TM 11-5820-477-12

TECHNICAL MANUAL

OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL

RADIO SET CONTROL GROUPS AN/GRA-39 (NSN 5820-00-889-3860), AN/GRA-39A (NSN 5820-00-082-3998) AND AN/GRA-39B (NSN 5820-00-949-9909)

This copy is a reprint which includes current pages from Changes 1 through 3.

HEADQUARTERS, DEPARTMENT OF THE ARMY
JULY 1975

CHANGE

No. 3

HEADQUARTERS
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OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL
AN/GRA-39 (NSN 5820-00-889-3860)
AN/GRA-39A (NSN 5820-00-082-3998)
AN/GRA-39B (NSN 5820-00-949-9909)
AND
AN/GRA-39C (NSN 5820-01-196-0204)

TM 11-5820-477-12, 10 July 1975, is changed as follows:

1. Title of the manual is changed as shown above.

2. Remove old pages and insert new pages as indicated below. New or changed material is indicated by a vertical bar in the margin of the page. Added or revised illustrations are indicated by a vertical bar adjacent to the identification number.

Remove pages	*Insert pages*
i and ii	i and ii
1-1 through 1-4	1-1 through 1-4
2-5 and 2-6	2-5 and 2-6
A-1	A-1/(A-2 blank)
B-1 and B-2	B-1 and B-2
C-1 through C-5	C-1 through C-5/(C-6 blank)

3. File this change sheet in the front of the publication for reference purposes.

By Order of the Secretary of the Army:

JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff

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R.L. DILWORTH
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-51 literature requirements for AN/GRA-39.

TECHNICAL MANUAL
No. 11-5820-477-12

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *10 July 1975*

Operator's and Organizational Maintenance Manual
RADIO SET CONTROL GROUPS AN/GRA-39 (NSN 5820-00-889-3860), AN/GRA-39A (NSN 5820-00-082-3998), AN/GRA-39B (NSN 5820-00-949-9909), AND AN/GRA-39C (NSN 5820-01-196-0204)

*This manual supersedes TM 11-5820-477-12, 5 October 1962, including all changes.

LIST OF ILLUSTRATIONS

Figure 1-1. Radio Set Control Group AN/GRA-39 (*).

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1-1. Scope

a. These instructions, applicable to Radio Set Control Group, AN/GRA-39, AN/GRA-39A, AN/GRA-39B,and AN/GRA-39C, are for use by operator organizational personnel. They cover operation, installation, and organizational maintenance.

b. An asterisk in parenthesis (*) used immediately after the official nomenclature indicates all models of an item of equipment that are operationally similar.

(1) Radio Set Control Group AN/GRA-39(*) applies to Radio Set Control Groups AN/GRA-39, AN/GRA-39A, AN/GRA-39B, and AN/GRA-39C.

(2) Control Radio Set C-2328(*)/GRA-39 applies to C-2328/GRA-39, C-2328A/GRA-39, C-2328B/GRA-39, and C-2328C/GRA-39, and is identified in this manual as the remote control unit.

(3) Control Radio Set C-2329(*)/GRA-39 applies to C-2329/GRA-39, C-2329A/GRA-39, C-2329B/GRA-39, and C-2329C/GRA-39, and is identified in this manual as the local control unit.

c. Appendix B is current as of February 1975, Appendix C is current as of August 1978.

1-2. Consolidated Index of Army Publications and Blank Forms

Refer to the latest issue of DA Pam 310-1 to determine whether there are new editions, changes or additional publications pertaining to the equipment.

1-3. Maintenance Forms, Records and Reports

a. Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750 as contained in Maintenance Management Update.

b. Report of Packaging and Handling Deficiencies. Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/NAVMATINST 4355.73B/AFR 400-54/MCO 4430.3H.

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33C/AFR 75-18/MCO P4610 .19D/DLAR 4500.15.

1-3.1. Reporting Equipment Improvement Recommendations (EIR)

If your equipment needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-PA-MA-D, Fort Monmouth, New Jersey 07703-5000. We'll send you a reply.

1-4. Reporting 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 or DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-ME-MP, Fort Monmouth, New Jersey 07703-5000. In either case, a reply will be furnished direct to you.

1-5. Administrative Storage

For procedures, forms and records, and inspections required during administrative storage, refer to TM 740-90-1.

1-6. Destruction of Army Materiel

Refer to TM 750-244-2 for procedures to be used for destruction of Army materiel to prevent enemy use.

Section II. DESCRIPTION AND DATA

1-7. Purpose and Use

a. The AN/GRA-39(*) enables an operator to transmit and receive voice communication through a radio set (fig. 2-3) from a distance up to 2 miles (3.3 kilometers, approximately) from the radio set. A push-to-talk circuit permits the radio in the system also to be operated by a local battery switchboard and the telephones connected to the switchboard (fig. 2-4). Voice communication of the radio is initiated through either the remote control unit or the local control unit. Also, provision is made for voice communication between the operators of the local and remote control units.

b. The AN/GRA-39(*) is used with the following and similar radio sets (fig. 2-3) that have a 5-pin audio connector.

(1) Vehicular Radio Sets AN/VRC-12, AN/VRC-43 through AN/VRC-49 (TM 11-5820-401-12).

(2) Vehicular Radio Sets AN/VRC-53, AN/VRC-64, AN/GRC-125, and AN/GRC-160 (TM 11-5820-498-12).

(3) Man-pack Radio Sets AN/PRC-25 (TM 11-5820-398-12), AN/PRC-77 (TM 11-5820-667-12),

AN/PRC-74 (TM 11-5820-590-12), and AN/PRC-74B (TM 11-5820-590-12-1).

1-8. Description (fig. 1-2)

a. Each control unit consists of a main circuit chassis (fig. 5-2 and 5-3) attached to the front panel, a waterproof case, and a rear cover. Rear clamps hold the rear cover to the case; front clamps hold the front panel to the case. Two D-rings are provided for attachment of a sling (fig. 1-1). A compartment in the rear (fig. 2-2) contains the battery. All operating controls are located on the front panel (fig. 3-1 and 3-2). A loudspeaker is provided on the front panel of the remote control unit; a radio cable for connection to the radio is attached to the front panel of the local control unit.

b. A handset (H-189/GR, H-138/U, or equivalent) is provided for connection to the remote control unit for communication of the radio connected to the local control unit (fig. 2-3 and 2-4).

c. Each sling is a webbed strap to permit each control unit to be carried or to be lashed to a tree, post, chair, or similar objects.

d. Bag, Cotton Duck CW-598/GRA-39 provides storage for the components of the AN/GRA-39(*) (fig. 2-1).

1-9. Items Comprising an Operable Radio Set Control Group AN/GRA-39(*) (fig. 1-1)

The following chart lists the operable components of Radio Set Control Group AN/GRA-39(*). The remaining accountable components of the AN/GRA-39(*) are listed in the basic issue items list, appendix B. (Note information in paragraph B-2).

NSN	Item	Quantity	Dimensions (in.) Height	Depth	Width	Weight
5820-00-889-3860	Radio Set Control Group AN/GRA-39 includes:					
5820-00-889-3857	Control, Radio Set C-2328/GRA-39	1	4	4⅞	4⅞	11
5820-00-889-3858	Control, Radio Set C-2329/GRA-39	1	4	4⅞	4⅞	10¼
5965-00-069-8886	Handset H-189/GR*	1	8	⅞	1¼	
			Retractile cord: 2 to 6 feet			
5820-00-082-3998	Radio Set Control Group AN/GRA-39A includes:					
5820-00-082-3999	Control, Radio Set C-2328A/GRA-39	1	4	4⅞	4⅞	11
5820-00-082-4000	Control, Radio Set C-2329A/GRA-39	1	4	4⅞	4⅞	10¼
5820-00-069-8886	Handset H-189/GR*	1	8	⅞	1¼	
			Retractile cord: 2 to 6 feet			
5820-00-949-9909	Radio Set Control Group AN/GRA-39B includes:					
5820-00-949-9907	Control, Radio Set C-2328B/GRA-39	1	4	4⅞	4⅞	11
5820-00-949-9908	Control, Radio Set C-2329B/GRA-39	1	4	4⅞	4⅞	10¼
5965-00-069-8886	Handset H-189/GR*	1	8	⅞	1¼	
			Retractile cord: 2 to 6 feet			
5820-01-196-0204	Radio Set Control Group AN/GRA-39C includes					
	Control, Radio Set C-2328C/GRA-39	1	4	4⅞	4⅞	11
	Control, Radio Set C-2329C/GRA-39	1	4	4⅞	4⅞	10¼
5965-00-069-8886	Handset H-189/GR*	1	8	⅞	1¼	
			Retractile cord: 2 to 6 feet			

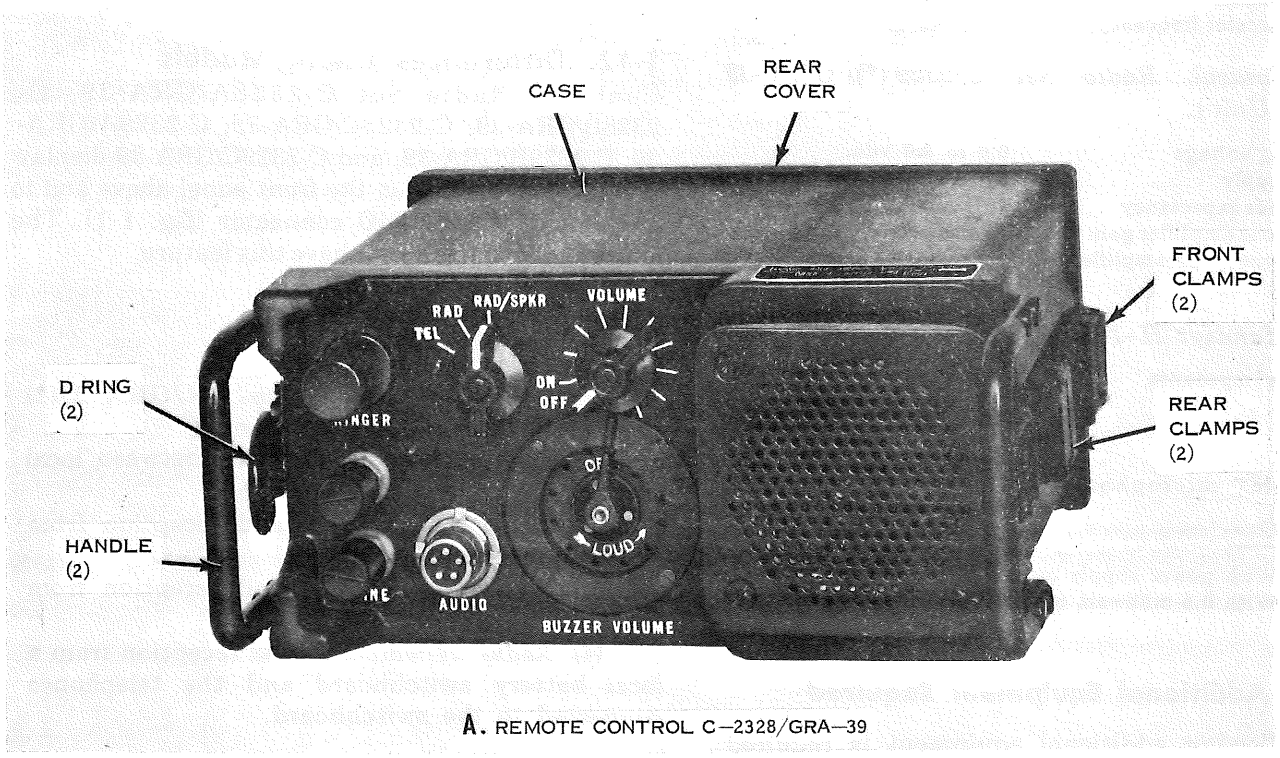
*Handset H-138/U (NSN 5965-00-892-0972) may be issued instead of H-189/GR.

