Red) if:
							Check battery condition on front panel meter, bottom scale. If meter reads in red range, replace batteries with 12 BA-30 type and try again. Turn unit off.	or reading above red cannot be obtained.
4	•					EXTERIOR SURFACES	Check all exterior surfaces for evidence of moisture, dust, dirt, or corrosion. Clean if necessary.	

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services - Continued

Item No.	Interval B	D	W	M	C	Item to be inspected	Procedures	Equipment will be reported Not Ready (Red) if:
5	•				•	OPERATIONAL CHECK	Configure the equipment for operation. Operate the equipment as follows: a. Receivers. Operate each receiver on one or more authorized frequencies. b. Recorder/Reproducer. Record and reproduce signals from both receiver and microphone inputs.	Any operating deficiency is found which might prevent satisfactory mission completion.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services - Continued

Item No.	Interval					Item to be inspected	Procedures	Equipment will be reported Not Ready (Red) if:
	B	D	W	M	C			
6		•			•	CONTROLS	While performing the operational check, check all controls of the receivers, recorder/ reproducer, and antennas for proper function and action.	Any deficiency is found which might prevent satisfactory mission completion.
7			•		•	STRAPS	Check straps for fraying or other damage. Check buckles for corrosion or other damage.	Straps are damaged sufficiently to impair strength, function, or reliability.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services - Continued

Item No.	Interval B	D	W	M	C	Item to be inspected	Procedures	Equipment will be reported Not Ready (Red) if:
8			•		•	MICRO-PHONE, HEADSET, AND CABLES	Clean microphone and headset with soft brush. Clean cables. Inspect all items for damage. Check for wire damage, especially at strain points.	Damage is found which could prevent satisfactory mission completion.
9			•			MAGNETIC HEAD (see figure 3-1)	Clean magnetic head of recorder/ reproducer using cotton swabs dampened with Xylene.	

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services - Continued

Item No.	Interval B	D	W	M	C	Item to be inspected	Procedures	Equipment will be reported Not Ready (Red) if:
10			•			CARRYING CASES AND WEATHER COVER	Check all canvas items for tears, rips, split seams, rot, or other damage. Clean as needed with a stiff brush. If necessary, substitute any suitable replacement for a damaged item until a proper repair is possible.	

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services - Continued

Item No.	Interval B	D	W	M	C	Item to be inspected	Procedures	Equipment will be reported Not Ready (Red) if:
11			•		•	PACKFRAME AND PACK-BOARD	Check for cracks, breaks, or other damage. Check for missing or damaged hardware. Clean packboard and packframe with a stiff brush.	Damage exists which would impair reliable transport.
12				•	•	MWO's	Determine whether all current MWO's have been applied. Check for MWO numbers on each piece of equip-	One or more URGENT MWO's have not been applied.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services - Continued

Item No.	Interval B	D	W	M	C	Item to be inspected	Procedures	Equipment will be reported Not Ready (Red) if:
							ment near nomenclature plate. Current MWO's are listed in DA PAM 310-7	

Section IV. TROUBLESHOOTING

3-3 TROUBLESHOOTING PROCEDURES. If your AN/TRQ-30(V) does not function properly, troubleshoot it as indicated in table 3-2. Isolate the trouble to one unit, then find the trouble with that unit.

3-4 CORRECTIVE ACTION. Once the trouble has been isolated, perform the corrective action indicated in table 3-2. Defective items may be replaced by the operator. Return defective items when ordering replacements. Any trouble that is beyond the scope of operator/crew maintenance shall be referred to organizational maintenance.

NOTE

Weak or improperly installed batteries can cause most of the malfunctions listed in the troubleshooting table. Check battery condition first when troubleshooting a piece of equipment.

NOTE

Avoid disturbing a recording or other mission operation while troubleshooting.

Table 3-2. Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
RECORDER/REPRODUCER AND RELATED ITEMS
1. BATTERIES WEAK OR DISCHARGED, OR NO POWER. Step 1. Press the mode selector switch in, press down the latch, and turn to REPRODUCE position. Step 2. Press BAT TEST button. Read battery condition on the LEVEL meter. Reading should be in the green area. **If the battery condition reads below green, replace the batteries as instructed in paragraph 2-6b. Check the fresh batteries.**

Table 3-2. Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
Step 3. After reading, press down the latch and return the mode selector switch to OFF.

Be sure the batteries are installed in the proper direction. Each battery installed backwards is like having two dead batteries. Installing batteries backwards could damage the recorder/reproducer.

