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DEPARTMENT OF THE ARMY TECHNICAL MANUAL — TM 11-5820-222-10

DEPARTMENT OF THE AIR FORCE TECHNICAL ORDER — TO 31R2-2TRC68-1

OPERATOR'S MANUAL

# RADIO SETS AN/VRC-24 AND AN/TRC-68

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## WARNING

### DANGEROUS VOLTAGES EXIST AT ANTENNA AND AC POWER CONNECTORS

Be careful when working around the antenna or the antenna connectors, as high radiofrequency voltages exist at these points. Be careful when working on the ac power connector to Receiver-Transmitter Case CY-2712/TRC-68. Serious injury or death may result from contact with these connectors.



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TECHNICAL MANUAL
No. 11-5820-222-10

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No. 31R2-2TRC68-1

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE

WASHINGTON 25, D. C., *7 June 1960*

# RADIO SETS AN/VRC-24 AND AN/TRC-68


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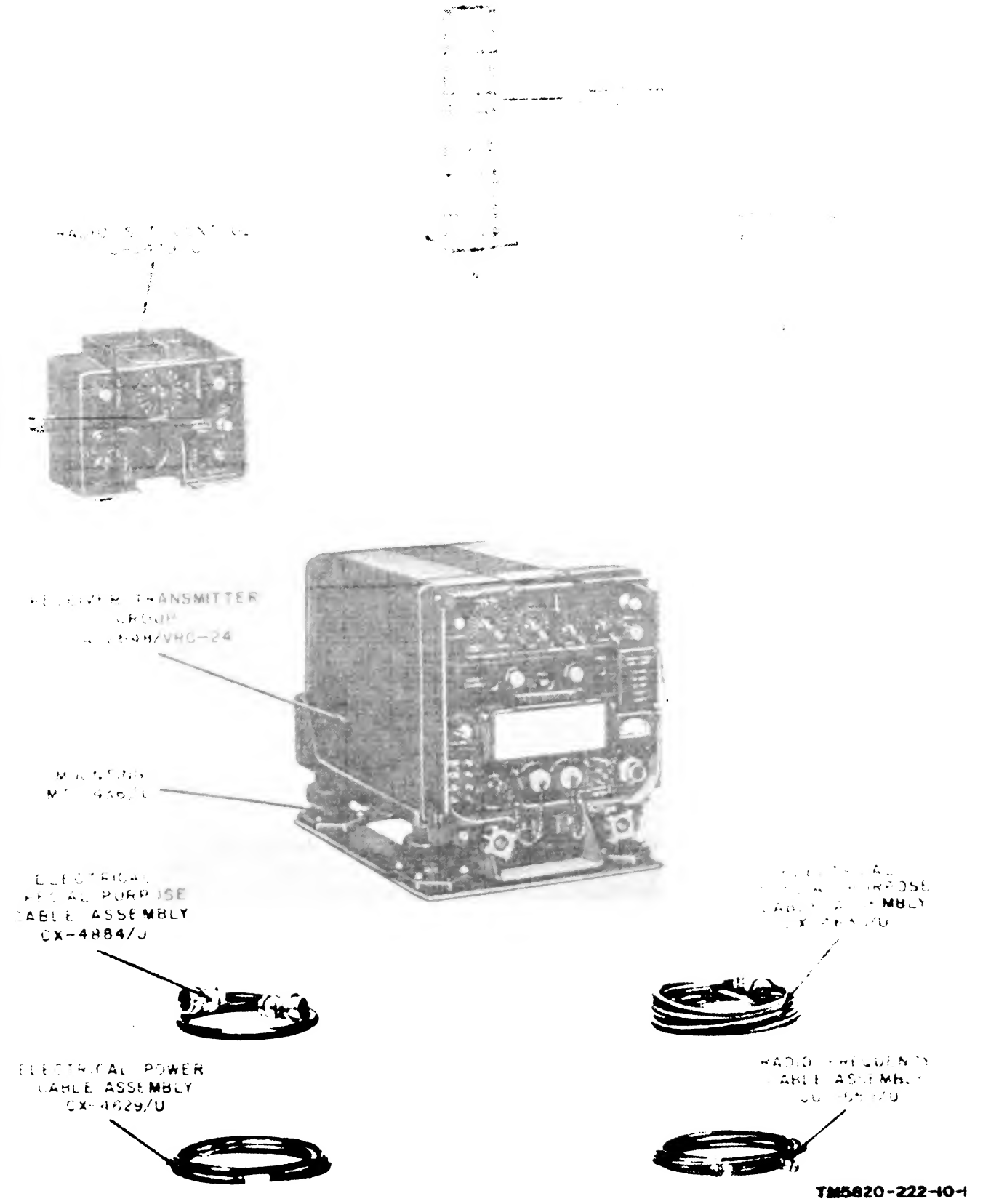



***Figure 1. Radio Set AN/VRC-24, major components.***



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# CHAPTER 1
# INTRODUCTION

## Section I. GENERAL

### 1. Scope

This manual describes Radio Sets AN/VRC-24 (fig. 1) and AN/TRC-68 (fig. 2) and covers the operation and operator's maintenance of the radio sets. It includes operation, first echelon maintenance, and replacement of parts available to first echelon. Appendix I contains a list of references.

### 2. Forms and Records

*a. Unsatisfactory Equipment Reports.*

(1) Fill out and forward DA Form 468 (Unsatisfactory Equipment Report) to the Commanding Officer, U. S. Army Signal Equipment Support Agency, Fort Monmouth, N. J., as prescribed in AR 700-38.

(2) Fill out and forward AF TO Form 29 (Unsatisfactory Report) to the Commander, Air Materiel Command, Wright-Patterson Air Force Base, Ohio, as prescribed in AF TO 00-35D-54.

*b. Report of Damaged or Improper Shipment.* Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700-58 (Army) and AFR 71-4 (Air Force).

*c. Preventive Maintenance Forms.* Prepare DA Form 11-238 (fig. 17) (Maintenance Check List for Signal Equipment (Sound Equipment, Radio, Direction Finding, Radar, Carrier, Radiosonde and Television)), in accordance with instructions on the form.

*d. Parts List Form.* Forward DA Form 2028 (Recommended Changes to DA Technical Manual Parts Lists or Supply Manuals 7, 8, and 9) directly to the Commanding Officer, U. S. Army Signal Equipment Support Agency, Fort Monmouth, N. J., with comments on parts listings.

*e. Comments on Manual.* Forward all other comments on this publication direct to the Commanding Officer, U. S. Army Signal Publications Agency, Fort Monmouth, N. J.

## Section II. DESCRIPTION AND DATA

### 3. Purpose and Use

*a.* Radio Sets AN/VRC-24 and AN/TRC-68 operate on 1,750 crystal-controlled channels within the frequency range of 225.0 to 399.9 megacycles (mc). The sets provide for the transmission and reception of amplitude-modulated (am) radiotelephone signals for ground-to-air liaison. The sets may also be used to transmit and receive encoded voice signals.

*b.* The AN/VRC-24 is used for vehicular ground-to-air communications. It may also be used as a retransmission device for Radio Sets AN/GRC-3 through -8 (TM 11-284) when connected as shown in figure 3. Audio output from the AN/VRC-24 receiver frequency-modulates the transmitter of one of the AN/GRC-3 through -8 series for retransmission. Audio output from the AN/GRC-3 through -8 receiver amplitude-modulates the transmitter of the AN/VRC-24.

*c.* The AN/TRC-68 is used for ground-to-air radio communications from a stationary location. It can be vehicular mounted if a suitable 115-volt or 230-volt alternating current (ac) power source is available. Control Group AN/GRA-6 (TM 11-5038) is provided to control and operate the AN/TRC-68 from a remote position (fig. 4).

### 4. Technical Characteristics

Frequency range ..... 225.0 mc to 399.9 mc.
Type of modulation ..... Am.
Type of transmission ..... Voice.
Number of channels ..... 1,750.



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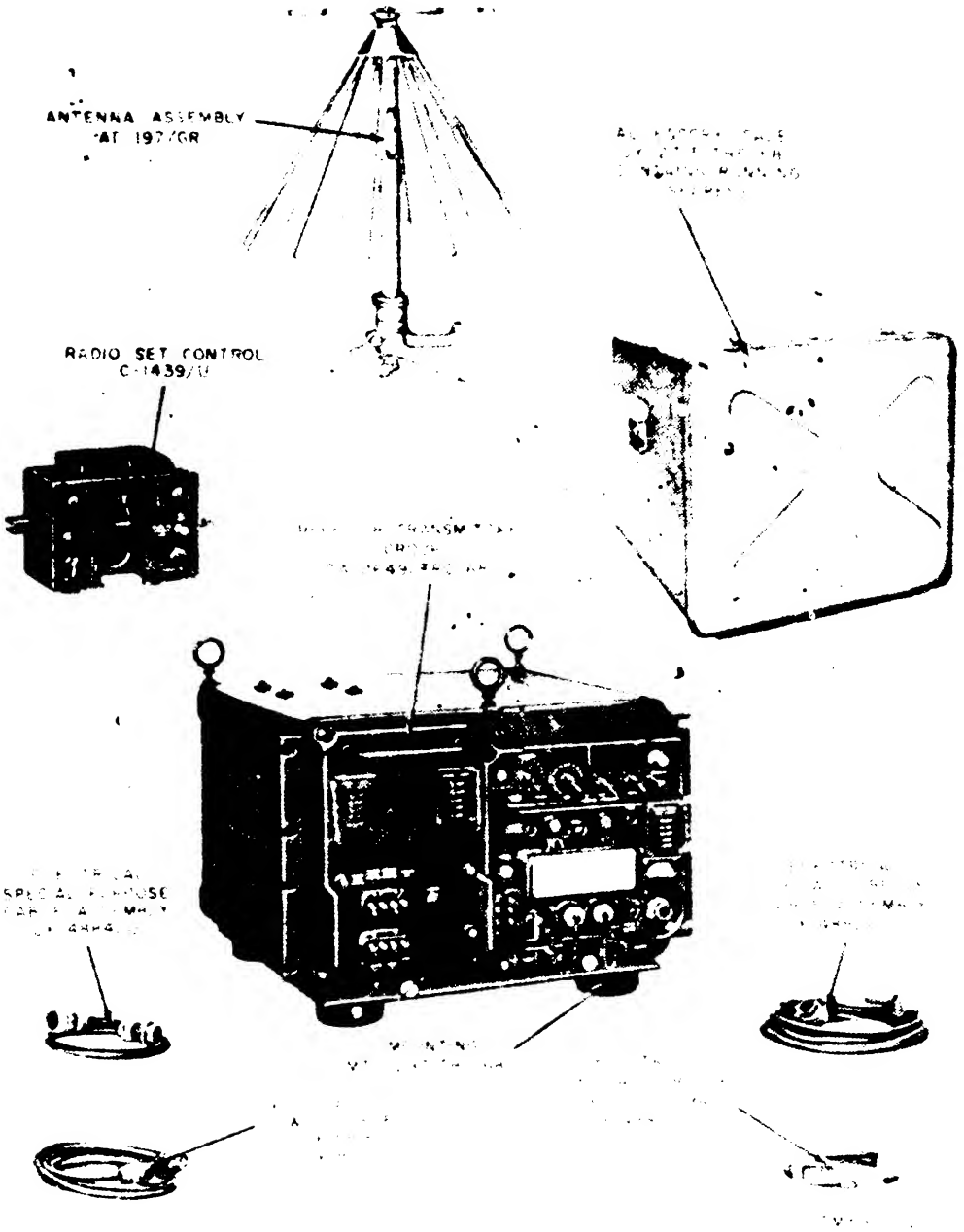



*Figure 2. Radio Set AN/TRC–68, major components.*

**Number of preset channels** .....19.
**Channel spacing** .....100 kc between channels.
**Time required to preset channel** .....Approximately 10 sec.
**Channel selection time** .....5 sec maximum.
**Number of tubes** .....29.
**Number of crystals** .....35.

**Power requirements** .....250 watts receiving, 300 watts transmitting, unmodulated.

**Power source** .....AN/VRC–24; 24-volt vehicular battery.

AN/TRC–68; 115- or 230-volt, 50/60-cps, single-phase.



