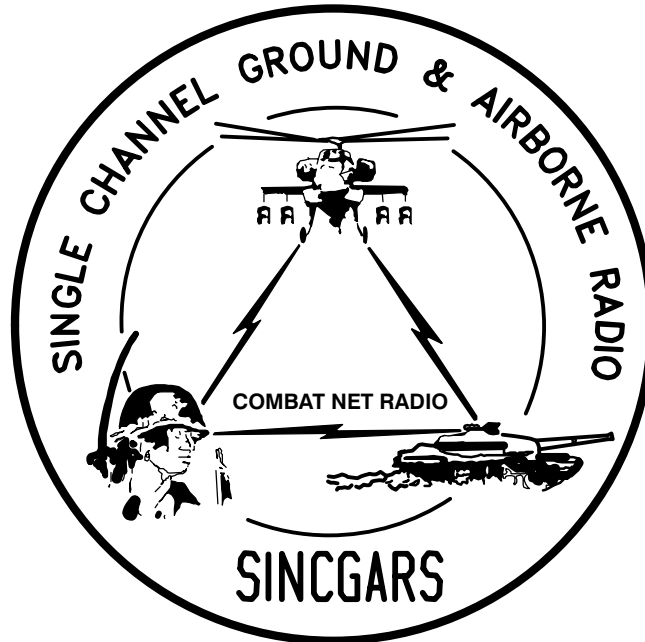


**TECHNICAL BULLETIN**



**INSTALLATION INSTRUCTIONS FOR  
INSTALLATION KIT, ELECTRONIC EQUIPMENT  
MK-2300/VRC (NSN 5895-01-299-5864) (EIC: N/A)  
TO PERMIT INSTALLATION OF  
RADIO SET AN/VRC-89/91 SERIES  
IN A  
HOWITZER, MEDIUM, SELF-PROPELLED, M109A6**

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**HEADQUARTERS, DEPARTMENT OF THE ARMY**

**1 AUGUST 1999**

**INSTALLATION INSTRUCTIONS FOR  
 INSTALLATION KIT, ELECTRONIC EQUIPMENT  
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 HOWITZER, MEDIUM, SELF-PROPELLED, M109A6**

**REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS**

You can help improve this manual. If you find any mistakes, or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms) or DA 2028-2 located in back of this manual direct to: Commander, US Army Communications-Electronics Command Fort Monmouth, ATTN: AMSEL-LC-LEO-D-CS-CFO, Fort Monmouth, New Jersey 07703-5000. The Fax number is 732-532-1413, DSN 992-1413. You may also e-mail your recommendation to AMSEL-LC-LEO-PUBS-CHG@ce-com3.monmouth.army.mil.

In either case a reply will be furnished direct to you.

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\*This manual supersedes TB 11-5820-890-20-17, dated 1 September 1993.

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## 0.1 SCOPE.

This technical bulletin provides Installation Instructions for Electronic Equipment MK–2300/VRC, commonly referred to as the Mounting Kit (MK). The MK shall be installed into the following type of vehicle(s):

- Howitzer, Medium, Self-Propelled, M109A6

The MK is used for installation of radio set components at field locations. The information contained in this technical bulletin is the official authorization to perform the installation at the unit maintenance level.

### NOTES

- This technical bulletin is not an authorization for requisition or turn-in of vehicles.
- This technical bulletin does not establish quantity or types of vehicles assigned to using units.

This technical bulletin does not contain information on the maintenance or replacement of the MKs. This information is contained in the MAC of TM 11–5820–890–20–2 and RPSTL of TM 11–5820–890–20P.

## 0.2 GENERAL INFORMATION.

The MK becomes operable when all the radio set components are installed in the vehicle and correct power is supplied. Refer to TM 11–5820–890–20–1 or TM 11–5820–890–20–2 for installation, Operational (OP) Check instructions, and required maintenance procedures. Refer to TM 11–5820–890–20P for repair parts.

Radio Set AN/VRC–89/91 Series includes:

- Radio Set AN/VRC–89/91 Series (for RT–1523(C)/U)

## 0.3 MAINTENANCE FORMS, RECORDS, AND REPORTS.

**0.3.1 Reports of Maintenance and Unsatisfactory Equipment.** See section 4.2.2.3 for information.

**0.3.2 Report of Packaging and Handling Deficiencies.** See section 4.2.2.1 for information.

**0.3.3 Discrepancy in Transportation Deficiency Report (TDR) (SF361).** See section 4.2.2.2 for information.

## 0.4 CONSOLIDATED INDEX OF ARMY PUBLICATIONS.

Refer to the latest issue of DA Pam 25–30 to determine whether there are new changes, or additional publications pertaining to the equipment.

**1. PURPOSE OF INSTALLATION.**

The Electronic Equipment MK–2300/VRC (MK) contains the items needed to mount Radio Set AN/VRC–89/91 Series in a Howitzer, Medium, Self-Propelled, M109A6.

**2. END ITEM OR SYSTEM TO BE MODIFIED.**

Not applicable.

**3. APPLICATION TIMES.**

**3.1 Time for Completion of Installation.** Using one person, a total of 4.5 work hours is required. Typical vehicle downtime is 5 hours.

**3.2 Time for Installation of One Assembly or Component.** The following table lists the time required to install one component. All times have been rounded off to the nearest half hour. The sum of these times will not reflect the typical vehicle downtime.

ITEM	SECTION	TIME
Antenna AS–3900/VRC	5.1	0.5
Mounting Base, Electrical Equipment MT–6352/VRC	5.2	1.5
Cables	5.3	1.0

**4. PREPARATION FOR INSTALLATION.**

This section explains how to prepare the vehicle and MK for installation.

**4.1 Preparation of Vehicle.** To prepare the vehicle for installation, insure that the site includes adequate lighting and a power source when drilling is required. Inspect the vehicle for damage that could affect installation. Have any such damage repaired before installing MK.

**4.1.1 Items to be Removed.** Remove existing AN/VRC–12 radio family installation kit/harness. See TM 11–5820–401–20–2 for removing items used with intercom systems, or TM 11–5820–401–20–1 (used without intercom systems), and TM 9–2350–303–20.

**4.1.2 List of Items to be Retained.** Not applicable.

**4.2 Preparation of MK.** To prepare MK, unpack, inspect and check inventory.

**4.2.1 Precautions During Handling.** Observe these steps to prevent equipment damage.

- a. Keep dust covers in place on connectors.
- b. Do not disassemble or modify parts in MK unless authorized to do so.
- c. Keep mounting hardware covered and protected until needed.
- d. When exposed to moisture, rain or salt water, keep all parts dry to prevent corrosion.

## 4.2.2 Unpack and Inspect Equipment.

**4.2.2.1 Inspect Packaging for Evidence of Damage.** Any shipping damage should be reported on SF364 Report of Discrepancy (ROD) as prescribed in AR 735-11-2/DLAR 4140.55/NAVMATINST 4355.73A/AFR 400-64/MCO 4430.3F.

**4.2.2.2 Unpack and Inventory MK.** If any item is missing, fill out and forward Transportation Deficiency Report (TDR) (SF361) as described in AR 55-38/NAVSUPINST 4610.33C/AFR 75-18/MCO P4610.19D/DLAR 4500.15.

