WAR DEPARTMENT TECHNICAL MANUAL

TM 11-600

This manual supersedes TM 11-600, Radio Sets SCR-508-(*), SCR-528-(*), and SCR-538-(*), 25 March 1943; including C 1, 19 January 1944; and C 2, 20 January 1945

RADIO SETS SCR-508-A, C, D, AM, CM, DM; SCR-528-A, C, D, AM, CM, DM; and AN/VRC-5

WAR DEPARTMENT • MAY 1947

United States Government Printing Office
Washington: 1947

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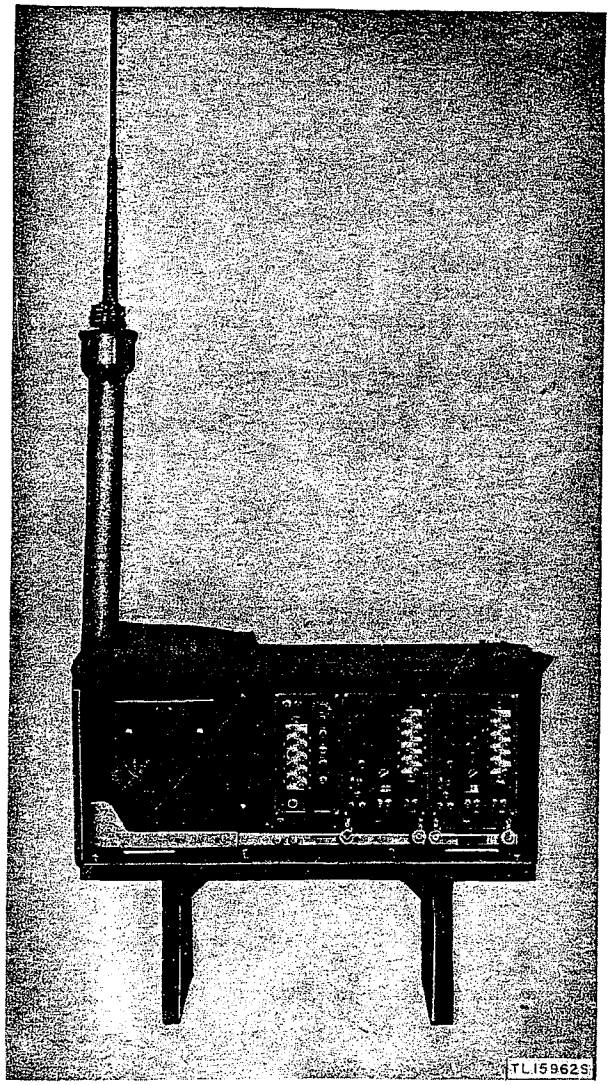

Figure 1. Radio Set SCR-508-(*).

This manual supersedes TM 11-600, Radio Sets SCR-508-(*), SCR-528-(*), and SCR-538-(*), 25 March 1943; including C 1, 19 January 1944; and C 2, 20 January 1945.

PART ONE

INTRODUCTION

Section I. DESCRIPTION OF RADIO SETS SCR-508-(*), SCR-528-(*), AND AN/VRC-5

1. General

a. Radio Sets SCR-508-(*), SCR-528-(*), and AN/VRC-5 provide frequency-modulated (f-m) radiotelephone facilities. The radio sets may be installed and operated in combat vehicles such as tanks, scout cars, half-tracks, and command cars, or any other authorized vehicles (fig. 1).

b. Radio Set SCR-508-(*) consists basically of Radio Transmitter BC-604-(*) and two Radio Receivers BC-603-(*) (fig. 2). The transmitter provides f-m, radiotelephone transmitting facilities for antiaircraft and antitank warning and control nets, for base stations at battalion command posts for fire control and fire-direction nets, and for intrabattalion communication. The receivers provide f-m radiotelephone reception facilities for car, platoon, company, battalion, and regimental commanders, and for staff officers and commanders in higher echelon.

c. Radio Set SCR-528-(*) consists mainly of one Radio Transmitter BC-604-(*) and one Radio Receiver BC-603-(*) (fig. 2).

d. Radio Set AN/VRC-5 is used for intercommunication with Radio Set SCR-508(*). It consists of Radio Receiver BC-603-(*) and Radio Transmitter BC-604-(*) mounted on Mountings FT-346 and FT-508, respectively.

e. Radio Sets SCR-508-A, SCR-508-C, and SCR-508-D are identical except that equipments marked with issue letters C and D include modifications. The same is true of Radio Sets SCR-528-A, C, and D.

f. Later models of Radio Sets SCR-508-(*) have been modified by the manufacturer and incorporate all or most of the first 10 modification work orders. The nameplates of the basic components of these equipments are marked with the letter M following the nomenclature of the equipment thus: Radio Receiver BC-603-(*)M. The radio sets are designated as Radio Sets SCR-508-AM, CM, and DM. The same is true of later models of Radio Sets SCR-528-(*). These modified equipments will be referred to in the manual as Radio Sets SCR-508-(*)M, and SCR-528-(*)M, whereas the SCR-508-A, C, and D models and SCR-528-A, C, and D will be referred to as the unmodified earlier models of Radio Sets SCR-508-(*), and SCR-528-(*), respectively.

g. Official nomenclature followed by (*) is used to indicate all models of the item of equipment included in this technical manual. Thus Radio Set SCR-508-(*) represents Radio Sets SCR-508-A, C, D, AM, CM, and DM.

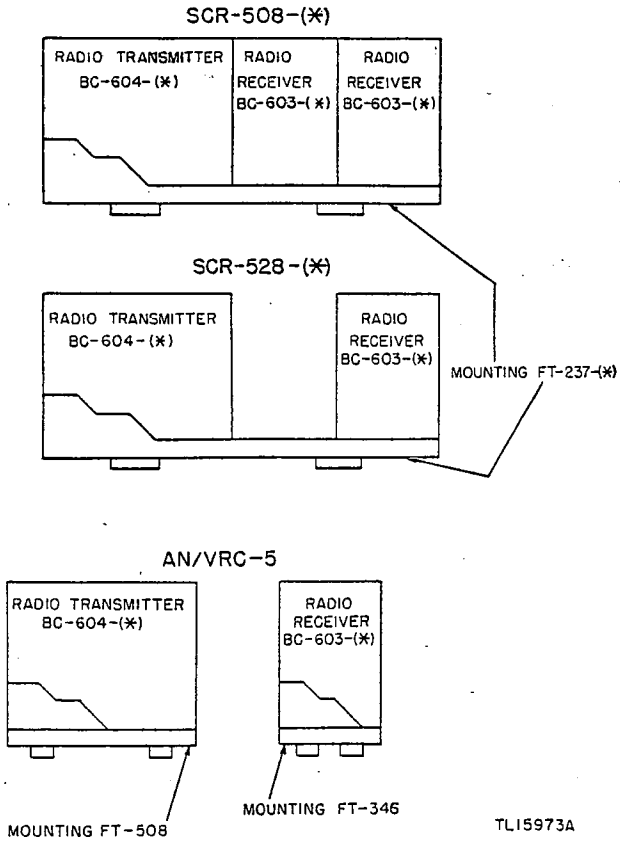

Figure 2. Radio Set SCR-508-(*), SCR-528-(*), AN/VRC-5, basic components.

2. Application of Equipment

a. A simple block diagram of a communication system using Radio Set SCR–508–(*) in each of two vehicles is shown in figure 3. Each radio station may transmit on any one of 10 channels and receive on any one of 20 preset channels. Radio Receiver BC–603–(*) may also be tuned manually to any frequency in the range 20 to 27.9 megacycles (mc). Two-way communication may be established between the stations by use of a single channel, or by use of two channels. Hence, each station may operate in the same or several tactical nets and in liaison channels according to the plan of combat operation. The antenna at each station is connected to the two radio receivers during stand-by periods and to the transmitter during transmission. An interphone system using the transmitter audio stages is provided for communication between vehicle members.