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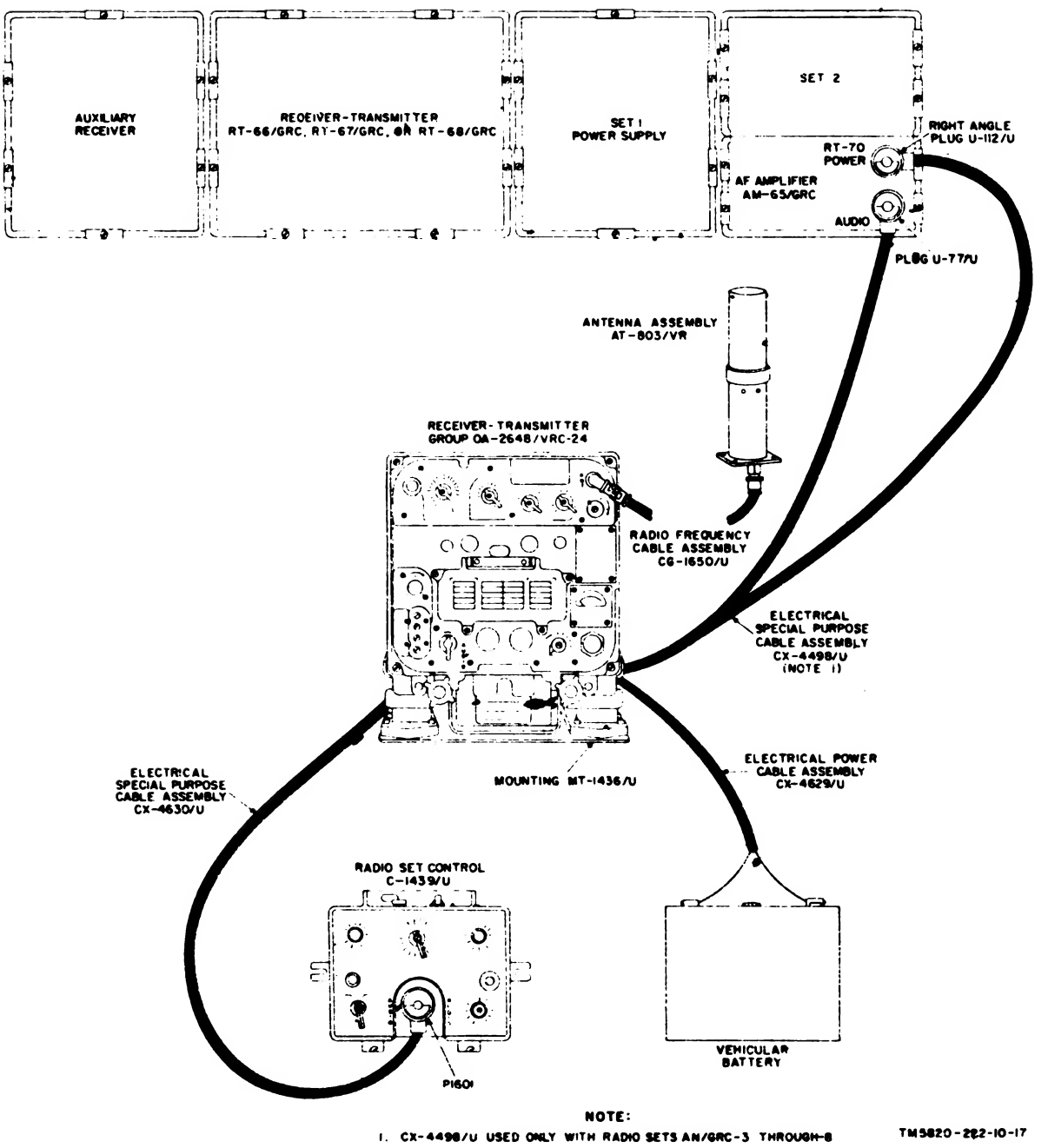



*Figure 3. Radio Set AN/VRC-24 as used with Radio Sets AN/GRC-3 through -8, cording diagram.*

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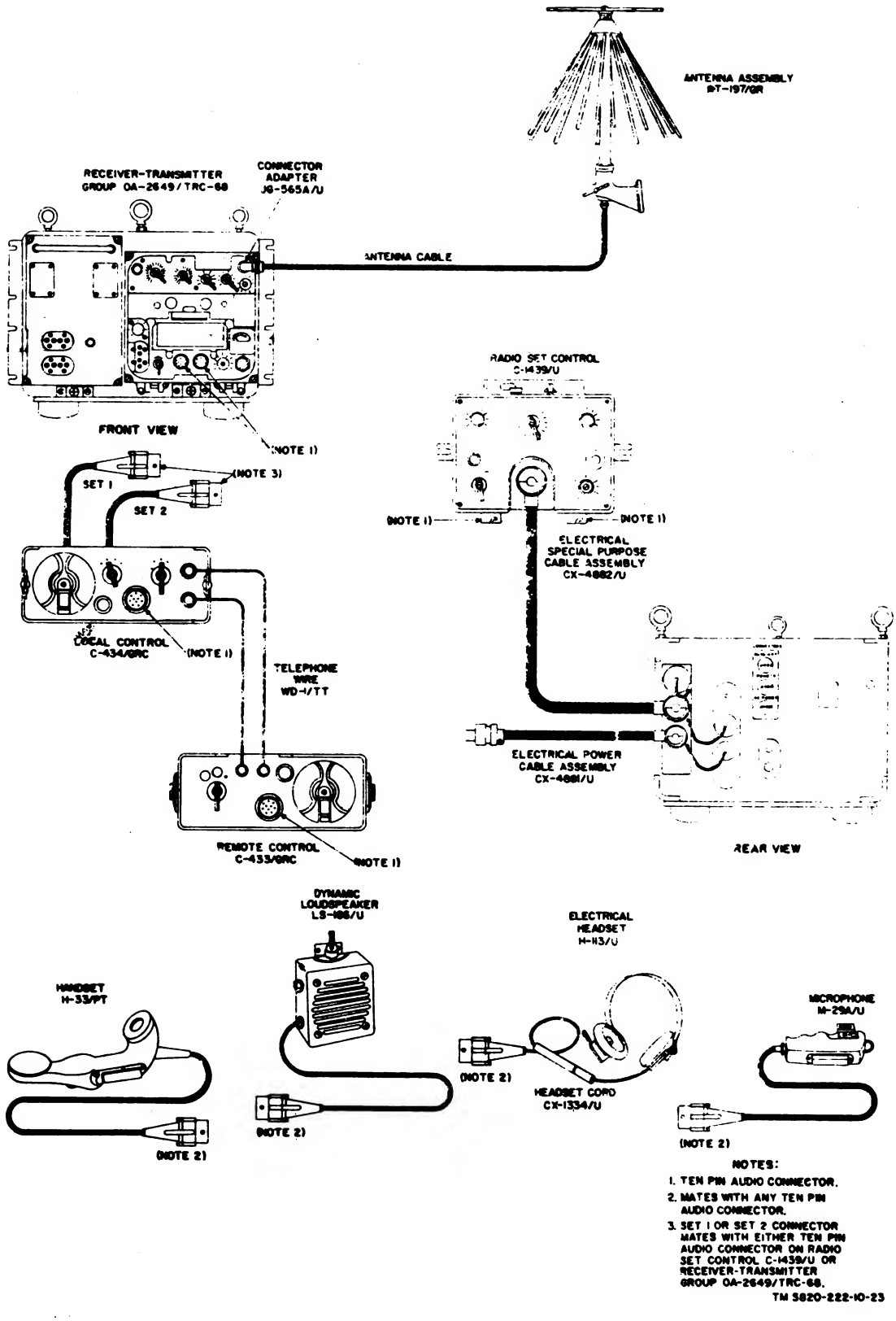



*Figure 4. Radio Set AN/TRC-68, cording diagram.*

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## 5. Components

*a. Radio Set AN/VRC-24.*

| Quantity | Item | Fig. No. | Height (in.) | Depth (in.) | Width (in.) | Unit weight (lb) |
|---|---|---|---|---|---|---|
| 1 | Receiver-Transmitter Group OA-2648/VRC-24 including: | 1 | 12 | 15 | 10 | 62 |
| 1 | Receiver-Transmitter RT-323/VRC-24 | 5 | 10 | 15½ | 9½ | 48 |
| 1 | Dynamotor DY-151/U | 5 | 3½ | 10 | 3½ | 6.5 |
| 1 | Receiver-Transmitter Case CY-2557/VRC-24 | 5 | 12 | 16½ | 10⅝ | 8 |
| 1 | Mounting MT-1436/U | 1 | 5¾ | 18 | 10½ | 20 |
| 1 | Radio Set Control C-1439/U | 1 | 6½ | 2⅞ | 6½ | 5 |
| 1 | Antenna AT-803/VR | 1 | 11 | 3 | 2¾ | |
| 1 | Radio Frequency Cable Assembly CG-1650/U | 1 | 6 ft (lg) | | | |
| 1 | Electrical Power Cable Assembly CX-4629/U | 1 | 8 ft (lg) | | | |
| 1 | Electrical Special Purpose Cable Assembly CX-4630/U | 1 | 10 ft (lg) | | | |
| 1 | Electrical Special Purpose Cable Assembly CX-4884/U | 1 | 3 ft (lg) | | | |
| 1 | Dynamic Loudspeaker LS-166/U | 11 | 5 | 5½ | 3½ | 1 |
| 1 | Microphone M-29A/U | 11 | | | | |
| 1 set | Running spares (c below) | 10 | | | | |
| 2 | TM 11-5820-222-10 | 11 | 10½ | | 8 | |
| 2 | TM 11-5820-222-20 | 11 | 10½ | | 8 | |

*b. Radio Set AN/TRC-68.*

| Quantity | Item | Fig. No. | Height (in.) | Depth (in.) | Width (in.) | Unit weight (lb) |
|---|---|---|---|---|---|---|
| 1 | Receiver-Transmitter Group OA-2649/TRC-68 including: | 2 | 12 | 20 | 18¼ | 155.6 |
| 1 | Receiver-Transmitter RT-441/TRC-68 | 6 | 10 | 15½ | 9½ | 48.8 |
| 1 | Centrifugal Fan HD-390/U | 6 | 3½ | 9½ | 3½ | 6 |
| 1 | Receiver-Transmitter Case CY-2712/TRC-68 | 6 | 12½ | 20 | 19¼ | 55.3 |
| 1 | Power Supply PP-1494/U | 6 | 12 | 18¾ | 7⅛ | 57.5 |
| 1 | Mounting MT-2297/TRC-68 | 6 | | | | |
| 1 | Radio Set Control C-1439/U | 2 | 6½ | 2⅞ | 6½ | 5 |
| 1 | Accessory Case CY-2713/TRC-68 | 2 | 23 | 24 | 26⅛ | 93.5 |
| 1 | Electrical Power Cable Assembly CX-4881/U | 2 | 25 ft (lg) | | | 2.3 |
| 1 | Electrical Special Purpose Cable Assembly CX-4882/U | 2 | 20½ ft (lg) | | | |
| 1 | Electrical Special Purpose Cable Assembly CX-4883/U | 2 | 3 ft (lg) | | | |
| 1 | Electrical Special Purpose Cable Assembly CX-4884/U | 2 | 3 ft (lg) | | | |
| 1 | Connector Adapter UG-565A/U | 9 | | | | |
| 1 | Antenna Assembly AT-197/GR | 2 | | | | |
| 1 | Control Group AN/GRA-6 including: | 12 | | | | |
| 1 | Remote Control C-433/GRC | 12 | 3½ | 7 3/32 | 8¼ | 7 |
| 1 | Local Control C-434/GRC | 12 | 3½ | 10⅛ | 8 9/16 | 10½ |
| 1 | Handset H-33/PT | 12 | | | | |
| 1 | Bad CW-189/GR | 12 | | | | |
| 1 | Electrical Headset H-113/U | 9 | | | | |
| 1 | Headset Cord CX-1334/U | 9 | | | | |
| 1 | Dynamic Loudspeaker LS-166/U | 11 | 5 | 5½ | 3½ | 1 |
| 1 | Microphone M-29A/U | 11 | | | | |
| 1 | Spool DR-8-A and Wire WD-1/TT | 9 | | | | |
| 1 set | Running spares (c below) | 10 | | | | |
| 2 | TM 11-5820-222-10 | 11 | 10½ | | 8 | |
| 2 | TM 11-5820-222-20 | 11 | 10½ | | 8 | |



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*c. Running Spares* (fig. 10).