**4.2.2.3 Examine Each Item for Damage.** If any item is damaged, fill out and forward SF364 Report of Discrepancy (ROD) as prescribed in AR 735-11-2/DLAR 4140.55/NAVMATINST 4355.73A/AFR 400-64/MCO 4430.3F. All damages should be reported as prescribed by DA Pam 738-750, as contained in Maintenance Management Update.

## 4.3 MK, Distribution, and Consumables.

**4.3.1 Items Supplied in MK and/or Required for Installation.** Use table 4-1 and figure 4-1 to identify and inventory MK parts.

### 4.3.2 Distribution and Issue Instructions.

- a. US Forces: Do not requisition MK. They will be shipped automatically.
- b. US Army Depots: Requisition MK through supply channels.
- c. Multiservice: Instructions shall be included for multiservice modifications.
- d. MAP/MAS Countries: Instructions shall be provided for MAP/MAS countries.

Table 4-1. Parts List for Installation of Radio Set AN/VRC-89/91 Series

NSN	ITEM DESCRIPTION AND PART NUMBER	QUANTITY IN MK	SMR CODE	FIGURE, ITEM NO.
5985-01-297-2971	Antenna AS-3900/VRC (A3017899-1)	2	PAOOF A	4-1, 2
5305-00-847-1159	Screw, Cap, Hexagon (3/8-16 x 1 3/4 in) MS35307-365	8	PAOZZA	
5310-00-913-8881	Nut, Hexagon (3/8-16 in) MS51971-3 (Not Used)	8	PAOZZA	
5310-00-061-1258	Washer, Lock, Internal/External-Toothed (3/8 in) MS45904-76 (Not Used)	16	PAOZZA	
5310-00-889-2527	Washer, Lock, Internal/External-Toothed (5/16 in) MS45904-72 (Not Used)	4	PAOZZA	
5306-00-225-9086	Bolt, Machine (5/16-24 x 5/8 in) MS90726-31 (Not Used)	2	PAOZZA	
5330-01-205-2864	Gasket (A3013655-1)	2	PAOZZA	
5975-01-188-8873	Mounting Base, Electrical Equipment MT-6352/VRC (A3013367-1)	1	PAOOF A	4-1, 1
5306-00-225-9089	Bolt, Machine (5/16-24 x 1 in) MS90726-34	5	PAOZZA	
5310-00-889-2527	Washer, Lock, Internal/External-Toothed (5/16 in) MS45904-72 (5 Not Used)	10	PAOZZA	
5310-00-880-7746	Nut, Hexagon (5/16 - 24 in) MS51968-5 (Not Used)	5	PAOZZA	
5995-01-219-7034	Cable Assembly, Radio Frequency CG-3855/VRC (15 FT, 0 IN) (A3014031-7)	1	PAOZZA	4-1, 4
5995-01-225-1658	Cable Assembly, Radio Frequency CG-3856/VRC (21 FT, 0 IN) (A3014032-7)	1	PAOZZA	4-1, 5
5995-01-219-7307	Cable Assembly, Special Purpose, Electrical CX-13300/VRC (6 FT, 0 IN) (A3014044-4)	1	PAOZZA	4-1, 6
5995-01-303-4951	Cable Assembly, Special Purpose, Electrical CX-13313/VRC (2 FT, 7 IN) (A3018360-1)	1	PAOZZA	4-1, 7
5340-00-809-1490	Clamp, Loop (1/4 - 1/4 in) MS21333-98	7	PAOZZA	
4020-01-341-8795	Fiber Rope Assembly, Single Leg (A3167672-1)	2	PAOZZA	4-1, 3
5305-00-068-0502	Screw, Cap, Hexagon (1/4-20 x 3/4 in) MS90725-6	7	PAOZZA	
5975-00-074-2072	Strap, Tiedown, Electrical Components MS3367-1-9	20	PAOZZA	
5310-00-582-5965	Washer, Lock (1/4 in) MS35338-44	7	PAOZZA	

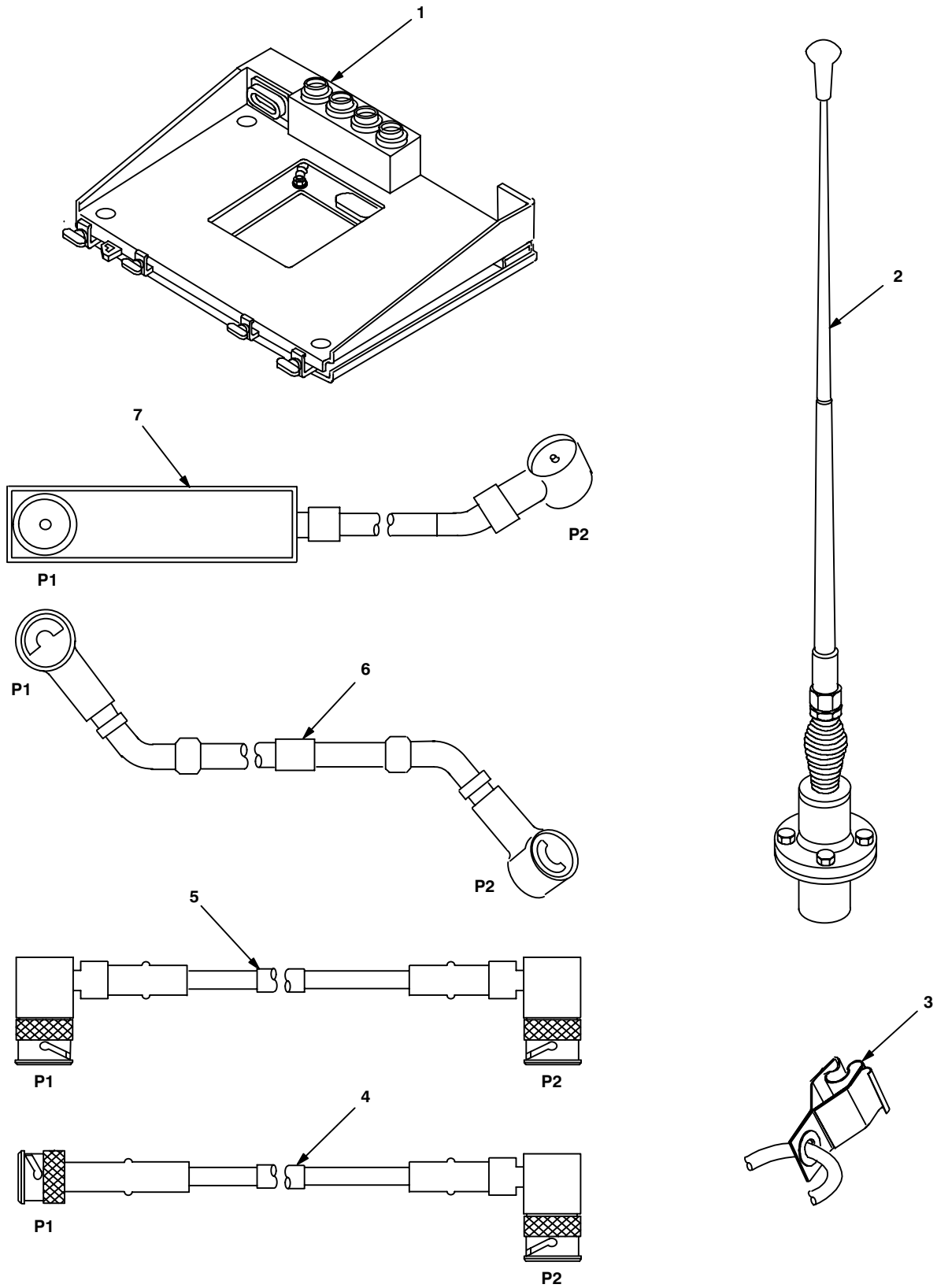


Figure 4-1. MK Illustrated Parts List



**4.3.3 Consumable Materials.** The table below lists materials required for installation but not supplied with MK.

NSN	NOMENCLATURE
8040-00-117-8510	Adhesive-Sealant, Clear, RTV
6850-00-880-7616	Silicone Compound, MIL-S-8660
8030-00-292-1102	Conductive Anti-Seize Compound