2. LOW (OR NO) SOUND LEVEL IN HEADSET IN RECORD AND REPRODUCE MODES.

Step 1. Check battery condition.

Step 2. Check for proper input signals and GAIN control settings when recording and reproducing.

Adjust controls as required.

Step 3. Headset or associated cables defective. Check by connecting headset to receiver AUDIO connector and monitoring a known strong signal.

Replace items as required.

Step 4. Recorder/reproducer defective.

Refer to organizational maintenance.

3. LOW SOUND LEVEL IN REPRODUCE MODE ONLY.

Step 1. Check tape heads for deposits.

Table 3-2. Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
Clean tape heads (para. 3-15).
Step 2. Reproduce a known good cassette to see if a defective cassette was used.
Step 3. Recorder/reproducer defective.
Refer to organizational maintenance.
4. ONE OR MORE TAPE MOVEMENT FUNCTIONS NOT WORKING PROPERLY.

Step 1. Check battery level.

Step 2. Check to see if water has entered recorder/reproducer.

Dry as completely as possible. Refer to organizational level at the first opportunity.

Step 3. Check for dirty capstans, pinch rollers, or guides.

Clean as necessary (para 3-15).

Step 4. Check for defective or jammed cassette.

Replace as necessary.

Step 5. Recorder/reproducer defective.

Refer to organizational maintenance.

Table 3-2. Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
5. UNIT FAILS TO ERASE OLD SIGNAL WHEN RECORDING ON USED TAPE.
Step 1. Erase switch in OFF position. **Erase switch is accessed below the cassette on the unit's right side.**
6. VOICE/MICROPHONE NOTATION DOES NOT WORK.
Step 1. Output from receiver too high. **Reduce RF or VOL setting on receiver.**

Step 2. Microphone or recorder/reproducer defective.

Refer to organizational maintenance.

7. END-OF-TAPE FUNCTION DOES NOT WORK.

Step 1. Check to see if tape has metal sense strip.

Step 2. Check for dirty sensor contracts.

Clean as necessary.

Step 3. Recorder/reproducer defective.

Refer to organizational maintenance.
Refer to organizational maint

Table 3-2. Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
RADIO RECEIVERS AND RELATED ITEMS
1. BATTERIES WEAK OR DISCHARGED, OR NO POWER.
Step 1. Press PWR CK (or PWR CHK) switch. Read battery condition on the panel meter. Reading in the red area of the bottom scale indicates discharged batteries. **If the battery reading is completely dead, check the position of the POWER switch on the rear of the receiver. It should be in the INT position.**

The FUSE does not affect battery operation.

Replace discharged batteries as instructed in paragraph 2-6a. Check the fresh batteries.

Be sure the batteries are installed in the proper direction. Each battery installed backwards is like having two dead batteries. Installing batteries backwards should not normally damage either receiver.

2. SIGNAL LEVEL WEAK, FADING, OR GARBLED.

Step 1. Check batteries.

Step 2. Check all control settings.

RF or RF GAIN at proper level or AGC?
VOL control at proper level?
FUNCTION and ANT switches at proper setting?

Table 3-2. Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	
	TUNE control at peak setting? **Antenna controls or other controls peaked or properly set?** **Correct control settings.**
Step 3.	Check antenna position. **Vary the antenna position for maximum signal. Remove obstructions.**
Step 4.	Incoming signal really is weak. Such a signal is usually buried in noise.

Check receiver with known strong signal. Vary the antenna position, change antennas, or move to a better location to improve weak signal.

Step 5. Signal affected by jamming or other interference.

See paragraphs 2-15 and 2-16.

Step 6. Antenna, cable, or connection defective. Substitute another antenna to test.

Replace items as necessary.

Step 7. Connect headset directly to receiver AUDIO connector to be sure problem is not in recorder/reproducer.

Correct as required.

Table 3-2. Troubleshooting - Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
Step 8. Receiver defective. **Refer to organizational maintenance.**
3. OTHER RECEIVER MALFUNCTIONS.
Step 1. Receiver malfunctions included failure to operate in any mode, failure of an input, improper operation of any control or indicator, or any similar fault. **Refer to organizational maintenance.**

ANTENNA PEDESTAL

1. ANTENNA MAST DOES NOT TURN FREELY IN PEDESTAL

Step 1. Check to see that the antenna mast retaining screw has been loosened.

Loosen antenna mast retaining screw.