(1) *AN/VRC-24.*

| Quantity | Item |
|---|---|
| 2 | Electron tube, 5763 |
| 3 | Electron tube, 5654/6AK5W |
| 2 | Electron tube, 5670 |
| 2 | Electron tube, 6J4WA |
| 1 | Electron tube, 4X150D |
| 1 | Electron tube, 6442 |
| 1 | Electron tube, 7554 |
| 2 | Lamp, LM-327 |
| 3 | Fuse, 5-ampere, 32-vdc |
| 3 | Fuse, 30-ampere, 32-vdc |
| 5 | Fuse, ⅛-ampere, 250-vdc |
| 5 | Fuse, ½-ampere, 250-vdc |

(2) *AN/TRC-68.*

| Quantity | Item |
|---|---|
| 2 | Electron tube, 5763 |
| 3 | Electron tube, 5654/6AK5W |
| 2 | Electron tube, 5670 |
| 2 | Electron tube, 6J4WA |
| 1 | Electron tube, 4X150D |
| 1 | Electron tube, 6442 |
| 1 | Electron tube, 7554 |
| 3 | Lamp, LM-327 |
| 3 | Fuse, 30-ampere, 32-vdc |
| 5 | Fuse, 15-ampere, 250-vdc |
| 3 | Fuse, 5-ampere, 32-vdc |
| 5 | Fuse, 3-ampere, 125-vdc |
| 5 | Fuse, 1.5-ampere, 125-vdc |
| 5 | Fuse, ¾-ampere, 250-vdc |
| 5 | Fuse, ½-ampere, 250-vdc |
| 5 | Fuse, ¼-ampere, 250-vdc |
| 5 | Fuse, ½-ampere, 250-vdc |
| 5 | Fuse, 5-ampere, 125-vdc |

## 6. Nomenclature and Common Names

A list of components of Radio Sets AN/VRC-24 and AN/TRC-68 to which common names have been assigned is given below.

| Nomenclature | Common name |
|---|---|
| Receiver-Transmitter Case CY-2557/VRC-24 | RT-323/VRC-24 case |
| Dynamotor DY-151/U ..... | Dynamotor |
| Radio Set Control C-1439/U | Radio set control |
| Receiver-Transmitter Case CY-2712/TRC-68 | AN/TRC-68 case |
| Power Supply PP-1494/U .... | Power supply |
| Centrifugal Fan HD-390/U .. | RT blower |
| Accessory Case CY-2713/TRC-68 | Accessory case |
| Electrical Headset H-113/U | Headset |
| Dynamic Loudspeaker LS-166/U | Loudspeaker |

## 7. Description of Radio Set AN/VRC-24

The AN/VRC-24 includes a receiver-transmitter group, a mounting, a radio set control, an antenna, a loudspeaker, a microphone, and interconnecting cable assemblies. The receiver-transmitter group (fig. 1) is secured to the mounting which is normally bolted to a vehicular mounting surface. The cable assemblies interconnect components of the radio set and connect the radio set to the vehicular battery (fig. 3). The actual location of the components in a vehicle depends upon the vehicle and is limited by the lengths of the cable assemblies.

## 8. Description of Radio Set AN/TRC-68 (fig. 2)

*a.* The AN/TRC-68 includes a receiver-transmitter group, an antenna, a mounting, a radio set control, and an accessory case containing the interconnecting cable assemblies and the remaining components of the radio set.

*b.* The receiver-transmitter group is secured to the mounting which may be bolted to a mounting surface. Connections to the power source and radio set control are made at the rear of the receiver-transmitter group case. The interconnecting cable from the antenna is connected to the ANT connector on the front panel of the receiver-transmitter. When the AN/GRA-6 is used, Local Control C-434/GRC is connected directly to the radio set control and through a telephone wire to Remote Control C-433/GRC. The C-434/GRC and the C-433/GRC are components of the AN/GRA-6.

## 9. Description of Receiver-Transmitter Group OA-2648/VRC-24 (fig. 5)

The OA-2648/VRC-24 consists of a receiver-transmitter, a dynamotor (mounted on the receiver-transmitter) and a case. All operating controls, meter, indicator lamps, and fuses are located on the front panel of the receiver-transmitter. An access plate covers the spare fuse and lamp compartment. An access door covers the memory drum and provides a space for recording the frequencies of the preset channels. Receptacles are provided on the front panel for connection to a microphone, loudspeaker or headset, antenna, and to security equipment. All other connections are made at



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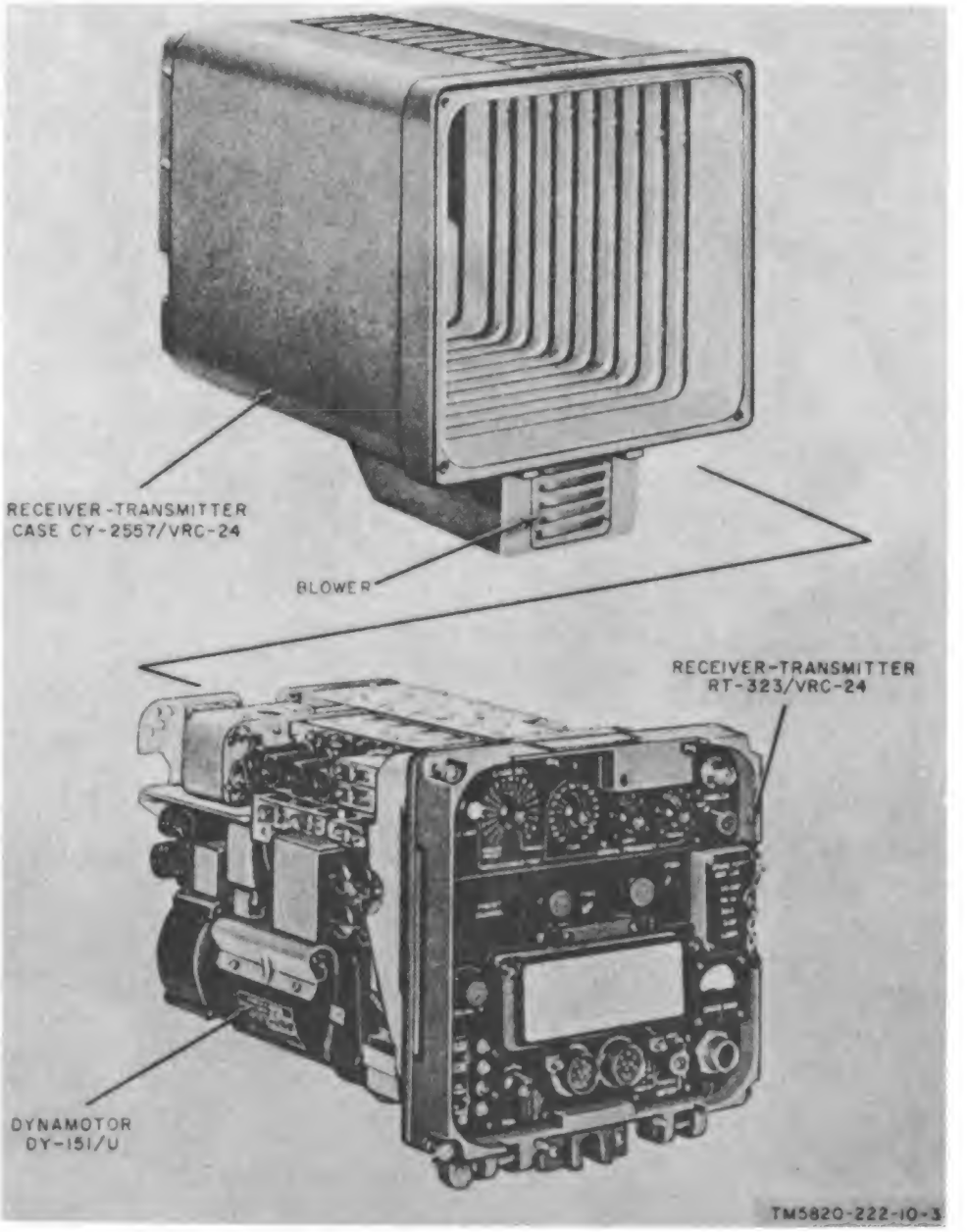



*Figure 5. Receiver-Transmitter Group OA-2648/VRC-24.*

the rear of the receiver-transmitter. A blower is fastened to the underside of the case. The dynamotor is connected to the vehicular battery and generates the necessary operating voltages for the receiver-transmitter.

## 10. Description of Receiver-Transmitter Group OA-2649/TRC-68 (fig. 6)

The OA-2649/TRC-68 consists of a receiver-transmitter, a power supply, and a case. The receiver-transmitter is the same as the receiver-transmitter of the AN/VRC-24 (par. 9) except that a blower is mounted in place of the dynamotor and the number of fuses on the front panel is different. The power supply operates from either a 115-volt or 230-volt ac source and contains the remaining fuses for the radio set. The case is divided into two compartments, one for the power supply, the

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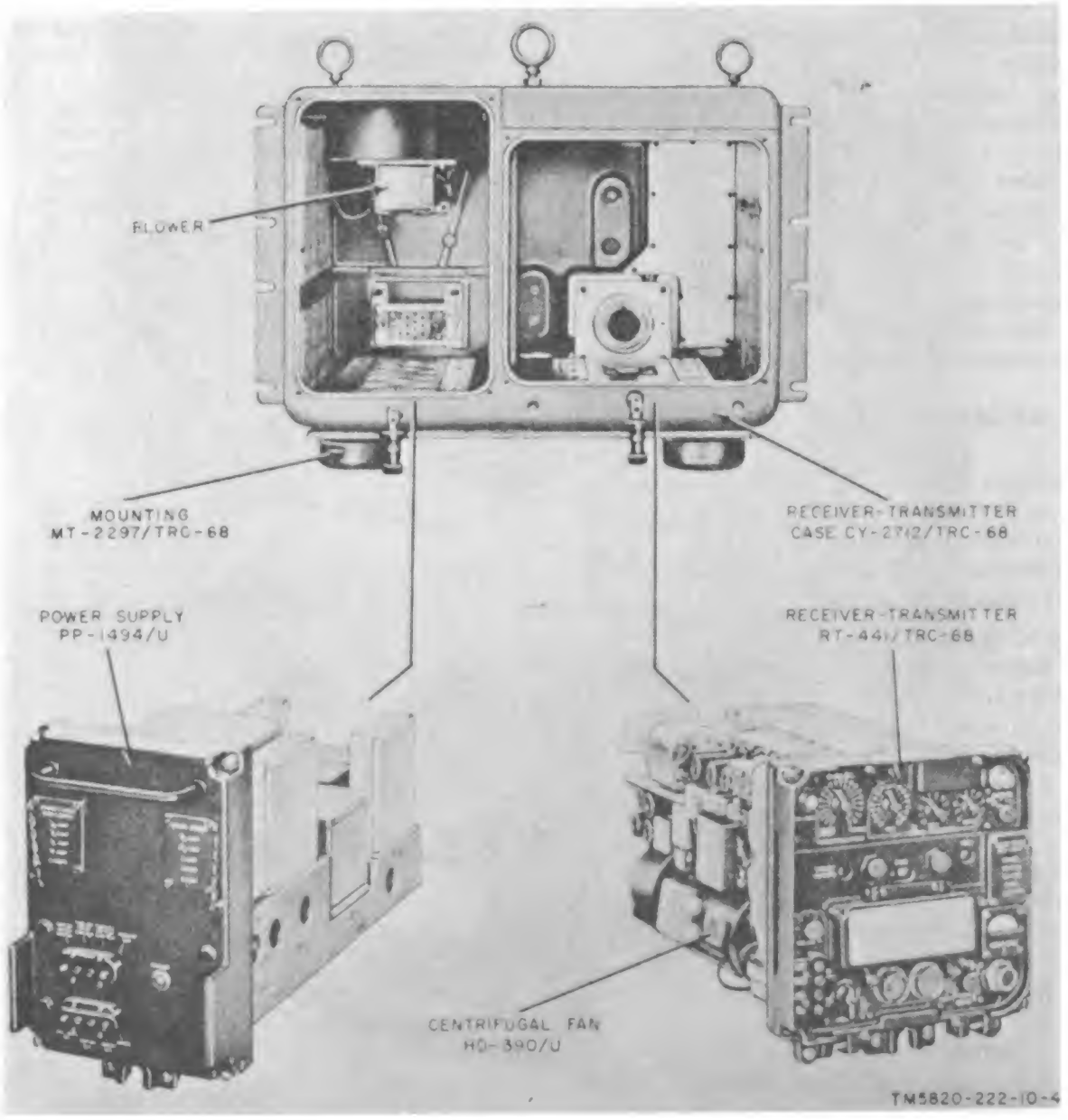



*Figure 6. Receiver-Transmitter Group OA-2649/TRC-68 and Mounting MT-2297/TRC-68.*

other for the receiver-transmitter. A blower is mounted at the rear of the power supply compartment. The louvered sides of the case are covered with plates to make the unit immersion proof. The plates are removed when operating.