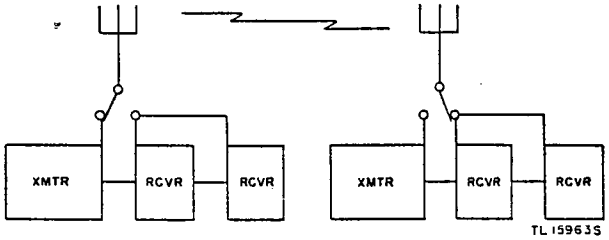

Figure 3. Radio Set SCR–508–(*), simple block diagram.

b. The block diagram of a communication system using Radio Set SCR–528–(*) is similar to the system using Radio Set SCR–508–(*). However, the number of preset receiving channels is reduced to 10 as only one receiver is provided.

c. Radio Set AN/VRC–5 is essentially the same as Radio Set SCR–528–(*), except that two mountings are used.

d. Figure 4 shows the location of the radio set in the frequency spectrums. This figure also shows other radio sets with which Radio Sets SCR–508–(*), SCR–528–(*), and AN/VRC–5 can communicate.

3. Technical Characteristics

a. Radio Transmitter BC–604–(*).

Frequency range:
10 preset channels....20.0 to 27.9 megacycles (mc) (80 channels).
Frequency range (Cont.)
Channel spacing.....100 kilocycles (kc)
Crystal frequency.....370.370 to 516.667 kc
Transmitter type.....f-m
Type of signal transmitted .....voice
Distance range.....10 to 15 mi †
Type of modulation.....phase modulator coil
Power input:
12-volt input.....20 amp
24-volt input.....12 amp
Nominal power output....30 w
Whip antenna.....10 ft long. Consists of Mast Sections MS–116, MS–117, and MS–118 mounted on Mast Base AB–15/GR.
Power supply.....12-v vehicular battery through Dynamotor DM–35–(*), or 24-v vehicular battery through Dynamotor DM–37–(*).
Weight .....67 lb
Nominal frequency deviation .....40 kc
Frequency multiplication..54
Interphone output.....3 w
Number of tubes.....8
V101, V102, V103, V105, V106, V107, and V108.....VT–164 or JAN–1619
V104 .....VT–165 or JAN–1624

b. Radio Receiver BC–603–(*).

Frequency range.....20.0 to 27.9 mc
Receiver type.....superheterodyne, f-m
Type of signal which can be received.....voice
Number of preset channels.10
Control of channels.....local only
Sensitivity .....1 microvolt (μv)
Intermediate frequency (nominal) .....2.65 mc
Bandwidth .....80 kc
Power output, speaker.....2 w
Power output, headset.....0.2 w
Call signal.....lamp
Noise suppression.....squelch
Power input:
12-volt input.....4 amp
24-volt input.....2 amp
Power supply.....12-v vehicular battery through Dynamotor DM–34–(*), or 24-v vehicular battery through Dynamotor DM–36–(*).
Antenna .....Uses same antenna as transmitter
Weight .....35 lb

† This value is an approximation, since the range will vary considerably according to terrain and atmospheric conditions.

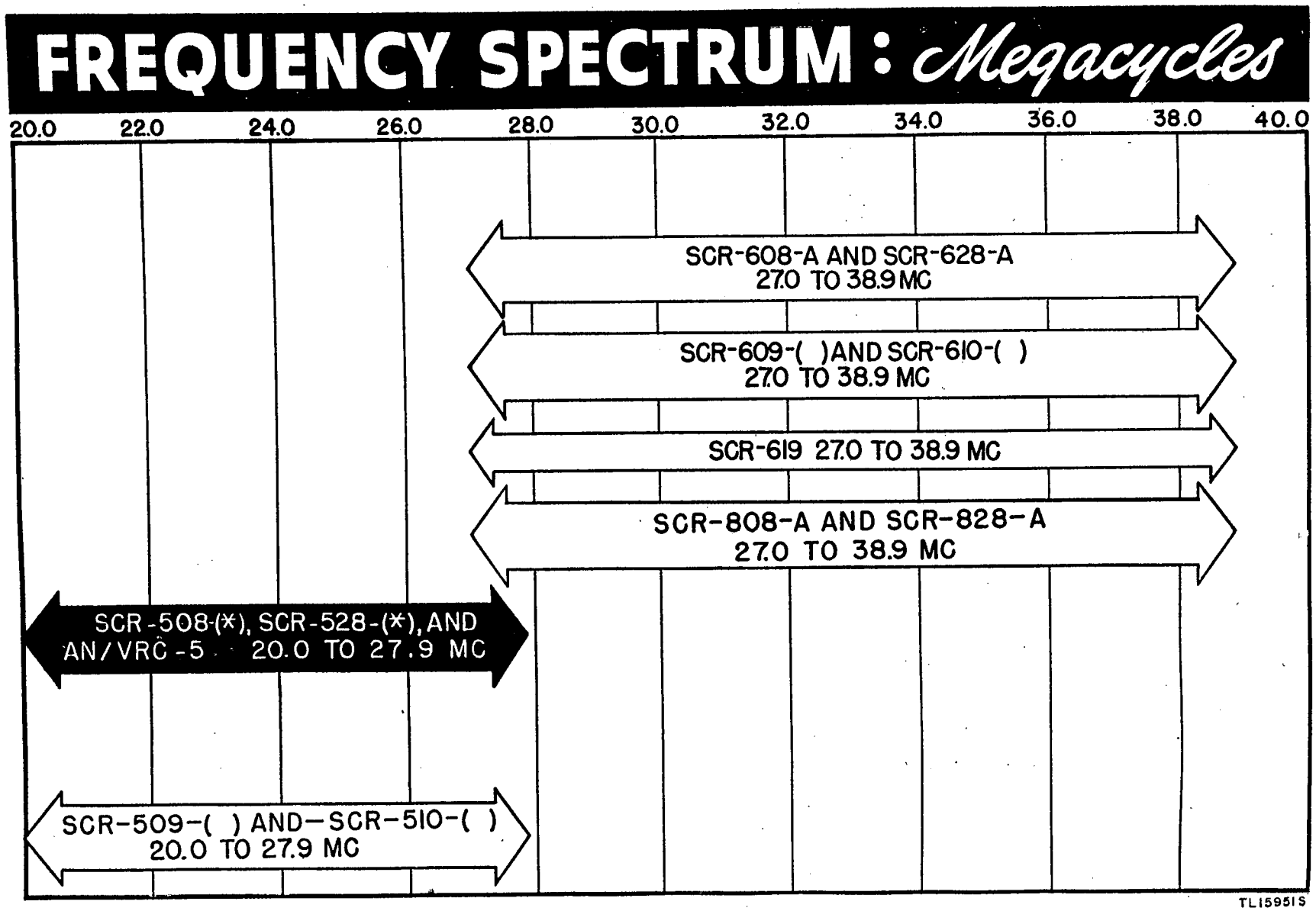

Figure 4. Frequency spectrum of Radio Sets SCR–508–(*), SCR–528–(*), and AN/VRC–5.

Number of tubes.....10

V1	VT-112 or JAN-6AC7
V2	VT-112 or JAN-6AC7
V3	VT-94 or JAN-6J5
V4	VT-209 or JAN-12SG7
V5	VT-209 or JAN-12SG7
V6	VT-112 or JAN-6AC7
V7	VT-90 or JAN-6H6
V8	VT-107-A or JAN-6V6GT
V9	VT-229 or JAN-6SL7GT
V10	VT-229 or JAN-6SL7GT

4. Table of Components

a. RADIO SET SCR–508–(*). Radio Set SCR–508–(*) is composed of a 12- or 24-volt basic unit and an installation unit. The basic unit is common to all installations. The installation unit varies and depends upon the type of installation. The table below is the Parts Control Lists listing of components of the radio set required for its installation in a personnel carrier half-track M3A1. These components, however, will vary from time to time. Figures 5 and 6 show the components actually provided in one instance where a radio set was ordered. The 12-volt basic unit, common to all 12-volt installations, is shown in figure 5 and a typical installation unit appears in figure 6.