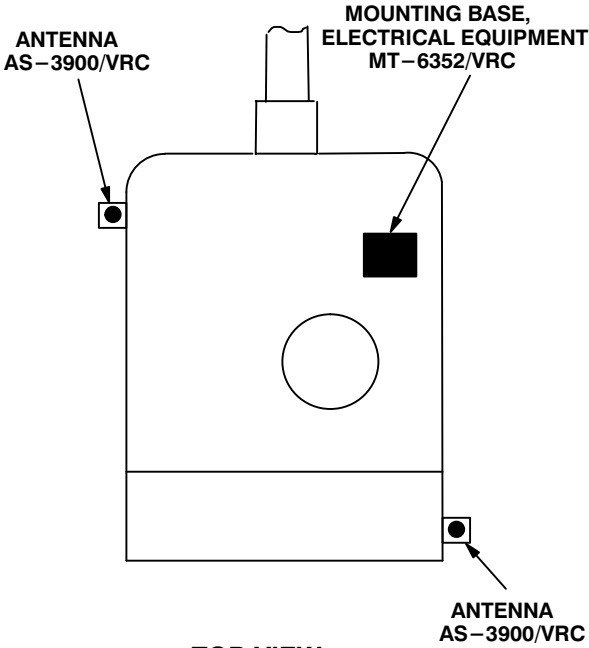
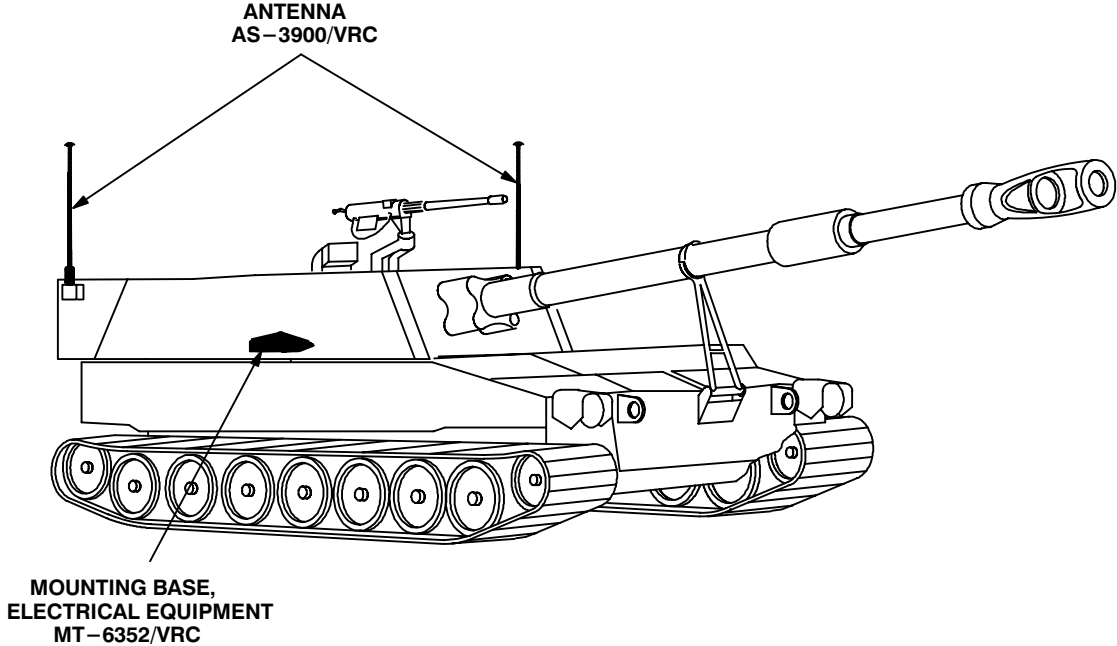
**4.4 Tools and Test, Measurement, and Diagnostic Equipment (TMDE) Required.** The following tools and TMDE are needed for installation.

NOMENCLATURE	NSN	QUANTITY
Radio Set*		1
Electric Grinder or Equivalent		1
Pocket Knife, Electrician's	5110-00-240-5943	1
Screwdriver, No. 2 Point Phillips, 4 in	5120-00-234-8913	1
Screwdriver, 1/4 in Flatblade, 4 in	5120-00-222-8852	1
Pliers, Round Nose	5120-00-240-6172	1
Pliers, Diagonal Cutting	5110-00-965-0974	1
Wrench, Open/Box: 7/16 in	5120-00-228-9505	1
1/2 in	5120-00-228-9506	1
9/16 in	5120-00-228-9507	1
Handle, Socket Wrench	5120-00-240-5364	1
Socket: 7/16 in	5120-00-227-6703	1
1/2 in	5120-00-237-0977	1
9/16 in	5120-00-227-6704	1

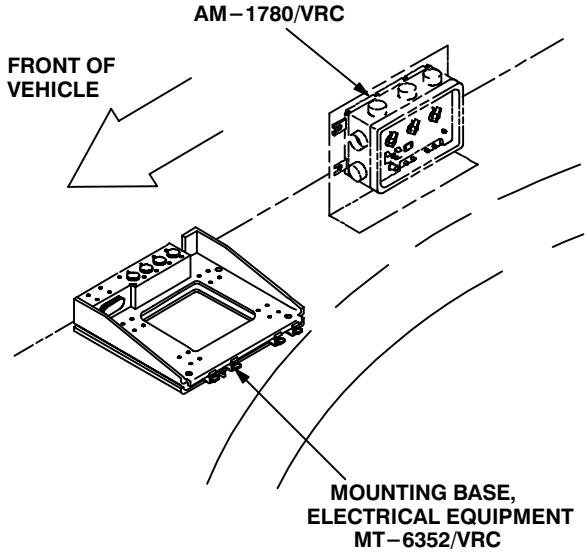
\* Use radio issued with your vehicle if available.

**5. INSTALLATION PROCEDURES.**

This section describes where and how to install MK items in the vehicle. See figure 5-1 for an overall view of where vehicular MK equipment, as well as radio components, typically will be installed. When installing MK equipment, be sure to read and follow instructions and illustrations carefully.