Step 2. Disassemble mast from pedestal and check for dirt or other foreign material.

Clean as needed. Reassemble and align.

Step 3. Check for damage to pedestal/mast area due to overtightening of retaining screw, corrosion, bending, or other causes.

Repair if possible. Give to organizational maintenance at first opportunity for complete repairs.

Section V. MAINTENANCE OF RADIO RECEIVING SETS ANtTRQ-30(V1), AN/TRQ-30(V2), AND ANITRQ-30(V4)

3-5 GENERAL. Operator's maintenance of the AN/ TRQ30(V) sets consists of inspecting, testing, and servicing the components of the sets and replacing defective items. The procedures in this and the following sections are best done by the operator at organizational facilities. These procedures supplement PMCS. Procedures in the field may be limited by requirements for continuous operation or by available facilities. Perform the steps below and in the following sections in the order indicated. Refer any repairs beyond operator maintenance capability to organizational maintenance.

3-6 DISASSEMBLY. Work in a flat, clean, organized area. Uncover the radio receiving set, unbuckle the straps holding the equipment to the packboard, and remove the equipment from the packboard.

3-7 CLEANING.

WARNING
The fumes of trichloroethane are toxic. Provide complete ventilation whenever used.

DO NOT USE NEAR AN OPEN FLAME. Trichloroethane is not flammable, but exposure of the fumes to an open flame or hot metal forms highly toxic phosgene gas.

WARNING

Xylene is toxic and flammable. Do not ingest. Avoid breathing concentrated fumes. Do not use near fire or flame.

CAUTION

Do not press on clear meter, counter, and scale window faces. The faces are easily damaged.

Clean the outer surfaces of each item of the radio receiving set. Remove dust and loose dirt with a soft clean cloth. Remove grease, fungus, and ground-in dirt from the cases and other metal parts using a cloth dampened (not wet) with water, soapy water, or trichloroethane. Do not use trichloroethane on meter, counter, and scale faces or on controls and front panels. Clean connectors and other hard-to-reach areas with a brush. Additional cleaning instructions for each item are given in later sections of this chapter.

3-8 INSPECT. Check the equipment for completeness against Appendixes B and C. Additional inspection instructions for each item are given in later sections of this chapter.

3-9 TEST. Perform all the individual item tests, specified in later sections of this chapter. Connect the set for operation at that time to verify that the components work properly together. Be sure to test as many configurations, bands, modes, and functions of the equipment as time and available signals allow.

3-10 HANDLING AFTER TESTS. Battery handling instructions are given after the tests in section XI of this chapter. Never leave weak or discharged batteries in the equipment as they are likely to leak. Be sure fresh batteries are available for the equipment for the next use.

3-11 REFINISHING. Inspect the finish of each item of the set for poor finish. If touch-up or refinishing is required, refer the equipment to organizational maintenance.

3-12 REASSEMBLY. After all servicing, inspection, and testing has been completed, place the recorder/ reproducer and receiver (or receivers) back on the packboard and secure with straps. Load all remaining items into their cases and secure them to the set. Cover the equipment with the weather cover.

Section VI. MAINTENANCE OF RECORDER/ REPRODUCER AN/PNH-7 AND BATTERY ASSEMBLY BA-622/PNH-7

3-13 GENERAL. The AN/PNH-7 requires periodic service to ensure that it is always ready for operation.

The unit must be regularly and systematically inspected, tested, and cleaned so that defects are discovered and corrected before they result in serious damage or failure. The paragraphs below describe the required maintenance procedures.

NOTE

The operator may wish to keep a test cassette for reference purposes. Such a tape can be made by recording useful sounds from the receiver or microphone. Mark the cassette clearly to prevent confusing it with others.

3-14 INSPECT. Be sure the recorder/reproducer mode selector switch is in the OFF position. Check the recorder/reproducer and battery assembly for damage, dirt, deposits, corrosion, moisture, loose parts, and other problems when performing the inspections which follow.

a. Inspect all outside surfaces and controls.

b. Detach the battery assembly from the recorder/ reproducer. Inspect the latches and mating surfaces.

c. Open the battery compartment and inspect it for corrosion, leakage, or other damage. Leave the compartment open until the servicing below is conducted.

d. Unlatch and open the cassette loading door. Remove any cassette by pressing the EJECT button. Inspect the compartment, tape heads, capstans, rollers, and other items. (See figure 3-1.) 3-15 SERVICE.

