OPERATOR'S MANUAL

MULTIPLE INTEGRATED LASER ENGAGEMENT SYSTEM (MILES) XXI

COMBAT VEHICLE SYSTEM (CVS) KIT FOR

M1A1/M1A2 AND M1A2 SEP ABRAMS MAIN BATTLE TANKS

DISTRIBUTION STATEMENT A: Approved for Public Release. Distribution is Unlimited.

HEADQUARTERS, DEPARTMENT OF THE ARMY

11 May 2012

DANGER

Do not look at the LASER emitter at close range **(less than 10 meters)**. Increasing the distance between the eye and the LASER reduces the risk of injury.

Do not look directly at the LASER beam or the LASER emitter through optics such as binoculars, telescopes, or periscopes at ranges of **less than 75 meters.**

CHANGE AND REVISION RECORD

Rev	Date	Description
-	7 February 2006	Original Manual.
A	19 December 2007	Revised Manual with updated Operator Instructions.
		Revised Warnings and relocated to appropriate locations.
		Removed repetitive information.
		Re-ordered Detector Belt installation instructions.
		Added Boresight Maintenance Notes to Main Gun Bracket Assembly.
		Revised Connection instructions for Vehicle Detection System Cables.
		Added Live Fire Operation Tasks.
B	12 February 2009	Revised all operating instructions to reflect changes resulting from software "Block G" update.
C	4 August 2011	Added alt p/n 2031470-3 MAIN GUN LASER TRANSMITTER (MGLT) to manual.
D	1 February 2012	Added Note to Sub-task 1.2, Added note to task 9 and Figure 2-16a, Added Note to Sub-task 17.3, and added Sub-task 17.4.
	27 February 2012	Incorporated customer comments.
	11 May 2012	Incorporated customer comments.

Address comments concerning this publication to:

Commander
U.S. Army
Program Executive Office - Simulation, Training and Instrumentation. (PEOSTRI)
Attn: AMSTI-OPS
12350 Research Parkway
Orlando, FL. 32826-3276

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WARNING AND CAUTION SUMMARY

The safety notices and warnings are for protection against loss of life (users or maintenance personnel) or for protection against damage to property and are highlighted in this manual by the terms defined here. The terms used in this document have the following significance:

WARNING — Indicates that death or severe personal injury **may** result if proper precautions are not taken.

CAUTION — Indicates that property damage may result if proper precautions are not taken.

NOTE — Indicates an item of special interest.

Do not look at the LASER emitter at close range **(less than 10 meters)**. Increasing the distance between the eye and the LASER reduces the risk of injury.

Do not look directly at the LASER beam or the LASER emitter through optics such as binoculars, telescopes, or periscopes at ranges of **less than 75 meters.**

Vehicle/Weapon WARNINGS

WARNING

You can be killed or injured by sudden turret movement. While installing MILES XXI equipment, ensure the turret and master power are OFF. Ensure all hatches are locked in the open position.

Never load MILES XXI equipped weapons with live or incorrect ammunition.

Falling hatches could cause serious injury. Keep head lower than closed hatch position when opening or closing hatches. Keep hands clear of hatch rim when closing. Ensure locking mechanism is fully engaged when hatch is in open or closed position.

You can be **killed**, **burned**, or **injured** by MILES XXI devices even though they are simulators. Observe the same safety precautions you use for live ammunition.

Lithium Batteries

WARNING

- **Never** charge, short circuit, incinerate or mutilate lithium batteries because they may release extremely dangerous gas into the air. Lithium gas can cause death if inhaled and severely damage exposed skin. Lithium gas is extremely flammable and may explode in the presence of water vapor in the air.

- **Never** solder directly to a lithium battery. Always use a heat sink to isolate heat from the battery when soldering or unsoldering.

- **Never** dispose of lithium batteries in a fire or in anyway that exposes lithium batteries to excessive heat. Dispose of lithium batteries only in an approved manner.

- **Always** store, operate, and dispose batteries using the procedures currently approved for your location. If you are not sure what the current procedures are, ask your supervisor.

- **Depleted** batteries should be turned in to designated personnel for disposal processing In Accordance With (IAW) local regulations through the Defense Reclamation Management Office (DRMO).

- **Refer** to Technical Bulletin (TB) 43-1034, Batteries, Disposition And Disposal for additional information.

- **Store** new batteries in original packaging until ready for use.

First Aid

For information on FIRST AID, see **FM 4-25.11**.

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CHAPTER 1
INTRODUCTION

SECTION I GENERAL INFORMATION

1.1 SCOPE

This manual explains how to install, operate and maintain the Multiple Integrated LASER Engagement System (MILES) XXI equipment for the Abrams series vehicles. Step-by-step instructions are provided for all procedures necessary to use the system. Where distinction among the vehicles is needed for different configurations, the text will refer to the specific vehicle. This manual covers only authorized operator maintenance. Any maintenance problems not covered should be referred to maintenance personnel.

1.1.1 Skills Needed to Use This Manual

To use this manual, you should be able to:

a. Aim and fire the vehicle weapons.

b. Operate vehicle In Accordance With (IAW) vehicle operation manuals and procedures.

c. If you cannot perform these tasks, ask your Tank Commander or supervisor to show you how. When you can perform these tasks, continue using this manual.

Before using the equipment become familiar with this manual, especially the table of contents. This manual contains information on how to inspect, install, operate, maintain and remove the equipment.

1.1.2 Purpose Of Equipment

MILES XXI simulates the effects of direct fire weapons as they would affect vehicles and soldiers during an exercise. MILES XXI provides realistic training without the expense and environmental impact of firing live ammunition.

1.1.3 Limitation Of Equipment

When engaging any MILES equipped aircraft, vehicles, or personnel, MILES XXI equipped weapons simulate the range, effect, and operational capabilities of the weapon. However, a dirty transmitter lens or environmental conditions may reduce the effective range of the LASER transmitters.

1.1.4 Corrosion Prevention and Control

a. Corrosion Prevention and Control (CPC) of Army material is a continuing concern. It is important that any corrosion problems with this item be reported. Reported problems can be corrected and improvements can be made to prevent reoccurrence in the future.

b. While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may be a corrosion problem.

c. If a corrosion problem is identified, it can be reported using SF 368. Use of key words such as “corrosion”, “rust”, “deterioration”, or “cracking” will assure that the information is identified as a CPC problem.

d. The SF 368 should be submitted to Program Executive Office, Simulation, Training and Instrumentation, ATTN: AMSTI-OPS, 12350 Research Parkway, Orlando, Fl 32826-3276.

1.1.5 Maintenance Forms and Records

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, The Army Maintenance Management System (TAMMS).

1.1.6 Destruction of Army Material to Prevent Enemy Use

MILES XXI is a training device and will not be used in a combat zone. Training devices do not meet current war reserve criteria. Therefore, the destruction of this system is up to the judgment of the unit commander.

1.1.7 Reporting Equipment Improvement Recommendations (EIR)

If the MILES XXI System needs improvement, let us know. You the user, can provide us with concerns and recommendations on how to improve this equipment. Put it on the DA 2028 located in the back of this publication and mail it to:

Commander, U.S. Army
Program Executive Office, Simulation, Training and Instrumentation (PEOSTRI)
ATTN: SFAE-STRI-OPS
12350 Research Parkway
Orlando FL. 32826-3276

We will send you a reply.

CHAPTER 2
INSTALLATION INSTRUCTIONS

SECTION I EQUIPMENT INVENTORY

2.1 GENERAL

The following installation instructions are based on the common configuration of the vehicle. If the vehicle is configured differently than shown, modify the installation tasks as necessary so you can install the MILES XXI equipment as closely as possible to the locations shown.

Cables: Physical variations may require cables to be routed differently than described in this manual. Use the installation instructions as general guidelines.

WARNING

To avoid injury to personnel outside the vehicle, never install a cable in a place where it could cause a soldier to trip or fall off the vehicle.

CAUTION

To avoid damaging MILES XXI equipment:

- **Securely attach** each cable to the surface of the vehicle.
- **Always** test the movement of the hatches before securing the cables to tie points.
- **Ensure** the cables do not prevent the turret from traversing and elevating.

2.1.1 Equipment Inventory and Inspection Notes

Inventory and inspect equipment prior to installation to ensure you have all equipment required and that it is serviceable. Refer to Table 2-2 (MILES XXI CVS KIT FOR M1A1/M1A2/M1A2 SEP). Use the inspection procedures described in Appendix C.

M1A1/A2/SEP Tank MILES XXI CVS Kit	
Device Number (DVC #)	17-236
National Stock Number (NSN)	6920-01-543-0475
Manufacturer's Part Number	2031915-1

2.2 EQUIPMENT NEEDED

Request all equipment needed to install and operate the MILES XXI CVS for the Abrams vehicles. Inspect the equipment for visible damage and inventory to ensure all required equipment is present.

Table 2-1 TOOLS REQUIRED

Flat Tip Screw Driver	1/2" Dr. Ratchet	6" Extension, 1/2" Dr.	1/2" Dr. 7/16" Socket
1/2" Dr. 9/16" Socket	7/16" Open End Box	9/16" Open End Box	15/16" Open End Box
1/2" Dr. 5/8" Socket	1/2" Dr. Torque Wrench		

Table 2-2 MILES XXI CVS KIT FOR M1A1/M1A2/M1A2 SEP

PART NO.	DESCRIPTION	QTY
2031470-2 or 2031470-3	MAIN GUN LASER TRANSMITTER (MGLT)	1
2030464-2	VEHICLE CONTROL UNIT (VCU)	1
2030754-1	RADIO INTERFACE ASSEMBLY (RIA)	1
2031236-1	FIRE CONTROL INTERFACE (FCI)	1
2030753-2	VEHICLE DISPLAY ASSEMBLY (VDA)	1
2030642-2	HULL-TO-TURRET TRANSMITTER (HUTT)	1
2031050-6	LASER DETECTOR BELT #4	1
2031050-2	LASER DETECTOR BELT #6	3
2031038-4	CABLE ASSEMBLY, SYSTEM BUS	4
2031038-8	CABLE ASSEMBLY, SYSTEM BUS	2
2030485-2	CABLE ASSEMBLY, RIA	1
2031481-1	CABLE ASSEMBLY, DIFCUE	1
2031482-1	CABLE ASSEMBLY, MAIN GUN SIGNATURE SIMULATOR (MGSS)	1
2031438-2	CABLE ASSEMBLY, VCU	1
2031480-1	CABLE ASSEMBLY, POWER	1
2031496-1	CABLE ASSEMBLY, MGLT	1
2031588-1	CABLE ASSEMBLY, M1A1 FCI	1
2031589-1	CABLE ASSEMBLY, M1A2/M1A2 SEP FCI	1
2031039-16	CABLE ASSEMBLY, SYSTEM BUS	1
2031039-6	CABLE ASSEMBLY, SYSTEM BUS	1
2031560-1	VCU BRACKET	1
2031030	TERMINATOR	2

Table 2-2 MILES XXI CVS KIT FOR M1A1/M1A2/M1A2 SEP (Continued)

PART NO.	DESCRIPTION	QTY
2030690-2	COAX MIC TRIGGER ASSEMBLY	1
2030911-1	TRANSIT CASE	1
2030912-3	TRANSIT CASE	1
2031555-1	MGLT MOUNTING BRACKET	1
2030983-1	SEAL, PERISCOPE	1
2030680-15	LASER TRANSMITTER, M2	1
2030680-10	LASER TRANSMITTER, M240	1

SECTION II INSTALLATION TASKS

2.3 GENERAL

CAUTION

- Ensure master power is off.
- Fastener tape primer is highly flammable. Do not spray near heat, sparks, or open flame. Use only in well ventilated areas.
- Do not spray fastener tape primer on periscopes or sights.

Fastener Tape

A large part of the MILES XXI equipment is installed on the vehicle using hook and pile fastener tape. This task will show you where the hook fastener tape is required. Installation instructions are the same when fastener tape is required. Read the following general instructions first to familiarize yourself with how to install fastener tape.

NOTES

Always inspect the vehicle for existing fastener tape. If tape has been installed and in good condition, leave it in place. New tape is only necessary when old tape is damaged or not installed.

The following procedures provide instructions for standard MILES XXI component installation on the vehicle.

a. Look carefully at the designated areas in the following figures where MILES XXI equipment is installed on the vehicle.

b. Clean areas using water, brush, and rags. Tape will not stick to dirty, greasy, wet or rough surfaces.

c. After you have cleaned the areas described, mark the areas where each piece of MILES XXI equipment will be attached with chalk.

d. To mark equipment locations, lay each piece of equipment in the location described in this task. Mark the outline of each piece of equipment with chalk on the vehicle to help locate the fastener tape placement.

NOTE

Don't spray adhesive glue or add fastener tape where there is already tape in good condition.

e. Get a can of spray adhesive and a roll of **"hooked"** fastener tape.

Figure 2-1 Spray Adhesive and Fastener Tape

NOTE

Avoid installing tape directly over weld lines, bolts, screw heads, or other obstructions.

TASK 1

Conduct Vehicle Safety Checks and Ready Vehicle for Installation

WARNING

Hatch covers could fall and injure personnel. Keep head and hands clear when opening or closing hatch covers.

To avoid injury during equipment installation, do the following before performing any of the installation tasks.

a. Ensure vehicle MASTER POWER and TURRET POWER are set to the OFF position.

b. (M1A1 Only) Ensure Turret Utility Power is set to OFF.

c. Ensure the Commander's and Loader's HATCHES are LOCKED in the FULL OPEN position.

TASK 2

Prepare Vehicle Surfaces

NOTE

If tape has already been installed on the vehicle and is in good shape, proceed to TASK 1 (Install Detector Belt To Turret Left Side), in Section IV of this Chapter.

a. Clean areas where fastener tape is shown in the following figures, using water, brush and rags. Tape will not stick to dirty, greasy, wet or rough surfaces.

b. Clean areas inside vehicle as shown in the follow-on sections.

SECTION III FASTENER TAPE INSTALLATION

TASK

1 Install Fastener Tape

NOTES

When **LEFT, RIGHT, FRONT** and **REAR** references are used, it refers to positions relative to the driver while seated in the drivers compartment facing the front of the vehicle.

Installation procedures may be conducted in parallel using some or all of the crew members to expedite installation.

Sub-task 1.1 Install Fastener Tape to Turret Left Side

Figure 2-2 Turret Left Side Fastener Tape Installation

a. Mark the area with chalk from the front left of the turret to a point past the rear of the left tow cable holder as shown.

b. Spray a heavy coat of adhesive in the marked area.

c. Let adhesive dry for 3-5 minutes before applying fastener tape.

d. Cut tape to fit the area.

e. Remove the protective paper backing from the tape. For short lengths, the entire backing may be removed before mounting the tape. For long pieces of tape, remove the backing material as the tape is installed.

f. Press the tape firmly in place with your hand or a hand roller. You can also use the lid of the spray can or the head of a ball-peen hammer as a roller to press the tape firmly in place.