**TOP VIEW**



**TURRET INTERIOR**

**Figure 5-1 (1). MK and Radio Installation: MK Equipment Locations**

5. INSTALLATION PROCEDURES. Continued

INSTALLATION FOR  
AN/VRC-89/91

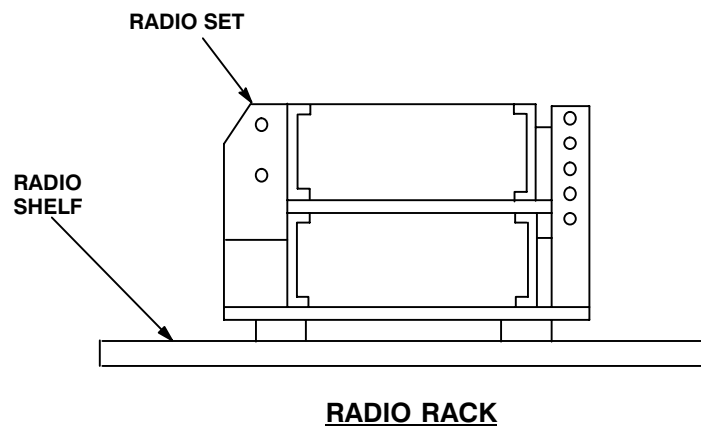


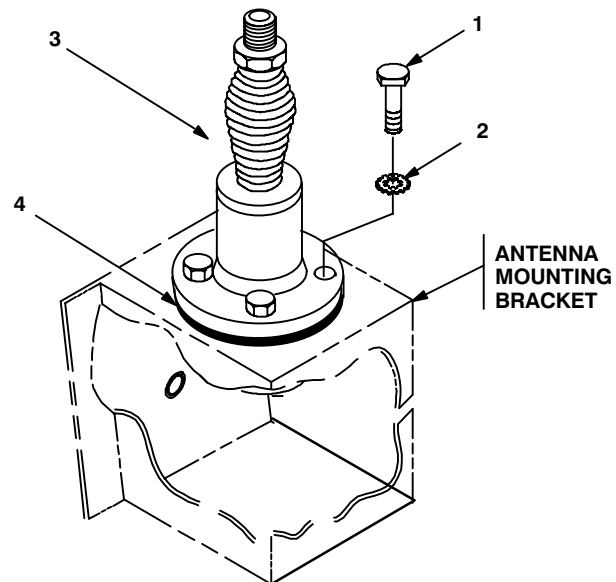
Figure 5-1 (2). MK and Radio Installation: Radio Equipment Locations

## 5.1 Installation of Antenna, Vehicular, AS-3900/VRC (antenna).

**5.1.1 Installation of Antenna Base.** Use the following procedures to install both antenna bases. See Figure 5-1(1) for locations.



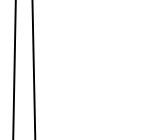
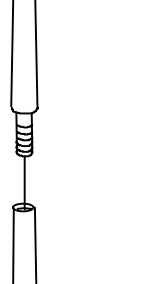
ITEM	ACTION	REMARKS
<b>NOTE</b>		
Apply a thin coat of adhesive-sealant to both sides of each internal/external-toothed (IET) washer during installation, and to the area of contact where IET washer is to be place.		
a. Existing antenna mounting bracket.	Remove access plate from bottom if installed. See figure 5-2.	Access plate not shown.
b. Existing antenna mounting bracket.	Remove the paint (1" strip) for 360° centered around the four mounting holes. Clean the paint removed area and apply a thin coat of conductive anti-seize compound (CASC).	Tools: Electric grinder or equivalent.
c. Gasket (4).	Place on antenna mounting bracket and align mounting holes.	
d. Antenna base (3).	Place on top of gasket (4) and antenna mounting bracket; then align mounting holes.	
e. Four cap screws (1), and four internal/external-toothed (IET) washers (2).	Install and secure to antenna base (3) and antenna port.	Tools: 9/16 in socket.
f. Gasket (4) and antenna mounting bracket.	Apply a bed of adhesive-sealant/silicon compound 360° around the seam between gasket (4) and antenna mounting	

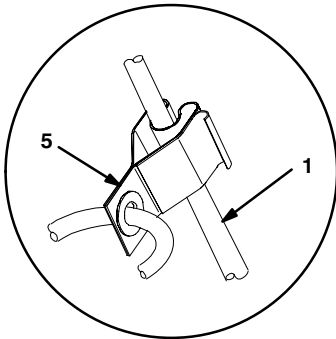
1. CAP SCREW (3/8-16 x 1 3/4 in)
2. IET WASHER (3/8 in)
3. ANTENNA BASE
4. GASKET



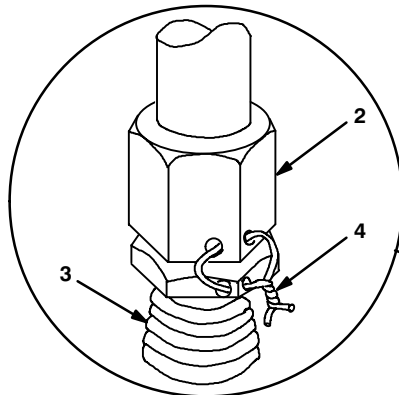
**Figure 5-2. Antenna Base Installation**

**5.1.2 Installation of Top Antenna Assembly.** The top portion of the antenna includes a lower element and an upper element (with installed cap). Use the following procedure to assemble, install and tie down all antennas.

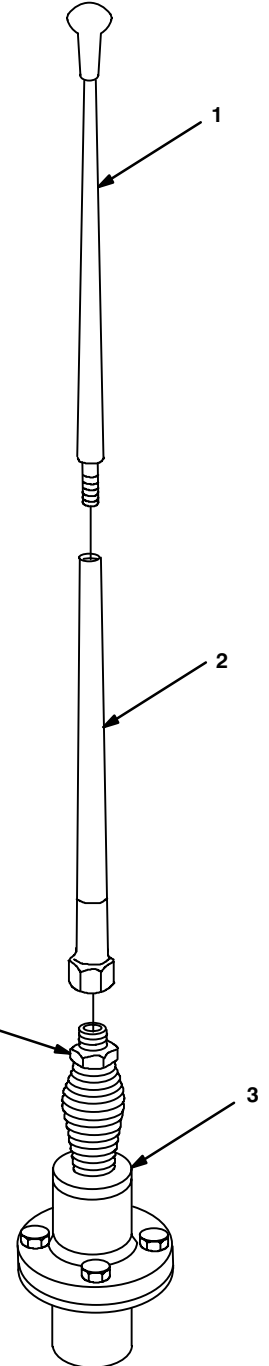
ITEM	ACTION	REMARKS
a. Antenna elements (1, 2).	Apply silicone compound to element threads and assemble. See figure 5-3.	
b. Antenna element (2).	Install and hand-tighten to antenna base (3).	
c. Lock wire (4).	Install to antenna element (2) and antenna base (3). See figure 5-3, detail A.	
	Cut and remove excess wire with diagonal cutting pliers.	
d. Fiber rope assembly (5).	Attach clip to antenna element (1). Tie rope to vehicle to position antenna in desired location. See figure 5-3, detail B.	