1-10. Technical Characteristics

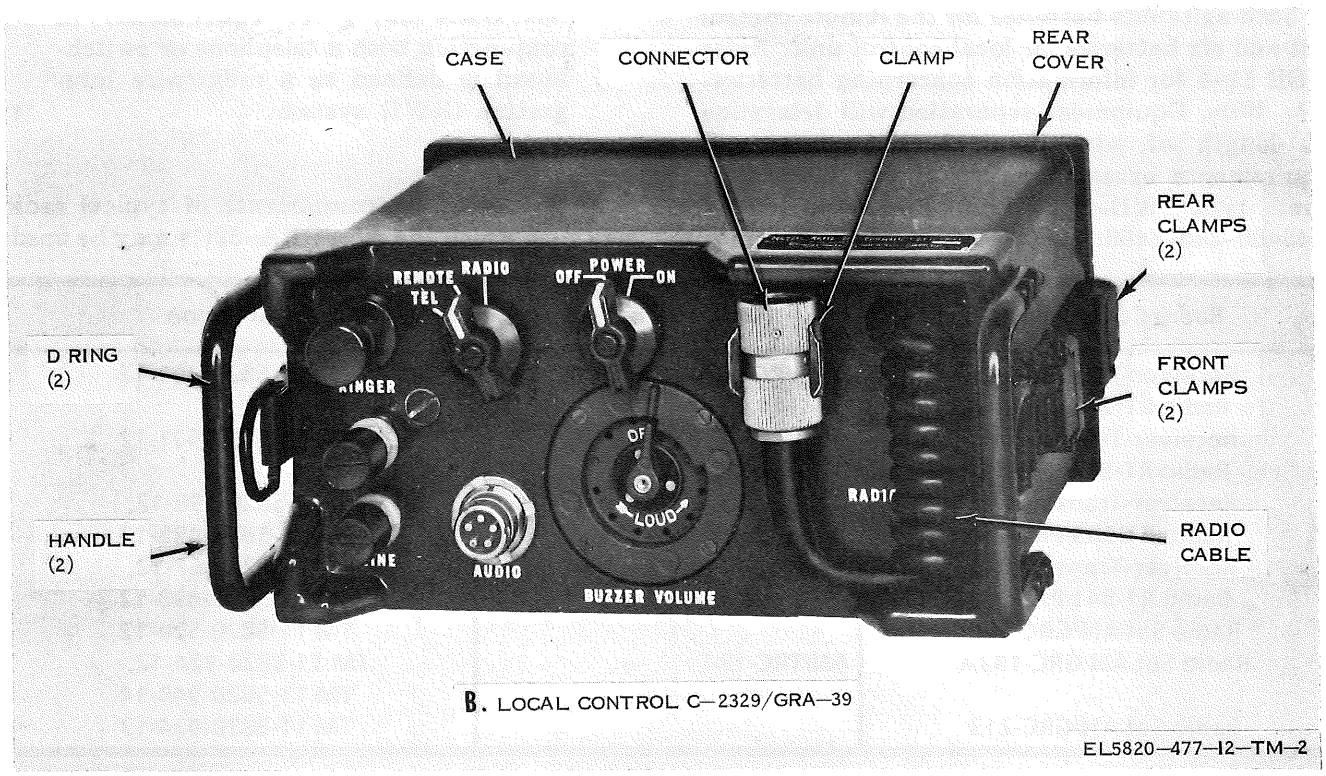
a. Control, Radio Set C-2328 (*)/GRA-39 (Remote Unit).

Control distance ..... Up to 2 miles (3 km approx.).

Operating..... 6.6 to 9.0 vdc.
Power supply..... 6 BA-30 (9 vdc).
Battery life expectancy ..... 24 hours.
Microphone preamplifier output[a] ..... 5 milliwatts.
Microphone preamplifier gain[a] ..... 55 decibels.
Driver amplifier output to handset[b]..... 5 milliwatts.



A. REMOTE CONTROL C-2328/GRA-39



B. LOCAL CONTROL C-2329/GRA-39

Figure 1-2. Control, Radio Set C-2328/GRA-39 and Control, Radio Set C-2329/GRA, parts location.

Power amplifier output to loudspeaker[b]	300 milliwatts.
Tone generator frequency	3,900 Hertz.

b. Control, Radio Set C-2329 (*)/GRA-39 (Local Unit).

Operating voltage	6.6 to 9.0 vdc.
Power supply	6 BA-30 (9 vdc).
Battery life expectancy	72 hours.
Microphone amplifier gain[a]	55 decibels.
Microphone preamplifier output[a]	5 milliwatts.

c. Handset H-189/GR.

Earpiece Impedance	1,000 ohms ± 20 % for 1,000 Hz α 1-volt input level.
Dynamic microphone output	2.5 millivolts.

[a]With power supply output of 9 volts dc.
[b]With 0.5-milliwatt output from radio set receiver.

1-11. Additional Equipment Required

The following additional equipment is required but is not supplied as part of the AN/GRA-39(*).

a. Batteries. Twelve BA-30 batteries (NSN 6135-00-120-1020) provide the operating voltage for both units: six batteries for the remote control unit and six batteries for local control unit. Refer to SB 11-6 for information concerning batteries.

b. Wire. Equipment separation will determine the length of wire required, but never will requirements exceed 2 miles of 600-Ohm field wire, type WD-1/TT on Reel 159 (NSN 6145-00-243-8466; 5280 feet per reel) or equivalent, to be used to interconnect the local and remote control units.

1-12. Differences Among Models

Controls, Radio Set C-2328A/GRA-39, C-2328B/GRA-39, C-2328C/GRA-39, C-2329A/GRA-39, C-2329B/GRA-39, and C-2329C/GRA-39 display a call lamp, located on the front panel above and to the left of the AUDIO connector (fig. 1-1). The unlettered models do not have this feature.

1-13. System Application

(fig. 2-3 and 2-4)

a. Radio Set Control Group AN/GRA-39(*) provides four types of operation:

(1) Telephone communication between local and remote control unit operators.

(2) Radio transmission and reception from the remote control unit.

(3) Radio transmission and reception from the local control unit.

(4) Radio transmission and reception from a local battery switchboard and the telephones connected to the switchboard.

NOTE

The use of a radio set and AN/GRA-39(*) (or equivalent) in conjunction with a telephone or switchboard is defined as a radio/wire integration (RWI) system.

b. Following are components of typical radio sets with which the AN/GRA-39(*) may be used.

Radio Component†	Part of Radio Set	Publication
Receiver-Transmitter, Radio RT-246(*)/VRC	AN/VRC-12, and AN/VRC-43, -44, and -45.	TM 11-5820-401-12
Receiver-Transmitter, Radio RT-524(*)/VRC	AN/VRC-46, -47, -48, -49, -54, and -55	TM 11-5820-401-12
Receiver-Transmitter, Radio RT-505/PRC-25	AN/PRC-25 and AN/VRC-53 and AN/GRC-125	TM 11-5820-398-12, TM 11-5820-498-12
Receiver-Transmitter, Radio RT-841/PRC-77	AN/PRC-77 and AN/VRC-63 and AN/GRC-160	TM 11-5820-667-12, TM 11-5820-498-12
Radio Set AN/GRC-106		TM 11-5820-520-12
Radio Set AN/GRC-193A	AN/TRC-184	TM 11-5820-924-12, TM 11-5820-940-14
Radio Set AN/GRC-213		TM 11-5820-924-13

†(*) Indicates all models of the equipment.

CHAPTER 2
INSTALLATION

2-1. Service Upon Receipt of Equipment

When packed for shipment the components of the AN/GRA-39(*) are placed in a corrugated packing and shipping carton. The shipping carton may be placed in a wooden shipping carton. Open the boxes, remove the equipment, and inspect (para 2–2).

2-2. Checking Unpacked Equipment

a. Inspect the equipment for damage that might have occurred during shipping. If the equipment has been damaged, report the damage on DD Form 6 in accordance with paragraph 1-3*b*.

b. Check to see that the equipment is complete as listed on the packing slip. If a packing slip is not available, check the equipment against the listing in paragraph 1-9 and the basic issue items list (appx B). Report all shipping shortages in accordance with ragraph 1-3*c*. The equipment should be placed in ser- .e even though a part that does not affect proper functioning might be missing.

c. Check to see whether the equipment has been modified. (Equipment which has been modified will have the MWO number on the front panel, near the nomenclature plate.) Check also to see whether all current applicable MWO's have been applied. (Current MWO's applicable to the equipment are listed in DA Pam 310-7.)

2-3. Installing Equipment in Bag, Cotton Duck CW-598/GRA-39

(fig. 2-1)

a. Before installing the equipment, clean out the compartments of the bag, and wipe clean the cases of the controls.

b. Install the equipment as shown in figure 2–1. One of the slings may be used to carry the bag after the ends of the sling are attached to the D-rings of the bag.

2-4. Battery Installation

(fig. 2-2)

a. Unsnap the two clamps holding the rear cover to the case and remove the cover.

b. Inspect the battery compartment and perform the following:

(1) Clean the compartment and the contacts. A pencil eraser can be used to clean the contacts.

(2) After the barriers are installed (*c* below), check to see that all contacts touch the battery terminals and that the batteries are held in place under tension.

(3) Check to see that the battery compartment case is not cracked. Such a condition would prevent the batteries from being under tension.

c. Install the six batteries, observing the polarity indicated on the battery box. (With the cover off and the battery compartment to the left when looking into the unit, all batteries should be inserted with the positive terminal to the left.)

d. Replace the rear cover and snap the two clamps in place.

NOTE

Batteries in the local control unit should be replaced after approximately 72 hours of operation; those in the remote control unit should be replaced after approximately 24 hours of operation. Batteries must be removed from the equipment on those days when the equipment is not being used. When the equipment is not being used for communication, turn it off.

e. The rubber pad in the battery box hold the batteries so firmly that when they are jarred away from the contacts they are unable to move back to make positive electrical contact. The result is that the control unit does not function. If this occurs, proceed as follows:

(1) Unsnap the battery box cover to relieve the pressure of the rubber pad on the batteries and reposition the batteries against the contacts.

(2) Then while holding the battery cover level, resnap both cover clamps simultaneously to close the cover.

2-5. Installing Equipment on Site

After installing the batteries (para 2-4), install the equipment as explained in *a* or *b* below.

a. Installation with Radio (fig. 2-3).

(1) Locate the local control unit next to the receiver-transmitter of the radio. Connect the connector of the local control unit radio cable to the receptacle of the radio receiver-transmitter.

(2) Locate the remote control unit at the site it is to be used. Connect the handset (H-189/GR or equal) to the unit.