Sub-task 1.2 Install Fastener Tape to Turret Bustle Rack

Figure 2-3 Bustle Rack Fastener Tape Installation

NOTE

If vehicle has a fold-down extended bustle rack option, alter fastener tape installation as needed to install the belt on the extended bustle rack in a similar fashion as shown above.

a. Mark the area from the left-most edge to the right-most edge of the bustle rack as shown with chalk and spray a heavy coat of adhesive on the marked area.

b. Let adhesive dry for 3-5 minutes before applying fastener tape.

c. Cut fastener tape to fit the area.

d. Remove the protective paper backing from the tape. For short lengths, the entire backing may be removed before mounting the tape. For long pieces of tape, remove the backing material as the tape is installed.

e. Press the tape firmly in place with your hand or a hand roller. You can also use the lid of the spray can or the head of a ball-peen hammer as a roller to press the tape firmly in place.

Sub-task 1.3 Install Fastener Tape to Turret Right Side

Figure 2-4 Turret Right Side Fastener Tape Installation

a. Mark the area with chalk from the front right of the turret to a point past the rear of the right tow cable holder as shown.

b. Spray a heavy coat of adhesive in the marked area.

c. Let adhesive dry for 3-5 minutes before applying fastener tape.

d. Cut fastener tape to fit the area.

e. Remove the protective paper backing from the tape. For short lengths, the entire backing may be removed before mounting the tape. For long pieces of tape, remove the backing material as the tape is installed.

f. Press the tape firmly in place with your hand or a hand roller. You can also use the lid of the spray can or the head of a ball-peen hammer as a roller to press the tape firmly in place.

Sub-task 1.4 Install Fastener Tape to Turret Front

Figure 2-5 Turret Front Fastener Tape Installation

a. Mark the area across the turret front left and right and over the main gun as shown with chalk.

b. Spray a heavy coat of adhesive on the areas.

c. Let adhesive dry for 3-5 minutes before applying fastener tape.

d. Cut fastener tape to fit the area.

e. Remove the protective paper backing from the tape. For short lengths, the entire backing may be removed before mounting the tape. For long pieces of tape, remove the backing material as the tape is installed.

f. Press the tape firmly in place with your hand or a hand roller. You can also use the lid of the spray can or the head of a ball-peen hammer as a roller to press the tape firmly in place.

Sub-task 1.5 Install HUTT Fastener Tape

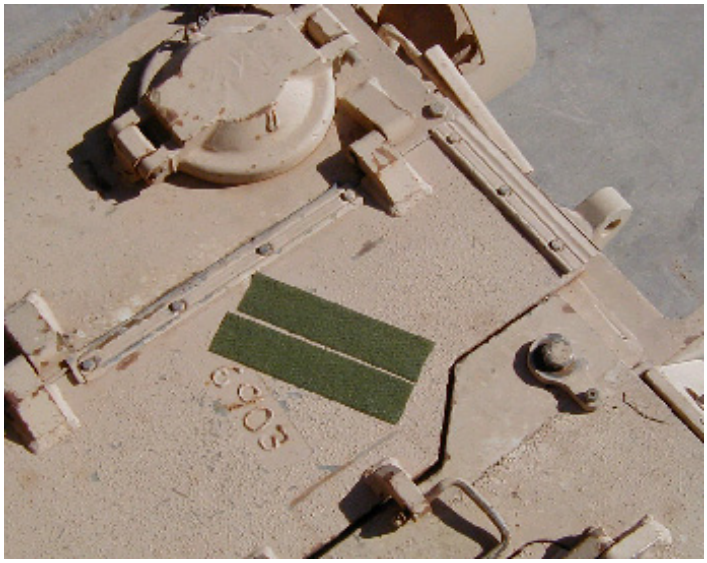


Figure 2-6 HUTT Fastener Tape Installation

a. Locate the area on the rear of the battery box as shown.

b. Spray a heavy coat of adhesive on the area.

c. Let adhesive dry for 3-5 minutes before applying fastener tape.

d. Cut 2 ea. 6 inch strips of tape to fit the area. Remove the fastener tape backing.

e. Press the tape firmly in place with your hand or a hand roller. You can also use the lid of the spray can or the head of a ball-peen hammer as a roller to press the tape firmly in place.

Sub-task 1.6 Install VDA and FCI Fastener Tape

Figure 2-7 VDA and FCI Fastener Tape Installation

a. Locate the area on the ammo door support bracket as shown.

b. Spray a heavy coat of adhesive on the area.

c. Let adhesive dry for 3-5 minutes before applying fastener tape.

d. Cut 4 ea. 6 inch strips of tape to fit the area.

e. Remove the protective paper backing from the tape.

f. Press the tape firmly in place with your hand or a hand roller. You can also use the lid of the spray can or the head of a ball-peen hammer as a roller to press the tape firmly in place.

Sub-task 1.7 Install RIA Fastener Tape

Figure 2-8 RIA Fastener Tape Installation

NOTE

Cover removed for clarity.

a. Locate an area in front of the ammo door under the Master Control Station (MCS) as shown. Clean then spray a heavy coat of adhesive on the area.

b. Let adhesive dry for 3-5 minutes before applying fastener tape.

c. Cut 1 ea. 6 inch strip of tape to fit the area. Remove the fastener tape backing.

d. Press the tape firmly in place with your hand or a hand roller. You can also use the lid of the spray can as a roller to press the tape firmly in place.

SECTION IV EQUIPMENT INSTALLATION

TASK

1 Install Detector Belt To Turret Left Side

NOTES

When **LEFT, RIGHT, FRONT** and **REAR** references are used, it refers to positions relative to the driver while seated in the drivers compartment facing the front of the vehicle.

Installation procedures may be conducted in parallel using some or all of the crew members to expedite installation.

For ease of detector belt and cable connections, we refer to detector belt and cable locations on the vehicle. Refer to Figure 2-9 (Vehicle Detector Belt Location).

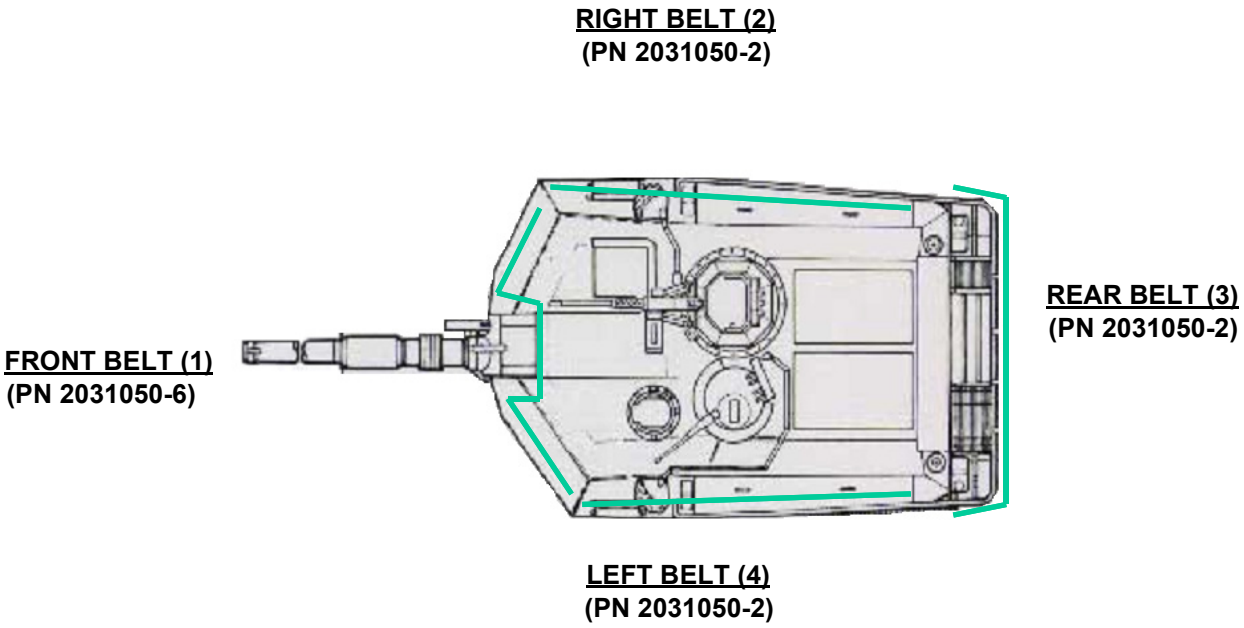


Figure 2-9 Vehicle Detector Belt Location

a. The detector belts are configured at the warehouse for placement on the vehicle.

b. Labels are placed on the detector belt electronics module by CLS personnel, which dictate

c. vehicle placement. The labels are marked with a number and a location, as shown in Figure 2-10.

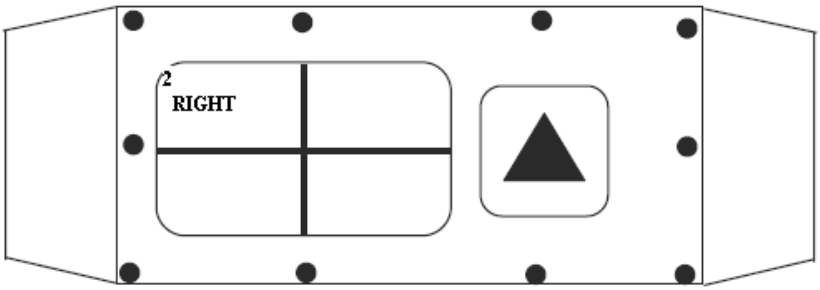


Figure 2-10 Detector Belt, Factory Configuration Label

d. The number on the label, denotes the location on the vehicle as follows:

(1) 1 = Front detector belt

(2) 2 = Right detector belt

(3) 3 = Rear detector belt

(4) 4 = Left detector belt

e. The additional spaces on the label, are used for indicating that a detector belt was reconfigured for an alternate mounting location on the vehicle.

f. Locate detector belt part number *2031050-2* (marked **4 LEFT**), to install on the left side of the turret.

g. Starting at the left front of the turret, attach the belt to the fastener tape.

h. Smoothly apply the full length of the detector belt to the fastener tape.

i. Apply pressure to the detector belt to ensure a good adherence to the fastener tape.

TASK

2 Install Detector Belt To Turret Rear

a. Locate detector belt part number *2031050-2* (marked **3 REAR**).

b. Starting at the left rear of the turret, attach the belt to the fastener tape across the bottom of the bustle rack.

c. Smoothly apply the full length of the detector belt to the fastener tape.

d. Apply pressure to the detector belt to ensure a good adherence to the fastener tape.

TASK

3 Install Detector Belt To Turret Right Side

a. Locate detector belt part number *2031050-2* (marked **2 RIGHT**).

b. Starting at the right rear of the turret, attach the belt to the fastener tape.

c. Smoothly apply the full length of the detector belt to the fastener tape.

d. Apply pressure to the detector belt to ensure a good adherence to the fastener tape.

NOTE

Ensure that the belt electronics unit is securely attached to a flat surface, and does not lay across a bolt head or seam.

TASK

4 Install Detector Belt To Turret Front

a. Locate detector belt part number *2031050-6* (marked **1 FRONT**),.

b. Starting at the front right of the turret, attach the belt to the fastener tape.

c. Smoothly apply the full length of the detector belt to the fastener tape.

d. Apply pressure to the detector belt to ensure a good adherence to the fastener tape.

TASK

5 Install MGLT Mounting Bracket Assembly

NOTE

Use only the attaching hardware that is supplied with the MGLT Mounting Bracket.

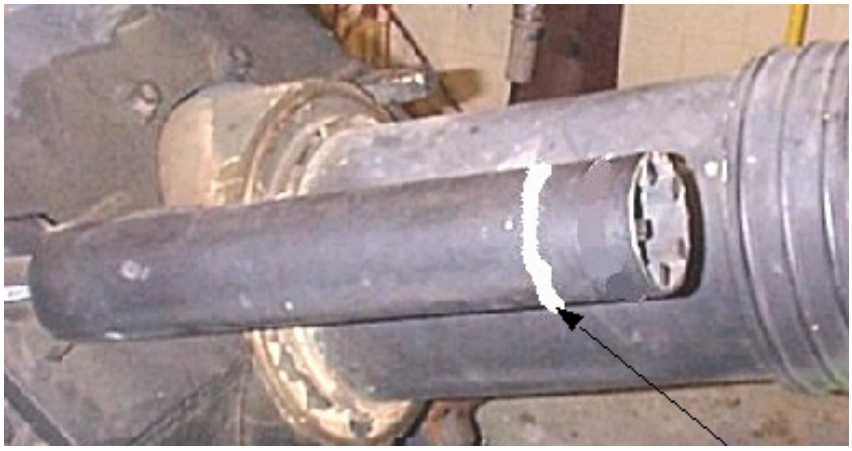


Figure 2-11 MGLT Mounting Bracket Alignment Mark

a. Make a mark approximately 2 inches from the end of the coax flash hider as shown.

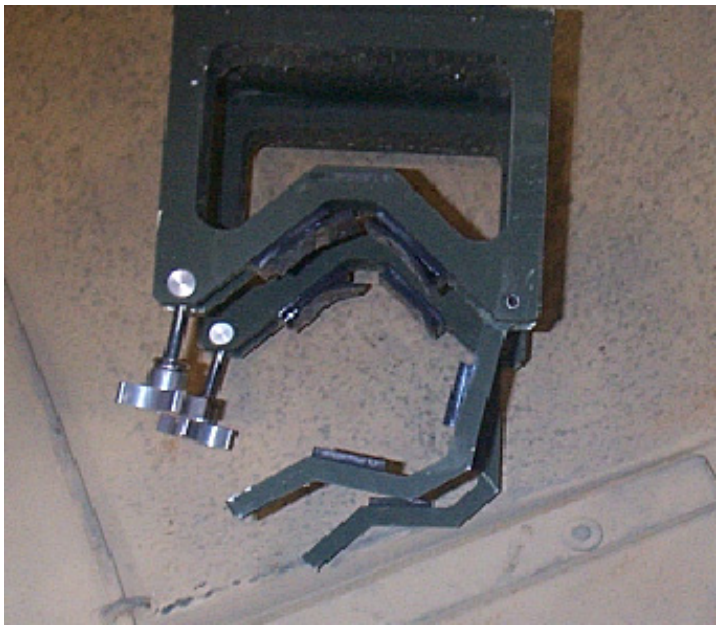


Figure 2-12 MGLT Mounting Bracket Installation

b. Position the MGLT mounting bracket on the flash hider with the tightening knobs towards the main gun and the front of the bracket aligned with the alignment mark made on the flash hider.

c. Secure the bracket by swinging the hinges onto the tightening knobs and tighten.

TASK

6 Install Main Gun Laser Transmitter (MGLT)

Figure 2-13 MGLT Installation

a. Secure the MGLT to the MGLT Mounting Bracket using the four captive mounting bolts on the MGLT, using a 9/16" wrench.

NOTES

MILES boresight will NOT be maintained unless the two knobs on the MGLT Bracket, and four captive bolts on the MGLT, are ALL properly secured.

Use only the attaching hardware that is supplied with the MGLT Mounting Bracket.