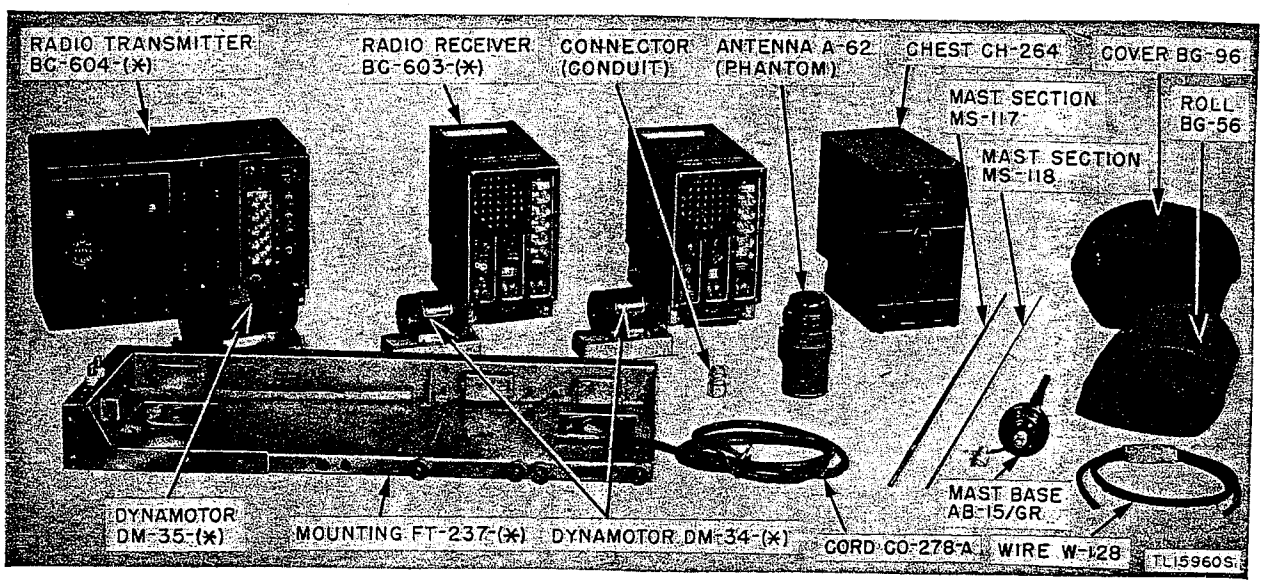

Figure 5. Radio Set SCR–508–(*), basic unit. (12-volt).

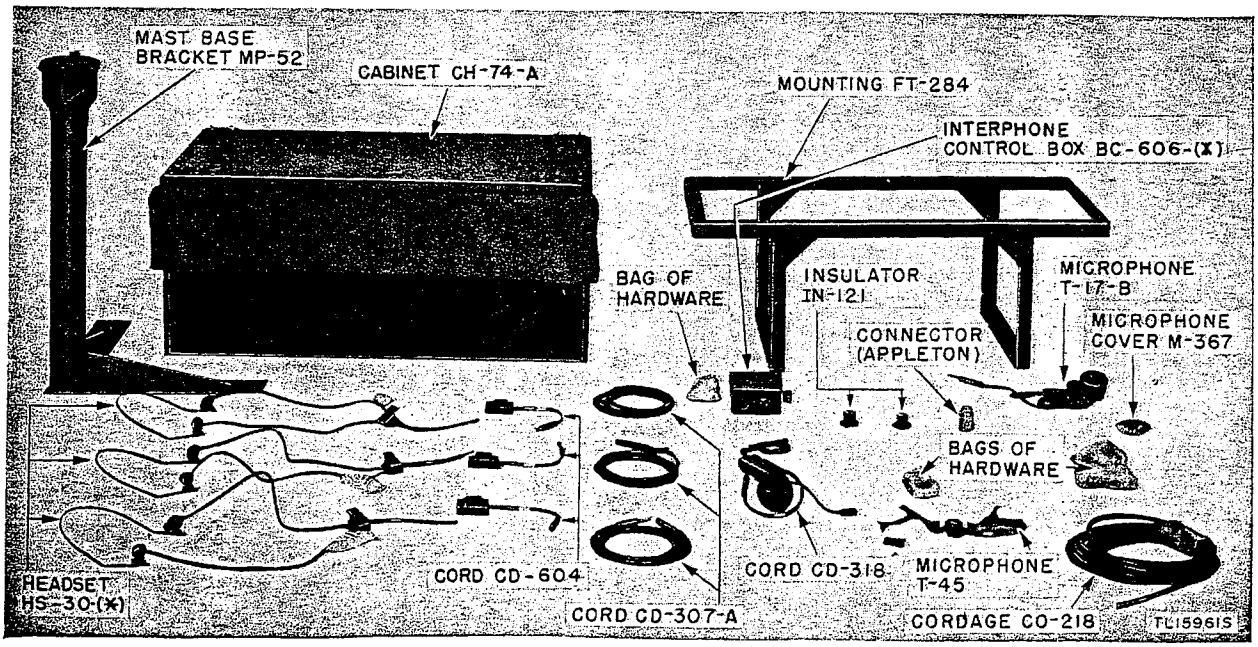

Figure 6. Radio Set SCR–508–(*), typical installation unit.

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Volume (cu. ft.)	Weight (lb.)
Basic Unit (12-volt):						
Antenna A–62 (Phantom)..	1	7	4	4	0.06	3
Mast Base AB–15/GR.....	1	15				2
Radio Receiver BC–603–(*).	2	11½	6¾	12½	0.5	35
Radio Transmitter BC–604–(*)	1	11½	10¼	18	1.2	67
Roll BG–56–A.....	1	2	4	42	0.18	1.7
Cover BG–96.....	1	12½	10½	32	2.2	3.3
Chest CH–264.....	1	11½	6⅞	11⅞	0.54	12
Dynamotor DM–34–(*)....	2	4½	3	6½	0.05	4.7
Dynamotor DM–35–(*)....	1	5½	4½	8¼	0.1	9.2
Mounting FT–237–(*).....	1	5½	13	33⅝	1.37	44
Mast Section MS–117.....	2			39½		0.7
Mast Section MS–118.....	2			39⅝		0.8
Wire W–128.....	6 ft.			72		0.4
Connector (conduit).....	1			1¾		0.3
Installation Unit:						
Interphone Control Box BC–606–H	1	4¼	2¼	4¼	0.06	1.8
Cabinet CH–74.....	1	18	16	36	5.9	92
Cordage CO–218.....	18 ft.			252		1.4
Mounting FT–284.....	1	5	12	33	1.12	26
Headset H–16/U.....	2					1.0
Cover CW–110/U.....	1					0.01
Mast Base Bracket MP–52..	1	26				20
Microphone T–17.....	1					0.7
Microphone T–45.....	1					1.8
Chest Set TD–4.....	2					1
Bag of hardware.....	1					2
Connector (conduit).....	1			1¾		0.3
TM 11–2721.....	1					0.3

Note. This list is for general information only. See appropriate publications for information pertaining to requisition of spare parts.

b. RADIO SET SCR–528–(*). Radio Set SCR–528–(*) is identical to Radio Set SCR–508–(*), except that Radio Set SCR–528–(*) has one Receiver BC–603–(*) instead of two. (See fig. 2.)

c. RADIO SET AN/VRC–5. Radio Set AN/VRC–5 is identical to Radio Set SCR–528–(*) except that Radio Set AN/VRC–5 has two separate mountings, FT–346 and FT–508, for the receiver and transmitter, respectively. (See fig. 2.) A typical installation of Radio Set AN/VRC–5 is illustrated in figure 7. Weights and dimensions of the mountings used in this set are shown in the following table.

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Volume (cu. ft.)	Weight (lb.)
Mounting FT–346.....	1	3⅞	7	11¾	0.2	6
Mounting FT–508.....	1	4½	9½	19½	0.3	14.7

Note. This list is for general information only. See appropriate publications for information pertaining to requisition of spare parts.