**DETAIL B**



**DETAIL A**



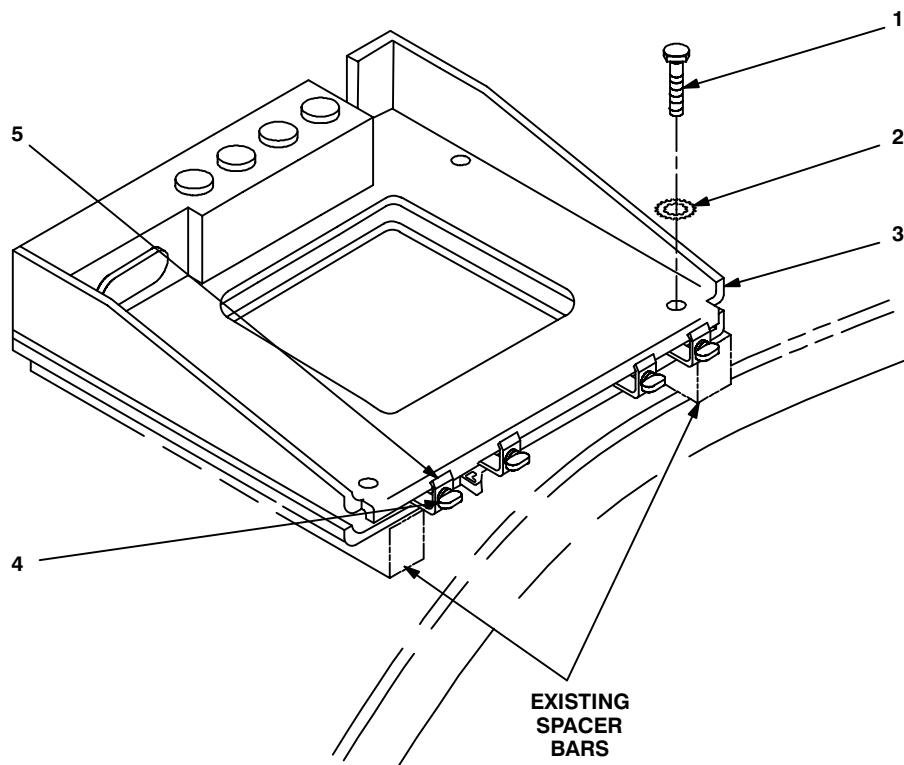
- 1. ANTENNA ELEMENT (UPPER)
- 2. ANTENNA ELEMENT (LOWER)
- 3. ANTENNA BASE
- 4. LOCK WIRE
- 5. FIBER ROPE ASSEMBLY

**Figure 5-3. Top Antenna Assembly Installation**

**5.2 Installation of Mounting Base, Electrical Equipment MT-6352/VRC (mounting base).** Remove and retain attaching bag of 5/16 mounting hardware. To insure good electrical grounding, any rust, corrosion or paint around mounting holes in radio shelf should be removed before installing the mounting base. See figure 5-1(1) for location; then see Figure 5-4 and perform the following steps.

ITEM	ACTION	REMARKS
<b>NOTE</b>		
Apply a thin coat of adhesive-sealant to both sides of each internal/external-toothed (IET) washer during installation, and to the area of contact where IET washer is to be placed.		
a. Mounting base (3) and existing spacer bars.	Remove a 2" square area of paint on the underside of the mounting base (1) around left front and rear mounting holes. Remove a 2" square area of paint on the existing spacer bars around the existing mounting holes that mate with left front and rear mounting holes of mounting base (1). Clean the paint removed areas and apply a thin coat of CASC.	Tools: Electric grinder or equivalent.
b. Mounting base (3).	Place on existing spacer bars over existing holes. See figure 5-4.	
c. Two outer thumbscrews (4).	Turn ccw until both sets of threads have cleared center of holes.	
d. Mounting base (3).	Align four holes and rear slot with matching hole pattern in equipment shelf.	
e. Five machine bolts (1) and five internal/external-toothed IET washers (2).	Install and secure to mounting base (3) and spacer bars.	Tools: 1/2 in socket and 1/2 in open/box wrench.
f. Two outer thumbscrews (4).	Tighten and secure to rim clenching clamps (5) and mounting base (1).	

5.2 Installation of Mounting Base, Electrical Equipment MT-6352/VRC (mounting base). Continued.



1. MACHINE BOLT (5/16 - 24 x 1 in)
2. IET WASHER (5/16 in)
3. MOUNTING BASE
4. THUMBSCREW
5. RIM CLENCHING CLAMP

Figure 5-4. Mounting Base Installation

**5.3 Installation of Cables.** To accomplish the installation, leave loop clamps and tiedown straps loose enough to adjust cable slack and allow easy adjustment of equipment. When installation is complete, tighten and secure all clamps and tiedown straps.

**WARNING**

Make sure vehicle power source is positioned OFF or disconnected before installing cables.

ITEM	ACTION	REMARKS
a. Existing curbside antenna mounting bracket.	Remove access plate from bottom if installed.	
b. RF cable (2) connector P2.	From outside vehicle, insert through existing grommet and into vehicle. See figure 5-5 (1), detail A.	
c. Armor plate.	Partially remove so that cable clamps (3) can be installed. See figure 5-5 (1).	
d. RF cable (2) connector P1.	Route behind armor plate and into curbside antenna mounting bracket.	
e. RF cable (2) connector P1.	Connect and secure to antenna base (1) connector J1.	
f. Four loop clamps (3), four cap screws (1/4-20 x 3/4 in), and four lock washers (1/4 in).	Wrap around RF cable (2); then install to existing holes.	Tools: 7/16 in socket.
g. RF cable (2).	Adjust slack in cable and securely tighten four loop clamps (3).	Tools: 7/16 in socket.
h. Armor plate.	Reinstall to vehicle.	
i. Existing curbside antenna mounting bracket.	Reinstall access plate to bottom.	