WARNING

The fumes of trichloroethane are toxic. Provide complete ventilation whenever used. DO NOT USE NEAR AN OPEN FLAME. Trichloroethane is not flammable, but

exposure of the fumes to an open flame or hot metal forms highly toxic phosgene gas.

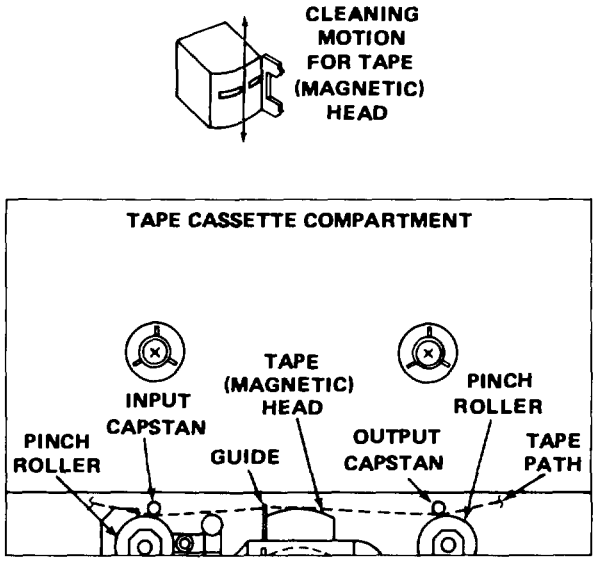

Figure 3-1. Cassette Tape Compartment and Tape Head

WARNING

Xylene is toxic and flammable. Do not ingest. Avoid breathing concentrated fumes. Do not use near fire or flame.

CAUTION

Do not press on clear meter, counter, and scale window faces. The faces are easily damaged.

Clean the recorder/reproducer and service the batteries as instructed below.

a. Be sure the exterior was cleaned as described in section V of this chapter. Clean the cassette compartment and mating surfaces as necessary.

b. Clean the tape head, capstans, and guides using lint-free cotton swabs dampened (not wet) with xylene. Clean the magnetic tape head by wiping the surface in the direction shown in figure 3-1. Be sure no deposits remain on any of the elements. The elements must be dry before use.

c. Clean the battery compartment as required. Load good batteries into the battery assembly as instructed in chapter 2. Attach the battery cover.

d. Attach the battery assembly to the recorder/ reproducer.

3-16 TEST. Test the recorder/reproducer with the rest of the receiving set as described in section XI of this chapter.

Section VII. MAINTENANCE OF RADIO RECEIVERS R-1218/UR AND R-1518/UR

3-17 GENERAL. The radio receivers used in the three AN/TRQ-30(V) models require periodic care and cleaning. The following procedures should be performed for each receiver as required.

3-18 INSPECT. Check the receiver for damage, dirt, deposits, corrosion, moisture, loose parts, and other problems when performing the inspections which follow.

a. Inspect all outside surfaces and controls.

b. Open the battery compartment. Inspect it for corrosion, leakage, or other damage. Leave the compartment open until the servicing below is conducted.

c. Press in the TUNE control and turn to one end of the scale. Turn the TUNE control to inspect the scale from end to end.

3-19 SERVICE.

WARNING

The fumes of trichloroethane are toxic. Provide complete ventilation whenever used. DO NOT USE NEAR AN OPEN FLAME. Trichloroethane is not flammable, but exposure of the fumes to an open flame or hot metal forms highly toxic phosgene gas.

CAUTION

Do not press on clean meter, counter, and scale window faces. The faces are easily damaged.

Clean the radio receiver and service the batteries as instructed below.

a. Be sure the exterior was cleaned as described in section V ofthis chapter.

b. Clean the battery compartment. Load good batteries into the battery compartment as instructed in chapter 2. Attach the battery cover.

3-20 CALIBRATE. Select the signal of a transmitter which is operating in the area on an authorized known frequency. If possible, select a frequency close to the usual receiver frequency. Verify proper operation of the receiver CAL ADJ control and CAL function (para. 2-7b).

3-21 TEST. Test the radio receiver with the rest of the receiving set as described in section XI of this chapter.

Section VIII. MAINTENANCE OF HEADSET, MICROPHONE, AND AUDIO CORDS

3-22 INSPECT. Inspect the headset, microphone, and telephone plug cord for broken or damaged parts or wires. Pay particular attention to wire strain points.

3-23 SERVICE.