TASK

7 Install VCU Bustle Rack Mounting Bracket

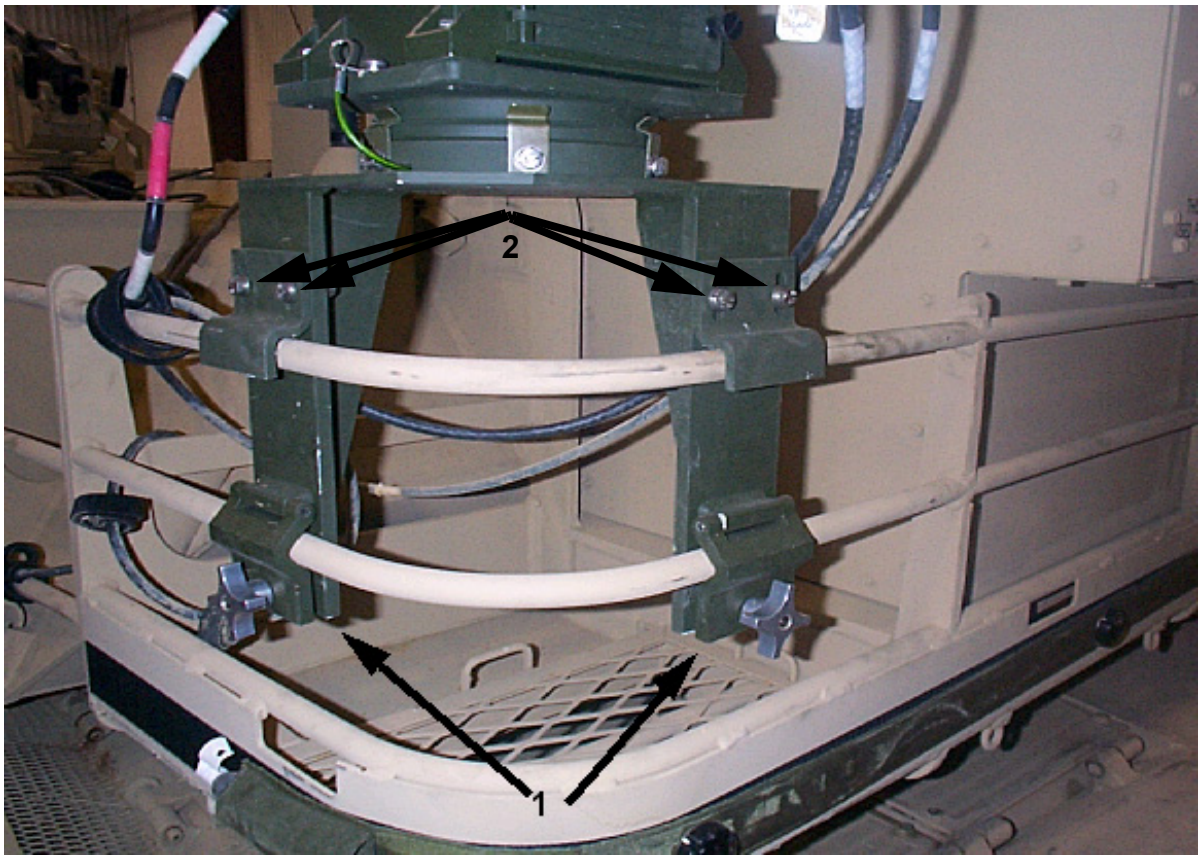


Figure 2-14 VCU Bustle Rack Mounting Bracket Installation

a. Loosen tightening knobs (1) and open clamps.

b. Position Bustle Rack Mounting Bracket on left rear of the bustle rack as shown.

c. If necessary, loosen adjustment bolts (2) to get a good fit, and then secure.

d. Close clamps and secure mount by tightening knobs (1).

TASK

8 Install Vehicle Control Unit (VCU)

Figure 2-15 VCU Installation

a. Position VCU on the Mounting Bracket with power switch facing forward and secure it with the four captive mounting bolts (1) using 7/16" wrench.

TASK

9 Install Hull-to-Turret Transmitter (HUTT)

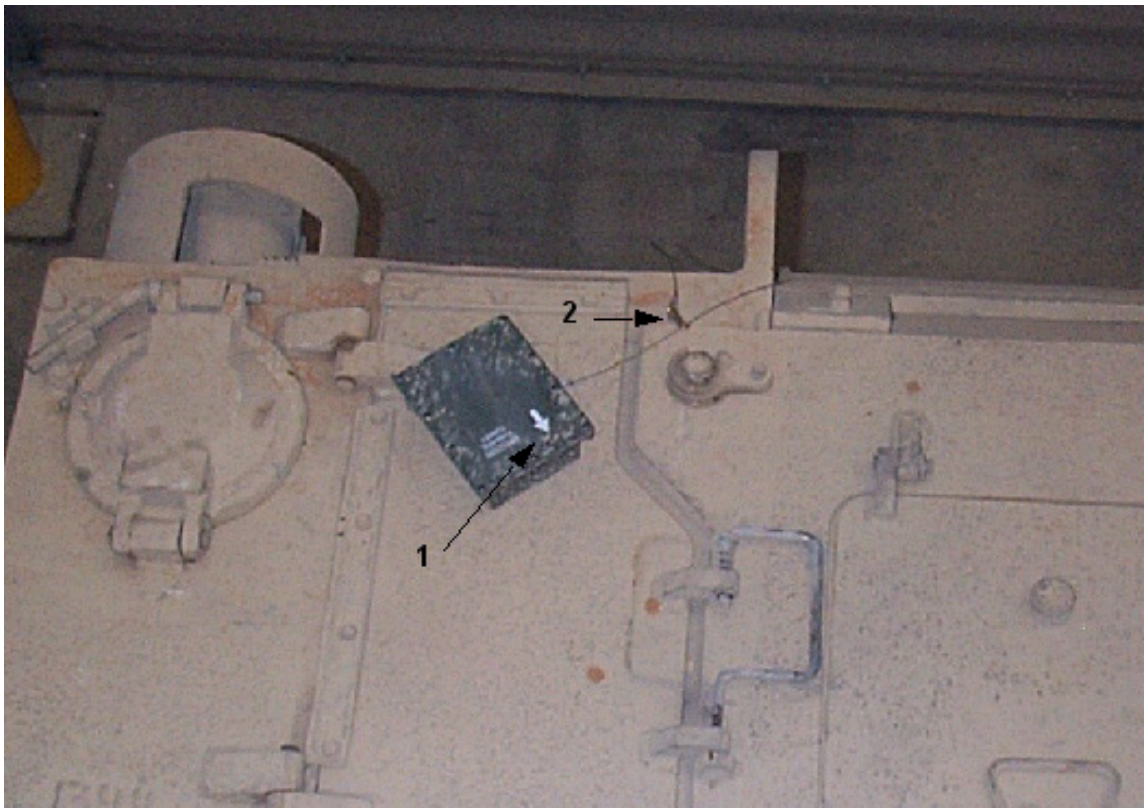


Figure 2-16 HUTT Installation

a. Secure the HUTT to the fastener tape with the directional arrow (1) pointed at the center of the turret.

b. Secure the safety clip (2) to the right rear hull lifting eye as shown.

c. Insert a 9-volt battery into the compartment, close the door and tighten the screw. The battery will fit either way, polarity is not important.

d. Turn the ON/OFF switch to the **ON** position. After approximately 1 second, the red battery indicator light should light for 1 to 3 seconds. If the light does **not** come on, replace the battery with a new one and perform the test again.

e. After the battery indicator light does come on (battery test is good), turn the ON/OFF switch to the **OFF** position.

NOTE

If vehicle is equipped with an extended bustle-rack, the HUTT may not be able to communicate reliably with the Rear Detector belt when the turret is positioned with the gun-tube forward, and "HUTT MISSING" errors may appear on the MILES XXI System.

If the extended bustle-rack is used, it is recommended that several layers of fastener tape be used under the front end of the HUTT to angle it upward for better detector coverage, as illustrated in Figure 2-16a

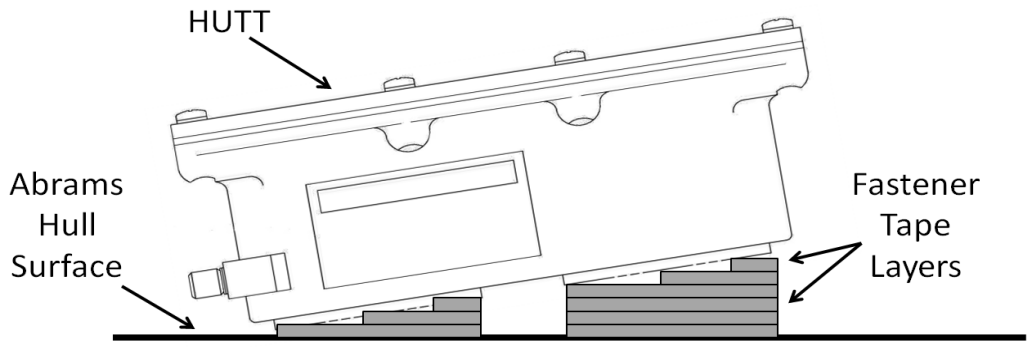


Figure 2-16a HUTT Mounting For Extended Bustle-Rack Coverage

TASK

10 Install M240 Coax Machine Gun Microphone

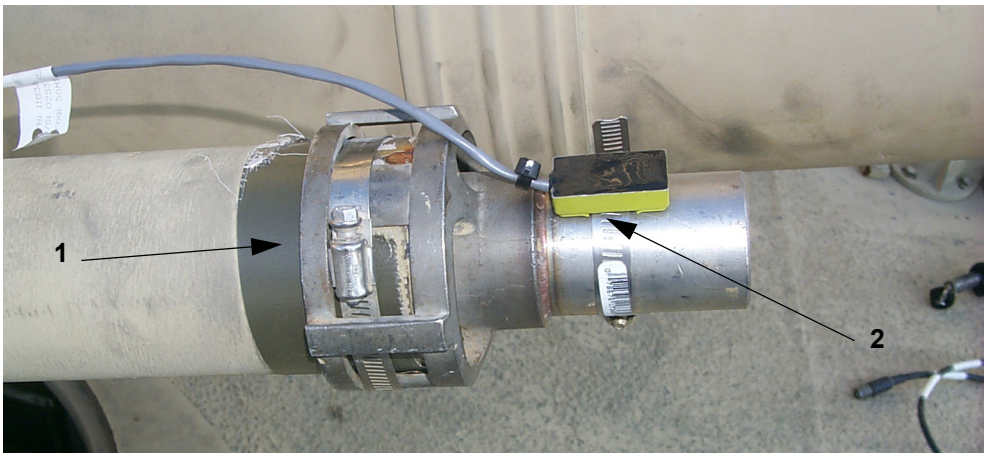


Figure 2-17 Coax Microphone Installation

a. Install M240 Blank Firing Adapter (BFA-M21) over the flash hider as shown (1). (Refer to TM 9-1005-316-12&P)

b. Secure the Coax Mic Trigger (2) to the BFA as shown.

c. Set the cable on top of the turret. It will be connected in a later Task.

TASK

11 Install Main Gun Signature Simulator (MGSS)

- If MGSS is provided, refer to TM 9-6920-892-10 for installation and operating instructions.

TASK

12 Install Direct/Indirect Fire CUE (DIFCUE)

- If DIFCUE is provided, refer to TM 9-6920-893-10 for installation and operating instructions.

TASK

13 Install Fire Control Interface (FCI) Assembly and Vehicle Display Assembly (VDA)

Figure 2-18 FCI and VDA Installation

a. Secure the FCI (1) to fastener tape as shown.

b. Secure the VDA (2) to fastener tape as shown.

TASK

14 Install Radio/Communications Interface Assembly (RIA)

Figure 2-19 RIA Installation

a. Locate fastener tape on turret ring below the MCS.

b. Secure the RIA to the turret ring, utilizing fastener tape as shown.