5.3 Installation of Cables. Continued

ITEM	ACTION	REMARKS
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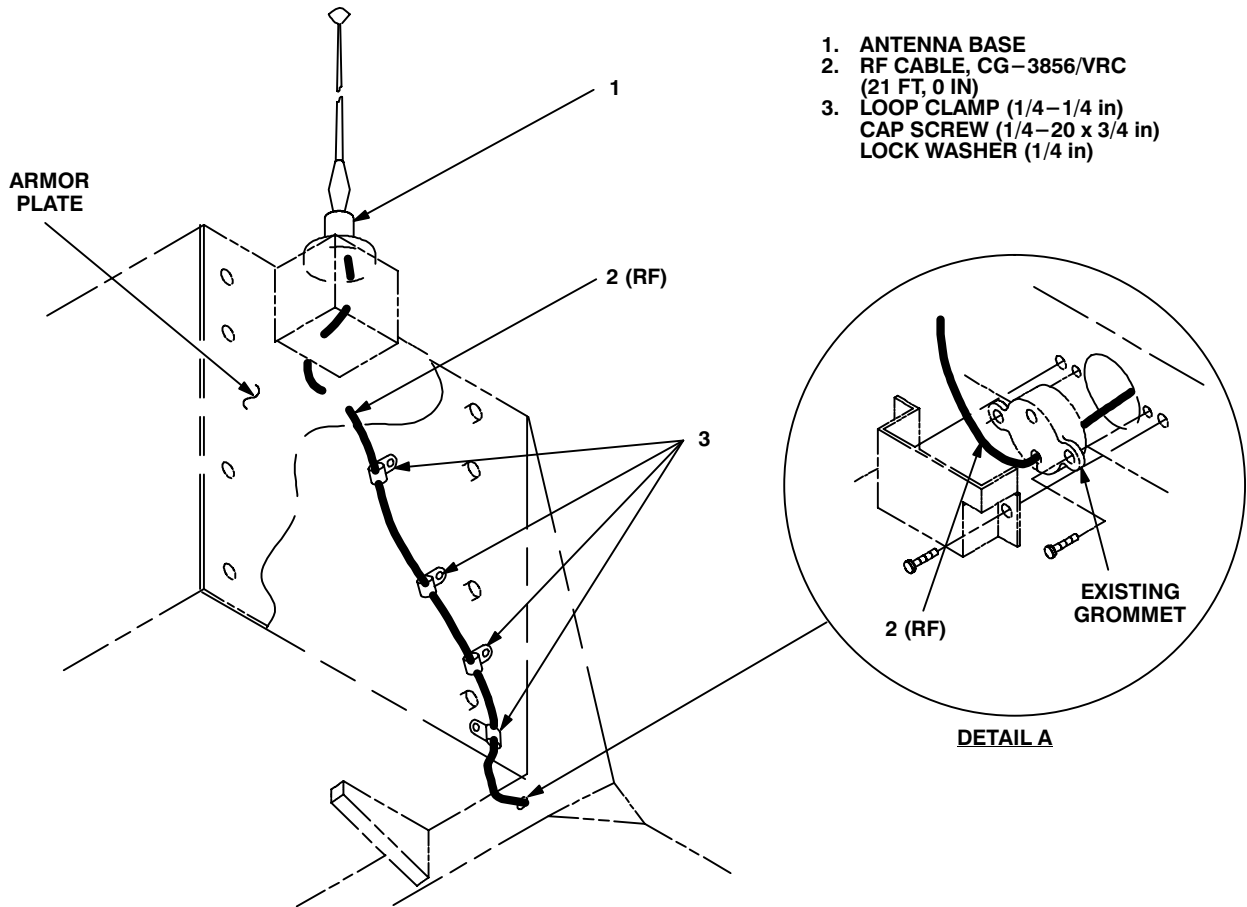


Figure 5-5 (1). Cable Installation: Curbside Antenna

- |  |  |
|--|--|
| j. Existing roadside antenna mounting bracket. | Remove access plate from bottom if installed.  |
| k. RF cable (3) connector P2.                  | From outside vehicle, insert through existing grommet in turret. See figure 5-5 (2). |
| l. RF cable (3) connector P1.                  | Connect and secure to antenna base (1) connector J1.                                 |
| m. RF cable (3).                               | From inside vehicle, route cable down turret and around to mounting base.            |

5.3 Installation of Cables. Continued

ITEM	ACTION	REMARKS
n. Three loop clamps (4), three cap screws (1/4-20 x 3/4 in), and three lock washers (1/4 in).	Wrap around RF cable (3); then install to existing holes in turret. See figure 5-5 (2) for locations.	Tools: 7/16 in socket.
o. Six tiedown straps (2).	Wrap around RF cable (3); then secure to existing cables along the turret.	
p. RF cable (3) connector P2.	Position on top of mounting base.	
q. Existing roadside antenna mounting bracket.	Reinstall access plate to bottom.	

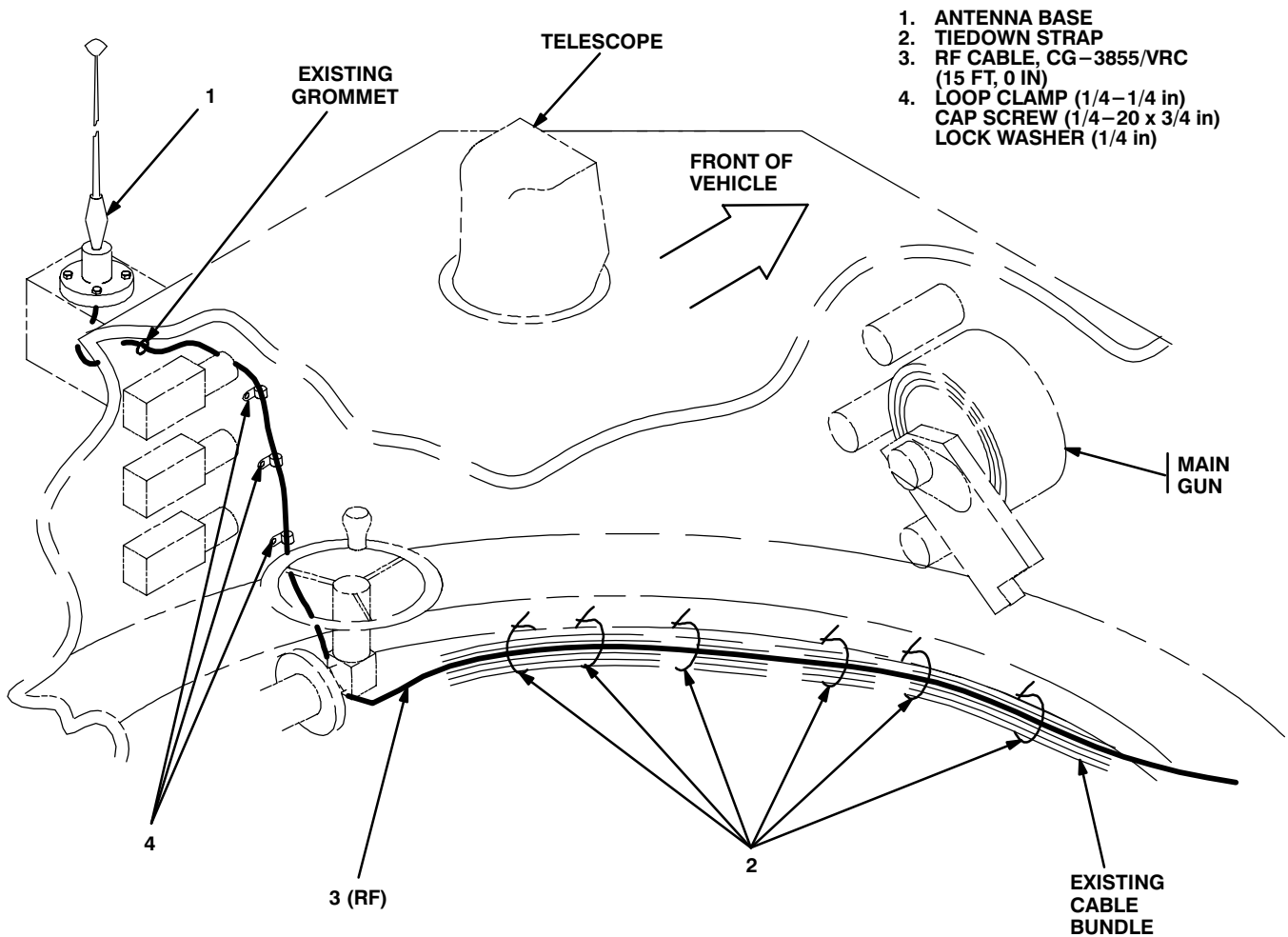


Figure 5-5 (2). Cable Installation: Roadside Antenna

5.3 Installation of Cables. Continued

ITEM	ACTION	REMARKS
r. RF cable (1).	Route along turret behind existing power conditioning unit, behind existing AM-1780/VRC, and around left side of mounting base (3). See figure 5-5 (3).	
s. RF cable (1) connector P2.	Position on mounting base (3).	
t. Existing power cable from power conditioning unit.	Route behind existing AM-1780/VRC and connect to J1 on mounting base (3).	
u. Two tiedown straps (2).	Wrap around existing power cable and secure to RF cable (1).	
v. SP cable (4) connector P1.	Connect and secure to AM-1780/VRC connector J501.	
w. SP cable (4).	Route from AM-1780/VRC to back of mounting base (3).	