WARNING

The fumes of trichloroethane are toxic. Provide complete ventilation whenever used. DO NOT USE NEAR AN OPEN FLAME.

Trichloroethane is not flammable, but exposure of the fumes to an open flame or hot metal forms highly toxic phosgene gas.

Clean the headset and microphone with a soft brush. Clean the cords with a soft cloth.

3-24 TEST. Test the headset, microphone, and audio cords with the rest of the receiving set as described in section XI of this chapter. Be sure that each item works properly and that no item makes noisy or intermittent contact.

Section IX. MAINTENANCE OF ANTENNAS AND RELATED ITEMS

3-25 INSPECT.

a. Inspect the df antennas for loose or missing controls, setscrews, connectors, or other items. Inspect for corrosion, bad seals, or other damage.

b. Inspect the RF cable for exposed shield, missing or displaced connector center pins, or other damage. Be sure the connectors are tightly assembled and clean.

c. Inspect the whip antenna for damage. Be sure that the blade and base fit together tightly, that the connector is clean, that the connector threads smoothly and securely onto the receiver ANT 1 connector, and that the base supports the antenna properly.

d. Inspect the longwire antenna for cuts, frays, or other damage which would impair its strength and usefulness. Be sure sufficient nylon cord is available to string the antenna.

e. Check the antenna adapters for damage or dirt.

f. Check the antenna pedestal for completeness. Be sure no parts are worn or damaged. Check the legs for smooth telescoping action. Be sure the chucks tighten. Check the mating parts for a snug fit. Check to be sure the mast rotates smoothly in the tripod assembly without excessive play. Excessive play or bent mast sections will reduce bearing accuracy.

g. Check the compass to be sure the element (card) rotates freely. Inspect the compass for damage.

h. Check null meter for evidence of broken or cracked glass, bent or broken pointer, and cracked or crushed case.

3-26 SERVICE.

WARNING

The fumes of trichloroethane are toxic. Provide complete ventilation whenever used. DO NOT USE NEAR AN OPEN FLAME. Trichloroethane is not flammable, but exposure of the fumes to an open flame or hot metal forms highly toxic phosgene gas.

Clean the antennas and related components with a soft clean cloth and a soft brush by the guide in paragraph 3-7.

3-27 TEST. Test the antennas and related components with the rest of the receiving set as described in section XI. Be sure that each item works properly and that no item makes noisy or intermittent contact.

Section X. CARRYING CASES, PACKFRAME, AND RELATED ITEMS

3-28 INSPECT. Inspect the carrying cases, weather cover, and straps for dirt, rot, tears, split seams, frayed material, damaged fasteners, or other problems. Inspect the packframe for loose or missing items, cracks, bent or badly dented members, loose pads, or other problems. Replace damaged items as required.

3-29 SERVICE.

WARNING
The fumes of trichloroethane are toxic. Provide complete ventilation whenever used.

DO NOT USE NEAR AN OPEN FLAME. Trichloroethane is not flammable, but exposure of the fumes to an open flame or hot metal forms highly toxic phosgene gas.

Clean all fabric items and hard-to-reach places with a bristle brush. Clean metal surfaces with a soft clean cloth by the guide in paragraph 3-7.

3-30 REASSEMBLY. See sections V, VI, and VII of this chapter.

Section XI. TESTING RADIO RECEIVING SETS

3-31 GENERAL. Remount the radio receivers and recorder/reproducer on the packboard and secure them with straps. When mounting the recorder/reproducer, secure only the strap over the battery assembly.

Connect the set for operation as shown in figure 2-10, 2-11, or 2-12. Test the components of the set as described below and by the operating instructions in chapter 2 of this manual.

3-32 RECORDER/REPRODUCER TEST.

a. Perform a battery check (para. 2-6b).

b. Make recordings using the receiver(s) and microphone as sources. Check the functions of the controls and indicators (para 2-9).

c. Operate the unit in F/F and F/R modes (para. 2-9).

d. Reproduce the recordings (para. 2-9). Notice any distortion, noise, wow, flutter, or other problems. Clean the tape head and other elements again if necessary. Other problems should be referred to organizational maintenance.

e. Rewind the tape to the beginning, reset the counter, and advance the tape to a count of about 10. Turn the tape over and set the mode selector switch to REPRODUCE. Observe the tape as it plays and note any problems such as bent capstans, binding, etc. When the end of the tape is encountered, the unit should stop and sound a tone in the headset.

f. Be sure to set the mode selector switch to OFF after testing the system.