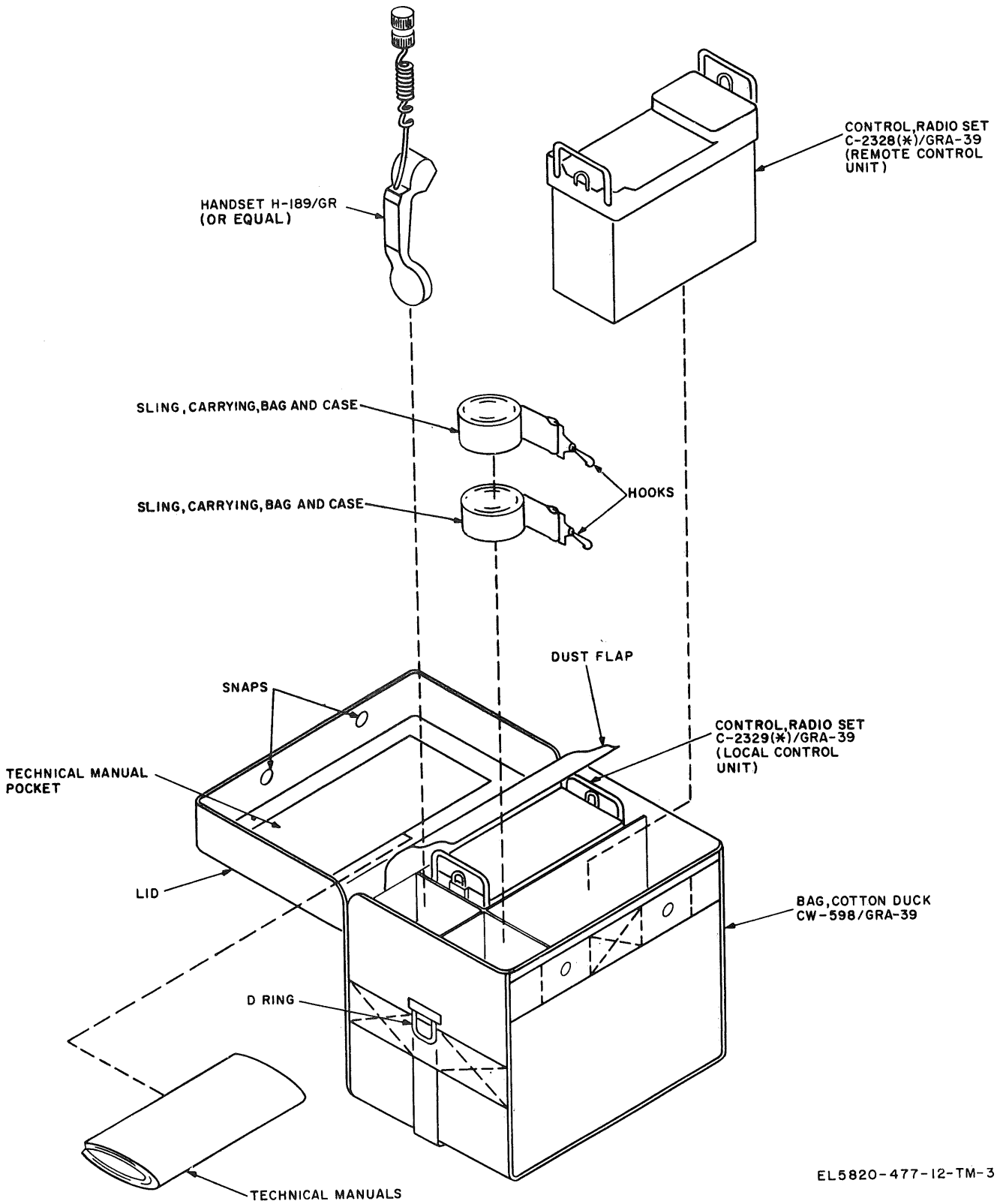


Figure 2-1. Installing components in Bag, Cotton EL 5820-477-12-TM-3 Duck, CW-598/GRA-39.

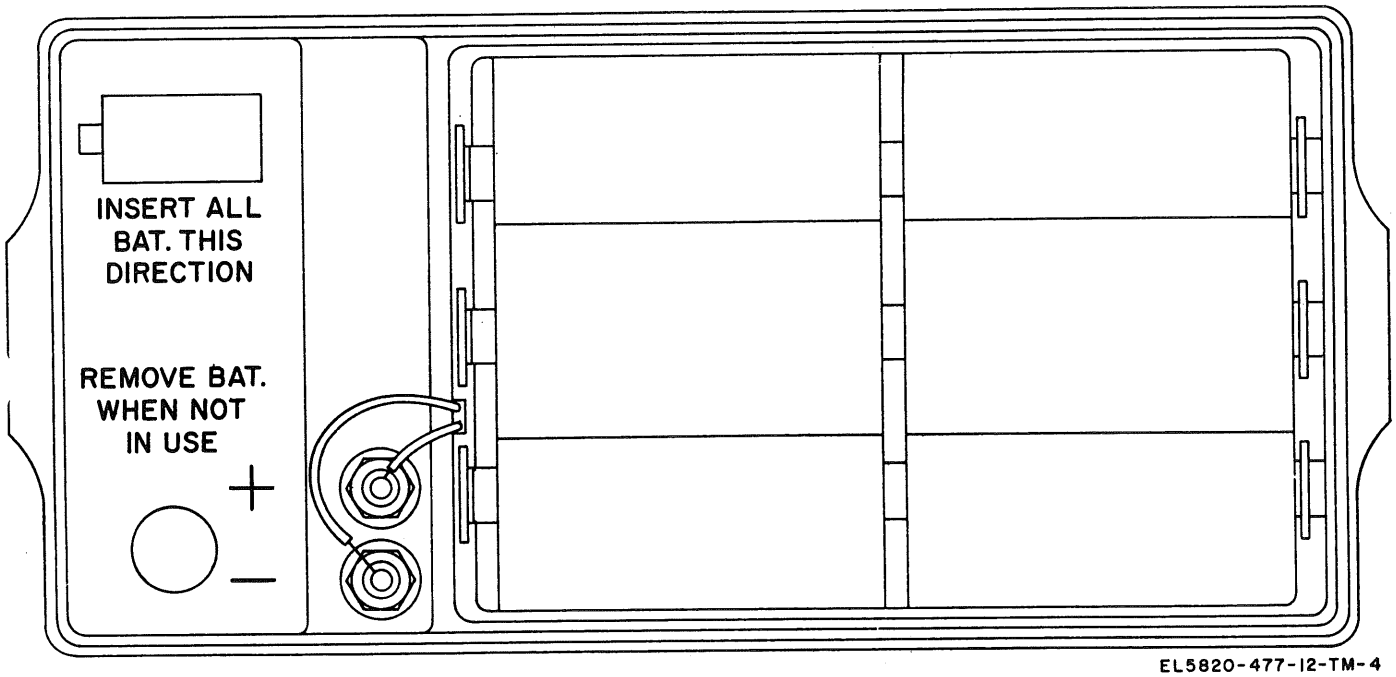


Figure 2-2. Battery compartment layout. EL 5820-447-12-TM-4

WARNING

DO NOT PRESS THE RINGER BUTTON of either the local or remote control unit while installing the wires on the LINE binding posts ((3) below). Operating the RINGER button applies a voltage which can shock the person touching the binding posts or the bare field wires.

(3) Connect the LINE binding posts of the local control unit to the remote control unit with field wire (para 1-11*b*). Remove the insulation from the ends of the wire, press down the binding post, insert the end of the wire into the slot, and release the binding post.

(4) Use other audio accessories as follows:

(*a*) If Headset-Microphone H-161/U or Combat Vehicle Crewman (CVC) Helmet is used, connect the short cord connector to the AUDIO receptacle of the control unit. The long cord connector with the yellow band of the H-161/U or CVC helmet is not connected.

(*b*) Microphone M-80/U can be connected to either control unit AUDIO receptacle. At the remove control unit, reception will be obtained from the loudspeaker of the control unit; at the local control unit, reception will be obtained from the associated radio loudspeaker or headset.

(*c*) Headset H-140/U or H-251/U must be connected to the radio.

b. RWI Installation with Local Battery Switchboard (fig. 2-4).

(1) Prepare a Connector, Plug U-229/U (NSN 5935-00-992-2035; part of Handset H-189/GR) with two jumper wires soldered to pins A and C (keying circuit).

(2) Locate the remote control unit at the SB-22/PT and connect the equipment as shown in A, figure 2-4. Turn on the radio, observe the response; follow the instructions in note 1 of figure 2-4, if required.