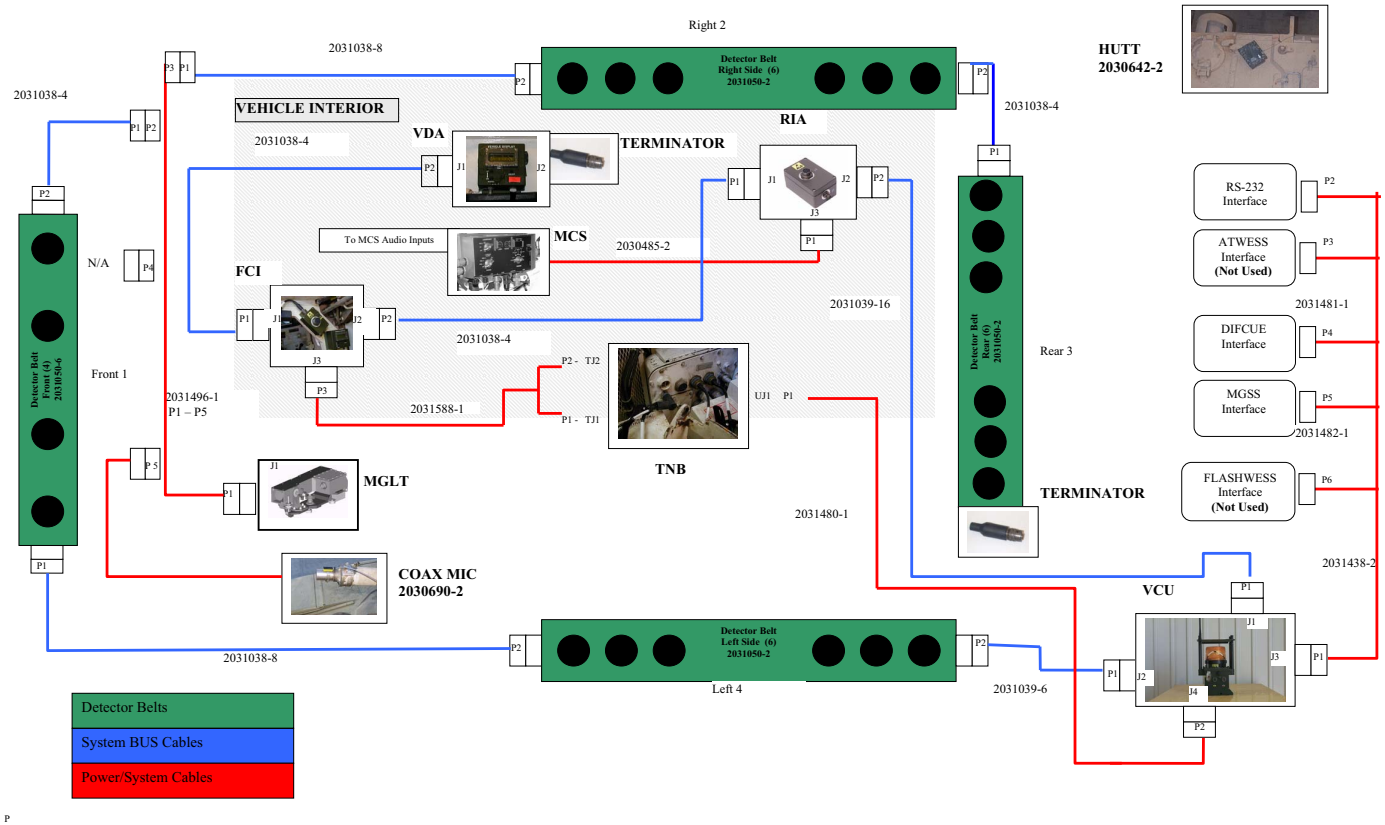


Figure 2-20 M1A1 Interconnect Diagram

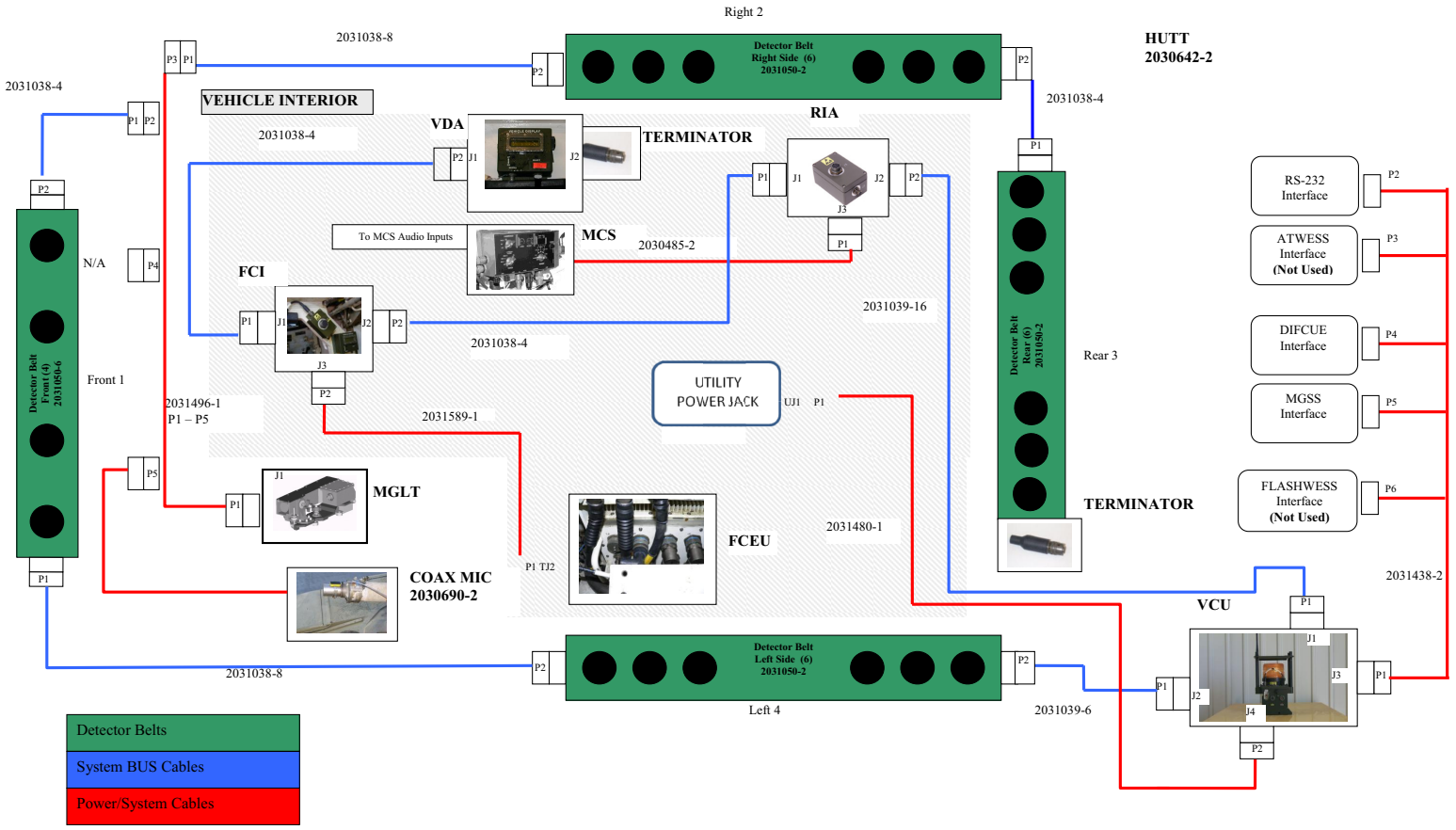


Figure 2-21 M1A2 Interconnect Diagram

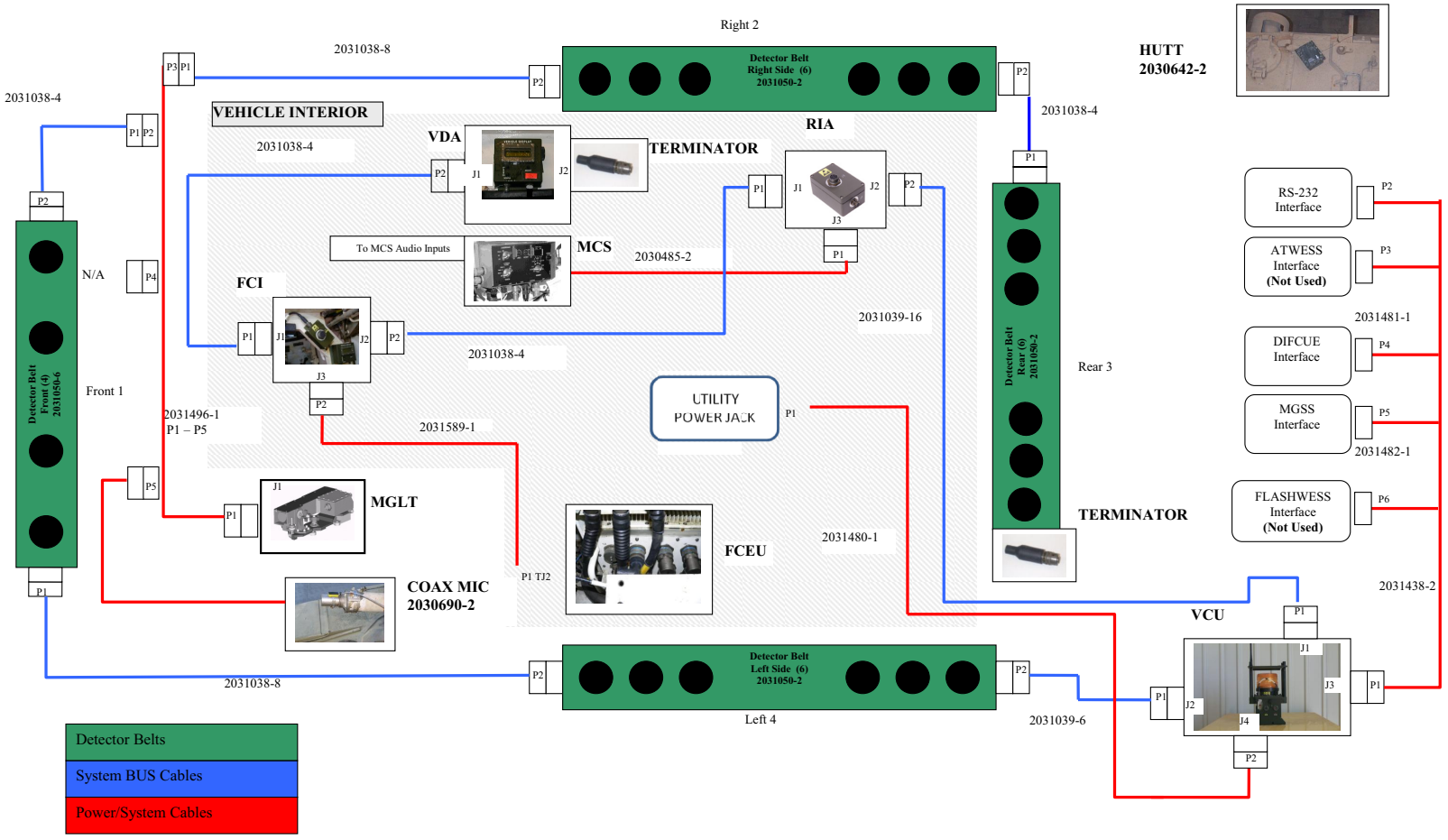


Figure 2-22 M1A2 SEP Interconnect Diagram

TASK

15 Install System Cables

CAUTION

Cables can become damaged during turret rotation if not properly secured. Ensure that cables are attached so that turret rotation does not interfere with the cables.

NOTES

Refer to the appropriate TM to remove loader's periscope.

Refer to the appropriate Interconnect Diagram, Figure 2-20, Figure 2-21, or Figure 2-22 for all cable installations.

Secure all cables after they are in place with the fastener tape strips attached to the cables. Plastic cable ties may also be used. You may vary the attachment points and routing on the vehicle for convenience.

Sub-task 15.1 Connect MGLT Adapter Cable

a. Locate MGLT Cable *2031496-1*.

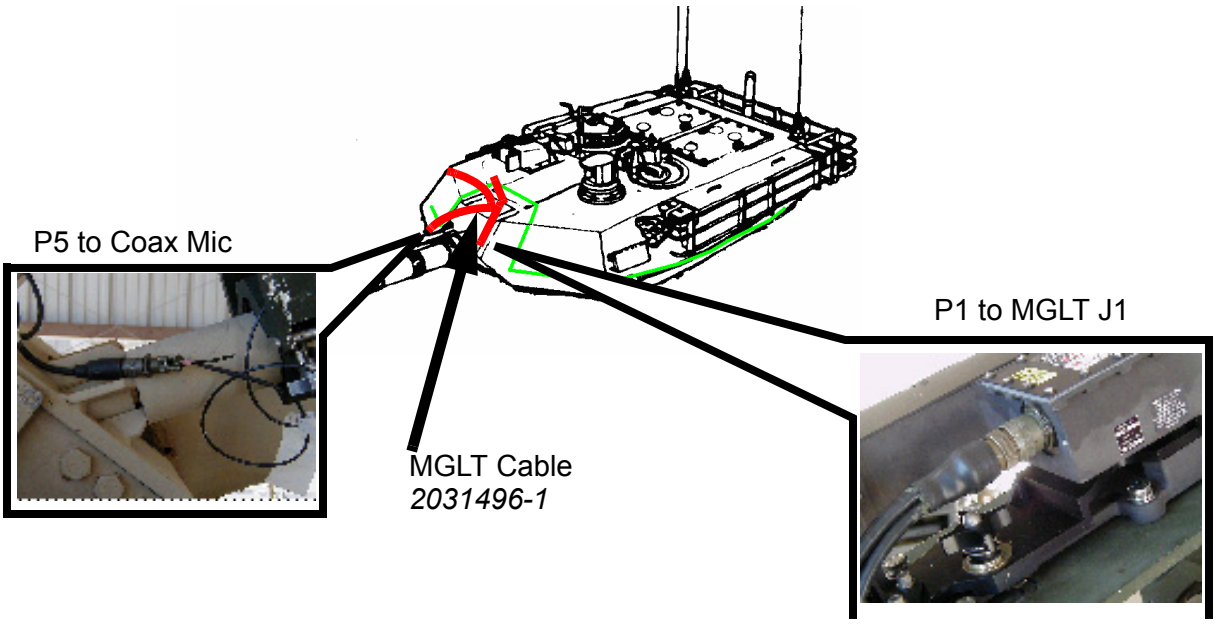


Figure 2-23 MGLT Cable (2031496-1) Routing

b. Connect P1 of Adapter Cable *2031496-1* to MGLT J1.

c. Connect coax mic *2030690-2* to P5 on the MGLT Adapter Cable *2031496-1*.

d. Connect dust cap *660-008NF08S6-50* to P4 on the MGLT cable.

Sub-task 15.2 Connect System BUS Cables

a. Remove the loaders periscope and store in sponson box. Insert periscope seal P/N *2030983-1*, into the periscope opening.

b. Locate system BUS cable *2031039-6.*

c. Connect P2 of system BUS cable *2031039-6* to the “rear” of the left side belt, and P1 to J2 of the VCU.

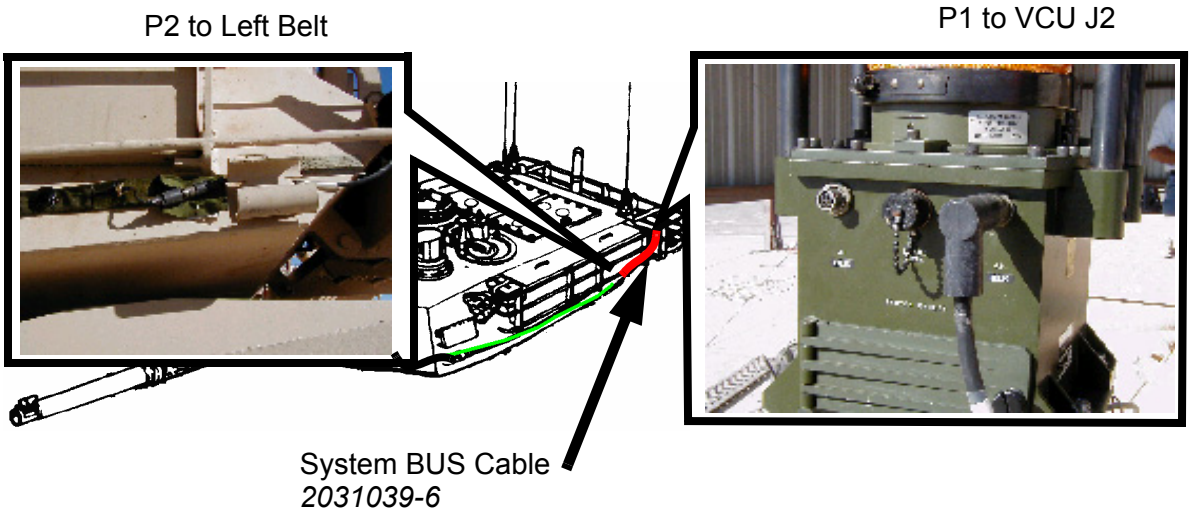


Figure 2-24 System Bus Cable (2031039-6) Routing

d. Locate system BUS cable *2031038-8.*

e. Connect P1 of system BUS cable *2031038-8* between the “left” side front detector belt, and P2 to the “front” of the left belt.