## 11. Radio Set Control C-1439/U
(fig. 1 and 13)

The radio set control contains controls which permit operation of the radio set from a position at a short distance away from the receiver-transmitter. The radio set control may be used for radio, interphone, or simultaneous radio and interphone operation. Receptacles at the bottom of the radio set control provide connections for a microphone and either a loudspeaker or headset. In the AN/TRC-68, these receptacles also provide connections to Local Control C-434/GRC of the AN/GRA-6.



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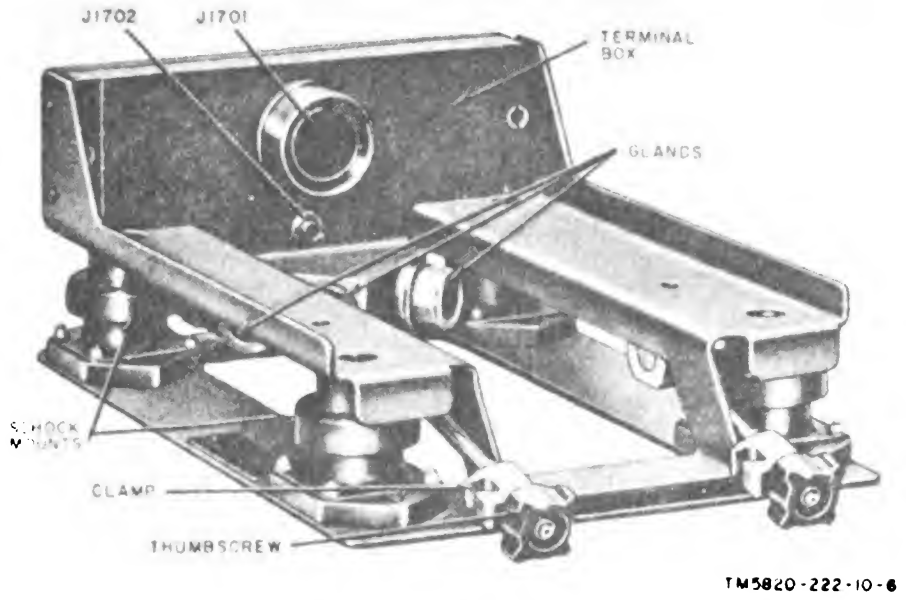



*Figure 7. Mounting MT-1436/U.*

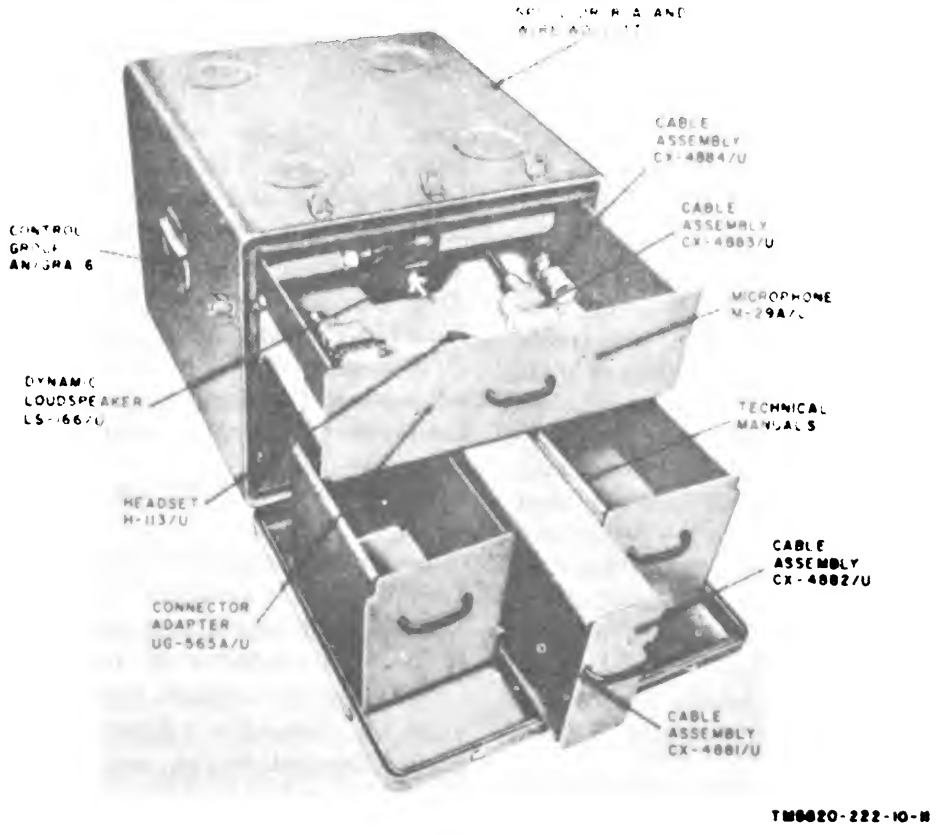



*Figure 8. Accessory case.*



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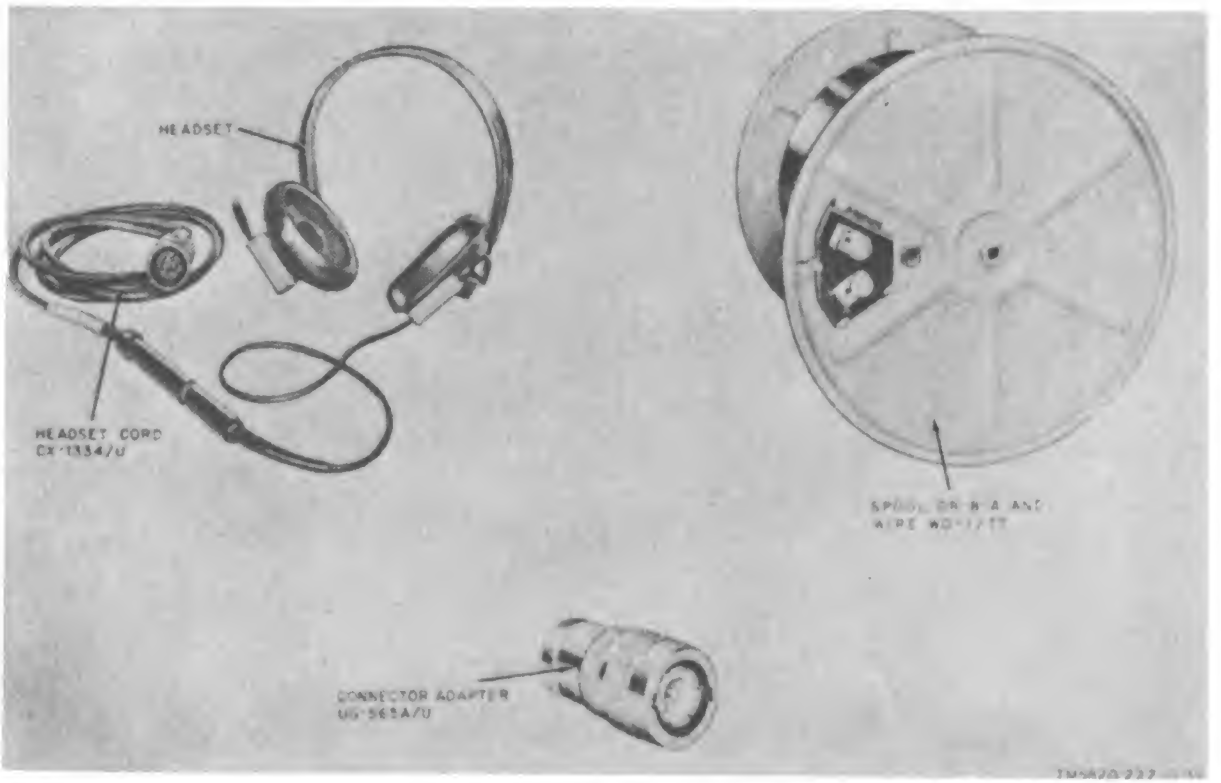



*Figure 9. Spool DR–8–A with wire, Connector Adapter UG–565A/U, and headset with cord.*

## 12. Mounting MT-1436/U
(fig. 7)

The mounting consists of two steel platforms separated by four shock mounts. The lower platform is drilled to accommodate bolts for fastening the mounting rigidly to a vehicle. A waterproof terminal box with a removable cover is fastened to the rear of the upper platform. The terminal box contains the receptacles which receive the rear plugs of Receiver-Transmitter Group OA-2648/VRC-24. Two terminal boards in the terminal box are used for connecting the receptacles to the power and interconnecting cables. Three glands provide waterproof entrances for the cables. Clamps at the front of the mounting engage pins in the lower edge of the RT-323/VRC-24 front panel. The thumbscrews which secure the clamps also serve as injector-ejector mechanisms.

## 13. Antennas

*a. Antenna AT-803/VR.* Antenna AT-803/VR (fig. 1) is designed for mobile operation. It is used with Receiver-Transmitter Group OA-2648/VRC-24. It is approximately 10 inches long and has a UG-484/U connector at its base for attaching the CG-1650/U.

*b. Antenna Assembly AT-197/GR.* Antenna Assembly AT-197/GR (fig. 2) is used with Receiver-Transmitter Group OA-2649/TRC-68. It is a disk-cone antenna with two radiator assemblies; the upper part forms a disk, and the lower part forms a cone.

## 14. Cables for Radio Set AN/VRC-24
(fig. 1)

*a. Radio Frequency Cable Assembly CG-1650/U.* This is a 6-foot coaxial radiofrequency (rf) cable which connects Antenna AT-803/VR to the ANT connector on the RT-323/VRC-24.

*b. Electrical Power Cable Assembly CX-4629/U.* This cable is a two-wire 8-foot power cable. Connections on one end are made at the vehicular battery terminals and connections at the other end are made at Mounting MT-1436/U.