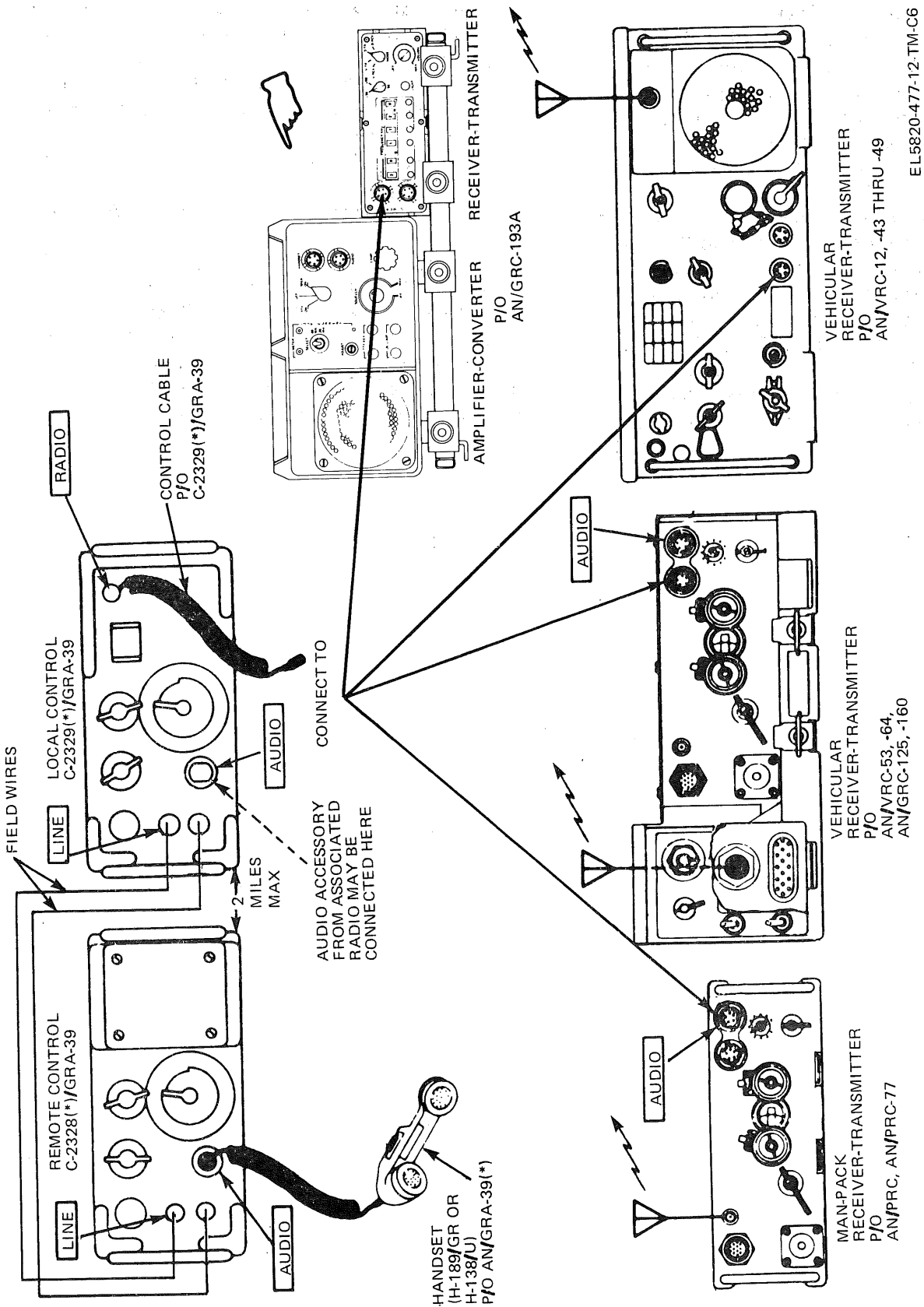
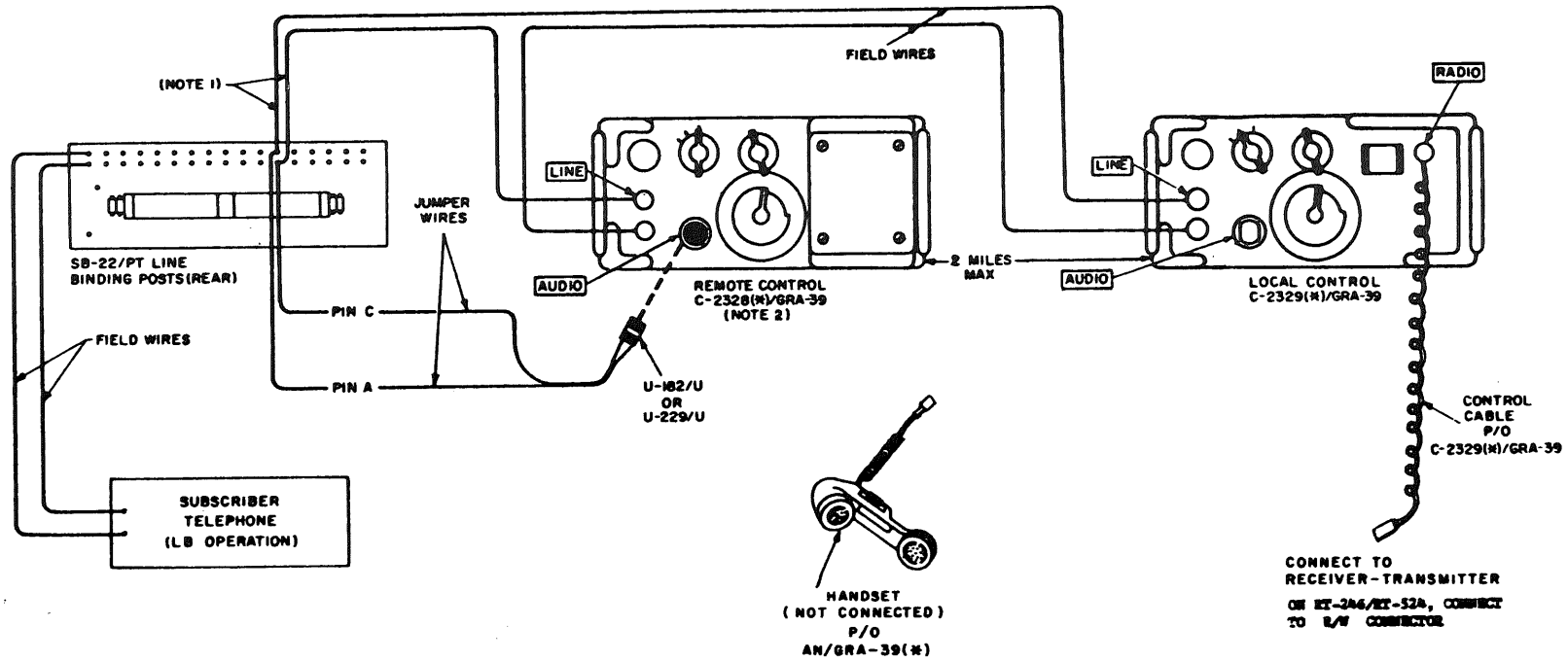
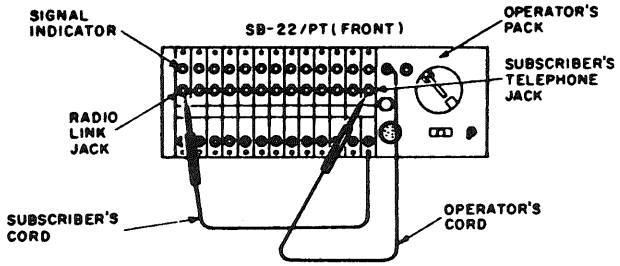


Figure 2-3. AN/GRA-39(*) interconnections with radios.



A. INTERCONNECTIONS AND SWITCH POSITIONS.



B. SWITCHBOARD CONNECTIONS FOR SUBSCRIBER-RADIO LINK.

NOTES:

1. IF RECEIVER-TRANSMITTER IS KEYED, TRANSPOSE CONNECTION OF THESE WIRES AT SB-22/PT.
2. THE REMOTE CONTROL IS LOCATED NEXT TO SB-22/PT TO ENABLE SWITCHBOARD OPERATOR TO HEAR INCOMING RADIO CALLS.

EL5820-477-12-TM-6-C1

Figure 2-4. AN/GRA-39(*) RWI interconnections with Switchboard SB-22/PT.

CHAPTER 3

OPERATING INSTRUCTIONS

Section I. OPERATOR'S CONTROLS AND INDICATORS

3-1. Remote Control Unit, Controls, Indicators, and Connectors (fig. 3-1)

Control, indicator, or connector	*Function*
RINGER button	When pressed several times in rapid succession, activates the buzzer and the call lamp (in A and B models) in the local control unit to gain attention of the operator. The RINGER button may be used for this purpose at any time, regardless of the setting of the TEL-RAD-RAD/SPKR switch.
TEL-RAD-RAD/SPKR switch	Selects mode of operation.
	Sw Pos — *Action*
	TEL — Permits voice communication with the local control unit operator or through a telephone switchboard.
	RAD — Permits remote control unit operator to transmit or receive voice communication through the radio set when the TEL-REMOTE-RADIO switch on the local control unit is at REMOTE.
	RAD/SPKR — Same as RAD position; also provides loudspeaker output when receiving.
ON-OFF switch and VOLUME control	Controls remote control unit power ON and OFF; adjusts the audio level of the handset or internal loudspeaker.
BUZZER VOLUME control	Adjusts the volume of the internal buzzer; provides an audible buzzer signal when RINGER button on local control is depressed. Disables buzzer in OFF position.
AUDIO connector	For connecting the handset or other suitable audio accessory.
LINE binding posts	Connection for field wire.
INTERNAL speaker	Permits monitoring of received radio signal with TEL-RAD-RAD/SPKR switch at RAD/SPKR.
Call Lamp (A and B models only)	Provides a visual signal when RINGER button on local control unit is pressed.

3-2. Local Control Unit, Controls, Indicators, and Connectors (fig. 3-2)

Control, indicator, or connector	*Function*
RINGER button	When pressed several times in rapid succession, activates the buzzer and the call lamp (in the A and B models) in the remote control to gain attention of the operator. The RINGER button may be used for this purpose at any time, regardless of the setting of the TEL-REMOTE-RADIO switch.
TEL-REMOTE-RADIO switch	Selects mode of operation.
	Sw Pos — *Action*
	TEL — Permits voice communication with the remote control operator. Permits voice communication through a telephone switchboard. The switch is spring loaded in the TEL position and will automatically return to REMOTE position when released.
	REMOTE — Permits remote operator to transmit and receive voice communications through the radio set.
	RADIO — Permits local control unit operator to transmit and receive voice communications through the radio set. The switch is spring-loaded in the

Control, indicator, or connector	Function	
	Sw Pos	Action
		RADIO position, and will automatically return to REMOTE position when released.
POWER switch		Controls power to local control unit.
RADIO connector		Attached to retractable cord. Connects to radio set; permits local or remote operator to transmit or receive through the radio set.
BUZZER VOLUME control		Adjusts the volume of the internal buzzer; provides an audible buzzer signal when RINGER button on the remote control unit is pressed. Disables the buzzer in OFF position.
LINE binding posts		Connection for field wire to remote control unit.
AUDIO connector		For connecting the handset or other suitable audio accessory.
Call lamp (A and B models only)		Provides a visual signal when RINGER button on remote control unit is pressed.

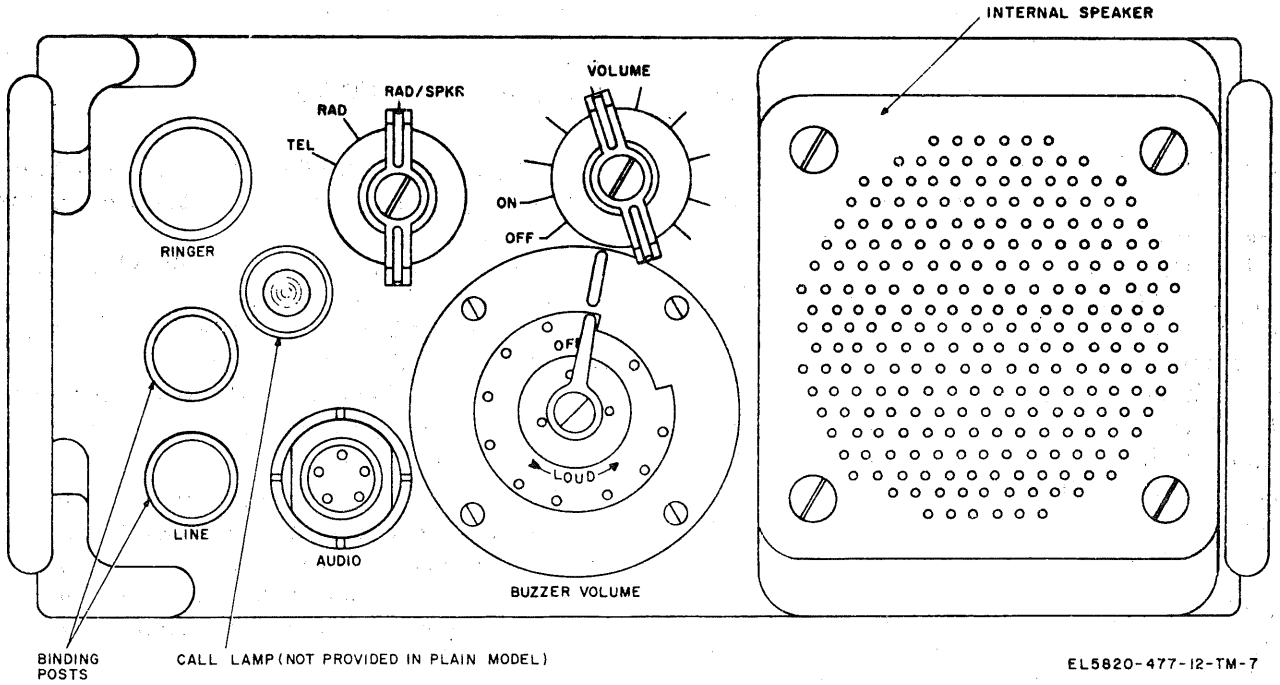


Figure 3-1. Remote control unit, controls, indicator, and connectors.