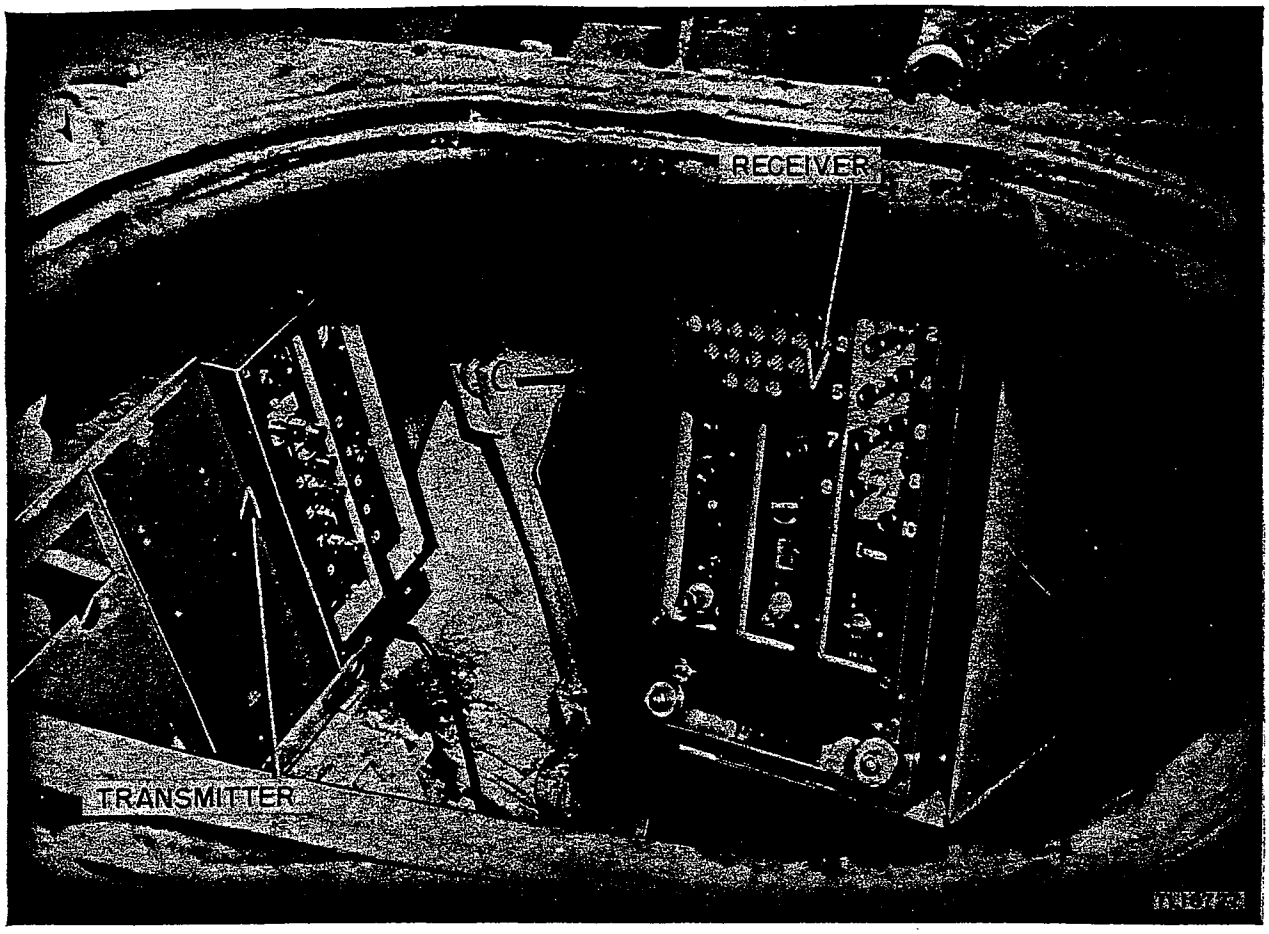

Figure 7. Radio Set AN/VRC–5, mounted in Twin 40–mm Gun Motor Carriage, M19.

5. Packaging Data

a. Radio Set SCR–508–(*) is packed in seven wooden boxes, six of which contain the components of the basic unit and one of which contains the installation unit. Radio Set SCR–528–(*) is packed in six boxes, or one less than required for the SCR–508–(*), since it includes one receiver instead of two.

b. Domestic and export packaging and packing are the same for both sets except that moistureproof and vaporproof barriers, desiccant, and waterproof box liners or bags are not required for domestic packing. The following table lists the dimensions, volume, and weight of the boxes containing Radio Set SCR–508–(*).

Note. Items may be packaged in a different manner from that shown, depending upon supply channels.

Radio Set SCR–508–(*)

Item	Outside dimensions (in.)	Cubic feet (approx.)	Gross weight (lb.)
Box No. 1	39 x 17 x 9½	3.7	83
Box No. 2	17½ x 14¾ x 12⅞	2	65
Box No. 3	17½ x 14¾ x 12⅞	2	65
Box No. 4	33 x 15½ x 16	4.7	129
Box No. 5	45 x 10½ x 6¾	2.8	70
Box No. 6	21 x 13⅜ x 13⅞	2.2	50
Box No. 7	40 x 26 x 25	14.2	248

c. Radio Set AN/VRC–5 is packed in approximately the same manner as Radio Set SCR–528–(*).

6. Radio Transmitter BC–604–(*)

This f-m transmitter operates over a frequency range of 20.0 to 27.9 mc and delivers a carrier power to the antenna of approximately 30 watts. Figure 8 is an oblique view of the trans-

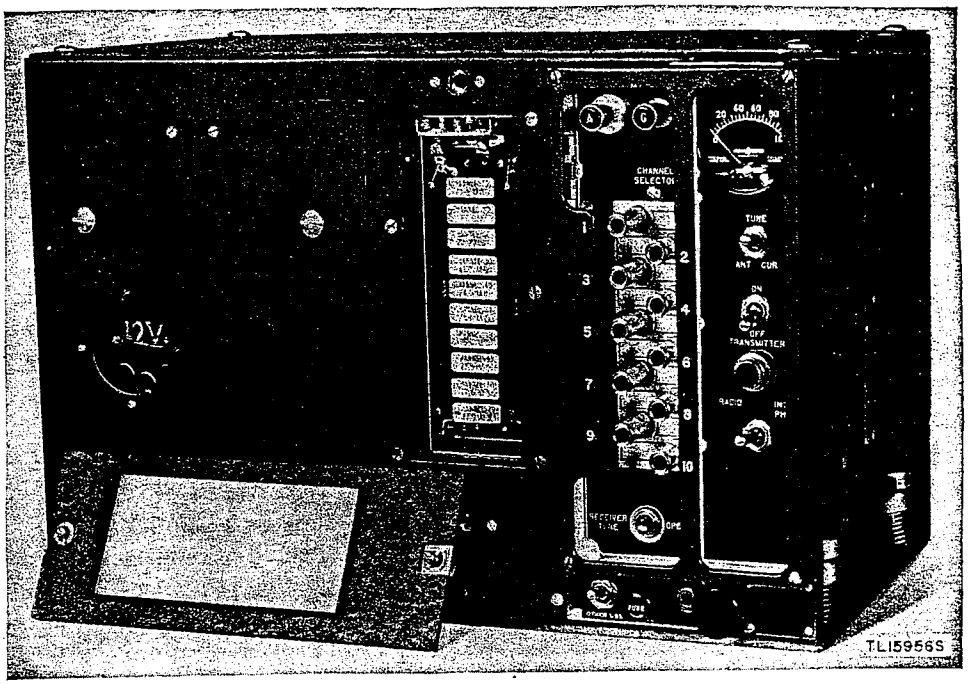

Figure 8. Radio Transmitter BC–604–(*), with crystal unit operating compartment open, oblique view.

mitter. A view of the right-hand end of the transmitter showing the various controls and access openings is shown in figure 9. The front panel contains 10 push buttons (fig. 10) by means of which any of 10 preadjusted transmitting channels may be immediately selected. The transmitter audio stages are used to modulate the r-f carrier, and are also used for interphone operation. The use of the transmitter as a radio transmitter or as an audio amplifier is controlled at the transmitter panel or from remote interphone control boxes. When the transmitter dynamotor is on, the receiver output is disabled. Audio modulation of the transmitter is heard as sidetone in all interphone headsets. Either a carbon or a magnetic microphone may be used with the transmitter. The magnetic microphone, however, is not generally used. The transmitter receives its power from a 12- or 24-volt dynamotor mounted in the transmitter. The top and bottom dust covers can be removed by turning the fasteners ¼ turn to the left and lifting the covers off the transmitter.