*c. Electrical Special Purpose Cable Assem-*



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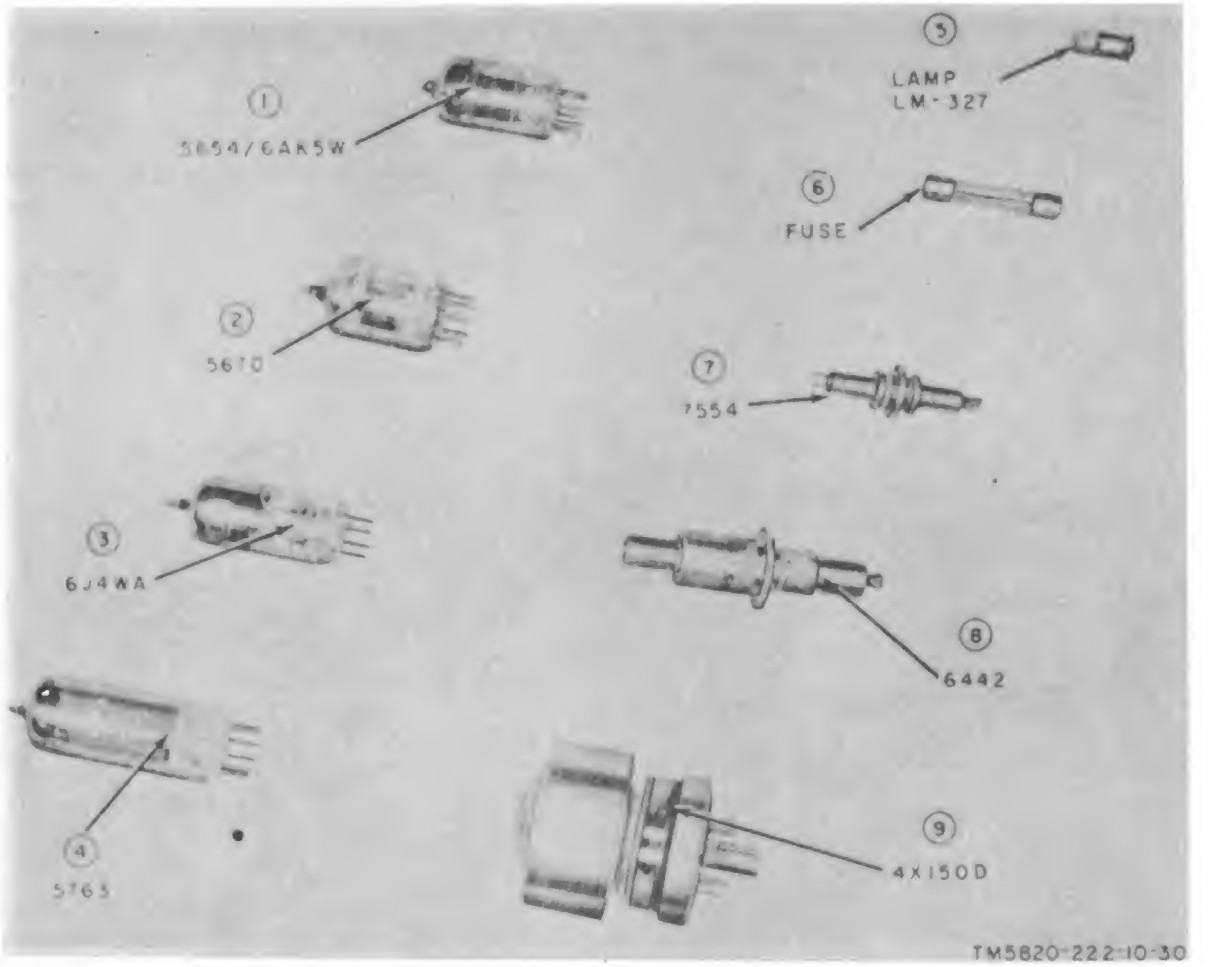



*Figure 10. Running spares.*

*bly CX-4630/U.* This is a 10-foot control cable. A 30-contact plug at one end of the cable connects to the radio set control and 22 wires at the other end are soldered to terminal boards in Mounting MT-1436/U.

*d. Electrical Special Purpose Cable Assembly CX-4884/U.* This is a 3-foot extension cable that permits operation of the RT-323/VRC-24 when removed from its case for maintenance.

## 15. Cables for Radio Set AN/TRC-68 (fig. 2)

*a. Electrical Power Cable Assembly CX-4881/U.* This is a 25-foot, 2-conductor power cable. One end plugs into an ac outlet and the other end connects to the AC POWER receptacle at the rear of the AN/TRC-68 case.

*b. Electrical Special Purpose Cable Assembly CX-4882/U.* This is a 20½-foot control cable. It connects the radio set control to the receiver-transmitter group.

*c. Electrical Special Purpose Cable Assembly CX-4883/U.* This is a 3-foot extension cable that permits operation of the power supply when removed from the AN/TRC-68 case for maintenance.

*d. Electrical Special Purpose Cable Assembly CX-4884/U.* This is a 3-foot extension cable that permits operation of the RT-441/TRC-68 when removed from the AN/TRC-68 case for maintenance.

## 16. Accessory Case CY-2713/TRC-68 (fig. 8)

The accessory case contains four drawers for storing the accessory equipment described in paragraph 18, Spool DR-8-A and Wire WD-1/TT (fig. 9), the interconnecting cables, spare tubes (fig. 10), and technical manuals supplied as part of the AN/TRC-68.

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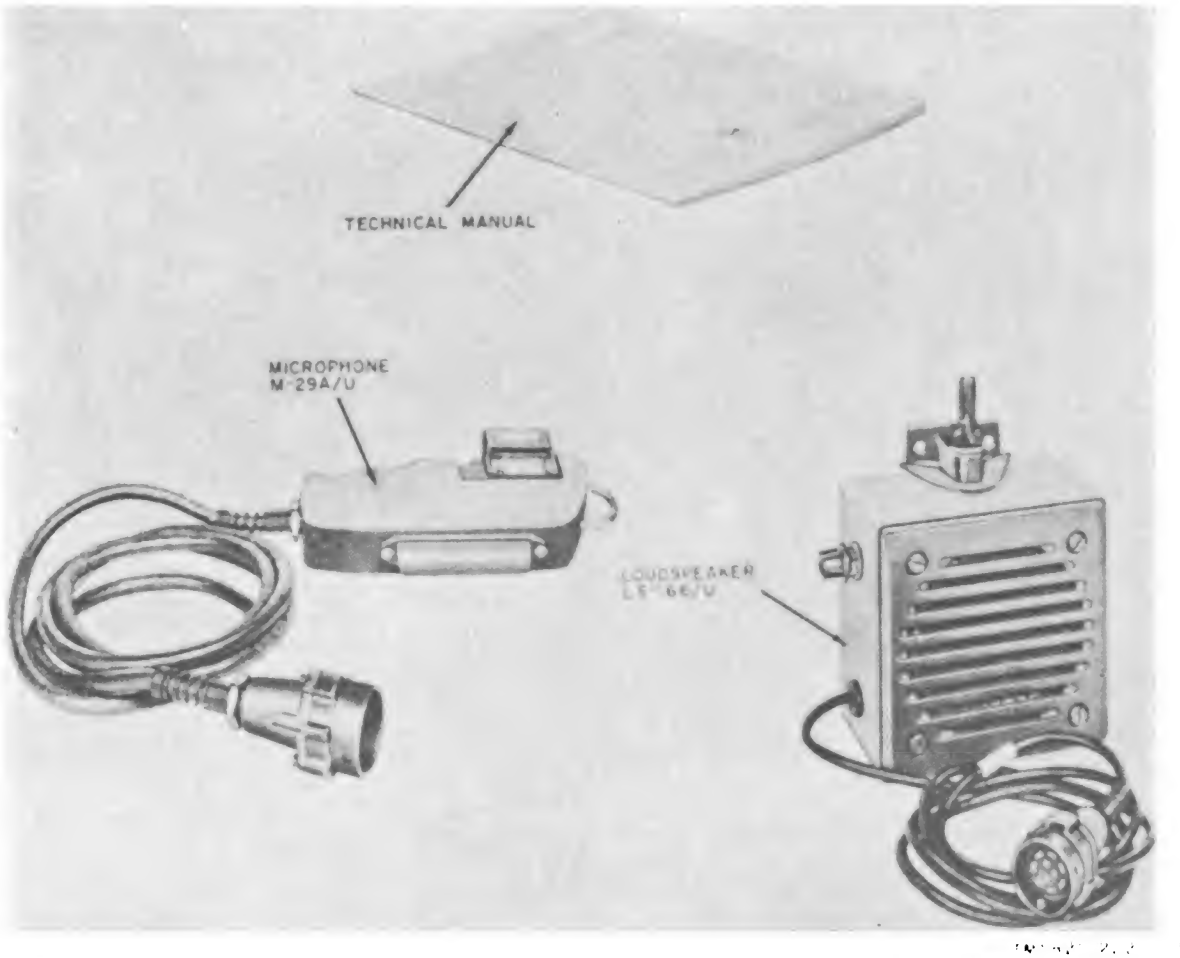



*Figure 11. Microphone, technical manual, and loudspeaker.*

## 17. Miscellaneous Components

*a. Control Group AN/GRA-6* (fig. 12). The AN/GRA-6 (TM 11-5038) consists of a local and a remote control, a handset, and a carrying bar. The AN/GRA-6 provides push-to-talk control of the AN/TRC-68 from a position up to 2 miles away.

*b. Headset and Headset Cord* (fig. 9). The headset consists of two series-connected earphones. A 14-inch cord, terminated at the earphones, connects the headset to Headset Cord CX-1334/U. The CX-1334/U is a 5-foot cord which is used to connect the headset to an AUDIO receptacle on the RT-323/VRC-24, RT-441/TRC-68, or radio set control.

*c. Loudspeaker* (fig. 11). The loudspeaker is a 4-inch unit. A 5-foot cord that terminates in a 10-pin plug is used to connect the loudspeaker to an AUDIO receptacle on the RT-323/VRC-24, RT-441/TRC-68, or radio set control. A universal-type clamp is provided on the speaker case for mounting purposes.

*d. Microphone M-29A/U* (fig. 11). The microphone element is housed in a plastic case. A push-to-talk switch is located on the side of the case. A connecting cord terminated in a 10-pin plug is used to connect the microphone to an AUDIO receptacle on the RT-323/VRC-24, RT-441/TRC-68, or radio set control.

*e. Connector Adapter UG-565A/U* (fig. 9). The adapter mates a series C female plug with a series N male plug. It is used to adapt the ANT connector on the RT-441/TRC-68 to the cable from Antenna Assembly AT-197/GR.

*f. Mounting MT-2297/TRC-68* (fig. 6). The mounting consists of a single plate upon which the AN/TRC-68 case is mounted and four feet which can be fastened to a mounting surface.



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## 18. Additional Equipment Required

Electrical Special Purpose Cable Assembly CX-4498/U (fig. 3) is not supplied with the AN/VRC-24, but is required when the AN/VRC-24 is to be used as a retransmission device with Radio Sets AN/GRC-3 through -8. Wires at the single end of the cable are wired to terminal boards in the mounting, and the branched ends of the cable connect to the RT-70 POWER and AUDIO receptacles of AF Amplifier AM-65/GRC, part of Radio Sets AN/GRC-3 through -8.




*Figure 12. Control Group AN/GRA-6.*



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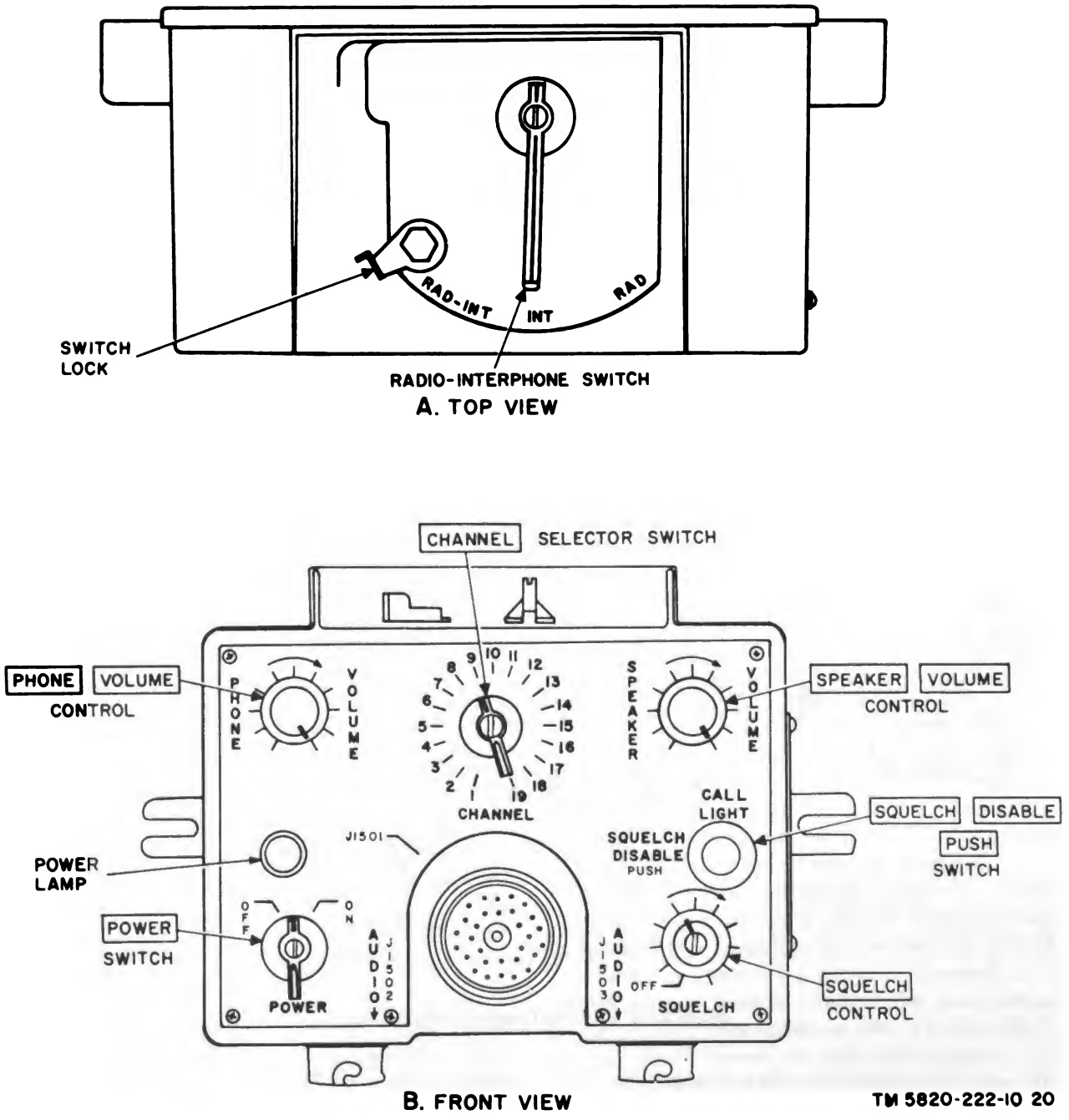



*Figure 13. Radio Set Control C-1439/U, controls and indicators.*



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# CHAPTER 2
# OPERATING INSTRUCTIONS

## Section I. CONTROLS AND INDICATORS

*Note.* Controls of the AN/GRA-6 supplied with the AN/TRC-68 are covered in TM 11-5038.