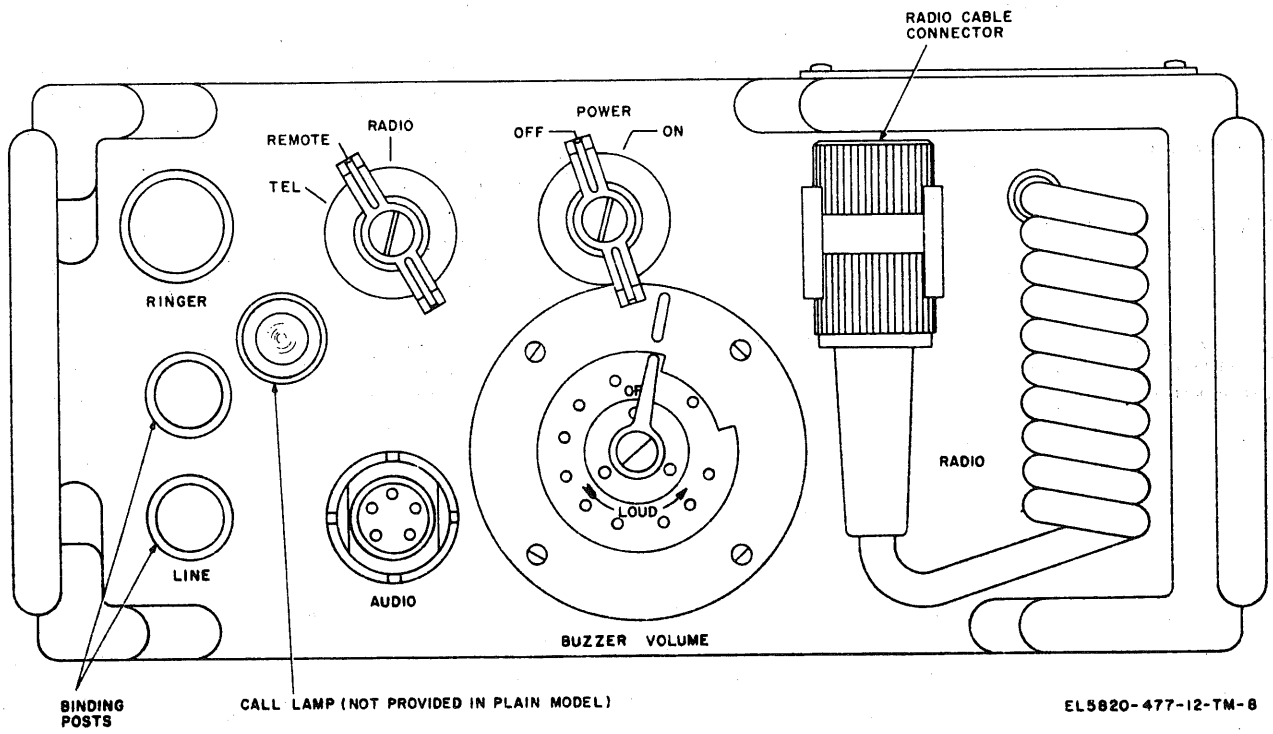


Figure 3-2. Local control unit, controls, indicator, and connectors.

Section II. OPERATION UNDER USUAL CONDITIONS

3-3. Starting Procedures

a. Local Control Unit. Start the local control unit as follows:

(1) Turn the POWER switch to ON.

(2) Set the BUZZER VOLUME control at approximately midrange.

b. Remote Control Unit. Start the remote control unit as follows:

(1) Turn the VOLUME control to approximate midrange position. (VOLUME control is also ON-OFF switch.)

(2) Set the BUZZER VOLUME control at approximately midrange.

3-4. Operating Procedures

During operation, adjust the BUZZER VOLUME control for any desired volume. If conditions require silencing of the internal buzzer, set the control at OFF.

a. Telephone Communication Between Remote and Local Control Units Operators. For this type of operation, proceed as follows:

(1) Start the local and remote control units (para 3-3).

WARNING

Do not touch the LINE binding posts while pressing the RINGER button.

(2) Press the RINGER button several times in quick succession to gain the attention of the other operator.

(3) Set the remote control unit TEL-RAD-RAD/SPKR switch to TEL.

(4) Turn and hold the local control unit TEL-REMOTE-RADIO switch to TEL.

(5) Press the handset push-to-talk switch to talk to the other operator; release to listen.

NOTE

The handset has two microphone elements for cancellation of noise. Speak with the lips close to and directly into only one of the elements. Speaking into both elements at the same time may cancel voice transmissions.

b. Radio Set Transmission and Reception from Remote Control Unit. For this type of operation, proceed as follows:

NOTES

The TEL-REMOTE-RADIO switch on the local control unit *must* be in the REMOTE position during this operation. The local operator must adjust the *radio VOLUME control* for a comfortable listening level at the local control unit

handset to prevent excessive audio level at the remote control unit.

(1) Start the local and remote control units (para 3-3).

(2) Set the TEL-RAD-RAD/SPKR switch to either RAD or RAD/SPKR.

(3) Adjust the VOLUME control to the desired listening level in the handset or loudspeaker.

(4) Press the handset push-to-talk switch to transmit; release to receive. Use proper radio communication call signs and procedures.

c. Radio Set Transmission and Reception from Local Control Unit. Perform this type of operation as follows:

(1) Start the local control unit (para 3-3).

(2) Set and hold the TEL-REMOTE-RADIO switch at RADIO.

(3) Press the handset push-to-talk switch to transmit; release to receive. Use proper radio communication call signs and procedures.

d. Radio Set Transmission and Reception Through Switchboard (fig. 2-4). Since the remote control unit is set up next to the switchboard, the switchboard operator will respond to calls from the distant radio station using the push-to-talk switch in the RADIO position of his headset-chestset, and use correct radio communication procedures and call signs. In effect, the switchboard operator becomes the radio operator for this RWI arrangement (para 1-13*a* (4)).

(1) To eliminate the continuous rushing noise from the receiver-transmitter, set the SQUELCH switch to ON on the receiver-transmitters of the AN/VRC-12 series radios (fig. 2-3). On the other receiver-transmitters (AN/PRC-25, AN/VRC-53, etc), set the function control switch to SQUELCH.

(2) At the local control unit set the TEL-REMOTE-RADIO switch to REMOTE; at the remote control unit, set the TEL-RAD-RAD/SPKR switch to RAD/SPKR.

(3) When the radio call is heard from the loudspeaker of the remote control unit, insert the operator's cord into the radio link jack and determine the desired subscriber. Advise the distant radio station operator to stand by while making the arrangements in (*a*) and (*b*) below. (Also refer to B, fig. 2-4.)

(*a*) Connect the operator's cord to the subscriber's jack, ring, and notify the subscriber of the radio call. Advise the subscriber of the call signs and to ring back when the call is completed.

(*b*) Connect the subscriber's cord to the radio link jack.

NOTE

Operation of the switchboard headset-chestset switch to push-to-talk *radio* position, while the operator's cord is still connected to the subscriber's jack will key the radio into transmission.

(4) Remove the operator's cord from the subscriber's jack.

(5) The subscriber will, in turn, use correct radio procedures and call signs using the telephone handset with push-to-talk to transmit on the radio and release-to-receive to listen to the radio reply.

(6) The incoming radio communication can be heard on the remote control unit loudspeaker; the subscriber's voice in reply cannot be heard.

(7) When the subscriber's signal indicator shows white, insert the operator's cord into the subscriber's jack and challenge the circuit without operating the headset-chestset switch to the *radio* position.

(8) If the radio call is completed, remove the subscriber's cord from the radio link jack.

(9) For the switchboard operator to initiate a radio call, insert the operator's cord into the radio link jack. Then operate the headset-chestset switch to *radio* to talk to the distant radio station and release the switch to hear the radio reply.

3-5. Stopping Procedures

a. Local Control Unit. Turn the POWER switch to OFF.

b. Remote Control Unit. Turn the VOLUME control to OFF.

CHAPTER 4
OPERATOR'S MAINTENANCE

4-1. Scope of Operator's Maintenance

The maintenance duties of the operator of the equipment are listed below. No special tools or test equipment is required.

a. Preventive maintenance checks and services (para 4-1, table 4-1).

b. Cleaning (para 4-3).

c. Operator's inspection (para 4-4).

d. Operational checklist (para 4-5).

4-2. Preventive Maintenance Checks and Services (PMCS)—Weekly

Preventive maintenance is the systematic care, servicing, and inspection of equipment to prevent occurrence of trouble, to reduce downtime, and to assure that the equipment is serviceable. Preventive maintenance checks and services defines procedures to be performed weekly on the equipment (table 4-1). The PMCS will be performed with the AN/GRA-39(*) connected to the radio equipment (fig. 2-3 or 2-4). The *Item No.* in table 4-1 shall be used for the *TM number* column on DA Form 2404 (Equipment and Inspection Worksheet) in recording the results of the PMCS.

NOTE

Routine checks are not listed in the PMCS; such as: cleaning (para 4-3), checking condition of cables and field wire; checking for loose nuts, bolts, and knobs; checking and cleaning connectors, and so on. Also, checking the performance of the equipment (para 4-8) is not prescribed in the PMCS. These are things you should do while using the equipment.

Table 4-1. Operator/Crew Preventive Maintenance Checks and Services

NOTE:

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

B—Before
D—During
A—After
W—Weekly
M—Monthly

Item No.	Interval B	D	A	W	M	Item to be inspected	Procedures Check for and have repaired or adjusted as necessary	Equipment is Not Ready/ Available, if:
1				•		Battery	Inspect the battery for corrosion and swelling. Clean the contacts if they are dirty or corroded.	
2				•		Battery compartment	Inspect the battery compartment for damage and corrosion. Clean the compartment and the spring contacts for the batteries (para 4-6).	

4-3, Cleaning

Inspect the exterior of the equipment. The surfaces should be clean and free of dirt, grease, and fungus.

a. Remove dust and loose dirt with a clean cloth.

WARNING

Trichlorotrifluoroethane is DANGEROUS. Adequate ventilation should be provided while using it. Prolonged breathing of its vapor should be avoided. The solvent should not be

used near heat or an open flame; the products of decomposition are toxic and irritating. Since trichlorotrifluoroethane dissolves natural oils, prolonged contact with skin should be avoided. When necessary, use gloves which the solvent cannot penetrate. If the solvent is taken internally, consult a physician immediately.

b. Remove grease, fungus, and ground-in dirt from the cases and cables; use a cloth dampened (not wet) with trichlorotrifluoroethane.

c. Clean the plugs and receptacles. Use a pencil eraser to clean the connector contacts.

d. Clean the carrying bag and slings with a brush; use water and soap. 4-4. Operator's Visual Inspection.

a. When the equipment fails to perform properly, turn off the power and check for the conditions listed below:

(1) Improper setting of switches and controls (para 3-3 and 3-4).

(2) Disconnected or improperly connected cables and field wire (fig. 2-3 and 2-4).

(3) Frayed or cut insulation on field wire and cables.

(4) Damaged connectors on cables.

(5) Open or short in field wire.

(6) Improperly installed batteries (fig. 2-2).

(7) Swollen, leaking or corroded batteries.

b. If the above checks do not locate the trouble, proceed to the operational checklist (para 4-5).

4-5. Operational Checklist

a. General. The operational checklist will help the operator to locate the trouble quickly. Apply the corrective measures given if a normal indication is not obtained. If the measures suggested do not restore normal operation, troubleshooting at a higher category is required. Note on the appropriate maintenance form how the equipment performed at the time of failure and what corrective measures were taken.

b. Procedure. Start the equipment (para 3-5). Perform the procedures in the checklists (*c* and *d* below) in the order given. Observe the operation of the equipment, and perform any necessary corrective measures. The procedures assume that the cables, the handset (or other audio accessories used), the associated radio set, and the field wire are in good working order, that all connections have been properly made, and that the batteries are good.

WARNING

Do not touch the LINE binding posts while pressing a RINGER button.

c. Operational Checklist for Local Control Unit.