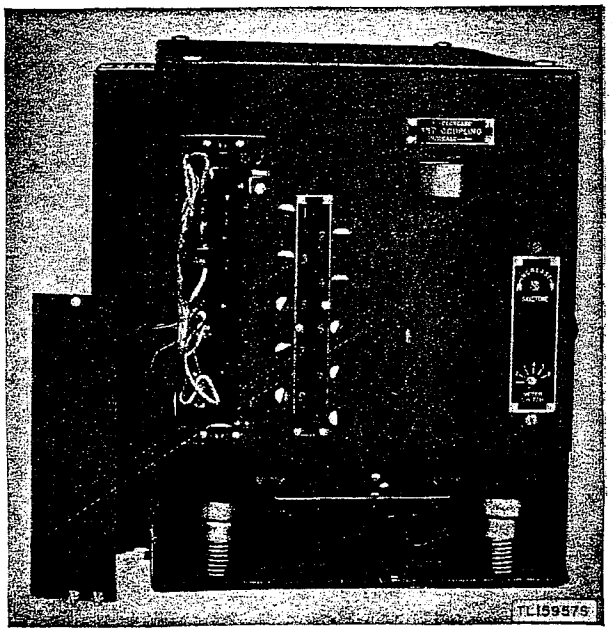

Figure 9. Radio Transmitter BC–604–(*), with cover plate removed, right-hand view.

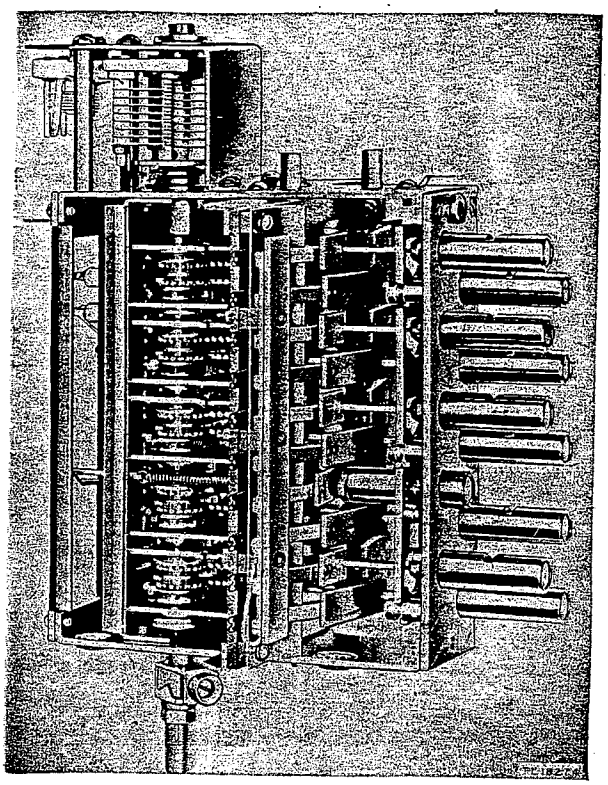

Figure 10. Radio Transmitter BC–604–(*), push-button assembly, left side view.

7. Radio Receiver BC–603–(*)

The receiver is of the superheterodyne type and is intended for reception of f-m signals within the range of 20.0 to 27.9 mc. The receiver can deliver an output of approximately 2 watts to its self-contained speaker or about 200 milliwatts to its headset circuits. A front view of the receiver is shown in figure 11 and an oblique rear view is shown in figure 12. The front panel contains 10 push buttons by means of which any one of 10 preadjusted receiving channels may be selected. (See fig. 13.)

The receiver is mounted on the right-hand side of Mounting FT–237. A disabling circuit grounds the output stage of the receiver when the transmitter dynamotor is on. The receiver output is also fed to the crew member interphone stations through the mounting. A squelch circuit is provided to eliminate noise when no signal is being received. In addition to the usual limiter circuits, a delayed automatic-volume-control (a-v-c) circuit is incorporated to limit the signal more efficiently prior to its application to the discriminator. The power for the receiver is supplied by a 12- or 24-volt dynamotor mounted in the receiver. The receiver dust cover may be removed by turning the fastener on the rear of the cover (fig. 12) ¼ turn to the left and sliding the cover off the rear of the receiver.

8. Dynamotor DM–34–(*) or DM–36–(*)

The two dynamotors that can be used for the operation of the receiver are identical except for the input voltage. Dynamotor DM–34–(*) operates from a 12-volt battery and Dynamotor DM–36–(*) operates from a 24-volt battery. Two views of the dynamotors are shown in figures 14 and 15.

The dynamotors are totally inclosed. Their armatures are dynamically balanced and are supported by two single-race ball bearings. Both dynamotors are shunt wound. The primary and secondary windings are wound in the same armature slots, but the two windings

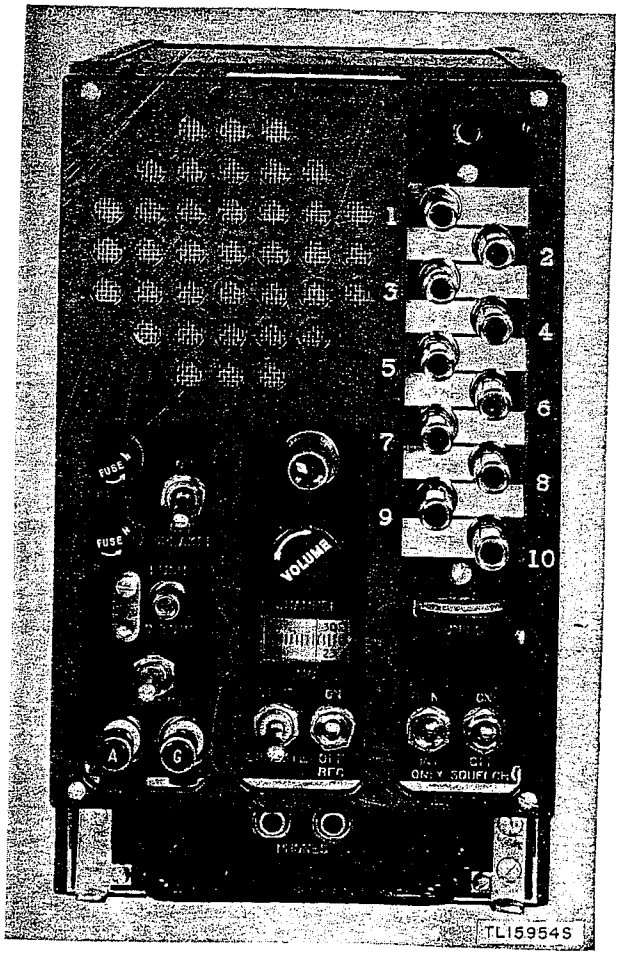

Figure 11. Radio Receiver BC–603–(*), front view.

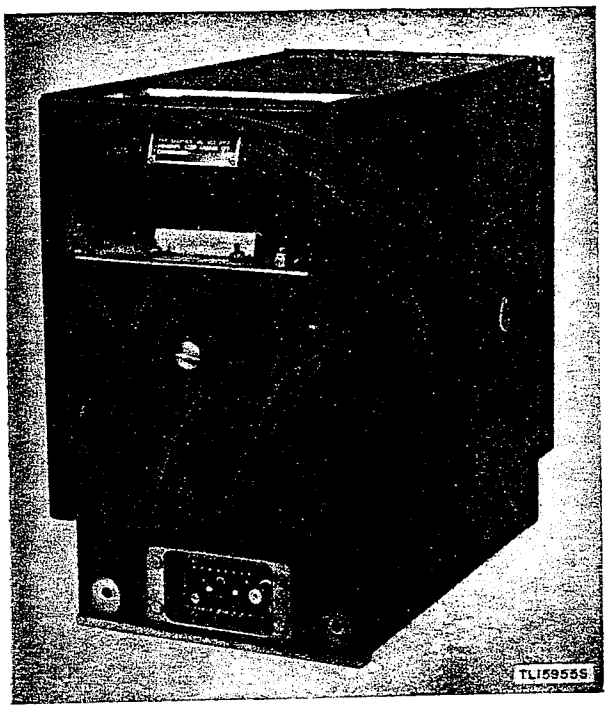

Figure 12. Radio Receiver BC–603–(*), rear view.