### 19. Radio Set Control C-1439/U (fig. 13)

| Control or indicator | Function |
|---|---|
| POWER switch | Turns the equipment on or off. Switch is spring-loaded to neutral position. |
| Power lamp | Lights when power is on. |
| SPEAKER VOLUME control | Controls loudspeaker audio output level. |
| PHONE VOLUME control | Controls headset audio ouput level. |
| CHANNEL selector switch | Selects one of 19 preset channels when the CHAN SEL switch on the receiver-transmitter is in the REMOTE PRESET position. |
| SQUELCH DISABLE-PUSH switch and CALL LIGHT lamp | *Switch*<br>When pushed, disables the squelch circuit.<br>*Lamp*<br>Lights when the SQUELCH control is OFF, when the SQUELCH DISABLE PUSH switch is pushed, or when the signal received is strong enough to deactivate the squelch. |
| SQUELCH control | Squelch circuit quiets receiver when there is no incoming signal above level determined by SQUELCH control setting. Squelch circuit is inoperative with the control in the OFF position. |
| Radio-interphone switch (RAD, INT, RAD-INT). | RAD position — Allows the operator to operate (transmit or receive) RT-323/VRC-24 or RT-441/TRC-68 from the radio set control.<br>INT position — Allows operator to communicate over interphone with personnel at interphone positions connected to retransmission equipment.<br>RAD-INT position — Combines the operation of the above two positions. This position is spring-loaded and must be locked in position. |

### 20. Controls and Indicators, RT-323/VRC-24 and RT-441/TRC-68 (fig. 14)

| Control or indicator | Function |
|---|---|
| POWER switch | Turns the equipment on or off. Switch is spring-loaded to neutral position. |
| CHAN SEL switch | A 21-position switch with functions as follows:<br>*Position* — *Function*<br>REMOTE PRESET — Transfers control of channel selection and squelch operation to radio set control.<br>Positions 1 through 19 — Selects preset channels 1 through 19.<br>MANUAL — Transfers frequency selection control to the MANUAL FREQUENCY switches; TENS, UNITS, TENTHS. |
| MANUAL FREQUENCY switches: | |
| TENS | Selects first two digits of frequency in mc. |
| UNITS | Selects third digit of frequency in mc. |
| TENTHS | Selects fourth digit of frequency in tenths of an mc. Example: To select 325.6 mc, set TENS switch to 32, UNITS switch to 5, and TENTHS switch to .6. |
| SQUELCH control | Squelch circuit quiets receiver when there is no incoming signal above level determined by SQUELCH control setting. Squelch circuit is inoperative with the control at OFF. |



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## 20. Controls and Indicators—Continued.

| Control or indicator | Function |
|---|---|
| SQUELCH DISABLE-PUSH switch and CALL LIGHT lamp | *Switch*<br>When pushed, disables the squelch circuit.<br>*Lamp*<br>Lights when the SQUELCH control is at OFF, when the SQUELCH DISABLE-PUSH switch is pushed, or when the signal received is strong enough to deactivate the squelch. |
| VOLUME control | Adjusts the loudspeaker or local headset audio output level. |
| Meter and METER switch | The meter monitors any one of 10 circuits selected by the METER switch. Indicates whether or not monitored circuit is NORMAL. |
| | *Position* — *Function*<br>S-METER — Indicates relative strength of received signal.<br>HIGH B+ — Checks 300-volt supply.<br>LOW B+ — Checks 125-volt supply.<br>LINE V — Checks 26.4-volt supply. |
| | *Position* — *Function*<br>% MOD — Checks modulator output.<br>DVR $I_b$ — Checks plate current of driver stage.<br>PA $I_g$ — Checks grid current of power amplifier stage.<br>PA $I_b$ — Checks plate current of power amplifier stage.<br>PWR — Checks power output.<br>SWR — Checks reflected power on transmission line. |
| AUDIO receptacles | Provide connections for af output (loudspeaker or headset), microphone input, and radio control line connections. |
| PRESET CHANNEL indicator | Indicates channel on which the set is operating. When CHAN SEL switch is set at MANUAL, M appears in the window. |
| FREQ indicators | Indicate frequency to which the set is tuned. Numerals in center window indicate tens and units of megacycles and numeral in right window indicates tenths of a megacycle. |

## 21. Power Supply Indicator (fig. 15)

The only indicator on the power supply panel is the POWER lamp. When lighted, it indicates that power supply voltages are available to the RT-441/TRC-68.

# Section II. OPERATION

*Note.* Before the radio set can be operated (by SQUELCH control and CHANNEL selector switch) from the radio set control, the CHAN SEL switch on the RT-323/VRC-24 or RT-441/TRC-68 unit must be set to REMOTE PRESET.

## 22. Presetting Channels (fig. 16)

Perform the following procedures to preset channels to a desired frequency.

*a.* Operate the POWER switch momentarily to ON and release.

*b.* Loosen the four slotted-head screws in the memory drum access door and open the door.

*c.* In the SET CHAN row, find the number of the channel to be preset.

*d.* Set the CHAN SEL switch to the number in the SEL PRESET row directly below the number in the SET CHAN row. For example: To preset channel 12, set the CHAN SEL switch to 8; to preset channel 17, set the CHAN SEL switch to 13. In figure 16, the CHAN SEL switch is set to MANUAL to preset channel 4.

*e.* Slide the four pins on the memory drum in the slots for the channel being preset. Set each pin to a position above the number on



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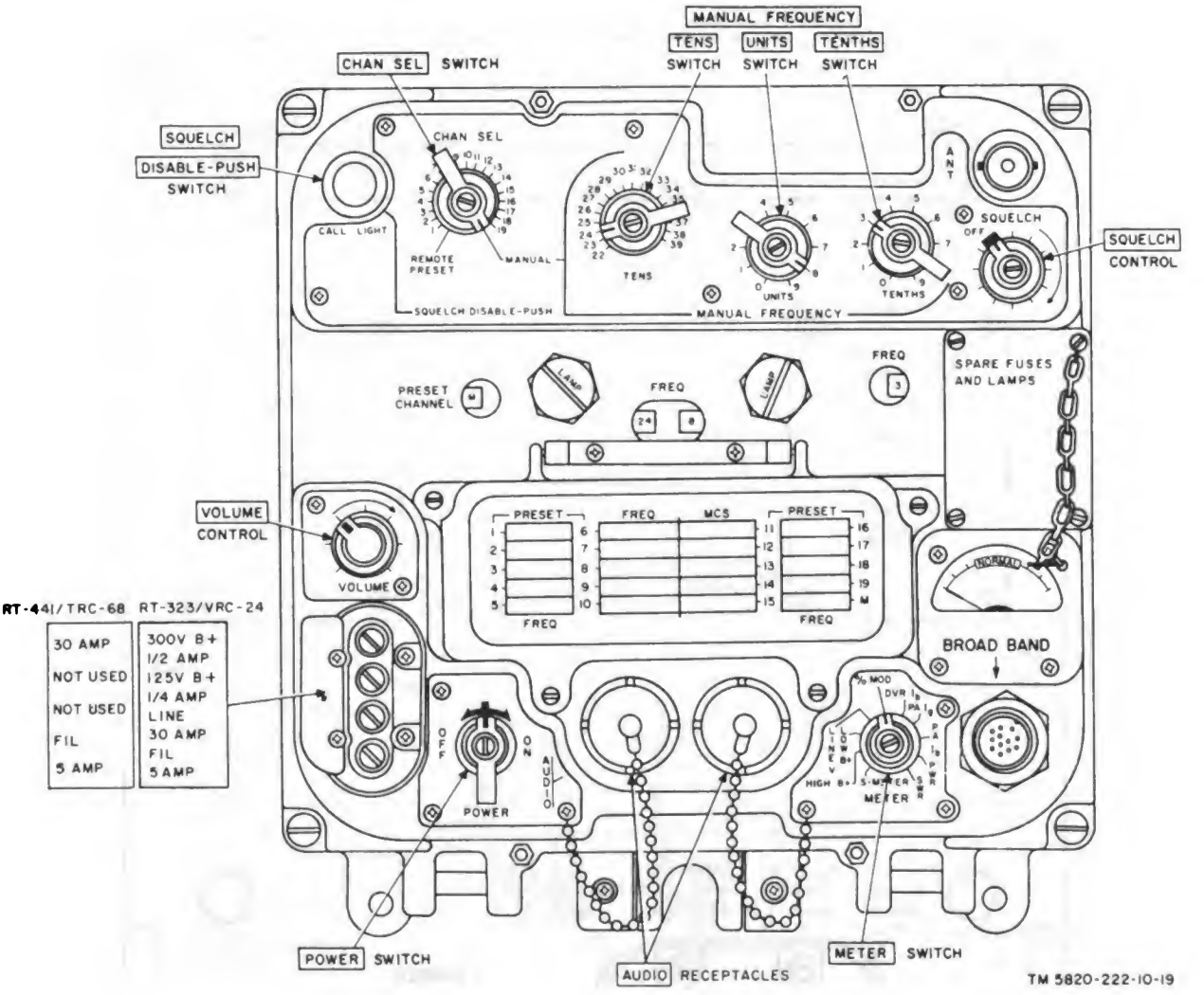



*Figure 14. Receiver-Transmitters RT–323/VRC–24 or RT–441/TRC–68, controls, indicators, and receptacles.*

the preset frequency selecting row corresponding to a digit of the desired frequency. Channel 4 in figure 16 is shown set for a frequency of 258.3 mc.

(1) The left-hand pin in the channel 4 slot is set over the number 2.

(2) The left-center pin is set over the number 5.

(3) The right-center pin is set over the number 8.

(4) The right-hand pin is set over the number 3.

*f.* Note the channel frequencies in the chart provided on the front of the memory drum access door.

## 23. Starting Procedure
(fig. 13 and 14)

*a.* Operate the POWER switch of the receiver-transmitter or the radio set control momentarily to ON.

*b.* Operate the METER switch to the LINE V position. The meter needle should indicate in the NORMAL range.

*c.* For preset-channel operation at the receiver-transmitter:

(1) Set the CHAN SEL switch to the desired channel.