Step	*Action*	*Normal indication*	*Corrective measure*
1	Press RINGER button several times in rapid succession to signal remote control unit operator.	Buzzer and lamp in remote control operate buzzer and lamp is local control do not operate.*	Check lamp by substitution; higher category maintenance repair required.*
2	Turn and hold the TEL-REMOTE-RADIO switch to TEL. Press the handset push-to-talk switch and speak into the microphone.	When the push-to-talk switch is pressed, operator hears own voice and voice communication is received by the remote operator.	Check handset by substitution.
3	Instruct remote control unit operator to press RINGER button several times in rapid succession. Rotate local control unit BUZZER VOLUME control from LOUD to OFF.	Buzzer is heard and lamp is lighted in local control unit. Buzzer volume control decreases as control is turned toward OFF. Lamp is lighted and buzzer is not heard when control is at OFF.*	Check lamp by substitution; higher category maintenance repair required.
4	Turn and hold the TEL-REMOTE-RADIO switch at RADIO.	Noise or an audio signal from the radio set receiver is heard from the handset.	Check to see that power is applied to the radio set.
5	Turn and hold the TEL-REMOTE-RADIO switch at RADIO. Press the handset push-to-talk switch and speak into the microphone.	Radio set transmitter is keyed. Operator hears own voice in the handset.	Higher category repair required.
6	Return the TEL-REMOTE-RADIO switch to REMOTE. Perform step 1; then instruct the remote control unit operate to set TEL-RAD/SPKR at RAD, to press handset push-to-talk switch, and to speak into the microphone.	Radio set transmitter is keyed. Remote operator's transmission is heard in local control unit in handset.	Higher category repair required.

*Call lamp is not provided in plain model.

Operational Checklist for Remote Control Unit.

Step	Action	Normal indication	Corrective measure
1	Press RINGER button several times in rapid succession to signal the local operator.	Buzzer and lamp in local control unit operate; buzzer and lamp in remote control unit do not operate.*	Check lamp by substitution; higher category repair required.
2	Instruct local operator to press RINGER button several times in rapid succession. Rotate remote control unit BUZZER VOLUME control from LOUD to OFF.	Buzzer is heard and lamp is lighted in remote control unit. Buzzer volume decreases as control is turned toward OFF. Lamp is lighted and buzzer is not heard when control is at OFF.*	Check lamp by substitution; higher category repair required.
3	Set the TEL-RAD-RAD/SPKR switch at TEL. Press the handset push-to-talk switch and speak into the microphone. Release the push-to-talk switch.	Operator hears his own voice, and voice communication is received by local control unit operator when the push-to-talk switch is pressed.	Check handset by substitution.
4	Set the TEL-RAD-RAD/SPKR switch at RAD.	Noise or an audio signal is heard in handset.	Higher category repair required.
5	Press the handset push-to-talk switch and speak into the microphone. Release the push-to-talk switch.	When the push-to-talk switch is pressed, the radio set transmitter is keyed, and the operator hears own voice and a soft, high-pitched tone in the handset.	Higher category repair required.
6	Set the TEL-RAD-RAD/SPKR switch at RAD/SPKR.	Noise or an audio signal is heard from the internal speaker.	Higher category repair required.
7	Rotate the VOLUME control clockwise from minimum to maximum volume.	Loudness of noise or audio signal increases smoothly.	Higher category repair requierd.

*Call lamp is not provided in plain model.

CHAPTER 5

ORGANIZATIONAL MAINTENANCE

Section I. GENERAL

5-1. Scope of Organizational Maintenance

a. Paragraphs 5-2 through 5-10 contain instructions covering organizational maintenance of Radio Set Control Groups AN/GRA-39(*). Refer to TM 11-5820-477-20P for organizational repair parts.

b. Organizational maintenance of the AN/GRA-39(*) includes:

(1) Quarterly preventive maintenance checks and services (para 5-5).

(2) Organizational maintenance visual inspection (para 5-8).

5-2. Tools, Materials, and Test Equipment Required

The tools, materials, and test equipment required for organizational maintenance are listed below.

a. Tool kit, Electronic Equipment TK-101/G.

b. Deleted.

c. Multimeter AN/URM-105.

d. Insulating Compound Dow Corning DC4 (NSN 6850-00-880-7616).

5-3. Organizational Preventive Maintenance

Preventive maintenance is the responsibility of all categories concerned with the equipment and includes the inspection, testing, and repair or replacement of parts, subassemblies, or units that inspection and tests indicate would probably fail before the next scheduled periodic service. Preventive checks and services of Radio Set Control Groups AN/GRA-39(*) at the organizational level are made at quarterly intervals unless otherwise directed by the commander.

5-4. Quarterly Maintenance

Quarterly preventive maintenance checks and services on Radio Set Control Groups AN/GRA-39(*) are required. Periodic daily and weekly services constitute a part of the quarterly preventive maintenance checks and services and must be performed concurrently. All deficiencies or shortcomings will be recorded in accordance with the requirements of TM 38-750. Perform all the checks and services listed in the quarterly preventive maintenance checks and services chart (para 5-5) in the sequence listed.

Item No.	Item to be inspected	Procedures
1	Publications	Check to see that TM 11-5820-477-12 with all changes is on hand; see DA Pam 310-4 for listing of latest changes.
2	Modification Work Orders (MWOs)	Check DA Pam 310-7 to see whether any MWO is required to be applied to the AN/GRA-39(*) or its components (para 1-9 and appx B). See TM 38-750 for MWO application procedures. All URGENT MWOs must be applied immediately; all NORMAL MWOs must be scheduled for application.
3	Battery	Inspect the batteries for corrosion and swelling; clean the contacts if they are dirty or corroded. Inspect the battery compartment for damage and corrosion. Clean the compartment and the spring contacts for the batteries (para 4-6).
4	Inside Local and remote control units	*a.* Inspect the condition of printed circuit boards, A101, A102, A201, and A202 (fig. 5-2 and 5-3); check for cracked boards and damaged wiring. *b.* Inspect capacitors, resistors, and transistors for discoloration, swelling, blistering, and other damage.
5	Preformed packing	Apply a thin coating of DC4 insulating compound to the preformed packing in the edge of the case and the back cover. The preformed packing shall not be brittle, damaged, or missing.

5-6. Touchup Painting Instructions

Remove rust and corrosion from metal surfaces by lightly sanding them with fine sandpaper. Brush two thin coats of the proper paint on the bare metal to protect it from further corrosion. Refer to the applicable cleaning and refinishing practices specified in SB 11-573 and TB 746-10.

5-7. Waterproofing Gaskets

Apply a light coating of insulating compound to prevent moisture infiltration. Use Compound Dow Corning DC-4 for this purpose (para 5-2*d*).

Section II. TROUBLESHOOTING

5-8. Organizational Maintenance Visual Inspection

When equipment failure occurs, inspect the equipment carefully for obvious defects. This will save time and may also avoid further damage to the equipment or a substituted component. If possible, obtain information from the operator regarding the performance of the local and remote control units at the time trouble occurred. Inspect for the following defects:

a. Improperly installed batteries.

b. Worn or broken wires and disconnected or improperly seated plugs.

c. Improperly seated or defective printed circuit boards.

5-9. Equipment Performance Checklist

a. General. The equipment performance checklist is a procedure for systematically checking equipment performance and for troubleshooting. It is assumed that all additional equipment used in the performance check is known to be good. All corrective measures which organizational maintenance personnel can perform are given in the *Corrective measures column.* When using the checklist, start at the beginning and follow each step in order. If the corrective measures indicated do not repair the equipment, troubleshooting is required by higher category. Note on the appropriate form how the equipment performed, and what corrective measures were taken.

b. Procedure. Check the performance of the equipment as shown in the checklist (*c* below). After placing the equipment in operation, allow it to warm up for about 1 minute before proceeding with the performance checks.

NOTE

All voltage measurements required in the steps of the checklists are referenced to ground. If a replacement of a printed circuit board assembly does not restore normal operation, remove the new printed circuit board assembly and put back the original.

c. Checklist for Radio Set Control Group AN/GRA-39 (*). Local control unit is used to identify the C-2329(*)/GRA-39 (fig. 2-3); and remote control unit is used to identify the C-2328(*)/GRA-39.

Step	Unit	Action	Normal indication	Corrective measures
1	Local control unit	Set POWER switch at OFF.		
2	Remote control unit	Set VOLUME control ON-OFF switch at OFF.		
3	Local control unit	Connect RADIO cable connector to radio set receiver-transmitter (fig. 2-3 or 2-4).		
4	Remote control unit	Connect handset connector to AUDIO connector.		
5	Remote and local control units.	Interconnect the LINE binding posts with as much field wire as necessary.		
6	Local control unit	Set POWER switch at ON. Set BUZZER VOLUME control at approximately midrange.		
7	Remote control unit	Set ON-OFF switch to ON. Set VOLUME control at approximately midrange. Set BUZZER VOLUME control at approximately midrange.		

Step	Unit	Action	Normal indication	Corrective measures
8	Local control unit	Measure battery voltage at TB101 terminals.	+8.5 to 9.0 volts dc	Replace batteries if voltage is below 6.6 volts.
9	Remote control unit	Measure battery voltage at TB201 terminals.	+8.5 to 9.0 volts dc	Replace batteries if voltage is below 6.6 volts.
10	Local control unit	Hold TEL-REMOTE-RADIO switch at TEL and press RINGER button rapidly several times to signal remote operator.	Buzzer and lamp* in remote control unit operate.	Connect the AN/URM-105 ac test to LINE binding posts. (Use the highest ac voltage range.)
		Press the RINGER button several times in quick succession to signal the remote operate.		Press RINGER button. AN/URM-105 meter pointer will deflect as RINGER button is pressed. If no indication obtained, higher category repair is required.
11	Local control unit	Press handset push-to-talk switch and speak into microphone.	Operator hears own voice and voice communication is received by remote operator.	Check dc voltage at test point E103. The AN/URM-105 meter indicates 8.0 volts dc with 9.0 volts dc measured at TB101 terminals. **NOTE** Meter indication at E103 will decrease proportionately as battery voltage decreases.
12	Local control unit	Turn and hold TEL-REMOTE-RADIO switch at RADIO.	Noise or audio signal from the radio set is heard in handset.	Check continuity between pin B of RADIO connector P101 and pin B of AUDIO connector J101.
13	Local control unit	Press handset push-to-talk switch and speak into microphone. Release handset push-to-talk switch.	Radio set transmitter keys and operator hears own voice. No noise or audio signal is heard in handset when operator is not speaking and the push-to-talk switch is pressed.	Higher category repair required.
14	Local control unit	Have remote operator set TEL-RAD-RAD/SPKR switch at RAD, press handset push-to-talk switch, and speak into microphone.	Radio set transmitter is keyed. Remote operator's transmission is heard in handset earpiece.	Higher category repair required.
		Set TEL-REMOTE-RADIO switch to REMOTE position.		
15	Remote control unit	Set TEL-RAD-RAD/SPKR switch at TEL. Press RINGER button rapidly several times to signal local operator.	Buzzer and lamp* in local control unit operate.	Connect an AN/URM-105 ac test lead to the LINE binding posts. (Use the highest ac voltage range.)

*A call lamp is not installed in plain model (para 1-12).