3-33 RADIO RECEIVER TEST AND ANTENNA TEST.

a. Perform a battery check (para. 2-6a).

b. If possible, operate the receiver on each band, in each reception mode, and with each antenna input. Be sure that all the receiver controls work properly.

Operating instructions are in paragraph 2-9.

c. Operate the HF receiver with the HF df antenna. If possible, operate the antenna at each BAND and FREQ IN MHZ switch position. Operate the VHF receiver with each VHF df antenna. Operating instructions are in paragraph 2-9.

d. Check to see that the antenna pedestal functions smoothly. Check the magnetic compass against known magnetic north. Take bearings to several nearby transmitters and check the bearing accuracy. Inaccurate bearings may be due to a damaged antenna, damaged RF cable, damaged antenna pedestal, or poor receiving conditions.

e. Be sure to set the receiver FUNCTION switch to OFF after operation.

3-34 HANDLING AFTER TESTS. After completing the operational tests, perform the following steps.

a. If the batteries are weak or the radio receiving set will not be used again soon, remove the batteries from the receivers and recorder/reproducer. The recorder/reproducer must be removed from the packboard to remove the batteries.

b. Prepare the equipment for movement. Be sure to have batteries available for operation. Pack and secure all items to the packframe. Chapter 2, section IV, gives step by step instructions for packing the equipment.

CHAPTER 4

MATERIEL USED IN CONJUNCTION WITH MAJOR ITEM

4-1 GENERAL. The Radio Receiving Sets AN/TRQ30(V1), AN/TRQ-30(V2), and AN/TRQ-30(V4) are primarily intended for independent operation without auxiliary equipment. From time to time it may be necessary to operate the sets with additional equipment as described below.

4-2 EXTERNAL POWER CABLES AND VEHICLE MOUNTS.

a. Receivers. Accessories Kit MK-1517/UR contains power cables for connecting the radio receivers to 24 Vdc, 110 Vac. or 220 Vac external power. In addition, the kit contains a receiver vehicle mount. TM 11-5820807-14&P covers operation and maintenance of this kit. Power lines may interfere with direction finding (df) operation. If external power must be used in df operation, interference may be minimized by running power lines straight into the receiving set, rather than running the lines at angles.

b. Recorder/Reproducer. No accessory power cable kit exists for the recorder/reproducer. Accessory power items for

the recorder/reproducer are listed in TM 325835-203-14&P. A PP-6109/PNH-7 power supply, and appropriate power cables, are required to operate the recorder/reproducer on external power. These items are not normally authorized.

4-3 LONGWIRE ANTENNA. The longwire antenna referred to throughout this manual is an Additional Authorized Item. The antenna may be a kit, or may be made of any solid or stranded signal conductor wire of suitable strength. The exact length is not critical. Insulation does not interfere with reception if conductor contact at the antenna adapter is provided. The antenna may be made of expendable materials if required by the mission.

4-4 OTHER EQUIPMENT. If other equipment is used with the AN/TRQ-30(V), be sure the requirements of chapter 2 are met.

APPENDIX A

REFERENCES

Reference	Title
TM 11-5820641-14	Operator, Organizational, Direct Support, and General Support Maintenance for Radio Receiving Set AN/URR-70 (R-1218/UR)
TM 11-5820-770-14	Operator, Organizational, Direct Support, and General Support Maintenance for Radio Receiving Set AN/URR-71 (R-1518/UR)
TM 11-5820-807-14&P	Operator, Organizational, Direct Support, and General Support Maintenance Manual Including Repair Parts and Special Tools List for Accessories Kit MK-1517/UR
TM 32-5835-203-14&P	Operator, Organizational,

Reference	Title
	Direct Support, and General Support Maintenance Manual Including Repair Parts List for Recorder/ Reproducer Set, Sound AN/PNH-7
TM 32-5895-206-14&P	Operator, Organizational, Direct Support, and General Support Maintenance Manual for Radio Receiving Sets AN/TRQ-30(V1), (V2), and (V4)
TM 38-750	The Army Maintenance Management System (TAMMS)
CTA 50-970	Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items)

Reference	Title
	DA Form 2028 Recommended Changes to Publications and Blank Forms
DA Form 2028-2	Recommended Changes to Equipment Technical Publications
DA Form 2404	Equipment Inspection and Maintenance Work-sheet
DA PAM 310-1	Consolidated Index of Army Publications & Forms
SF 368	Quality Deficiency Report

APPENDIX B

COMPONENTS OF END ITEM LIST

Section I. INTRODUCTION

B-1 SCOPE. This appendix lists integral components of and Basic Issue Items (BII) for the AN/TRQ-30(V) to help you inventory items required for safe and efficient operation.