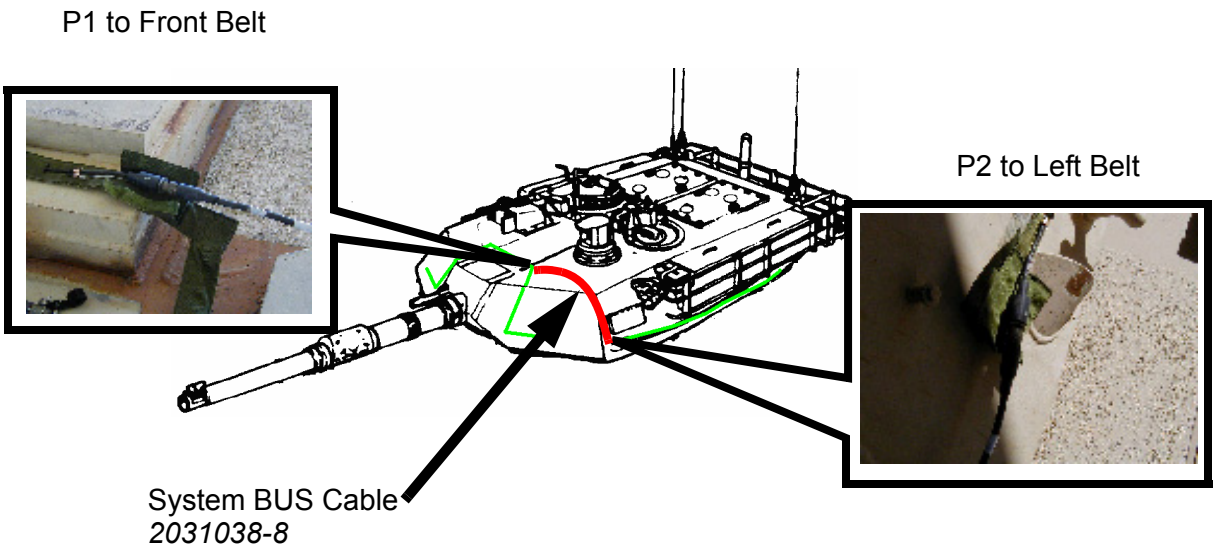


Figure 2-25 System Bus Cable (2031038-8) Routing

f. Locate system BUS cable *2031038-4.*

g. Connect P2 of system BUS cable *2031038-4* to the “right” side of the front belt, and P1 to the MGLT Adapter Cable-P2.

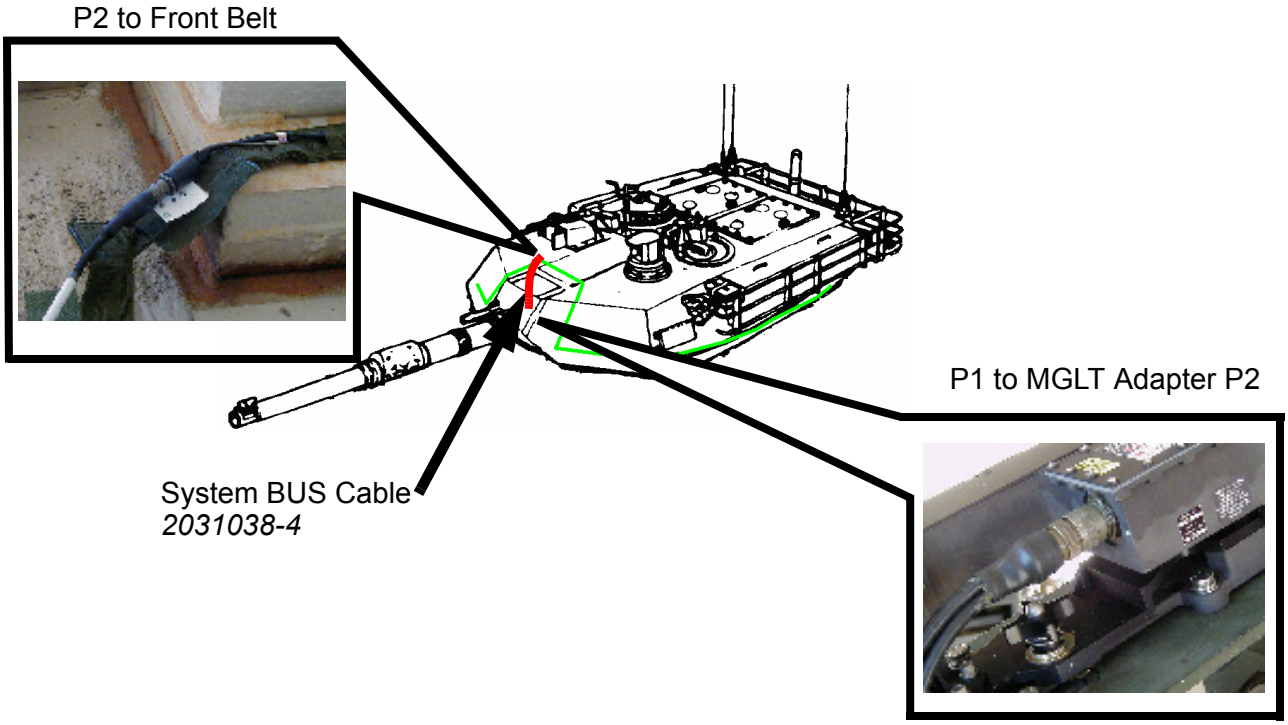


Figure 2-26 System Bus Cable (2031038-4) Routing

h. Locate system BUS cable *2031038-8*.

i. Connect P2 of system BUS cable *2031038-8* to the “front” of the right detector belt, and connect P1 to the MGLT Adapter Cable - P3.

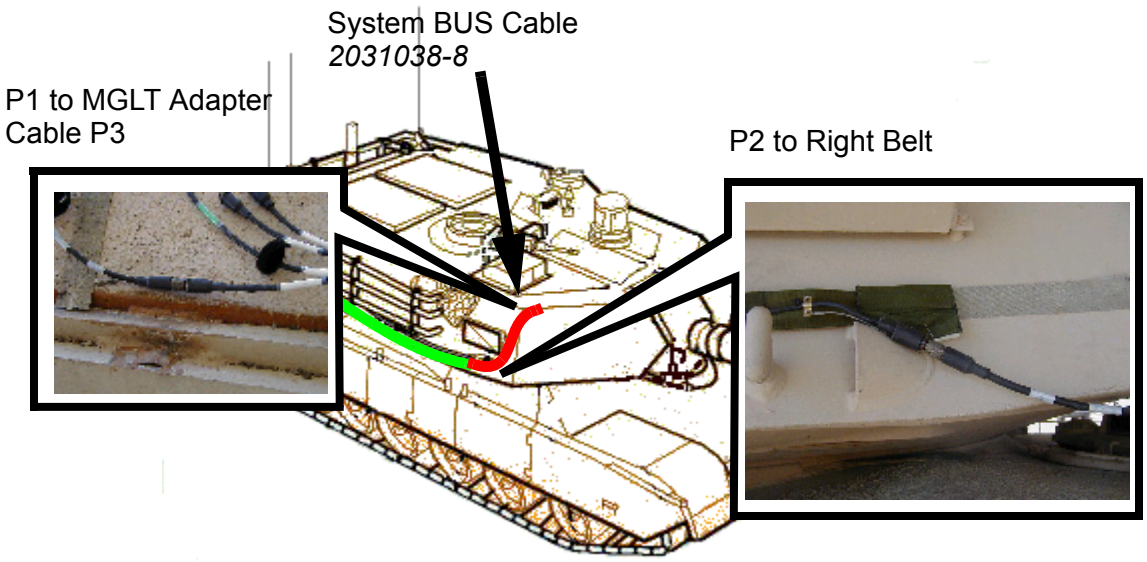


Figure 2-27 System BUS Cable 2031038-8 Cable Routing

j. Locate system BUS cable *2031038-4*.

k. Connect P2 of system BUS cable 2031038-4 to the right side of the “rear” detector belt and P1 to the “rear” of the right side detector belt.

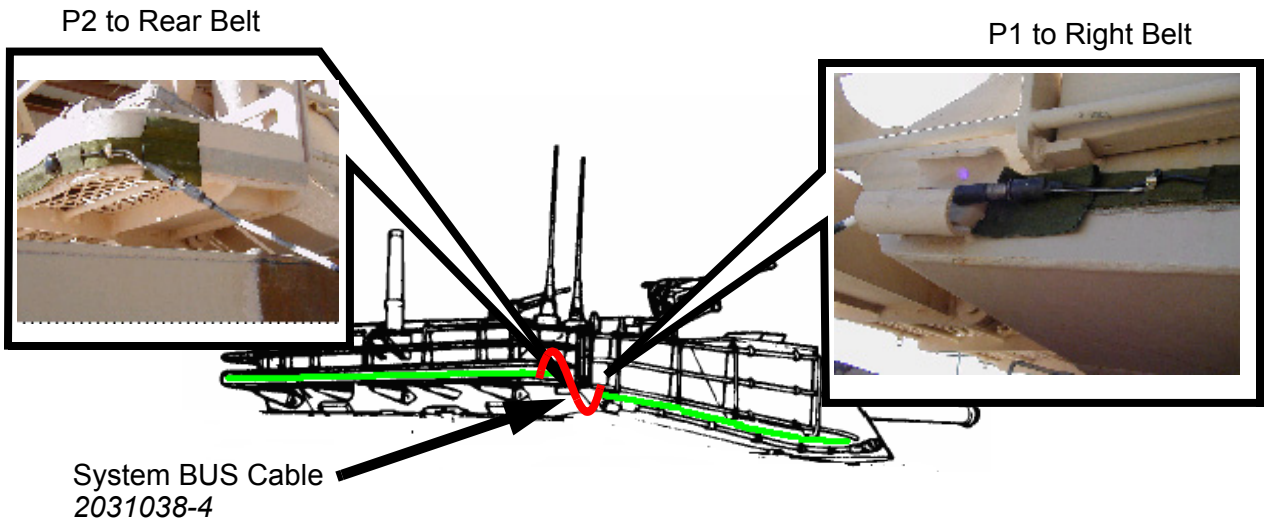


Figure 2-28 System Bus Cable 2031038-4 Cable Routing

l. Locate a Terminator *2031030*.

m. Connect a Terminator to the “left” side of the rear detector belt.

n. Cover all connections using detector belt protective flap and secure cables to turret.

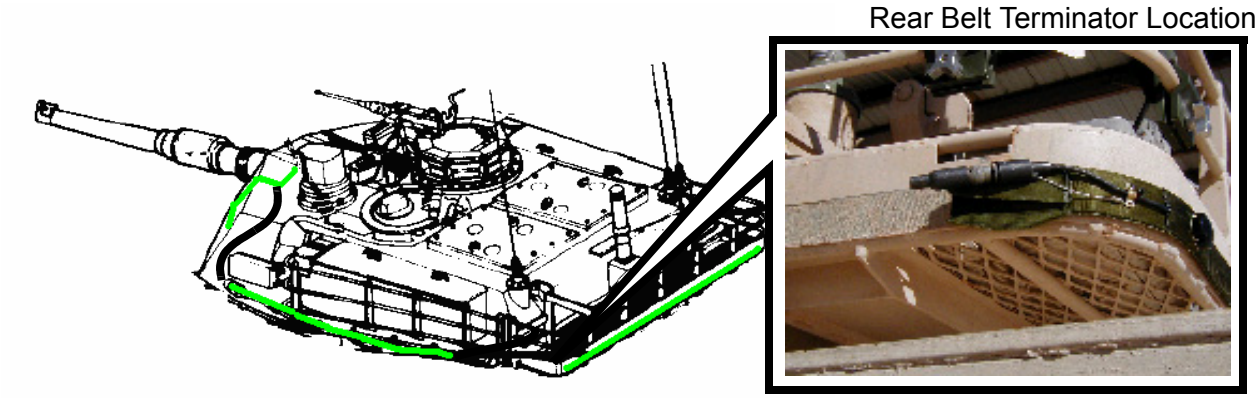


Figure 2-29 Rear Belt Terminator Connection

Sub-task 15.3 Locate the VCU cable *2031438-2.*

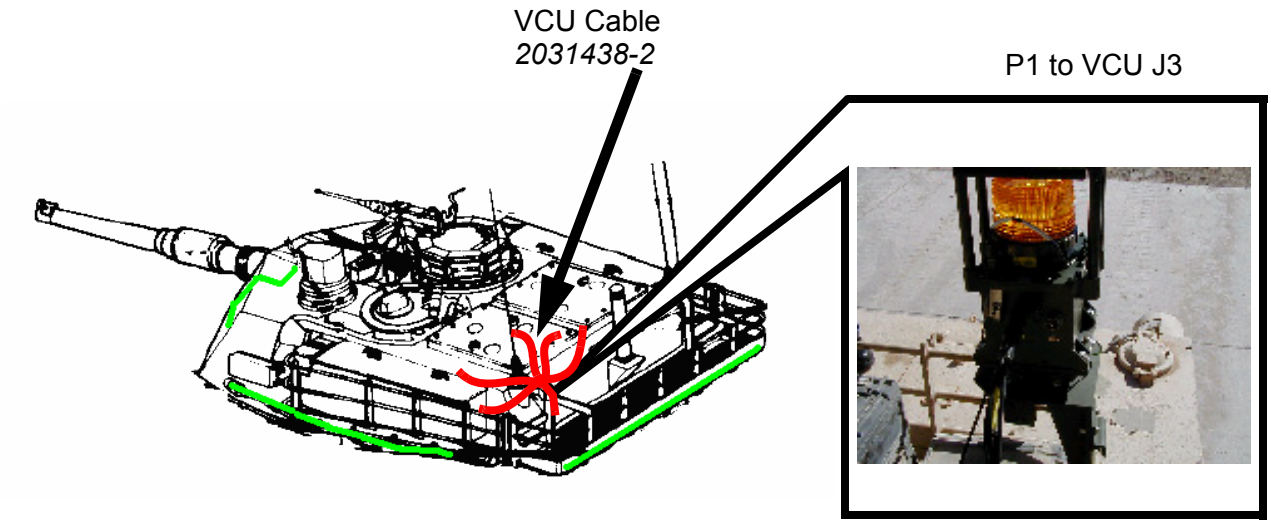


Figure 2-30 VCU Cable (2031438-2) Cable Routing

o. Connector P1 of the VCU cable *2031438-2* to VCU connector J3.

p. P2 of the VCU cable *2031438-2* is connected to a instrumentation package (if present) otherwise cap with provided dust cap.

q. Ensure dust caps *660-008NF08S6-50* are connected to P3 and P6 (not used), on the VCU cable *2031438-2*.

r. P4 of the VCU cable *2031438-2* is used to connect the DIFCUE trigger cable (*2031481-1*) if the DIFCUE is to be used during the exercise.

s. P5 of the VCU cable *2031438-2* is used to connect the MGSS trigger cable *2031482-1* if the MGSS is to be used during the exercise.

Sub-task 15.4 Connect Turret Exterior System Cables

a. Locate system cable *2031039-16*.