Step	Unit	Action	Normal indication	Corrective measures
				Press RINGER button. AN/URM-105 meter pointer will deflect as RINGER button is depressed. Higher category repair required.
16	Remote control unit	Press handset push-to-talk switch and speak into microphone.	Operator hears own voice and voice communication is received by local operator.	Check dc voltage at test point E203. AN/URM-105 meter indicates 8.0 volts dc with 9.0 volts dc at TB201 terminals. NOTE Meter indication at E203 will decrease proportionately as battery voltage decreases. If trouble still exists, higher category repair is required.
17	Remote control unit	Set TEL-RAD-RAD/SPKR switch at RAD.	Noise or audio signal can be heard in handset.	Check to see that power is on at radio set. If power is on and trouble still exists, higher category is required.
18	Remote control unit	Press handset push-to-talk switch.	Radio Set Transmitter is keyed. A muted 3,900-cps tone can be heard in handset.	Measure dc voltage at local control unit test point E104. AN/URM-105 meter indicates 7.9 volts dc with 9.0 volts dc measured at TB101 terminals. NOTE Meter indication at E104 will decrease proportionately as battery voltage decreases. If trouble still exists, higher category repair is required.
19	Remote control unit	Set TEL-RAD-RAD/SPKR switch at RAD/SPKR.	Noise or audio signal present in internal speaker.	Check dc voltage at test point E204. AN/URM-105 meter indicates 7.0 volts dc with 9.0 volts dc measured at TB201 terminals.

*A call lamp is not installed in plain model (para 1-12).

Step	Unit	Action	Normal indications	Corrective measures
				NOTE Reading at E204 will decrease proportionally as battery voltage decreases. If trouble still exists, higher category repair is required.
20	Remote control unit	Set VOLUME control ON-OFF switch at OFF.		
21	Local control unit	Set POWER ON-OFF switch at OFF.		

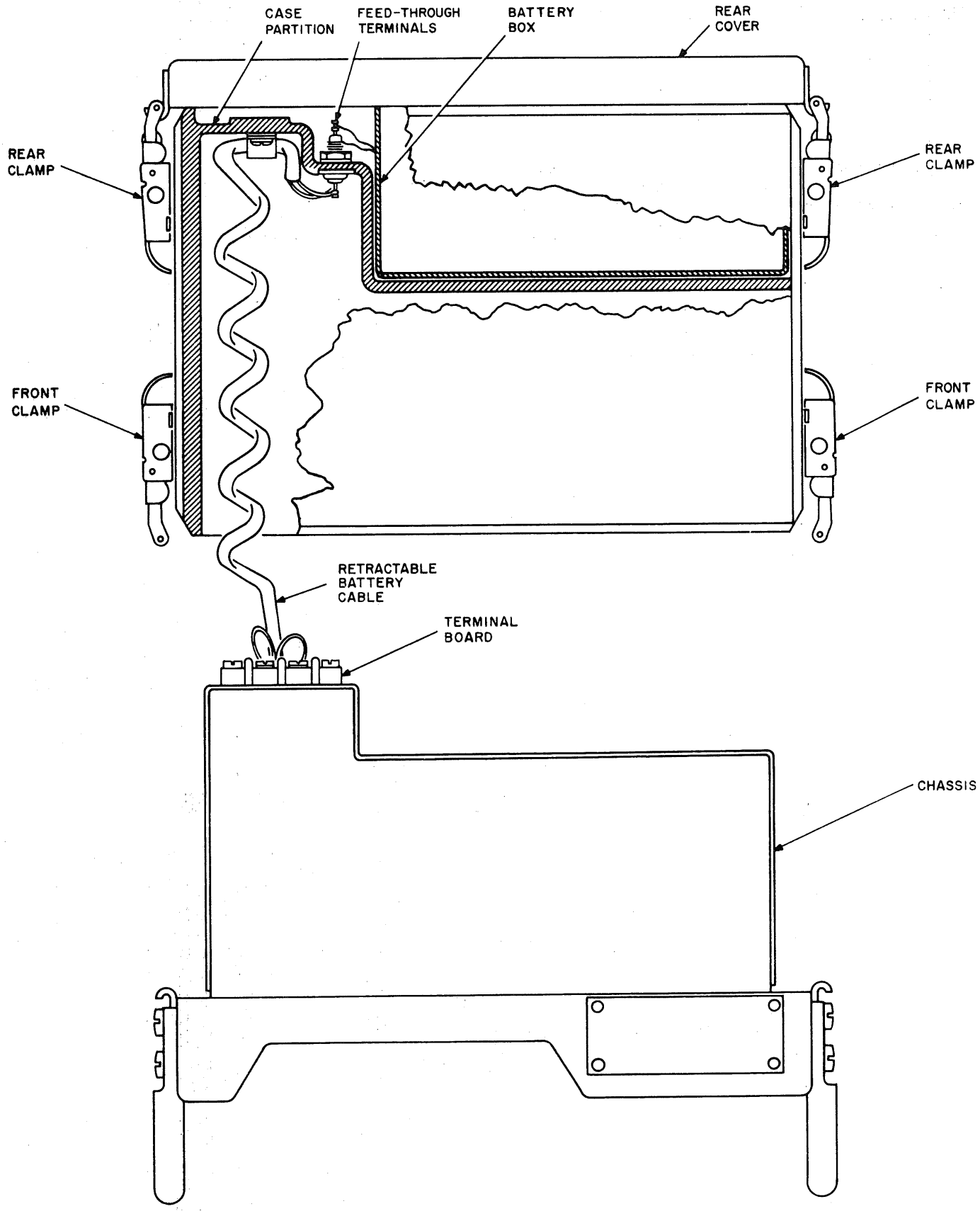


Figure 5-1 Remote or Local Control Unit, extended from case, top view.

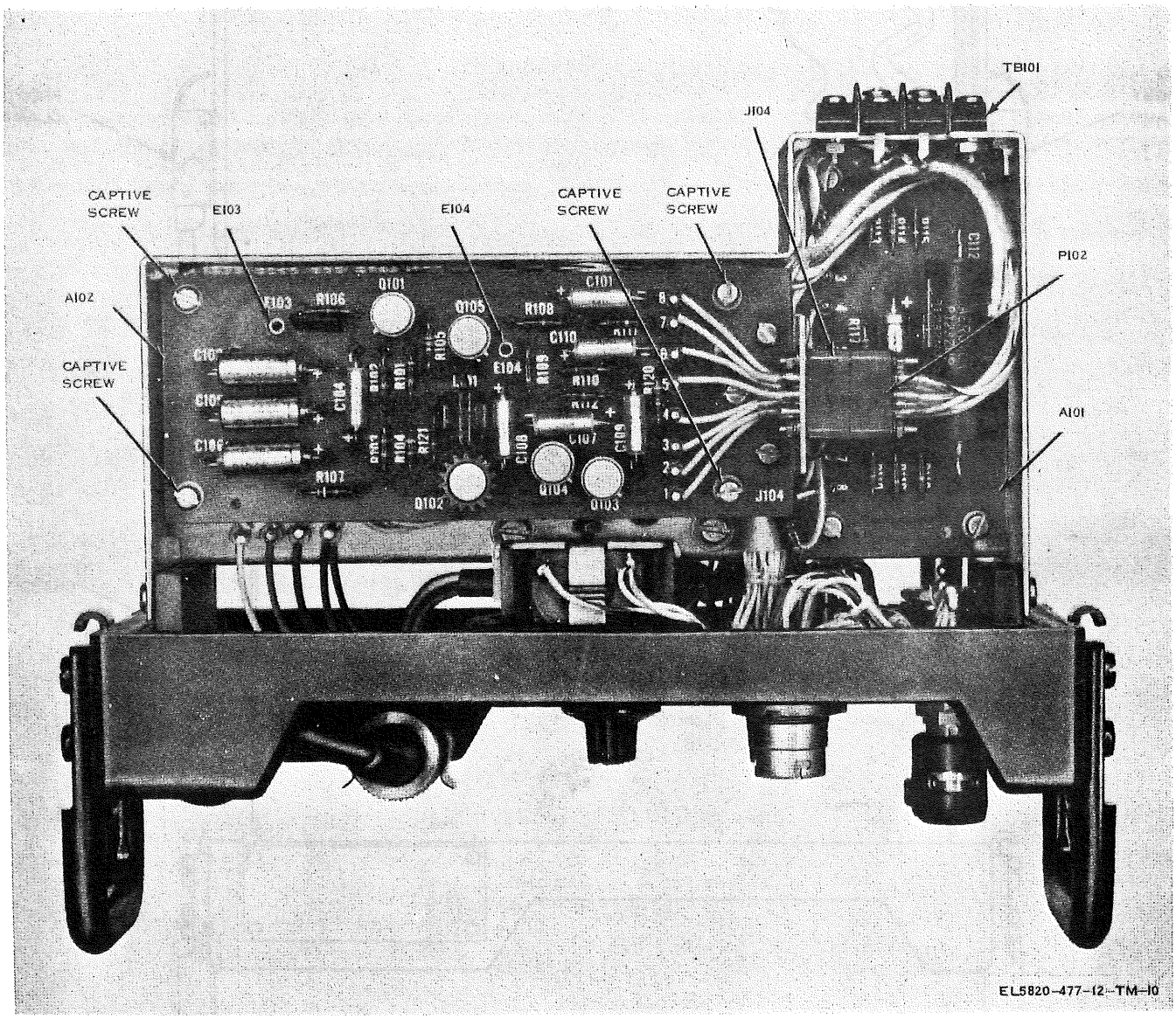


Figure 5-2 Control, Radio Set C-2328/GRA-39, case removed, parts location (C-2328A/GRA-39 and C-2328B/GRA-39 are similar.)

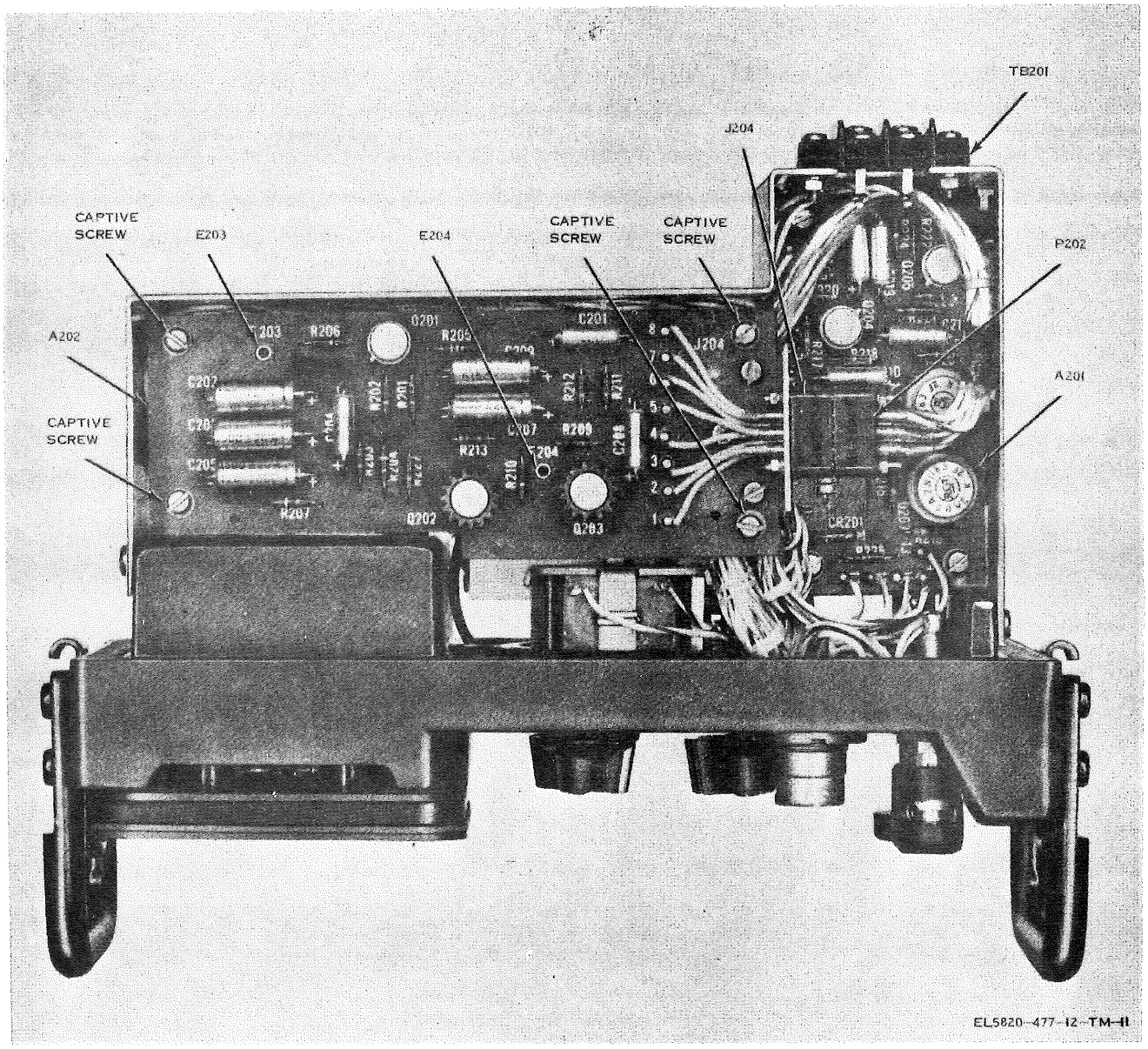


Figure 5-3 Controg, Radio Set C-2329/GRA-39, case removed, parts location (C-2329A/GRA-39 and C-2329B/GRA-39 are similar.)