B-2 GENERAL. This Components of End Item List is divided into the following sections:

a. Section II. Integral Components of the End Item. These items, when assembled, comprise the AN/TRQ30(V) and must accompany it whenever it is transferred or turned in. The illustrations will help you identify these items.

b. Section III. Basic Issue Items (BII). These are the minimum essential items required to place the AN/TRQ-30(V) in operation, to operate it, and to perform emergency repairs. Although shipped separately packed they must accompany the AN/TRQ-30(V) during operation and whenever it is transferred between accountable officers. This manual is your authority to

requisition replacement BII, based on TOE/MTOE authorization of the end item.

B-3 EXPLANATION OF COLUMNS.

a. Illustration Not applicable.

b. National Stock Number. Indicates the National stock number assigned to the item and which will be used for requisitioning.

c. Part Number. Indicates the primary number used by the manufacturer, which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items.

d. Description Indicates the Federal item name and, if required, a minimum description to identify the item.

e. Location. The physical location of each item listed is given in this column. The lists are designed to inventory all items in one area of the major item before moving on to an adjacent area.

i. *Usable on Code*. "USABLE ON" codes are included to help you identify which component items are used on the different models. Identification of the codes used in these lists are:

Code	Used On
V1	AN/TRQ-30(V1)
V2	AN/TRQ-30(V2)
V4	AN/TRQ-30(V4)

g. Quantity Required (Qty Req'd). This column lists the quantity of each item required for a complete major item.

h. Quantity. This column is left blank for use during an inventory. Under the Rcv'd column, list the quantity you actually receive on your major item. The Date columns are for your use when you inventory the major item at a later date, such as for shipment to another site.

NATIONAL STOCK NUMBER	PART NO.	DESCRIPTION	USABLE ON CODE	QTY REQD
5895-00-507-8485	AS-1523/TRQ-30(V)	ANTENNA, DF, HF	V1, V4	1
5895-00-510-1284	AS-1526/TRQ 30(V)	ANTENNA, DF, 19 TO 50 MHz	V2, V4	1
5895-00-577-8486	AS-1527/TRQ 30(V)	ANTENNA, DF, 45 TO 100 MHz	V2, V4	1
5895-00-510-1310	AS-1528/TRQ 30(V)	ANTENNA, DF, 95 TO 157.5 MHz	V2, V4	1
	AS-2887/UR	ANTENNA, WHIP		1
	AS-2887/UR	ANTENNA, WHIP (ADDITIONAL FOR V4)	V4	1

NATIONAL STOCK NUMBER	PART NO.	DESCRIPTION	USABLE ON CODE	QTY REQD
6135-00-192-6871	BA-522/PNH-7	BATTERY ASSEMBLY, RECORDER/REPRODUCER		1
	AB-1110/TRQ 30(V)	PEDESTAL ASSEMBLY, ANTENNA, COMPRISED OF:		1
	SMD879173	MAST ASSEMBLY, UPPER		1
	SMD879157	MAST ASSEMBLY, LOWER		1
	SMD879188	TRIPOD ASSEMBLY		1
	SMC879208	COMPASS, MAGNETIC, AND BRACKET ASSEMBLY		1
		NULL METER (0099-1-3366)		1
	SMC879204	SCREW, COMPASS BRACKET RETAINING		1

NATIONAL STOCK NUMBER	PART NO.	DESCRIPTION	USABLE ON CODE	QTY REQD
5995-00-935-2642	CG-409H/U	CABLE ASSEMBLY, RF		2
	SMC879177	ANCHOR ASSEMBLY GROUND, COMPRISED OF:		3
4030-00-801-5342	NAS 1090-1	HOOK, CHAIN, S		1 PER
	MIL-C-5040	CORD, TYPE H1, 10 FT		1 PER
	SMC879155	ANCHOR, GROUND		1 PER
5820-00-013-8442	R-1218/UR	RECEIVER, RADIO, HF	V1, V4	1
5820-0013-9001	R-1518/UR	RECEIVER, RADIO, VHF	V2, V4	1
5835-00-488-5347	AN/PNH-7	RECORDER/REPRODUCER, SOUND		1