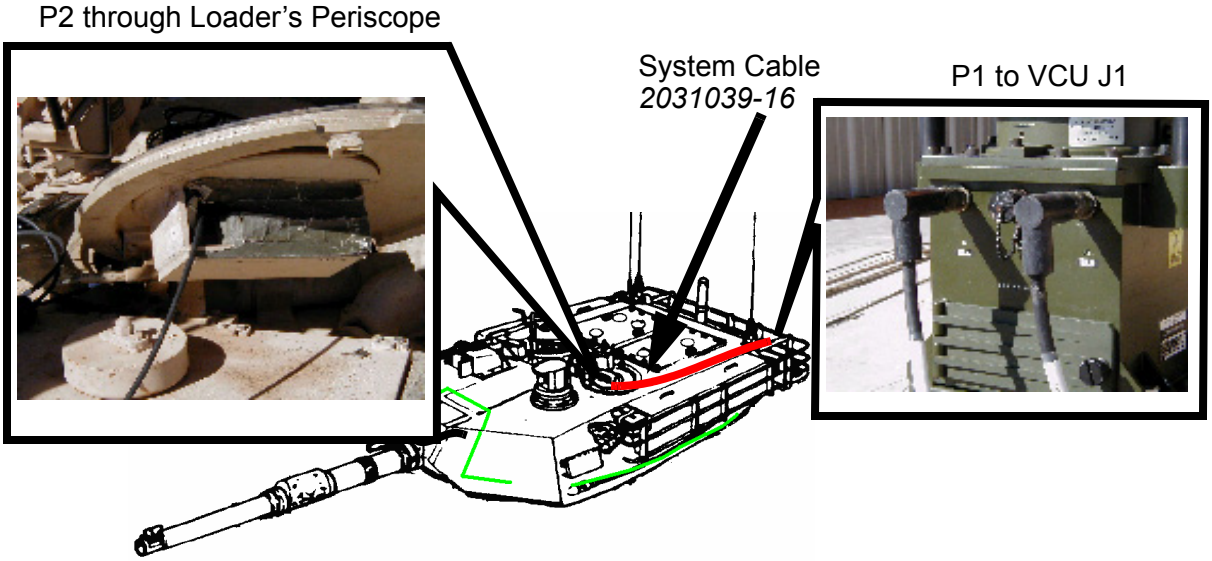


Figure 2-31 System Cable (2031039-16) Routing

b. Connect P1 of system cable *2031039-16* to J1 on the VCU.

c. Route cable through the loaders periscope.

d. Locate power cable *2031480-1.*

.

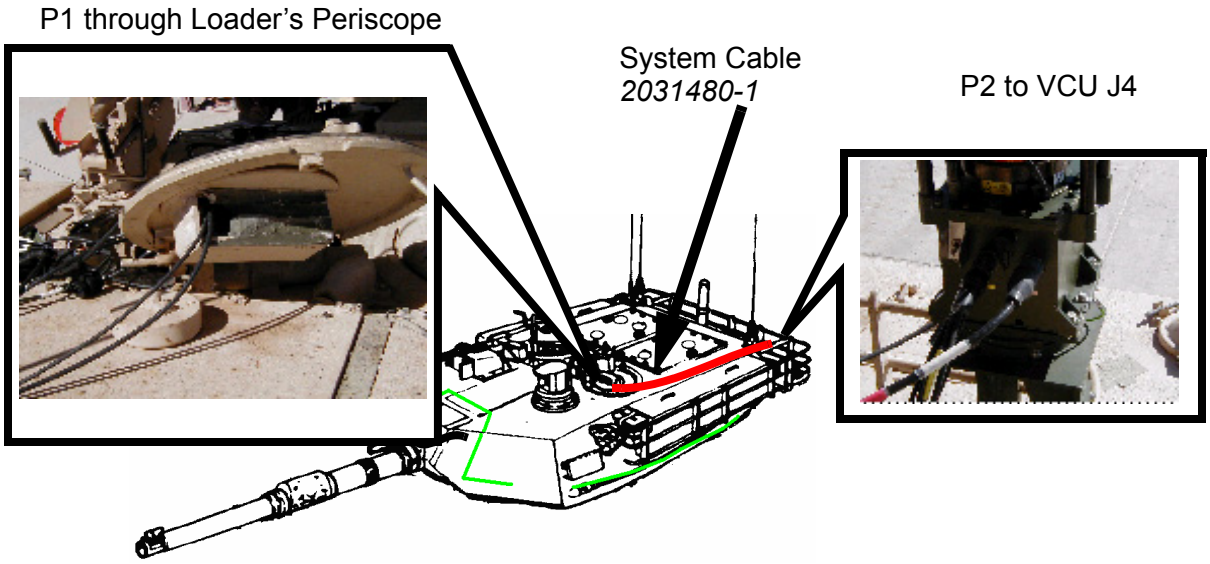


Figure 2-32 Power Interface Cable (2031480-1) Routing

e. Connect P2 of power interface cable *2031480-1* to J4 of the VCU.

f. Route cable through the loader's periscope.

Sub-task 15.5 Connect Turret Interior System Cables

a. Locate system cable *2031039-16* coming from loader's periscope. Connect P2 to J2 (1) on the RIA. Locate system BUS cable *2031038-4* and connect P1 to J1 (2) on the RIA.

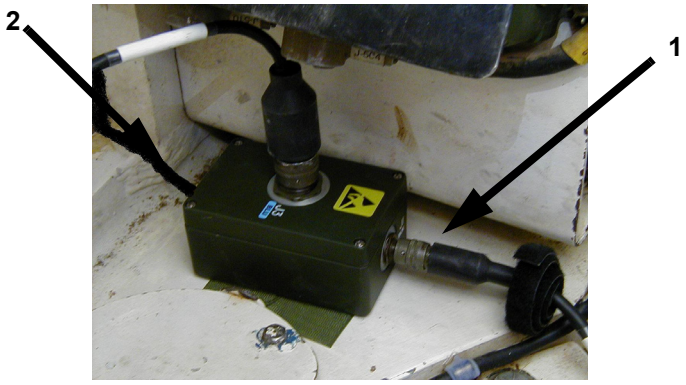


Figure 2-33 RIA Connections

b. Using system BUS cable *2031038-4* from the RIA, *c*onnect P2 to J2 (3) on the FCI.

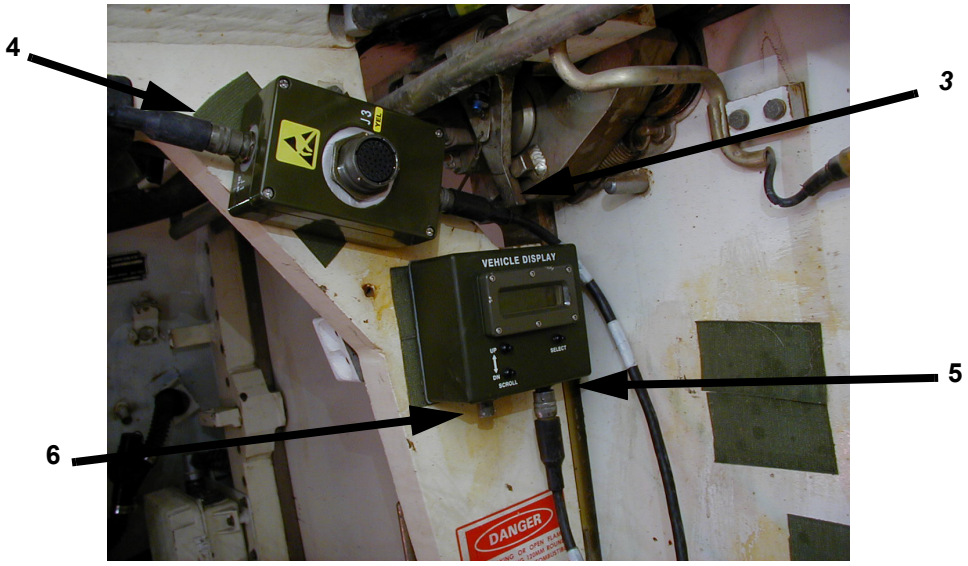


Figure 2-34 FCI and VDA Connections

c. Locate system BUS cable *2031038-4* and connect P1 to J1 (4) on the FCI. Connect P2 to J1 (5) on the VDA.

d. Locate and install a Terminator on J2 (6) on the VDA.

e. Locate RIA (audio) Cable *2030485-2*. Connect P1 to RIA J3 and the Audio Input terminals (or System Lines) to the Master Control Station (MCS). Blue wire to left terminal, white wire to right terminal.

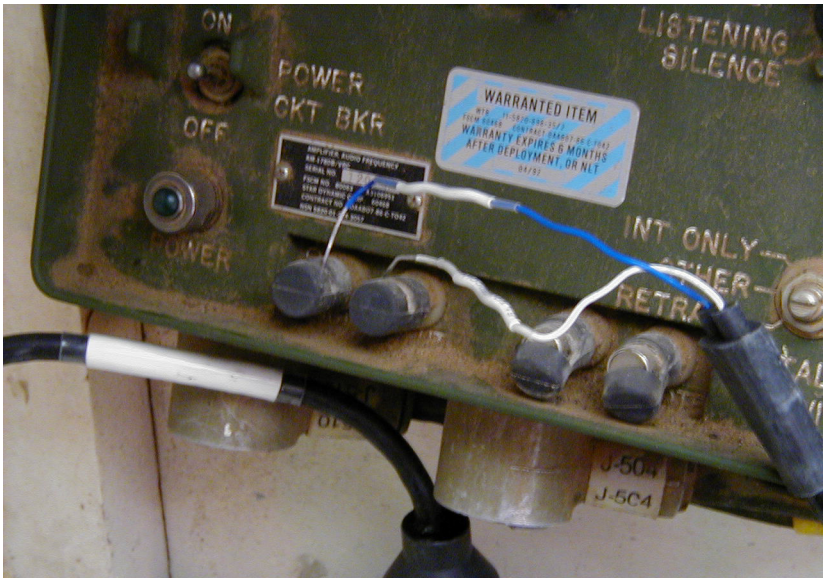


Figure 2-35 MCS Connections

NOTES

For M1A1 vehicles, complete Task 16 (Install M1A1 Specific Cables).

For M1A2/M1A2 SEP vehicles, proceed to Task 17 (Install M1A2/M1A2 SEP Specific Cables).

TASK

16 Install M1A1 Specific Cables

Sub-task 16.1 Install Trigger Cable

Figure 2-36 M1A1 Trigger and Power Cable Installation

NOTE

On RTNB, TJ1 AND TJ2 are located further down, near the bottom of the unit.

a. Locate FCI Cable Assembly *2031588-1*.

b. Connect the FCI Cable Assembly *2031588-1* P3 to the FCI J3 (3).

c. Connect *2031588-1* P1 to TJ1 (1) on the TNB or RTNB.

d. Connect *2031588-1* P2 to TJ2 (2) on the TNB or RTNB.

Sub-task 16.2 Install Power Cable

a. Locate Power Interface Cable *2031480-1* routed thru the loader's periscope. Connect P1 to UJ1(3) on the TNB.

b. Secure all cables.

NOTE

For M1A1 vehicle, proceed to Task 18 after completion of this task.

TASK

17 Install M1A2/M1A2 SEP Specific Cables

Sub-task 17.1 Install Trigger Cable

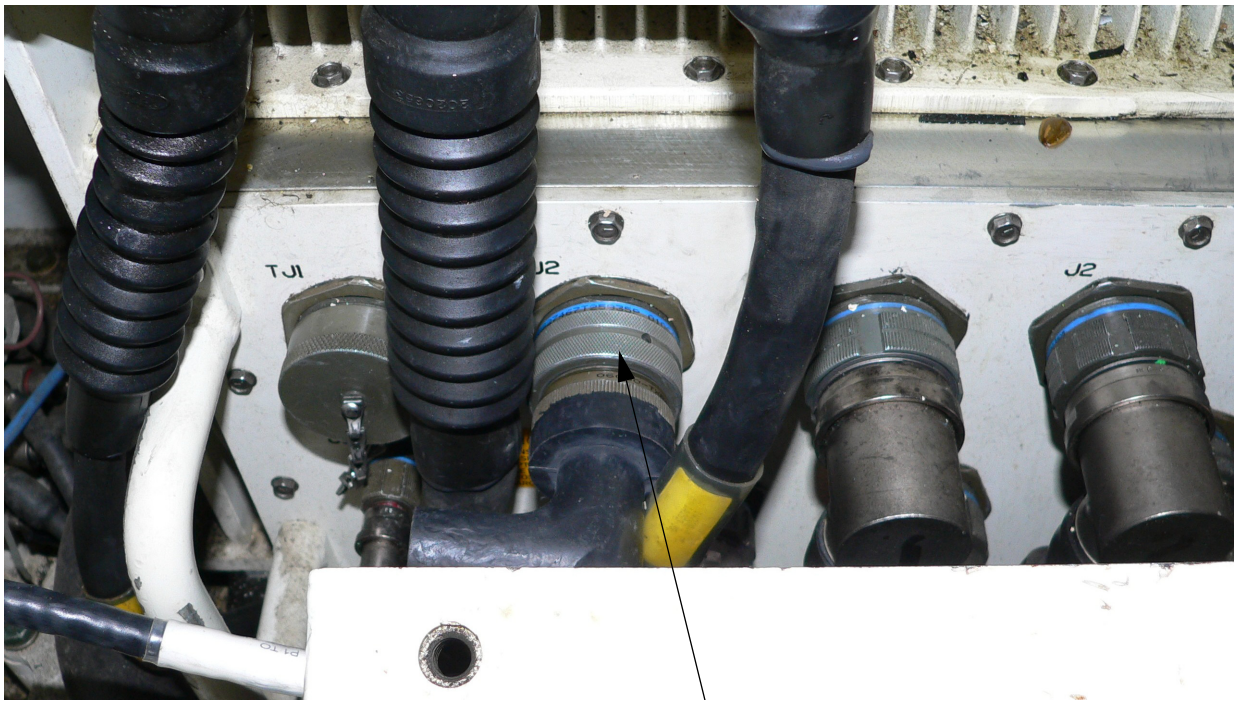


Figure 2-37 M1A2/M1A2 SEP Trigger Cable Installation

a. Remove Fire Control Electronics Unit (FCEU) protective cover.

b. Locate Trigger Cable Assembly *2031589-1*.

c. Connect P2 on the trigger cable to the FCI J3.

d. Connect P1 on the trigger cable assembly to vehicle FCEU **TJ2** as shown.

WARNING

If P1 on the trigger cable is connected to the incorrect test jack, the FCEU can be severely damaged. **Verify the trigger cable is connected to TJ2**.

Sub-task 17.2 Install Power Interface Cable M1A2

Figure 2-38 M1A2 Power to RSM 5 UJ1

a. Locate Power Interface Cable *2031480-1* coming from the loader's periscope.

b. Connect P1 of the Power Interface Cable *2031480-1* to UJ1 on RSM 5 (located in the commander's position).

c. Inspect and secure cables.