APPENDIX A

REFERENCES

DA Pam 310-1	Consolidated Index of Army Publications and Blank Forms.
SB 11-6	Dry Battery Supply Data.
SB 11-573	Painting and Preservation Supplies Available for Field Use for Electronics Command Equipment.
TB 43-0118	Field Instructions for Painting and Preserving Electronics Command Equipment Including Pattern Painting of Electrical Equipment Shelters.
TM 11-5805-262-12	Operator's and Organizational Maintenance Manual: Switchboards, Telephone, Manual SB-22/PT and SB-22A/PT.
TM 11-5820-398-12	Operator's and Organizational Maintenance Manual, Including Repair Parts and Special Tools Lists: Radio Set AN/PRC-25 (Including Receiver-Transmitter Radio RT-505/PRC-25).
TM 11-5820-401-12	Operator's and Organizational Maintenance Manual Including Repair Parts and Special Tools Lists: Radio Sets AN/VRC-12 (5820-00-223-7412); AN/VRC-43 (5820-00-223-7415), AN/VRC-44 (5820-00-223-7417), AN/VRC-45 (5820-00-223-7418), AN/VRC-46 (5820-00-223-7433), AN/VRC-47 (5820-00-223-7434), AN/VRC-48 (5820-00-223-7435), AN/VRC-49 (5820-00-223-7437), AN/VRC-54 (5820-00-223-7567), and AN/VRC-55 (5820-00-402-2265); Mounting MT-1029/VRC (5820-00-893-1323) and Mounting MT-1898/VRC (5820-00-893-1324); Antenna AT-912/VRC (5820-00-897-6357); Control Frequency Selector C-2742/VRC (5820-00-892-3343) and Control, Radio Set C-2299/VRC (5820-00-892-3340).
TM 11-5820-498-12	Operator's and Organizational Maintenance Manual Including Repair Parts and Special Tools Lists: Radio Sets AN/VRC-53, AN/VRC-64, AN/GRC-125, and AN/GRC-160; and Amplifier-Power Supply Groups OA-3633/GRC and OA-3633A/GRC.
TM 11-5820-520-12	Operator's and Organizational Maintenance Manual Including Repair Parts and Special Tools Lists: Radio Sets AN/GRC-106 and AN/GRC-106A.
TM 11-5820-667-12	Operator's and Organizational Maintenance Manual Including Repair Parts List: Radio Set AN/PRC-77 (Including Receiver-Transmitter, Radio RT-841/PRC-77).
TM 11-5965-257-15	Organizational, DS, GS, and Depot Maintenance Manual Including Repair Parts and Special Tool Lists: Handsets H-138/U and H-138A/U.
TM 11-5965-280-15	Operator's , Organizational, DS, GS, and Depot Maintenance Manual, Including Repair Parts and Special Tools List: Handset H-189/GR.
TM 11-6625-203-12	Operator's and Organizational Maintenance Multimeter AN/URM-105, Including Multimeter ME-77/U.
DA Pam 738-750	The Army Maintenance Management System (TAMMS).
TM 740-90-1	Administrative Storage of Equipment.
TM 750-244-2	Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command).

APPENDIX B

BASIC ISSUE ITEMS LIST (BIIL) AND ITEMS TROOP INSTALLED OR AUTHORIZED LIST (ITIAL)

Section I. INTRODUCTION

1. Scope

This appendix lists only basic issue items required by the crew/operator for installation, operation, and maintenance of Radio Set Control Groups AN/GRA-39, AN/GRA-39A, AN/GRA-39B, and AN/GRA-39C.

2. General

This Basic Issue Items and Items Troop Installed or Authorized List is divided into the following sections:

a. Basic Issue Items List—Section II. A list, in alphabetical sequence, of items which are furnished with, and which must be turned in with the end item.

b. Items Troop Installed or Authorized List—Section III. Not applicable.

3. Explanation of Columns

The following provides an explanation of columns found in the tabular listings:

a. Illustration. Not applicable.

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

c. Description. Indicates the Federal item name and a minimum description required to identify the item.

(1) *Part Number.* Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), 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.

(2) *Federal Supply Code for Manufacturer (FSCM).* The FSCM is a 5-digit numeric code used to identify the manufacturer, distributor, or Government agency, etc., and is identified in SB 708-42.

d. Unit of Measure (U/M). Indicates the standard of basic quantity of the listed item as used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in., pr, etc.). When the unit of measure differs from the unit of issue, the lowest unit of issue that will satisfy the required units of measure will be requisitioned.

e. Quantity Furnished with Equipment (Basic Issue Items Only). Indicates the quantity of the basic issue item furnished with equipment.

4. Special Information

Usable on codes are included in the description column. Uncoded items are applicable to all models.

SECTION II. BASIC ISSUE ITEMS LIST

(1) ILLUSTRATION (A) FIG. NO.	(B) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION PART NUMBER & FSCM USABLE ON CODE	(4) QTY FURN WITH EQUIP
1-1		5820-00-889-3856	BAG, COTTON DUCK CW-598/GRA-39: SC-DL-456290; 80063	1
1-1		8465-00-269-0682	SLING, CARRYING, BAG AND CASE, COTTON WEBBING: SM-A-456206; 80063	2

HISA-FM 2680-74

APPENDIX C

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

C–1. General

This appendix provides a summary of the maintenance operations for AN/GRA-39, AN/GRA-39A, AN/GRA-39B, and AN/GRA-39C. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

C–2. Maintenance Functions

Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

b. Test. To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean, preserve, drain, paint, or to replenish fuel/lubricants/hydraulic fluids or compressed air supplies.

d. Adjust. Maintain within prescribed limits by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

e. Align. To adjust specified variable elements of an item to about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipment used in precision measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Install. The act of emplacing, seating, or fixing into position an item, part, module (component or assembly) in a manner to allow the proper functioning of the equipment/system.

h. Replace. The act of substituting a serviceable like-type part, subassembly, module (component or assembly) for an unserviceable counterpart.

i. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module/component/assembly, end item or system.

j. Overhaul. That periodic maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (e.g., DWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like-new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc.) considered in classifying Army equipment/components.

C–3. Column Entries

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and module with the next higher assembly.

b. Column 2, Component/Assembly. Column 2 contains the noun names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in column 2.

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a "worktime" figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function

listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories appropriate "worktime" figures will be shown for each category. The number of man-hours specified by the "worktime" figure represents the average time required to restore an item (assembly, subassembly, component, module, end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart.

e. Column 5, Tools and Equipment. Column 5 specifies by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

C-4. Tool and Test Equipment Requirements

a. Tool or Test Equipment Reference Code. The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.

b. Maintenance Category. The codes in this column indicate the maintenance category allocated the tool or test equipment.

c. Nomenclature. This column lists the noun name and nomenclature of the tools and test equipment required to perform the maintenance functions.

d. National/NATO Stock Number. This column lists the National/NATO stock number of the specific tool or test equipment.

e. Tool Number. This column lists the manufacturer's part number followed by the Federal supply code for manufacturer (5-digit) in parentheses.

SECTION II. MAINTENANCE ALLOCATION CHART FOR

RADIO SET CONTROL GROUPS
ANGRA-39, AN/GRA-39A, AN/GRA-39B and AN/GRA-39C

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) TOOLS AND EQPT.	(6) REMARKS
00	Radio Set Control Group AN/GRA-39, AN/GRA-39A, AN/GRA-39B, and AN/GRA-39C	Inspect	0.1						A
		Inspect		0.1				1,5	B
		Test	0.1						C
		Test		0.2				1,2,5	
		Service	0.2						D
		Service		0.1				1,5	E
		Install	0.2						F
		Repair	0.1						G
		Repair		0.2				1,2,5	H
		Repair			0.5			3,4,5	
01	Control Radio Set C-2328/GRA-39, C-2328A/GRA-39, C-2328B/GRA-39, C-2328C/GRA-39	Inspect	0.1						A
		Service	0.1						D
		Replace		0.2				1,5	
		Test		0.1				1,2,5	
		Repair			0.2			3,4,5	
0101	Chassis Assembly	Inspect			0.1			4,5	I
		Test			0.2			3,4,5	
		Repair			0.5			3,4,5	
0102	Panel Assembly	Inspect			0.1			5	
		Test			0.1			3,4,5	
		Test			0.1			3,4,5	
		Replace			0.3			4,5	
		Repair			0.5			3,4,5	
02	Control Set Set C-2329/GRA-39, C-2329A/GRA-39, C-2329B/GRA-39 and C-2329C/GRA-39	Inspect	0.1						A
		Service	0.1						D
		Replace		0.2				1,5	
		Test		0.1				1,2,5	
		Repair			0.2			3,4,5	
0201	Chassis Assembly	Inspect			0.1			4,5	I
		Test			0.2			3,4,5	
		Repair			0.5			3,4,5	
0202	Panel Assembly	Inspect			0.1			5	
		Service			0.1			4,5	
		Test			0.1			3,4,5	
		Replace			0.3			3,4,5	
		Repair			0.5			3,4,5	

SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS FOR

RADIO SET CONTROL GROUPS
ANGRA-39, AN/GRA-39A, AN/GRA-39B and AN/GRA-39C

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	O	Tool Kit, Electronic Equipment TK-101/G	5180-00-064-5178	
2	O	Multimeter AN/URM-105	6625-00-999-6282	
3	F	Multimeter TS-352B/U	6625-00-553-0142	
4	F	Tool Kit, Electronic Equipment TK-105/G	5180-00-610-8177	
5	O, F	Multimeter AN/PSM-45 (When issued will replace items 2 and 3)	6625-01-134-2512	

SECTION IV. REMARKS

REFERENCE CODE	REMARKS
A	Inspect for structural damage, battery swelling, corrosion, and completeness.
B	Inspect for battery swelling, corrosion, printed circuit board damage, and wiring damage.
C	Perform operators' checklist for normal operation.
D	Remove dust, loose dirt and fungus from exterior surfaces.
E	Clean battery terminals and battery connection terminals.
F	Install equipment at selected site.
G	Limited to replacing handset and call lamp on A and B models.
H	Repair by replacing batteries.
I	Inspect for structural damage, circuit board damage, and wiring damage.

By Order of the Secretary of the Army:

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