NATIONAL STOCK NUMBER	PART NO.	DESCRIPTION	USABLE ON CODE	QTY REQD
5935-00-930-7461	UG-641A/U	ADAPTER, ANTENNA, BNC		2
TO BE SUPPLIED PER EIR		ADAPTER, ANTENNA, TNC		2
TO BE SUPPLIED		CASE, CARRYING, ANTENNA PEDESTAL		1
	CY-7331/TRQ 30(V)	CASE, CARRYING, HF DF ANTENNA	V1, V4	1
	CY-7332/TRQ 30(V)	CASE, CARRYING, VHF DF ANTENNAS	V2, V4	1
5995-00-222-0423	CD-307	CORD ASSEMBLY, EXTENSION		1

NATIONAL STOCK NUMBER	PART NO.	DESCRIPTION	USABLE ON CODE	QTY REQD
5995-00-681-8427	CX4768/U	CORD ASSEMBLY, PATCH		1
TO BE SUPPLIED		COVER, WEATHER		1
5965-00-892-3353	H-216/U	HEADSET, ELECTRICAL		1
5965-00-560-1760	M-104	MICROPHONE, MAGNETIC		1
5835-00434-5892	CY-6510/ PNH-7	PACK, FIELD, CANVAS	V1, V2	1
8465-00-9354732	MIL-P-43756	PACKBOARD, METAL		1
9320-00-935-9155	MIL-R-61308	SHEET, RUBBER (CUT INTO 3 PADS, ATTACHED TO PACKBOARD)		1
8465-00-360-0233	MIL-S-10055	STRAP, RETAINING		6

APPENDIX C

ADDITIONAL AUTHORIZATION LIST

Section I. INTRODUCTION

C-1 SCOPE. This appendix lists additional items you are authorized for the support of the AN/TRQ30(V).

C-2 GENERAL. This list identifies items that do not have to accompany the AN/TRQ-30(V) and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

C-3 EXPLANATION OF LISTING. National stock numbers, descriptions, and quantities are provided to help you identify and request the additional items you require to support this equipment. If the item you require differs between serial numbers of the same model, effective serial numbers are shown in the last line of the description. If item required differs for different models of this equipment, the model is shown under the "Usable on" heading in the description column. These codes are identified as:

Code	Used On
V1	AN/TRQ-30(V1)
V2	AN/TRQ30(V2)
V4	AN/TRQ30(V4)

Section II. ADDITIONAL AUTHORIZATION LIST

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION		(3) U/M	(4) QTY AUTH
	Part Number & FSCM	*Usable On Code*		
5820-00-001-9328	ACCESSORIES KIT MK-1517/UR (80058)	V1, V2	EA	1
5820-00-001-9328	ACCESSORIES KIT MK-1517/UR (80058)	V4	EA	2
	ANTENNA, LONGWIRE, 100 FT (MATERIALS AS REQUIRED)			
	CORD, NYLON (ANTENNA SUPPORT, AS REQUIRED)			

APPENDIX D

EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

D-1 SCOPE. This appendix lists expendable supplies and materials you will need to operate and maintain the AN/TRQ-30(V). These items are authorized to you by CTA 50-970, Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

D-2 EXPLANATION OF COLUMNS.

a. Column 1, Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, item 4, Appendix D").

b. Column 2, Level. This column identifies the lowest level of maintenance that requires the listed item.

C .....Operator/Crew

c. Column 3, National Stock Number (NSN). This is the NSN assigned to the item; use it to request or

requisition the item.

d. Column 4, Description. Indicates the Federal Item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Federal Supply Code for Manufacturer (FSCM) in parentheses, if applicable.

e. Column 5, Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the U/M differs from the unit of issue, requisition the lowest unit that will satisfy your requirements.

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U\M
1	C	6130-00-120-1020	BATTERY, D CELL, BA-30/U (80058)	EA
2	C	5835-00-106-0421	CASSETTE, TAPE, MAGNETIC (81349)	EA
3	C	8305-00-267-3015	CLOTH, LINT-FREE	RL
4	C	7930-00-395-9542	COMPOUND, CLEANING, TRICHLOROETHANE	CN

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U\M
5	C		SWABS, COTTON	BX
6	C		XYLENE (FED SPEC TT-X-916B)	CN

INDEX

Subject	*Paragraph, Figure, Table Number*

N

None

O

Subject	*Paragraph, Figure, Table Number*

P

Q

None

R

By Order of the Secretary of the Army:

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