Sub-task 17.3 Install Power Interface Cable M1A2 SEP

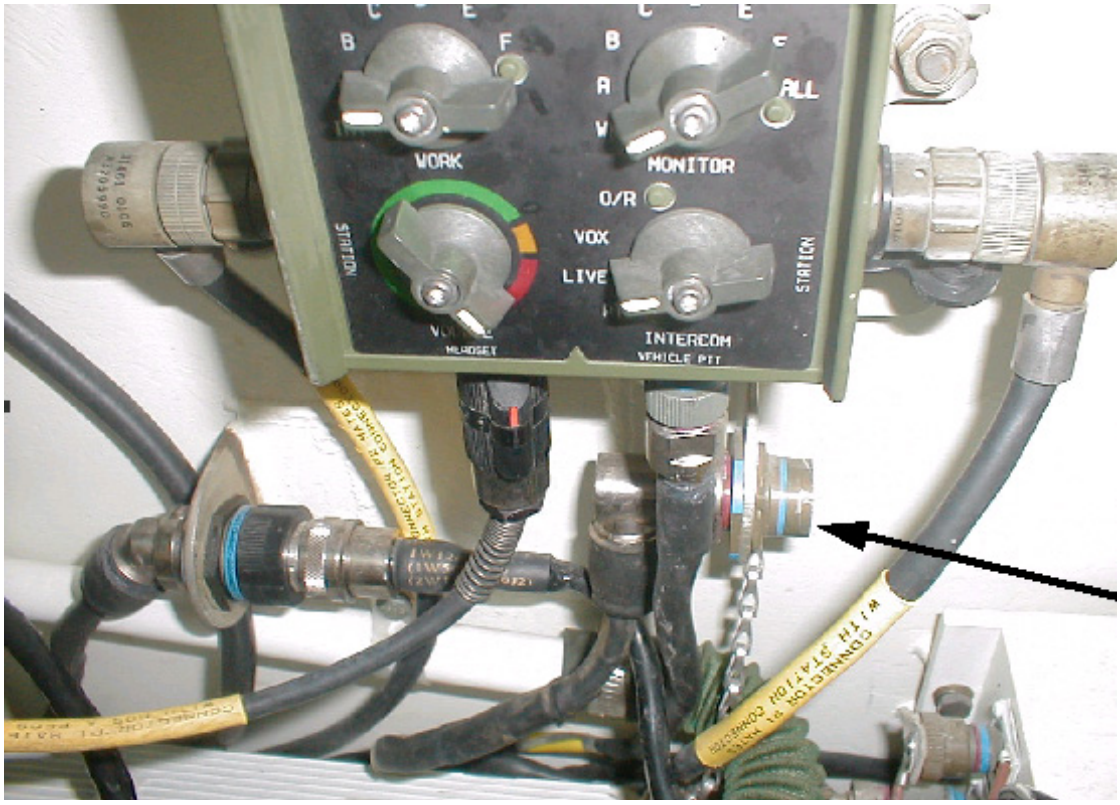


Figure 2-39 M1A2 SEP Power to RSM 5 UJ1

NOTE

If vehicle has CROWS system installed, the Utility Jack shown will not provide power. Proceed to Sub-task 17.4 for alternate MILES power connection for CROWS equipped vehicles.

a. Locate Power interface cable *2031480-1* coming from the loaders periscope.

b. Connect P1 of the Power Interface Cable *2031480-1* to the auxiliary power connection (1) (located under the commander's Intercom box).

c. Inspect and secure cables.

Sub-task 17.4 Install Power Interface Cable M1A2 with CROWS

Figure 2-40 M1A2 with CROWS - Power Connection

a. Locate Power Interface Cable 2031480-1 coming from the Loader's periscope.

b. Connect P1 of the Power Interface Cable 2031480-1 to any available Utility Jack on the Auxiliary Power Panel (1), located on the forward wall of the turret.

c. Ensure the Circuit Breaker for the selected Utility Jack is switched ON.

d. Inspect and secure cables.

TASK

18 Install Small Arms Transmitter (SAT)

Sub-task 18.1 Install M2 SAT and Mounting Bracket

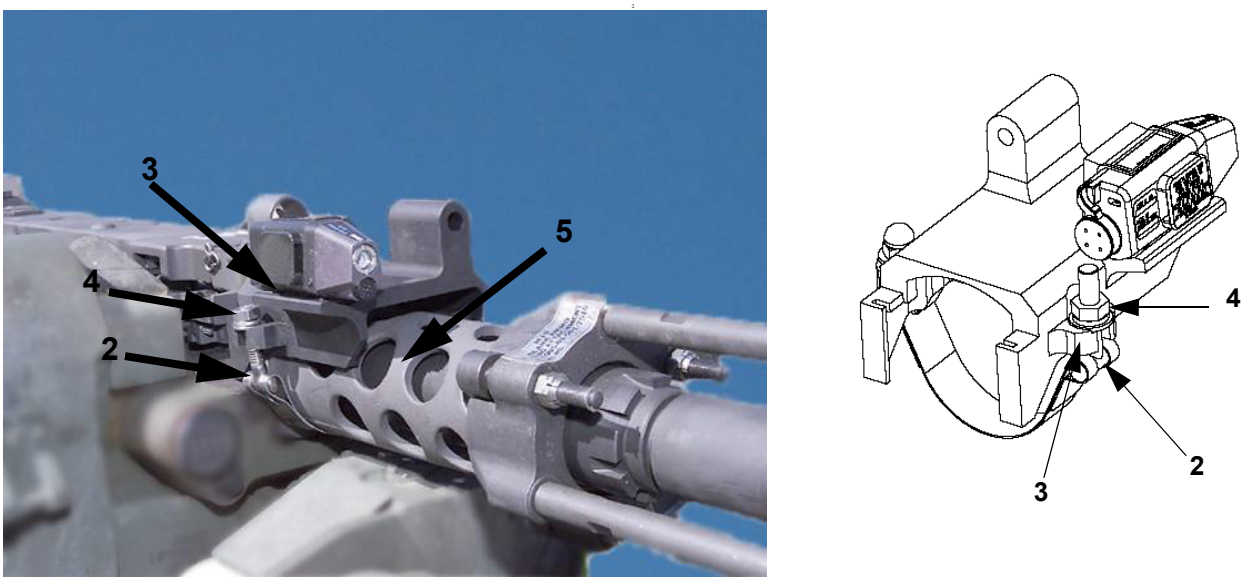


Figure 2-41 M2 SAT Installation

a. Place the SAT mounting bracket on the barrel support (5) and ensure the SAT mounting bracket sits flush against the body of the weapon.

b. Attach strap bolt (2) to the mounting bracket (3) and secure nut and washers (4) to the mounting bracket.

c. Using a torque wrench tighten the nut (4) to 25 ft. lbs. to ensure the mounting bracket is secured to the weapon.

d. Ensure the SAT is securely attached to the mounting bracket.

Sub-task 18.2 Install M240 SAT and Mounting Bracket

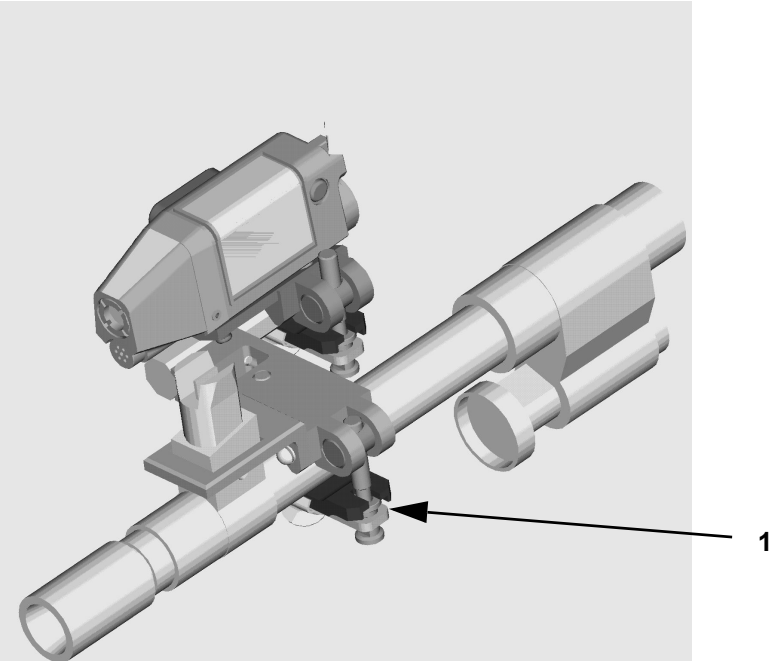


Figure 2-42 M240 SAT Installation

a. Open the clamp on the bracket by loosening the adjustment screw (1) and opening the clamp handle.

b. Place the SAT clamp on the barrel and ensure the SAT is sitting level with the weapon, on the right side of the barrel. The SAT bracket fits securely over the weapons front sight.

c. Close the clamp over the barrel and tighten the knob (1) with your fingers.

d. Secure the knob an additional 1/2 - 3/4 of a turn using the captive wrench (2). Slide the captive wrench into the holding clip.

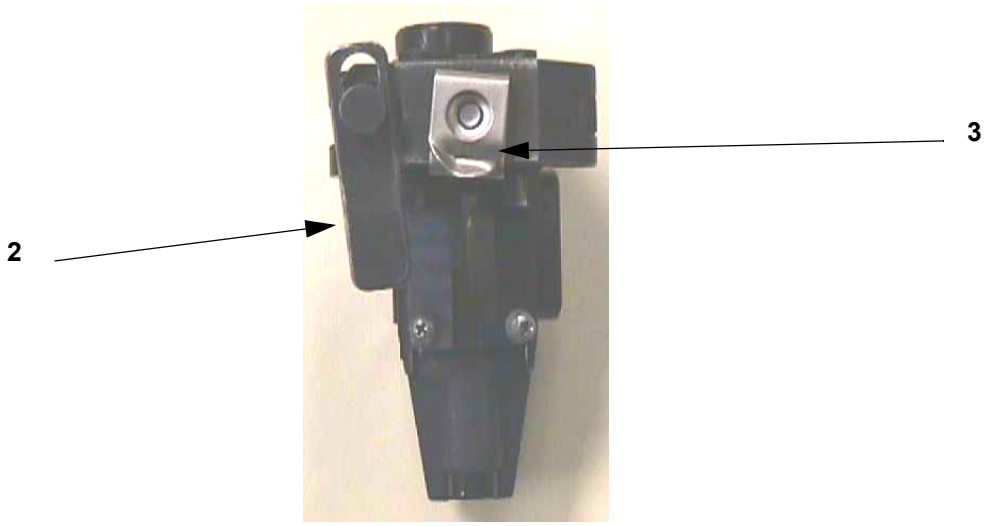


Figure 2-43 Captive Wrench with Holding Clip

NOTE

The captive wrench (2) on the M240 SAT is used to assist in tightening the bracket onto the barrel. Do not tighten bracket more than 1/2 - 3/4 of a turn or the SAT bracket may be damaged. The holding clip does nothing more than hold the captive wrench into place on the SAT bracket (3).

e. Ensure the SAT is securely attached to the bracket assembly.

TASK

19 Install Main Gun Signature Simulator (MGSS) Cable

a. If a MGSS has been provided and installed, locate MGSS extension cable *2031482-1* and connect P1 to VCU cable *2031438-2* P5.

b. Connect *2031482-1* P2 to MGSS connector J1.

TASK

20 Install Direct Indirect Fire CUE (DIFCUE) Cable

a. If a DIFCUE has been provided and installed, locate DIFCUE extension cable *2031481-1* and connect P1 to VCU cable *2031438-2* P4.

b. Connect *2031481-1* P2 to DIFCUE connector J2.

CHAPTER 3
OPERATING INSTRUCTIONS

SECTION I DESCRIPTION AND USE OF CVS CONTROLS AND INDICATORS

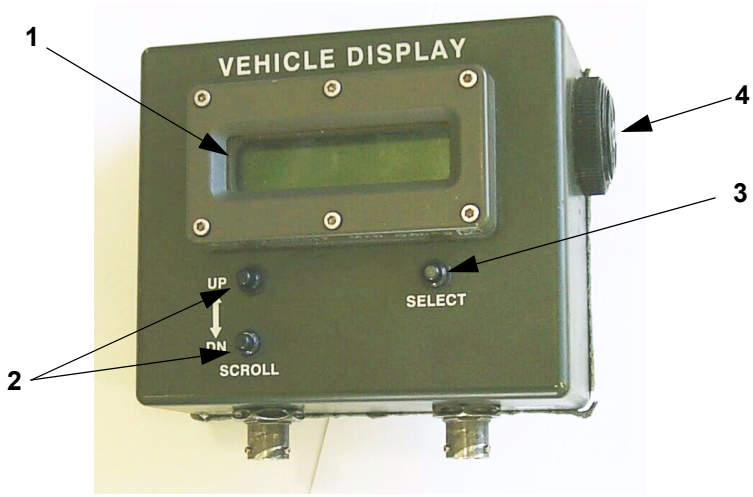


Figure 3-1 VDA Controls

3.1 VEHICLE DISPLAY ASSEMBLY (VDA) CONTROLS AND INDICATORS

a. The VDA provides a 2-row by 16-character backlit display (1), two menu/submenu scroll push-buttons (2) and one menu/submenu select push-button (3).

b. The display provides BIT results and event data that reinforce the audible cues provided by the audio alarm (4) and RIA audio messages.

c. Any BIT failure, or lack of vehicle power, generates 5 beeps from the VDA and two beeps through the vehicle intercom system. The VDA generates the following display when vehicle power is not detected:

```
NO VEHICLE POWER
TO MILES
```

3.1.1 Visual Indicators

The VCU will flash on vehicles that have been engaged and signal that the vehicle is receiving incoming fire. After being engaged by direct fire, an assessment message will be displayed on the VDA. The event message will be displayed until a new event is received, or until any button is pressed to clear it, returning to the previous display.

The VDA backlight will go out 7.5 secs after displaying a message. Thereafter it will take two button presses to activate the display menus, with the first press of a button activating the backlight.

3.1.2 Audio Messages

Audio indicators are voice messages heard through the vehicle intercom system. These messages describe direct or indirect fire events that affects the status of the vehicle.

3.1.3 Built in Test (BIT)

The MILES XXI VCU contains a BIT program, which provides an indication of system status both during initial start-up and operation. When power is first applied to the VCU, a BIT starts automatically to check system electronics. BIT tests battery voltage, VCU computer, detector belts, MGLT, FCI, RIA and VDA. BIT results are stored as event status data in the VCU memory and are available for review in the event log via the VDA.

A manual BIT may also be initiated by scrolling to **"SELECT AUX MENU"** and pressing the **"SELECT"** push-button. **"SELECT BIT"** will display. Press the **"SELECT"** push-button again. **"PRESS SELECT FOR BIT"** will display, press the **"SELECT"** push-button to initiate BIT. A FAIL message will appear on the display if BIT fails. Troubleshoot the system IAW Chapter 4.

NOTE

The system automatically runs a BIT every 15 minutes.

SECTION II OPERATION TASKS

TASK

1

Power Up and Start MILES XXI System BIT

NOTES

Before turning on power, ensure all installation tasks have been properly completed. The MILES XXI is powered up once the MILES XXI VCU power switch is turned on.

Turning ON power automatically starts BIT and the system goes to a KILL state. Use the Controller Device (CD) to RESET/RESURRECT the vehicle. Any generation MILES CD that sends a RESET/RESURRECT command can be used.

The **turret utility power** must be turned ON from the CDU (M1A2 SEP), after turning on turret power.

The **turret utility power** must be turned ON from the CID (M1A2), after turning on turret power.

The turret utility power must be ON in order to fire the MILES LASER. If the utility power is not ON, the vehicle will act as a non-firing target only.

While in use, the MILES XXI system battery in the VCU is constantly being charged when the vehicle turret utility power is ON.

a. Turn on HUTT and verify battery light “illuminates“ for 2 to 3 seconds.

NOTE

If battery light does not light up replace 9 volt battery and verify operation.

b. Power up the system and, once BIT has completed, the VDA will display a PASS or FAIL message.

NOTE

The following is used as an example only.

(1) The following menu will be displayed if the system passes BIT.