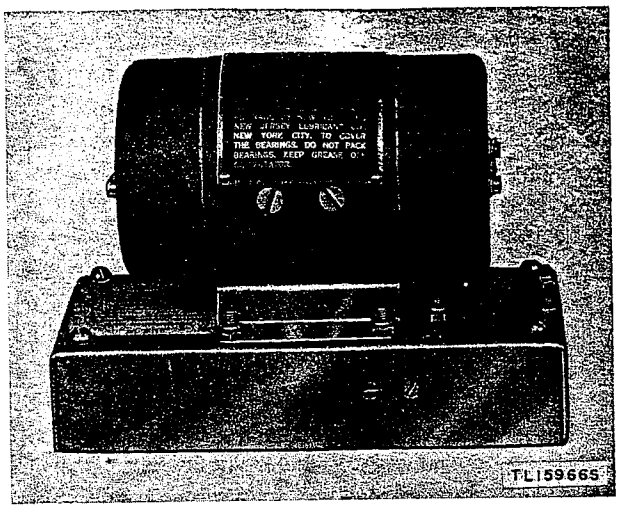

Figure 14. Dynamotor DM–34–(*) or Dynamotor DM–36–(*), side view.

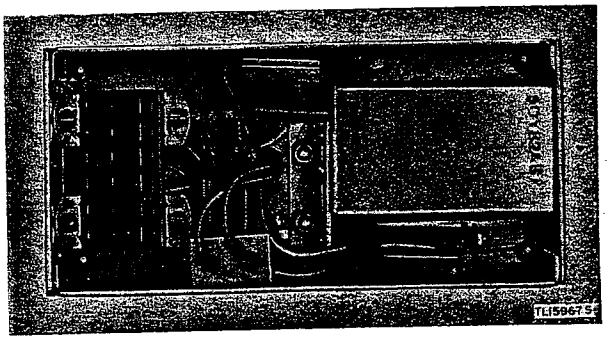

Figure 15. Dynamotor DM–34–(*) or Dynamotor DM–36–(*), bottom view.

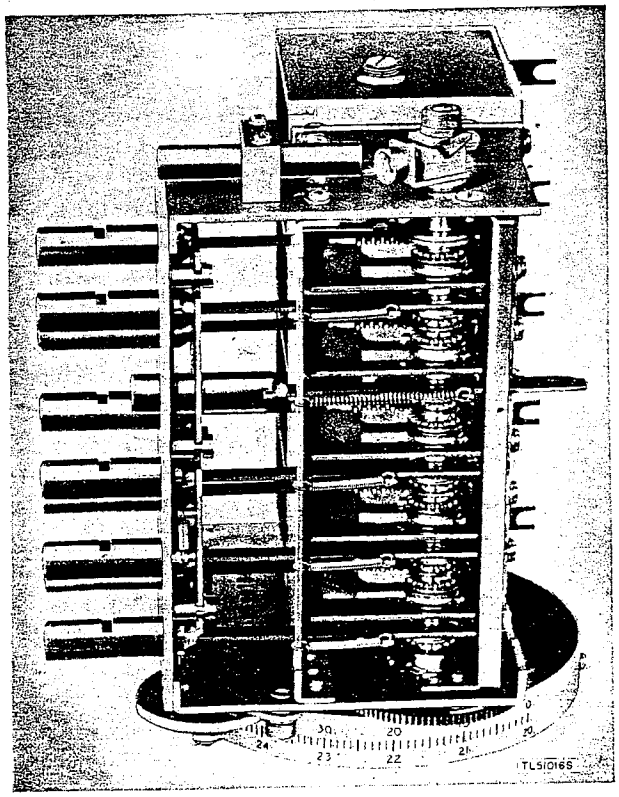

Figure 13. Radio Receiver BC–603–(*), push-button assembly, right side view.

are brought out to separate commutators mounted on opposite ends of the armature shaft. A multicontact jack on the base of each dynamotor is wired so as to make the necessary circuit changes in the receiver for 12- or 24-volt operation when the dynamotor is installed.

9. Dynamotor DM–35–(*) or DM–37–(*)

The two dynamotors that can be used for the operation of the transmitter are identical except for the input voltage. Dynamotor DM–35–(*) operates from a 12-volt battery and DM–37–(*) operates from a 24-volt battery. Two views of the dynamotors appear in figures 16 and 17. Except for screened breathing vents in the end covers, the dynamotors are totally inclosed. In later dynamotors, the screened holes have been omitted in order to reduce the entrance of dust or sand. This does

not affect the power rating of the dynamotor. Their armatures are dynamically balanced and are supported by two single-race ball bearings. Both dynamotors are compound wound. The primary and secondary are wound in the same armature slots; but the two windings are brought out to separate commutators mounted on opposite ends of the armature shaft. Each dynamotor is mounted on a base and provided with a multicontact connector so that it can be easily installed or replaced. Selection and installation of the proper dynamotor is the only step required to convert to operation on either supply voltage. The multicontact dynamotor jacks are wired so as to make all the circuit changes required in the transmitter for 12- or 24-volt operation when the proper dynamotor is installed.

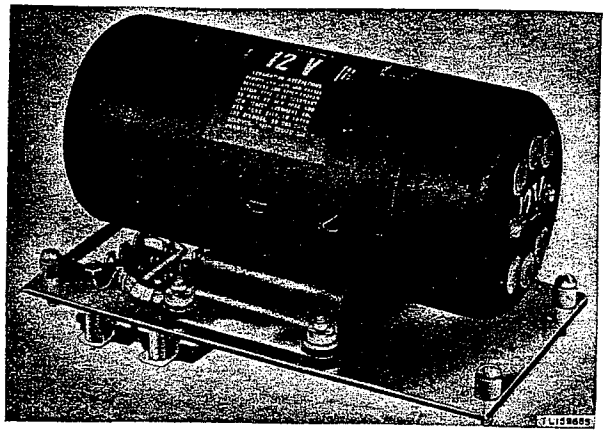

Figure 16. Dynamotor DM–35–(*) or DM–37–(*).

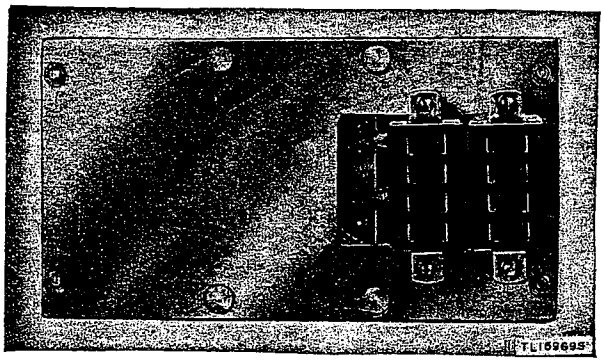

Figure 17. Dynamotor DM–35–(*) or DM–37–(*), subbase view.

10. Mounting FT–237–(*)

a. GENERAL. This mounting, a photograph of which is shown in figure 18, will hold:

(1) Radio Set SCR–508–(*); one Radio Transmitter BC–604–(*) and two Radio Receivers BC–603–(*).