1. RF CABLE, CG-3856/VRC (21 FT, 0 IN)
2. TIEDOWN STRAP
3. MOUNTING BASE
4. SP CABLE, CX-13300/VRC (6 FT, 0 IN)

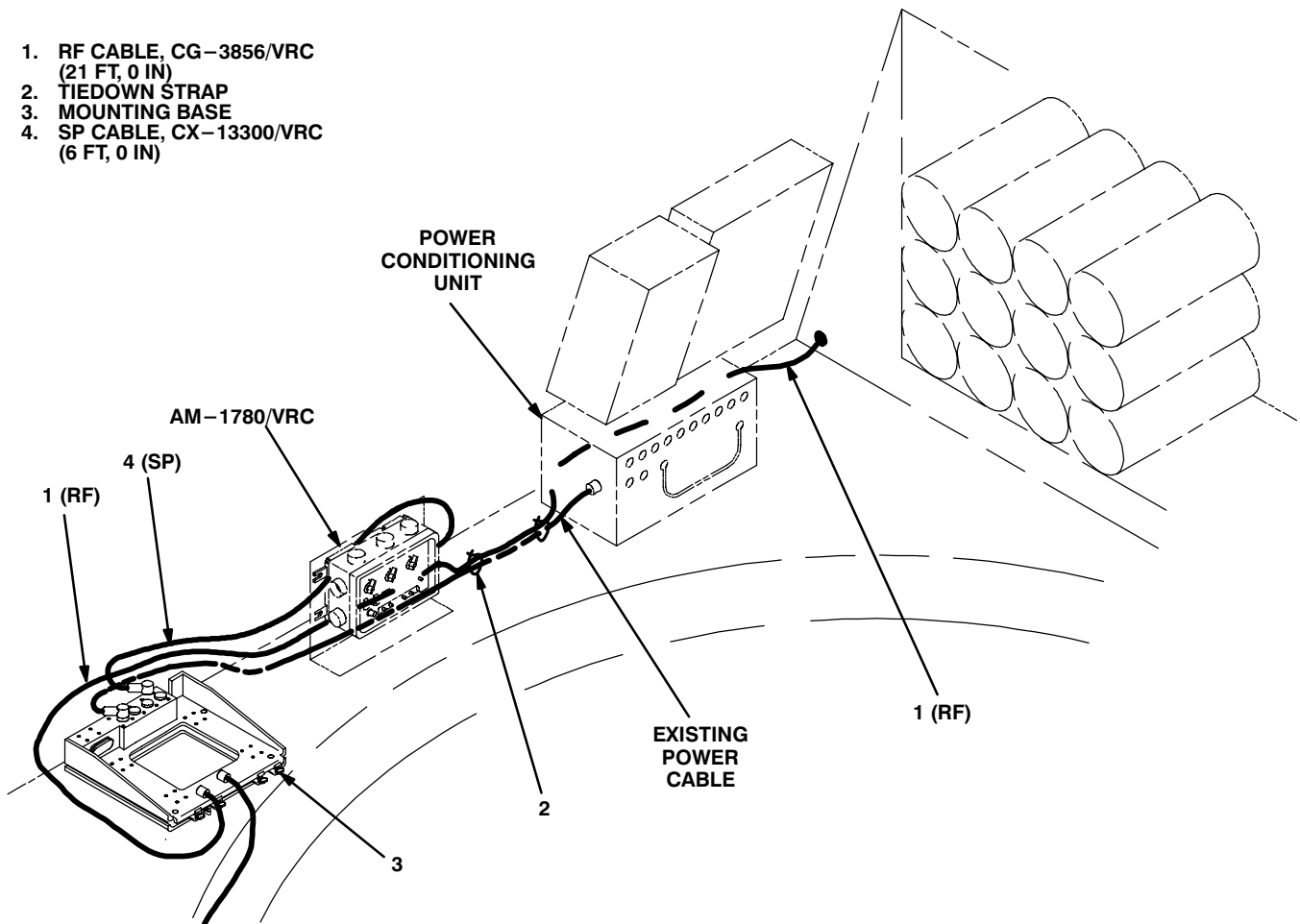


Figure 5-5 (3). Cable Installation: Turret Interior

5.3 Installation of Cables. Continued

ITEM	ACTION	REMARKS
x. SP cable (3) connector P2.	Connect and secure to SP cable (4) connector P1. See figure 5-5 (4).	
y. SP cable (4) connector P2.	Connect and secure to mounting base (1) connector J4.	
z. Tiedown strap (2).	Wrap around SP cable (4) and secure.	