(2) When the tuning cycle is complete (approximately 5 seconds), the desired channel number and channel



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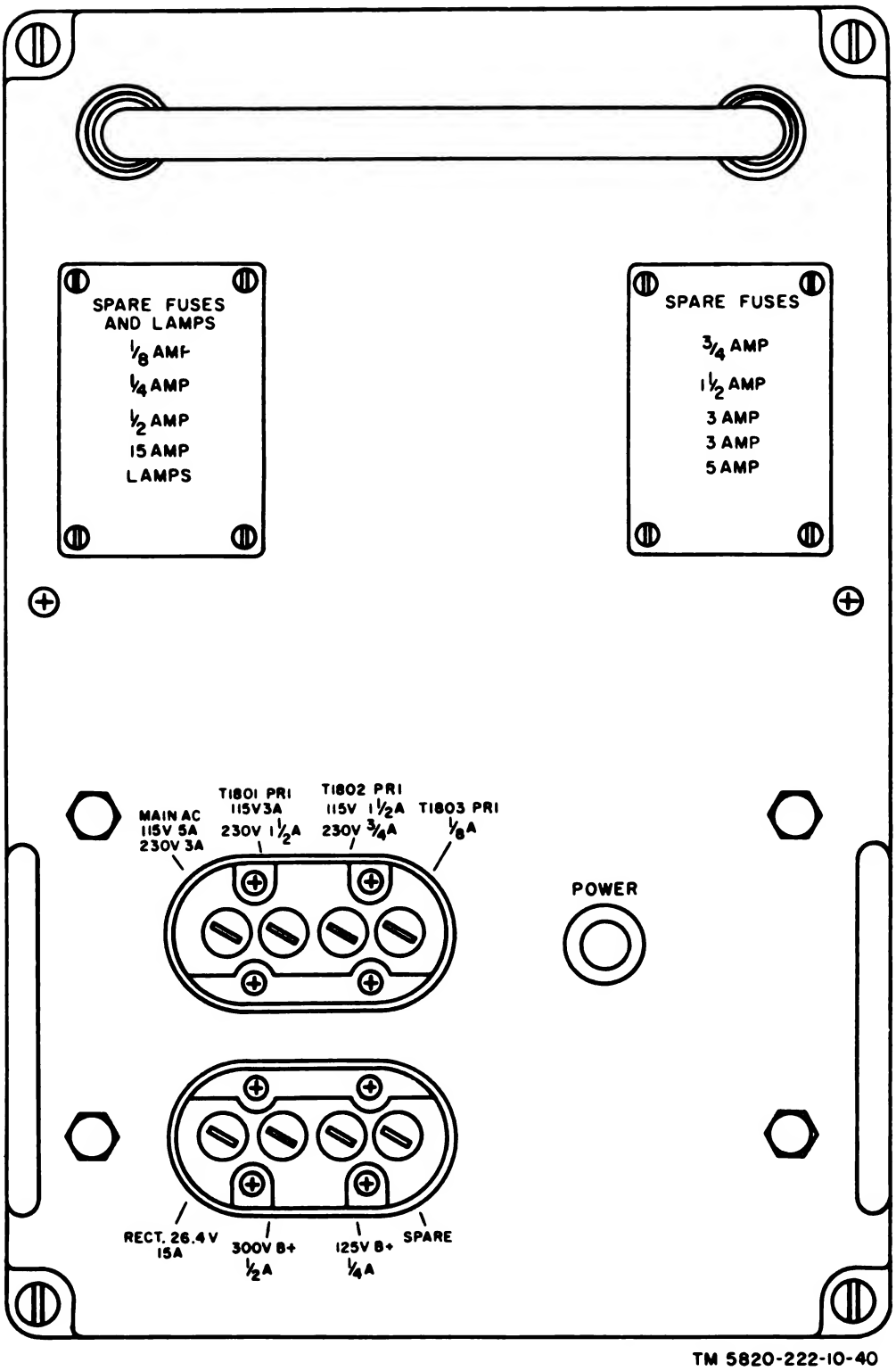



*Figure 15. Power Supply PP-1494/U, front panel.*



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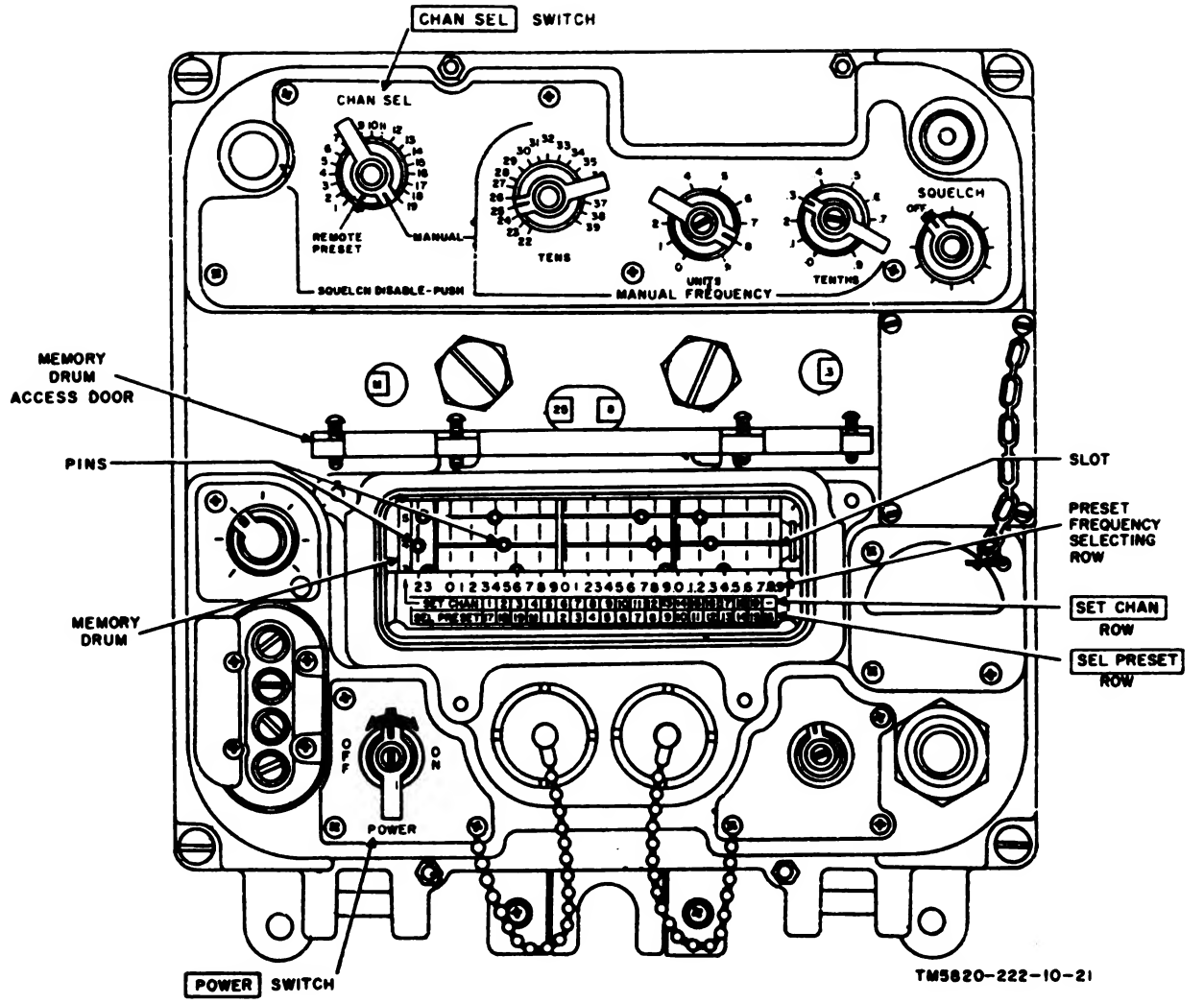



*Figure 16. Receiver-Transmitter RT-323/VRC-24 or RT-441/TRC-68, memory drum access door open.*

frequency are indicated in the PRESET CHANNEL and FREQ windows.

(3) The indication in the FREQ windows should correspond to the frequency marked on the chart on the memory drum access door.

*d.* For manual frequency operation:

(1) Set the CHAN SEL switch to MANUAL.

(2) Set the MANUAL FREQUENCY switches to the desired frequency.

*Example:* To select 325.4 mc, set the TENS switch to 32, UNITS switch to 5, and TENTHS switch to .4.

(3) When the tuning cycle is complete, the frequency is indicated in the FREQ windows; the PRESET CHANNEL window indicates M.

*e.* For operation at the radio set control:

(1) Set the CHAN SEL switch at the receiver-transmitter to REMOTE PRESET.

(2) Set the CHANNEL selector switch at the radio set control to the desired channel.

*f.* After the desired preset channel or manual frequency is set, connect the microphone and the loudspeaker or headset to the AUDIO receptacles at the receiver-transmitter or the radio set control. The radio set is now ready for push-to-talk operation.



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## 24. Radiotelephone Reception

*a. Squelch.*

(1) For average or strong signal reception, turn the SQUELCH control clockwise, with no incoming signal, until the CALL LIGHT goes out and the noise in the loudspeaker or headset just disappears.

(2) For weak signal reception, turn the SQUELCH control to OFF.

(3) To momentarily disable squelch operation, press and hold down the SQUELCH DISABLE-PUSH switch.

*b. Volume.*

(1) At the receiver-transmitter, use the VOLUME control to adjust the loudspeaker or headset output (fig. 14).

(2) At the radio set control, use either the PHONE VOLUME or SPEAKER VOLUME control as appropriate (B, fig. 13).

## 25. Radiotelephone Transmission

*a. Operation at Receiver-Transmitter.*

(1) Set the METER switch to % MOD.

(2) Operate the microphone push-to-talk switch and speak into the microphone.

(3) The meter should indicate in the NORMAL range while you speak.

*b. Operation at Radio Set Control.*

(1) Set the radio-interphone switch (A, fig. 13) to either the RAD or lock it in the RAD-INT position. On RAD-INT the transmitted speech is also heard over the interphone system.

(2) Operate the microphone push-to-talk switch and speak into the microphone.

*c. Operation at the AN/GRA-6 (AN/TRC-68 only).*

(1) Set the switches on the AN/GRA-6 for the desired operation as directed in TM 11-5038.

(2) Set the radio-interphone switch on the radio set control for the desired operation (RAD or RAD-INT).

(3) Operate the push-to-talk switch on the AN/GRA-6 handset and speak into the microphone portion of the handset.

## 26. Interphone Operation at Radio Set Control

*a.* Set the radio-interphone switch to INT.

*b.* Operate the microphone push-to-talk switch and speak into the microphone.

*c.* Communication is provided between the positions at the radio set control, the receiver-transmitter, and the interphone portion of Radio Sets AN/GRC-3 through -8.

*d.* In the RAD-INT position, the transmitted speech is also heard over the interphone system (para. 25*b*).

## 27. Stopping Procedure

To shut off the radio set, momentarily set the POWER switch on the radio set control or the receiver-transmitter to OFF.



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# CHAPTER 3

# MAINTENANCE INSTRUCTIONS

## 28. Scope of Operator's Maintenance

*a.* The following is a list of maintenance duties normally performed by the operator of the AN/VRC-24 or AN/TRC-68. The operator requires no special tools or equipment.

*b.* Operator's maintenance for the AN/VRC-24 and AN/TRC-68 consists of the following:

(1) Preventive maintenance (para. 29).

(2) Visual inspection (para. 30).

(3) Operational checklist (para. 31).

(4) Checking cable connections (fig. 3 and 4).

## 29. Preventive Maintenance

*a. DA Form 11-238.* DA Form 11-238 (fig. 17) is a preventive maintenance checklist to be used by the operator. Items 1 through 4 are checked daily, and items 5 through 11 are checked weekly by the operator. Items not applicable to the radio set are lined out. Follow the instructions on the form.

*b. Items.* The information shown in this subparagraph supplements DA Form 11-238. The item numbers correspond to the ITEM numbers on the form.

| Item | Maintenance procedure |
|---|---|
| 2 | Use lint-free cloth to remove dust, dirt, moisture, and grease from the front panel surfaces and controls. If necessary, wet the cloth with Cleaning Compound (Federal stock No. 7930-395-9542). Wipe the parts with a dry, clean cloth. |
| 3 | Check the spring-return action of the POWER and SQUELCH DISABLE-PUSH switches. |

***Warning:*** **Cleaning compound is flammable and its fumes are toxic. Do not use near a flame; provide adequate ventilation.**

## 30. Visual Inspection

*a.* When the equipment fails to perform properly, turn off the power and check all the items listed below. *Do not check any item with power on.*

(1) Incorrect setting of switches and controls.

(2) Power cable or signal cords disconnected or poorly connected.

*b.* If the above checks do not locate the trouble, proceed to the operational checklist (para. 31).

## 31. Operational Checklist

*a. General.* The operational checklist will help the operator locate the trouble quickly. Use the corrective measures listed to correct troubles. If the measures suggested do not restore normal equipment performance, troubleshooting by a higher echelon repairman is required. Note on the repair tag what corrective measures were taken and how the equipment performed at the time of failure.