(2) Radio Set SCR–528–(*); one Radio Transmitter BC–604–(*) and one Radio Receiver BC–603–(*). The transmitter must be installed in its allotted place at the left end of the mounting (fig. 19), but the receiver may be installed in either of the two right-hand positions. Each unit is secured to the mounting by thumbscrew clamps and may be quickly removed without tools. The dust covers are provided for protection of the unused receptacles. The dust covers should be screwed to the rear of the mounting, as shown in the photograph, when removed from the receptacles to be used. A reversible nameplate bearing the words BATTERY VOLTAGE—12V on one side and BATTERY VOLTAGE—24V on the other side is screwed to the front of the mounting near the right-hand end. To make sure that the correct dynamotor will be installed in the equipment, turn this plate so that it reads 24 volts if a 24-volt battery is being used as a power source, or 12 volts if a 12-volt battery is being used.

b. FASTENING OF MOUNTING. The mounting is secured to the vehicle frame or other support by suitable bolts passed through two heavy bedplates on the mounting. There are four bolt holes in each bedplate. Each bedplate supports the mounting through two sets of rubber shock absorbers. In addition, two rubber snubbers on each bedplate prevent excessive movement of the equipment on the mounting. Electrical bonding straps are connected across each rubber shock absorber so as to provide good (ground) connection to the bedplates.

c. TERMINALS. Two terminals are provided at the left end of the mounting. The antenna system is connected to the terminal designated TR for radio transmission and reception. A ground terminal is provided by a screw on the mounting or, on later mountings, by a ground binding post located near the antenna terminals. This terminal is generally used for grounding the sheath of coaxial cable CO–282. A door in the base plate of the mounting (fig. 20) permits access to battery fuse F401, and terminal strip TS401. One of the spare battery fuses is held in a clip on the under side of the door. The negative battery connection is

made at a screw on the under side of the mounting base plate. This screw is marked X on figure 20. Cordage from one or more remotely located interphone control boxes terminates at terminal strip TS401.

d. INTERCONNECTIONS BETWEEN UNITS. All connections between the transmitter and receiver units and the mounting are made through multicontact plugs and receptacles which are engaged when the units are secured to the mounting. The wiring between receptacles is inclosed in a trough along the rear and left end of the mounting.

Figure 21 shows the battery connections to the mounting. A bottom view of the mounting is shown in figure 22.

12. Mounting FT–346

Radio Receiver BC–603–(*), as a component of Radio Set AN/VRC–5, is mounted on Mounting FT–346. An oblique view and a bottom view of the mounting are shown in figures 23 and 24, respectively. The receiver is secured to the mounting by thumbscrew clamps and may be quickly removed without tools.

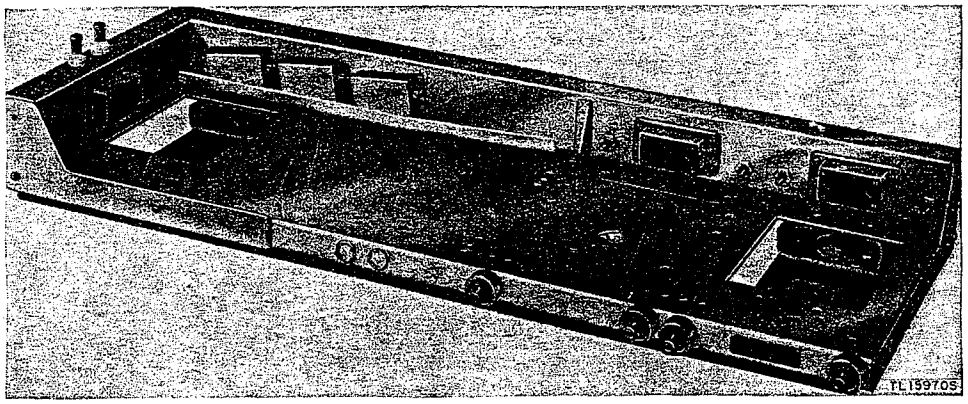

Figure 18. Mounting FT–237–(*).

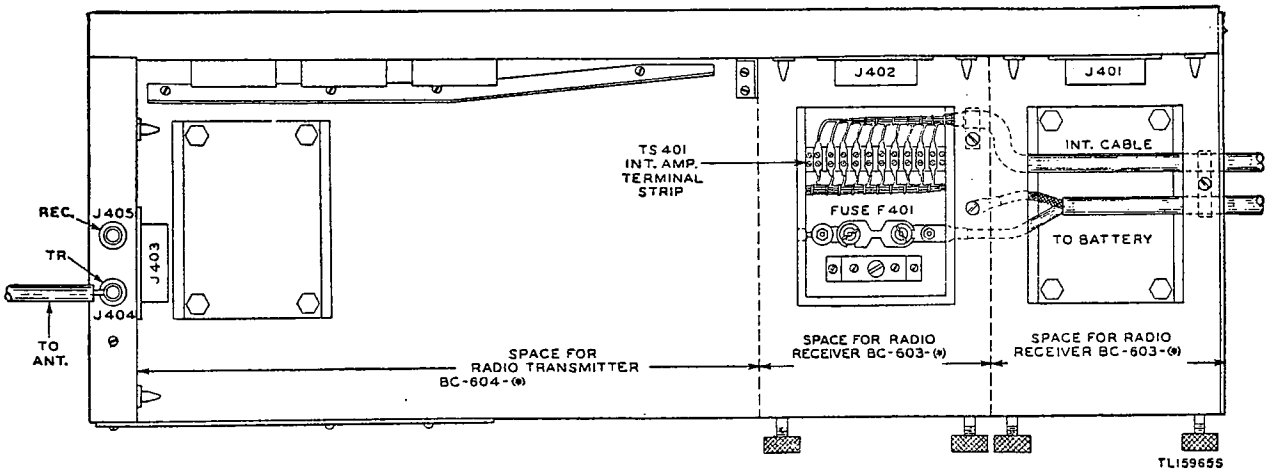

Figure 19. Mounting FT–237–(*), location of transmitter and receivers.

11. Mounting FT–508

Radio Set AN/VRC–5 is mounted on two separate mountings. This break-down is necessary because some vehicles have insufficient space to hold the equipment as a single unit on Mounting FT–237–(*). Radio Transmitter BC–604–(*) is installed on Mounting FT–508.

13. Antenna A–62 (Phantom)

a. Any antenna can be replaced by an equivalent electrical network consisting of a coil, a capacitor, and a resistor. If these elements are properly connected and adjusted, they can be used in place of the regular antenna to tune the transmitter without radiating a strong sig-

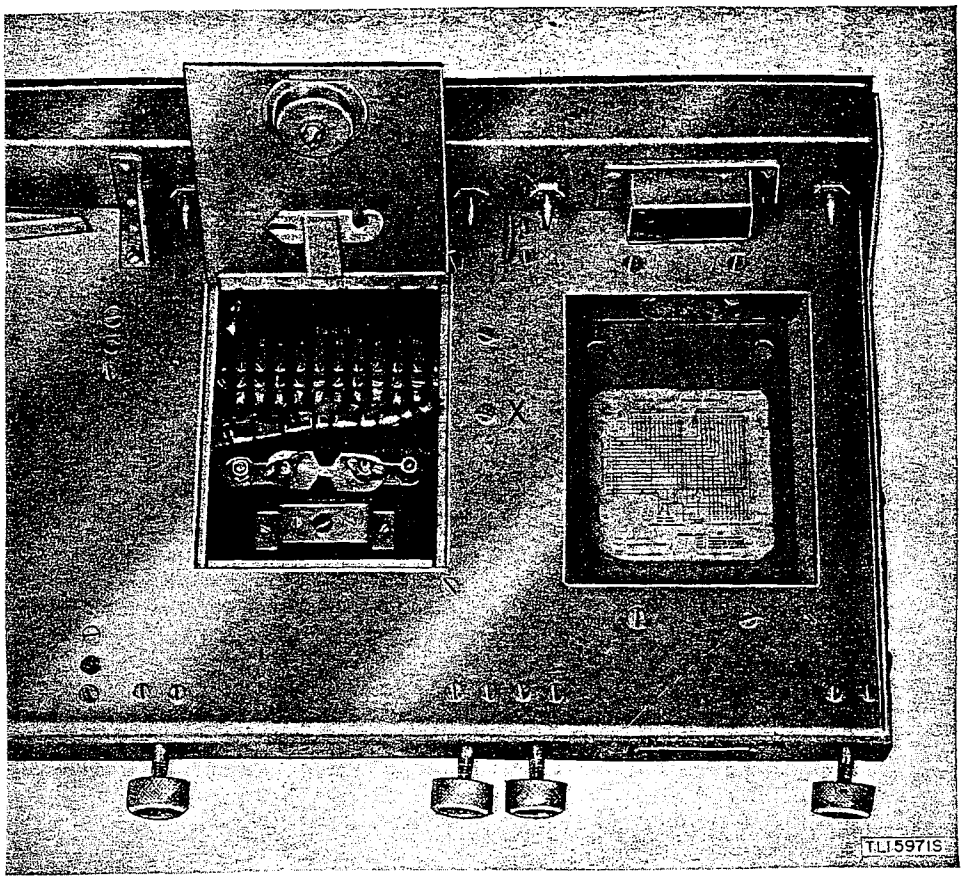

Figure 20. Mounting FT–237–(*), terminal box open.