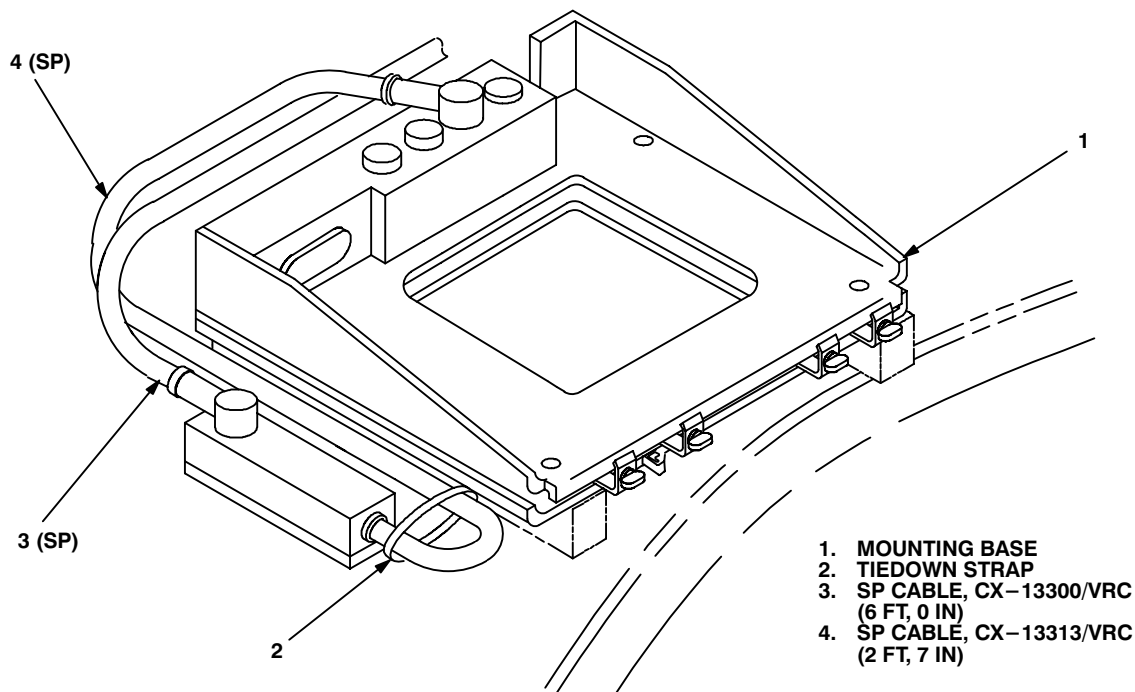
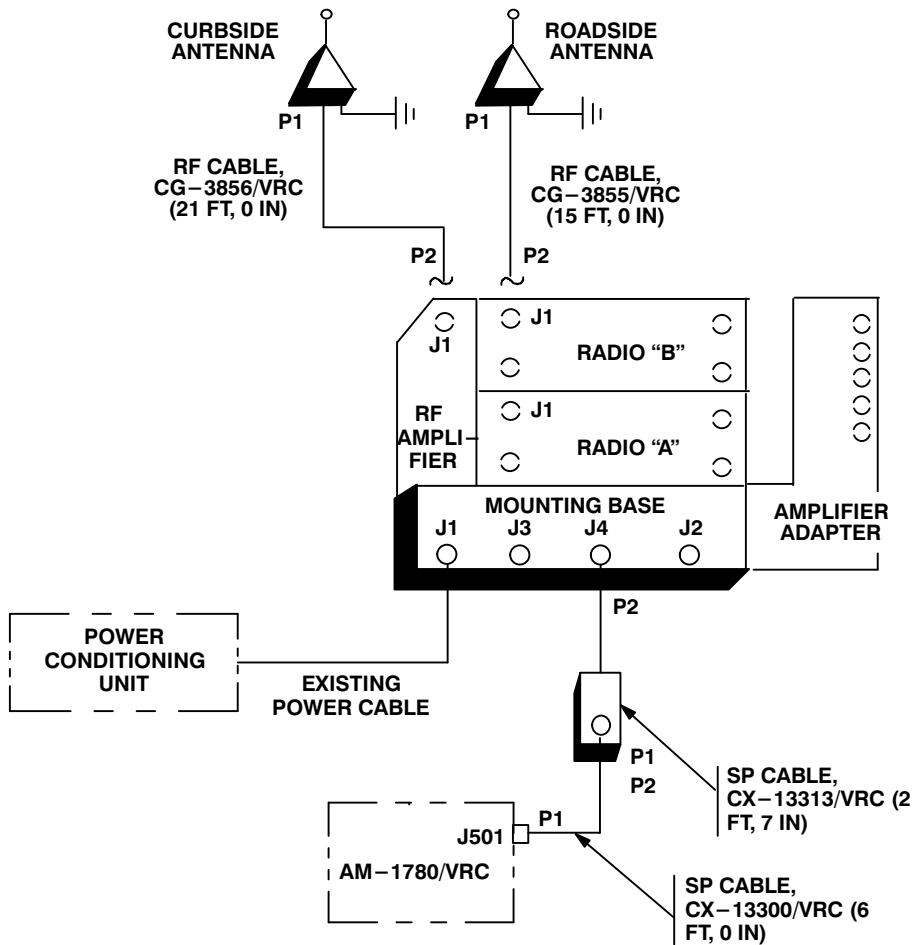


Figure 5-5 (4). Cable Installation: Mounting Base

**5.4 Post-Installation and Checkout.** After equipment is installed and cables are connected, perform the following steps.

ITEM	ACTION	REMARKS
a. Equipment.	Check for secure mounting. Check for loose parts, connectors and mounting hardware.	
b. Cables.	Check for proper installation and connection of cables. See figure 5–6 for cable connections. Unused cables should be stowed in appropriate place inside the vehicle.	
c. Loop clamps.	Check that all have been properly installed and tightened.	
d. Protective covers.	Insure that all installed cables are covered when not in use or connected.	
e. Radio issued with vehicle.	Install and connect cables. See TM 11–5820–890–20–1 or TM 11–5820–890–20–2 for installation and Operational (OP) Check instructions.	
f. MK line replaceable units.	See TM 11–5820–890–20P for Repair Parts and Special Tools List (RPSTL) information.	

5.4 Post-Installation and Checkout. Continued



CABLE ASSEMBLY	FROM			TO		
	CABLE CONN.	UNIT	UNIT CONN.	CABLE CONN.	UNIT	UNIT CONN.
Existing power cable		Power conditioning unit			Mounting base	J1
CG-3856/VRC (21 FT, 0 IN)	P1	Curbside antenna base	J1	P2	RF amplifier	J1
CG-3855/VRC (15 FT, 0 IN)	P1	Roadside antenna base	J1	P2	Radio "B"	J1
CX-13313/VRC (2 FT, 7 IN)	P1	CX-13300/VRC	P2	P2	Mounting base	J4
CX-13300/VRC (6 FT, 0 IN)	P1	AM-1780/VRC	J501	P2	CX-13313/VRC	P1

Figure 5-6. Cable Diagram: For AN/VRC-89/91 Series

## APPENDIX A

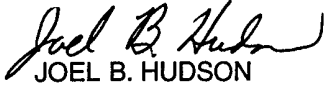
### REFERENCES

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AMDF	Army Master Data File (Microfiche)
AR 710-2	Supply Policy Below the Wholesale Level as Contained in Unit Supply UPDATE
AR 725-50	Requisitioning, Receipt and Issuing System in UPDATE
DA Pam 25-30	Consolidated Index of Army Publications (Microfiche)
DA Pam 710-2-1	Using Unit Supply System Manual Procedures as Contained in Unit Supply UPDATE
SB 11-131	Vehicular Radio Sets and Authorized Installations (SINCGARS)
TM 11-5820-890-10-1	Operator's Manual (ICOM Radio Sets)
TM 11-5820-890-10-3	Operator's Manual (Non-ICOM Radio Sets)
TM 11-5820-890-20-1	Unit Maintenance Manual (ICOM Radio Sets)
TM 11-5820-890-20-2	Unit Maintenance Manual (Non-ICOM Radio Sets)
TM 11-5820-890-20P	Repair Parts and Special Tools List

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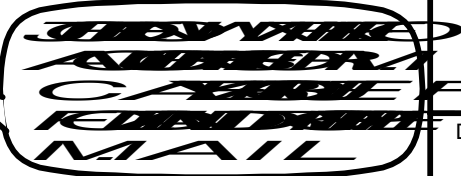
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5-6	5-8		
		FO-3	

Recommend that the installation antenna alignment procedure be changed throughout to specify a 20 IFF antenna lag rather than 10

REASON: Experience has shown that with only a 10 lag, the antenna servo system is too sensitive to gusting in excess of 25 knots, and has a tendency to rapidly accelerate and decelerate as it hunts, causing strain to the drive train. Hunting is minimized by adjusting the lag to 20 without degradation of operation.

Item 5, Functional column. Change  2 dB" to  3 dB".

REASON: The adjustment procedure for the TRANS POWER FAULT indicator call for a 3 dB (500 watts) adjustment to light the TRANS POWER FAULT indicator.

Add new step f.1 to read,  Replace cover plate removed in step d above."

REASON: To replace the cover plate.

ZONE C 3. On J1-2, change  +24 VDC" to  +5 VDC".

REASON: This is the output line of the 5 VDC power supply. +24 VDC is the input voltage.

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