*b. Procedure* (fig. 14).

(1) Connect the headset or loudspeaker and the microphone to the AUDIO connectors.

(2) Set the METER switch to the S-METER position.

(3) Turn the SQUELCH control to OFF.

(4) Set the VOLUME control to midrange.

(5) Perform the steps shown in *c* below, in the order listed. ***All steps refer to both Radio Sets AN/VRC-24 and AN/TRC-68 unless otherwise noted.*** They are performed at the receiver-transmitter front panel. If the steps in *c* below yield normal performance and operation from the remote position is abnormal, the radio set control or connecting cable requires higher echelon repair. Observe equipment operation and perform any corrective measures necessary.



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LEGEND for marking conditions:
Satisfactory, ✓.
Adjustment, Repair or Replacement required, X.
Defect corrected, (X).

DAILY CONDITION FOR MONTH OF

| NO. | DAILY ITEM | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 2D 3D ECHELON |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | | |
| 1. | COMPLETENESS AND GENERAL CONDITION OF EQUIPMENT. *(Transmitter, receiver, carrying cases, wire, cables, microphones, tubes, spare parts, technical manuals).* | RB ✓ | RB ✓ | RB ✓ | RB ✓ | RB ✓ | OD ✓ | OD ✓ | RB ✓ | RB ✓ | RB ✓ | RB ✓ | RB ✓ | OD ✓ | OD ✓ | | | |
| 2. | CLEAN DIRT AND MOISTURE FROM ANTENNA, MICROPHONES, HEADSETS, ~~KEYS~~, JACKS, PLUGS, COMPONENT PANELS | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| 3. | INSPECT CONTROLS FOR NORMAL OPERATION. ~~TAP CONTROLS LIGHTLY FOR EVIDENCE OF CUT-OUT FROM LOOSE CONTACTS~~ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| 4. | CHECK FOR NORMAL OPERATION OF EQUIPMENT. BE ALERT FOR UNUSUAL OPERATION OR CONDITION. | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | |

| WEEKLY | CONDITION EACH WEEK 1ST | 2D | 3D | 4TH | 5TH | 2D 3D ECH |
|---|---|---|---|---|---|---|
| 5. CLEAN AND TIGHTEN EXTERIORS OF CASES, ~~RACKS~~, MOUNTS, ~~TRANSMISSION LINES~~. | ✓ | ✓ | | | | |
| 6. INSPECT CASES, MOUNTS, ANTENNA ~~COVERS~~ AND EXPOSED METAL SURFACES FOR RUST, CORROSION. | ✓ | ✓ | | | | |
| 7. INSPECT CORDS, CABLE, WIRE, SHOCK MOUNTS FOR CUTS, KINKS, BREAKS, FRAYING, UNDUE STRAIN. | (X) | ✓ | | | | |
| 8. ~~CHECK ANTENNA GUY WIRES FOR PROPER TENSION OR DAMAGE.~~ | | | | | | |
| 9. INSPECT CANVAS ~~AND LEATHER~~ ITEMS FOR MILDEW, TEARS, FRAYING. | ✓ | ✓ | | | | |
| 10. INSPECT ACCESSIBLE ITEMS FOR LOOSENESS: SWITCHES, KNOBS, JACKS, CONNECTORS, ~~RELAYS, TRANSFORMERS, MOTORS~~, PILOT LIGHTS, ~~BLOWERS~~, ETC. | ✓ | ✓ | | | | |
| 11. CLEAN AND/OR INSPECT ~~AIR FILTERS~~, BRASS NAME PLATES, DIAL AND METER WINDOWS. | ✓ | ✓ | | | | |
| 12. ~~INSPECT STORAGE BATTERIES FOR DIRT, LOOSE TERMINALS, SPECIFIC GRAVITY, DAMAGED CASES. INSPECT DRY BATTERIES FOR LEAKAGE.~~ | | | | | | |

| ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS | CONDITION |
|---|---|
| 13. INSPECT SHELTERS AND COVERS FOR ADEQUACY OF WEATHER-PROOFING, TEARS, FRAYING. | |
| 14. CHECK TERMINAL BOX COVERS FOR CRACKS, DIRT, LEAKS, DAMAGED GASKETS, GREASE. | |

| ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS | CONDITION |
|---|---|
| 15. INSPECT SEATING OF READILY ACCESSIBLE PLUG-IN ITEMS: TUBES, LAMPS, FUSES, CRYSTALS, CONNECTORS, VIBRATORS, PLUG-IN COILS. | |
| 16. INSPECT RELAYS AND CIRCUIT BREAKERS FOR LOOSE MOUNTINGS, BAD CONTACTS, MIS-ALINEMENT OF CONTACTS AND SPRINGS, PROPER SPRING TENSION. | |
| 17. INSPECT VARIABLE CAPACITORS FOR DIRT, MIS-ALINEMENT OF PLATES, LOOSE MOUNTINGS, MOISTURE. | |
| 18. INSPECT RESISTORS, BUSHINGS AND INSULATORS FOR CRACKS, CHIPPING, BLISTERING, MOISTURE, DISCOLORATION. | |
| 19. CLEAN AND TIGHTEN SWITCHES, TERMINAL BLOCKS, BLOWERS, RELAY CASES AND INTERIORS OF CHASSIS AND CABINETS NOT READILY ACCESSIBLE. | |
| 20. INSPECT TERMINAL BLOCKS FOR LOOSE CONNECTIONS, CRACKS AND BREAKS. | |
| 21. INSPECT TERMINALS OF LARGE FIXED CAPACITORS AND RESISTORS FOR DIRT, CORROSION, LOOSE CONTACTS. | |
| 22. INSPECT TRANSFORMERS, CHOKES, POTENTIOMETERS AND RHEOSTATS FOR OVERHEATING AND OIL LEAKAGE. | |
| 23. INSPECT GENERATORS, AMPLIDYNES, DYNAMOTORS FOR BRUSH WEAR, SPRING TENSION, ARCING AND FITTING OF COMMUTATOR. | |
| 24. INSPECT CATHODE RAY TUBES FOR BURNT SCREEN SPOTS. | |
| 25. INSPECT WATERPROOF GASKETS FOR LEAKS, WORN OR LOOSE PARTS. | |

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*Figure 17. DA Form 11-238, as used by operator.*



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*c. Checklist*

| Step | Action | Normal indication | Corrective measures |
|---|---|---|---|
| 1 | Turn POWER switch to ON and release.<br>*Caution:* Do not hold POWER switch ON to operate set. | CALL LIGHT, POWER lamp (on power supply of AN/TRC-68) and dial lamps light. Blower motor (s) start.<br><br>Receiver noise heard in headset or loudspeaker after short interval. | Check power cable to power source.<br><br>Higher echelon repair required.<br><br>Connect headset or loudspeaker to other AUDIO receptacle.<br><br>Check headset or loudspeaker by substitution. If set remains inoperative, refer to steps 3 and 4 below. |
| 2 | Set METER switch to HIGH B+. | Meter indicates in NORMAL range. | Higher echelon repair required. |
| 3 | Set METER switch to LOW B+. | Meter indicates in NORMAL range. | Higher echelon repair required. |
| 4 | Operate CHAN SEL switch to several channels. Operate CHAN SEL switch to MANUAL and set MANUAL FREQUENCY controls to several channels. | PRESET CHANNEL and FREQ windows indicate correct channel and frequency. | Turn set off. Check to see whether channels are preset correctly on memory drum (par. 22). If preset channels are set correctly and indications for manual channels are not correct, higher echelon repair is required. |
| 5 | Press microphone push-to-talk switch. Set METER switch to DVR $I_p$, PA $I_g$, PA $I_b$, PWR and SWR. | Call LIGHT goes out and meter indications are in NORMAL range, except in SWR. In SWR, meter indicates between 0 and 15 percent of full scale. | Check antenna cable connections in case of PWR and/or SWR abnormal indication(s).<br><br>Interchange microphone and loudspeaker or headset connections.<br><br>Higher echelon repair required. |
| 6 | Set METER switch to % MOD. Press push-to-talk switch and speak into microphone. | During speech, meter indicates in NORMAL range and sidetone is heard. | Interchange microphone and loudspeaker or headset connections.<br><br>Higher echelon repair required. |
| 7 | Turn SQUELCH control clockwise. | CALL LIGHT goes out and noise in headset or loudspeaker disappears. | Higher echelon repair required. |
| 8 | Operate POWER switch to OFF and release. | All lights go out, blower motor(s) stop, and receiver noise disappears. | Remove line plug from power source (AN/TRC-68).<br><br>Higher echelon repair required. |



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## CHAPTER 4

## DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

### 32. Authority for Demolition

Demolition of the equipment will be accomplished only upon the order of the commander. The destruction procedures outlined in paragraph 33 will be used to prevent further use of the equipment.

### 33. Methods of Destruction

Any or all of the methods of destruction given below may be used. The time available will be the major determining factor for the methods to be used in most instances when destruction of equipment is undertaken. The tactical situation also will determine in what manner the destruction order will be carried out.

*a. Smash.* Smash the crystals, controls, tubes, coils, switches, capacitors, transformers, loudspeaker, microphones, and headsets; use sledges, axes, hammers, or crowbars.

*b. Cut.* Cut cords, cables, headsets, and wiring; use axes, machetes or bayonets.

*c. Burn.* Burn cords, cables, resistors, capacitors, coils, wiring, and technical manuals; use gasoline, kerosene, oil, flamethrowers, or incendiary grenades.

*d. Explode.* If explosives are necessary, use firearms, grenades, or TNT.

*e. Dispose.* Bury or scatter the destroyed parts in slit trenches or foxholes or throw them into streams.



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## APPENDIX I.

## REFERENCES

| | |
|---|---|
| AR 700-38 | Unsatisfactory Equipment Report (Reports Control Symbol CSGLD-247 (R2)). |
| AR 700-58 | Report of Damaged or Improper Shipment |
| DA PAM 108-1 | Index of Army Motion Pictures, Film Strips. Slides, and Phono Recordings |
| DA PAM 310-4 | Index of Technical Manuals, Technical Bulletins, Supply Bulletins Lubrication Orders, and Modification Work Orders. |
| FM 21-5 | Military Training |
| FM 21-6 | Techniques of Military Instruction |
| FM 21-30 | Military Symbols |
| SR 320-5 | Dictionary of United States Army Terms |
| SR 320-50 | Authorized Abbreviations and Brevity Codes |
| TM 11-284 | Radio Sets AN/GRC-3, -4, -5, -6, -7, and -8. |
| TM 11-5038 | Control Group AN/GRA-6 |



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USA Abn & Elct Bd (1)
USA ATB (1)
US ARADCOM (2)
US ARADCOM Rgn (2)
MDW (1)
Seventh, US Army (5)
EUSA (5)
Corps (2)
USASCS (25)
JBUSMC (2)
Units org under the fol TOE:
1-7 (2)
1-17 (2)
1-57 (2)
1-107 (2)
6-100 (2)
6-101 (2)
6-300 (2)
6-301 (2)
6-401 (2)
7 (2)
7-2 (2)
7-11 (2)
7-12 (2)
7-25 (2)
7-26 (2)
8-137 (2)
11-5 (2)
11-7 (2)
11-16 (2)
11-55 (2)
11-57 (2)
11-95 (2)
11-96 (2)
11-98 (2)
11-99 (2)
11-117 (2)
11-155 (2)
11-500 (Tms AA-AE) (2)
11-557 (2)
11-587 (2)
11-592 (2)
11-597 (2)
17 (2)
17-22 (2)
17-25 (2)
17-26 (2)
17-45 (2)
17-46 (2)
17-51 (2)
17-52 (2)
17-55 (2)
17-56 (2)
17-65 (2)
17-66 (2)
17-85 (2)
17-86 (2)
39-51 (2)
39-52 (2)
55-57 (2)
57 (2)
57-5 (2)

*NG:* State AG (3); Units — Same as Active Army except allowance is one copy to each unit.

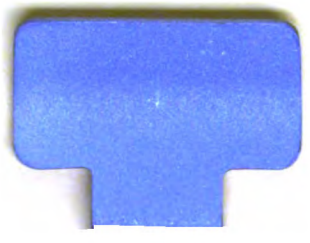
*USAR:* None.

For explanation of abbreviations used see AR 320-50.



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