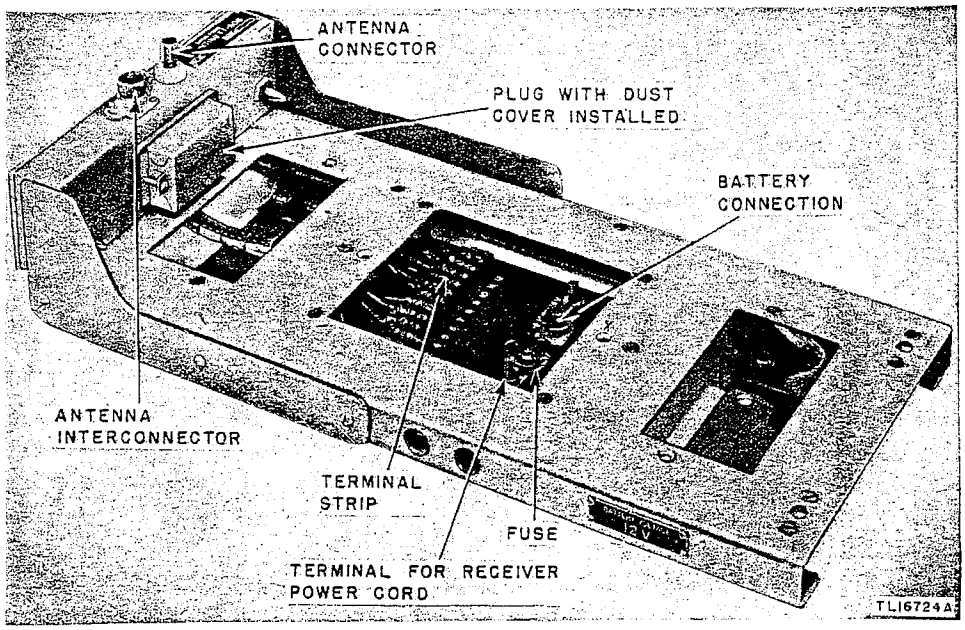

Figure 21. Mounting FT–508, showing battery connections.

nal. Antenna A–62 (Phantom) is provided for this purpose. (See figs. 25 and 26.) This phantom antenna consists of a variable inductance, a variable capacitor, and two fixed resistors in parallel, contained within a cylindrical metal container, approximately 6 inches high by 3 inches in diameter. The manufacturer's nameplate and circuit diagram are mounted on the outside of the container. A chained screw cap is the cover of the phantom antenna and can be removed for necessary adjustment by rotating it to the left. The chain prevents its being lost or misplaced. A metal bracket is included on the outside of the container to provide a flat side for ease in installation of the phantom antenna.

b. When the cap is removed, the control or adjustment panel of the phantom antenna is

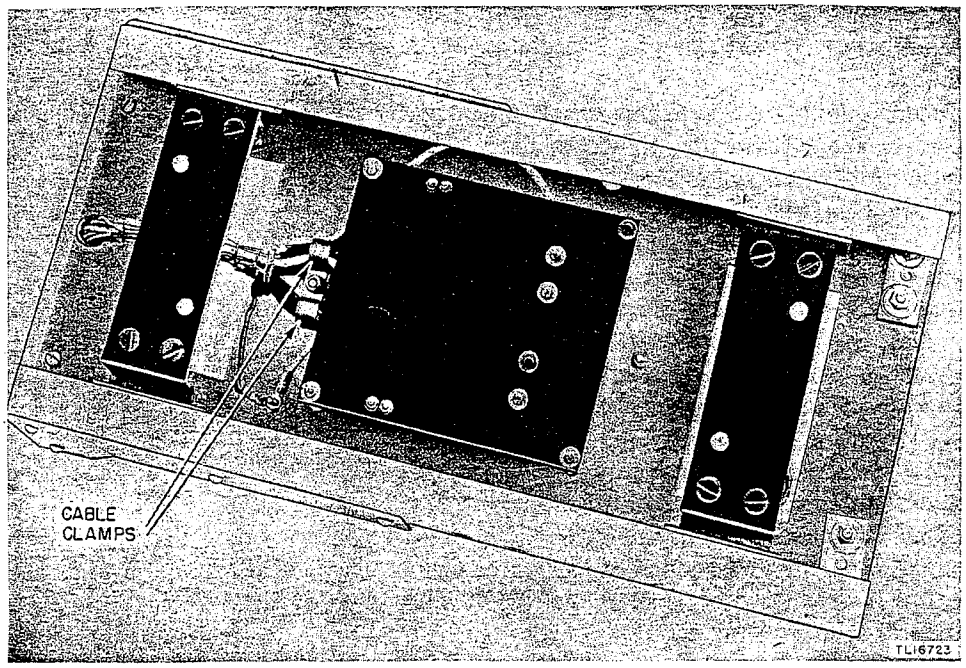

Figure 22. Mounting FT–508, bottom view.

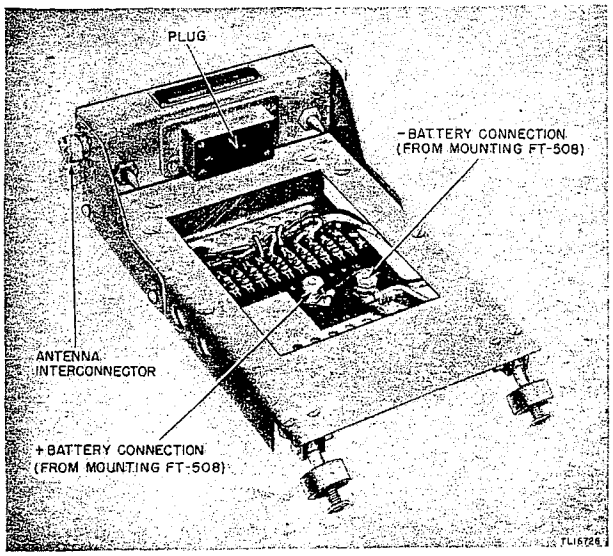

Figure 23. Mounting FT–346, oblique view.

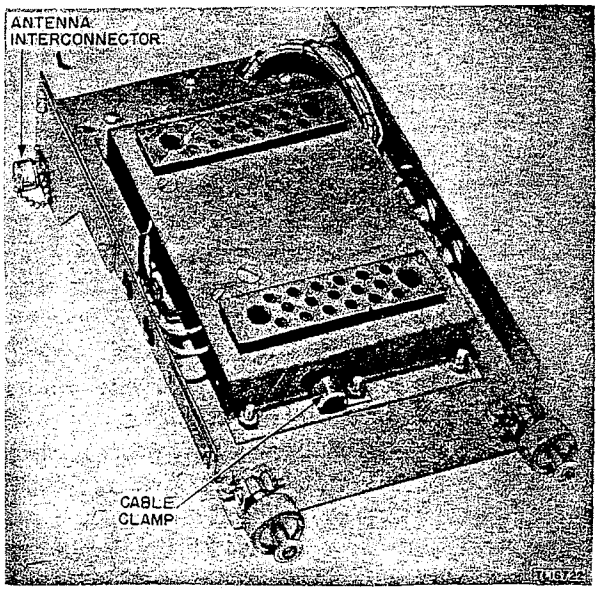

Figure 24. Mounting FT–346, bottom view.