WPN: MAINGUN **M1 ALIVE**

NOTE

The display will show M1 but supports all variants of the Abrams tank.

c. If BIT receives a failure, an indication will be displayed in the display window and the operator will have to scroll to the main menu to the **“PRESS SELECT FOR EVENT STATUS”** menu. Then press **“SELECT”** to determine where the failure lies by using the **UP/DOWN** scroll buttons.

d. If the following message is displayed in the VDA upon system start up, you can view the event log to determine what device is missing.

HHMMSS BIT **FAIL - MISSING DEV**

(1) ## - denotes **Event number**.

(2) HHMMSS - denotes current **Time**.

(3) BIT FAIL - could display **MISSING DEV**, **MISSING MOD**, or **DEV+MOD**, depending on which type of component was not detected. Troubleshoot the system IAW Chapter 4.

- To view the event log, scroll through the main menu using the **UP/DOWN** push-buttons to the **“PRESS SELECT FOR EVENT STATUS”** menu, press the **“SELECT”** push-button.

- Scroll through the sub-menu until the missing device message is displayed.

HHMMSS DEVICE DIFCUE MISSING

- In the above example, the DIFCUE is missing.

e. Set up the RIA for operation.

- Scroll the VDA to **"`SELECT AUX MENU`"** press the **"SELECT"** push-button.
- Scroll to **"`SELECT VOLUME LEVEL`"** press the **"SELECT"** push-button.
- Use the **UP/DOWN** scroll push-buttons to set the **"`Volume 20%`"** initially. It may be adjusted later according to user preference.

f. Set up Master Control Station (MCS).

- Use standard operating procedures for placing the MCS into operation.

TASK

2

Vehicle Display Assembly, (VDA) Menus

a. Once the MILES XXI system is powered up and the BIT is complete, the first menu to appear in the display will be the main menu. The main menu display allows the operator to view various menus and to navigate within those menus. The following menus and sub-menus will appear.

b. Using the **UP/DOWN** scroll push-buttons allows the operator to scroll through the main menu and sub-menus. Use the **"SELECT"** push-button to enter each of the menu and or sub-menu selections.

Table 3-1 VDA DISPLAY MENUS

MAIN MENU	SUB-MENU	SUB/SUB-MENU	DEFINITION
WPN: MAIN GUN M1 ALIVE	SELECT WEAPON MAIN GUN		Shows current weapon, vehicle type and status. Press SELECT to choose weapon for display then press UP/DOWN to change displayed weapon.
	SELECT WEAPON COAX		Press SELECT to change to the displayed weapon.
	PRESS SELECT TO CANCEL		Returns to MAIN MENU with no change to weapon selection.
RELOAD MAIN GUN SABO RNDS 0000	SABO LOADED 0000 SEL TO LOAD 0001	SABO LOADING nnnn nnn SECONDS REM	Displays the selected weapon, ammo type, and the current rounds loaded. Press SELECT to display current load and amount to reload. Press SELECT to initiate ammo loading.
	RELOAD TIME: nnn MAX LOAD: nnnn		Displays reload time and MAX number of rounds that can be loaded. Load time for the Main Gun is 5 secs and 120 sec for COAX.
	AMMOS 1-4:nnn nnnn nnnn nnnn		Number of rounds available for the different ammo types.
	AMMOS 5-8:nnn nnnn nnnn nnnn		Number of rounds available for the different ammo types.
	PRESS SELECT TO CANCEL		Press SELECT to exit to the Main Menu without loading ammunition.
AMMO TYPE SABO REM ROUNDS 0028	SWITCH TO HEAT REM RNDS 0012		Displays current ammo selection and load. Press SELECT to display other ammos. Press UP/DOWN to display the other ammos available. Press SELECT again to select the displayed ammo for reloading.
	PRESS SELECT TO EXIT		Press SELECT to exit to the Main Menu without changing ammo selection.

Table 3-1 VDA DISPLAY MENUS (Continued)

MAIN MENU	SUB-MENU	SUB/SUB-MENU	DEFINITION
PRESS SELECT FOR EVENT STATUS	TIME - HHMMSS {PID#} IS ALIVE		Shows current time, vehicle PID and status.
	{next most recent or previous event}		Pressing UP moves forward in time. Pressing DOWN moves back in time. Press SELECT to exit to the Main Menu or allow timeout (7.5 sec.)
SELECT AUX MENU			Press SELECT to enter Aux Menu. Use the UP/DOWN to scroll through the submenus
	SELECT BIT	PRESS SELECT FOR BIT	Press SELECT for BIT function. Press SELECT to initiate BIT. Press SELECT again to exit to previous menu.
	BACKLITE IS HIGH SELECT TO CHANGE	BACKLITE IS HIGH INC=UP DEC=DOWN	Starts with current BACKLITE level. Press UP to increase and press DOWN to decrease. Press SELECT to save setting and to exit.
	SELECT VOLUME CONTROL	VOLUME: nn% USE UP/DOWN SW	Displays current intercom volume. Press UP/DOWN to increase and decrease volume. Press SELECT to save setting and to exit .
	SELECT SOFTWARE VERSION	SELECT TO EXIT SW VER XX.XX	Press SELECT to exit to previous menu. NOTE: Only displays VDA software version.
	SELECT SYSTEM CONFIG	1234MLRCFS2 ++++++ +++++	Displays CVS module status. Press SELECT to exit to previous menu.
	SELECT LEARN WEAPON	PRESS SELECT TO LEARN WEAPON	Press SELECT to access SAT Learning Function. Press SELECT again to initiate learn process for M2 or M240 SAT.
	SELECT MAIN MENU		Press SELECT to exit to MAIN MENU.

Table 3-2 VDA Admin Menus

ADMIN MAIN MENU	SUB-MENU	SUB/SUB-MENU	DEFINITION
ADMIN FUNCTIONS SELECT TO EXIT			Main menu of Admin Functions Menu structure. SELECT exits to main Menus. Scroll Up or Down and SELECT Sub-menu functions.
SELECT TO CHOOSE VEHICLE TYPE	SELECT VEHICLE TYPE OF xxxxxx	SELECT CONFIRMS TYPE xxxxxx	Scroll UP/DOWN to display vehicle types. SELECT to choose. Press SELECT again to confirm or UP/DOWN to abort.
SELECT LEARN WEAPON	PRESS SELECT TO LEARN WEAPON		Press SELECT to access SAT Learning Function. Press SELECT again to initiate learn process for M2 or M240 SAT.
SELECT TO SET VEHICLE PID	UP/DOWN/SELECT TO SET PID nnnn	SELECT CONFIRMS SET PID TO nnnn	Scroll UP/DOWN to set each PID digit. SELECT for next digit. Press SELECT again to confirm or UP/DOWN to abort.
SELECT TO CHOOSE DCI MODE	SELECT TO SET DCI MODE TO xxx	SELECT CONFIRMS SET TO DCI xxx	Scroll UP/DOWN to display ON or OFF. SELECT to choose. Press SELECT again to confirm.
SELECT TO CHOOSE FIRE MODE	PRESS SELECT FOR xxxxx FIRE MODE	SELECT CONFIRMS xxxxx FIRE MODE	Scroll UP/DOWN to display DRY or BLANK. SELECT to choose. Press SELECT again to confirm or UP/DOWN to abort.
SELECT FOR BELT CONFIG	SELECT TO CONFIG BELT n	SHOOT RESET AT BELT n mm SEC	Scroll UP/DOWN to display belt to configure. SELECT to choose. Using CD, shoot RESET at belt to be configured within 30 seconds or UP/DOWN to abort.
SELECT TO SHOW SYSTEM CONFIG	1234 MLRCV ++++++++++		SELECT to show CVS System Configuration display. Press SELECT again to exit.
SELECT TO CLEAR EVENT LOG	SELECT CONFIRMS CLEAR EVENT LOG		SELECT to Clear Event Log. Press SELECT again to confirm or UP/DOWN to abort.

TASK

3 Vehicle Configuration

NOTES

Check vehicle config and if required perform one of the following procedures.

Either procedure can be utilized to configure the vehicle. However, Sub-task 3.2 requires the use of a MILES XXI Controller Device (CD).

Sub-task 3.1 Configure Vehicle Using the VDA

a. With the system powered up, check the VDA display to confirm the vehicle is configured correctly (configured as an "**M1**").

(1) The vehicle type will be displayed in the stet left hand corner of the display window.

b. If the vehicle needs to be reconfigured, do the following steps.

c. Use a CD to fire the "**CTRL ON**" command (or a MILES Code 35, PID 315) at any detector belt.

d. "**ADMIN FUNCTIONS**" is displayed on the VDA.

e. Scroll down to "**SELECT TO CHOOSE VEHICLE TYPE**" menu.

f. Press "**SELECT**" and scroll to select the appropriate vehicle.

g. Press "**SELECT**" and a display similar to the following will appear:

SELECT CONFIRMS TYPE M1

h. If the vehicle type shown is the one desired, press "**SELECT**" to activate it. If incorrect, press **UP** or **DOWN** to abort this function.

i. When the vehicle type has changed, an **"INITIALIZED"** voice cue sounds through the vehicle intercom system.

Sub-task 3.2 Configure Vehicle Using a MILES XXI Controller Device (CD)

NOTE

This Sub-task is an alternate for Sub-task 3.1, and can only be performed if a MILES XXI Controller Device is available.

a. With the system powered up, check the VDA display to confirm the vehicle is configured correctly (configured as an **M1**).

(1) The vehicle type will be displayed in the lower left hand corner of the display window on the Main Menu.

b. If the vehicle needs to be reconfigured do the following steps.

c. Use the CD to acquire the VCU via RF: Scroll thru the CD menus to the **"CD FUNCTIONS MENU".** Pull the trigger and scroll to the **"CD ACQUIRE MENU"**. Point the CD at a detector and pull the trigger. The VDA beeps twice. CD will display the acquired PID of the VCU. Check the VDA to insure the PID matches the PID acquired.

d. To reconfigure the vehicle type using the CD, scroll through the menus and locate the **"CVS MENU"** menu. Once located, pull the trigger.

e. In the **"CVS MENU"**, scroll to select the **"CVS SET VEHICLE CFG"** menu.

f. In the **"CVS SET VEHICLE CONFIG"** menu, pull the trigger and scroll to select the appropriate vehicle (**M1**).

NOTE

If the following menu appears **"NO VEHICLE TABLE AVAILABLE IN MEMORY"**, conduct the following procedures.

(1) Scroll to the **"CVS REQ VEHICLE CFG"** sub-menu and pull the trigger.

(2) The following sub-menu will be displayed, **"IMPORTING LIST"**.

(3) Once the list has been imported from the VCU, the following sub-menu will be displayed **"IMPORT COMPLETE"**.

(4) Importing the vehicle list is complete, continue conducting vehicle configuration.

g. Within the **"CVS SET VEHICLE CFG"** menu, pull the trigger and scroll to select the appropriate vehicle (**M1**).

h. Once the vehicle has been selected, pull the trigger to send the RF command and confirm the vehicle selected is displayed on the VDA display window. The CD will display:

VEHICLE RESPONSE
VEHICLE NUMBER: NN
VEHICLE ID: AAAAAA

i. If the system does not configure properly, repeat **Steps c. - f.**

TASK

4 Initialize System, Set Detector Belts

Sub-task 4.1 Detector Belt Factory Configuration

a. The detector belts are configured at the warehouse for placement on the vehicle.

b. Labels have been placed on the detector belt electronics module by CLS personnel, which indicate proper vehicle placement. The labels are marked with a number and a location, as shown in Figure 3-2.

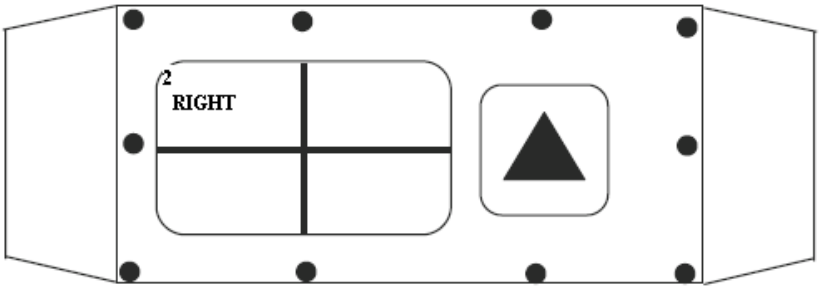


Figure 3-2 Detector Belt, Factory Configuration Label

c. The number on the label denotes the location on the vehicle as follows:

(1) 1 = Front detector belt

(2) 2 = Right detector belt

(3) 3 = Rear detector belt

(4) 4 = Left detector belt

d. The additional spaces on the label, are used for indicating that a detector belt was reconfigured for an alternate mounting location on the vehicle.

e. If the detector belts have to be manually configured, conduct one of the following procedures.

NOTE

Either procedure can be utilized to configure the detectors belts. However, Sub-task 4.3 requires the use of a MILES XXI CD.

Sub-task 4.2 Configure Detector Belts Using the VDA

NOTE

This procedure can be conducted utilizing any generation of the MILES controller devices.

a. If a detector belt needs to be configured, do the following steps.

b. Use the CD to fire the "**CTRL ON**" command (or MILES code 35, PID 315) at any detector belt.

c. **"ADMIN FUNCTIONS"** is displayed on the VDA.

d. Scroll to **"SELECT FOR BELT CONFIG"** menu.

e. Press "**SELECT**" and scroll to select the detector belt from the menu display, to be initialized.

f. Press "**SELECT**" and the following display will appear:

SHOOT RESET AT
BELT n mm SEC

- **BELT1** - Front detector belt
- **BELT2** - Right detector belt
- **BELT3** - Rear detector belt
- **BELT4** - Left detector belt

NOTE

Press UP or DOWN (or allow 30 sec. timer to expire) to abort this function.

g. Shoot only the selected detector belt to be configured with a **RESET** command within 30 seconds. The CVKI should flash the appropriate number of times corresponding to the number of the detector belt (1 - 4 flashes). The VDA should beep the appropriate number of times corresponding to the number of the detector belt (1 - 4 beeps).

h. The VDA displays:

BELT N
CONFIGURED

i. Press any button to return to the **"SELECT FOR BELT CONFIG"** menu, scroll to **"PRESS SELECT TO EXIT"** and press **"SELECT"**.

j. Scroll up until you find the **"SELECT TO SHOW SYSTEM CONFIG"** display.

k. Press "**SELECT."** The display will display the following:

Figure 3-3 "*SYSTEM CONFIG*" Display

- 1-4 - denotes the total number of belts defined for the configured vehicle.
- M - denotes MGLT.
- L - denotes VDA.
- R - denotes RIA (Intercom Interface).
- C - denotes CVKI CONTROLLER.
- F - denotes FCI.
- S - denotes M240 SAT.
- 2 - denotes M2 SAT

l. All items highlighted with an **"+"** denote the VCU has recognized those components connected within the system configuration. A **"-"** indicates that the component has not been recognized in the configuration of the vehicle kit. Additionally, the VDA will display a "**-**" for any component that fails during operations.

NOTES

Confirmation of the system config should be conducted initially after the completion of BIT.

If the vehicle cannot be configured refer to paragraph 4.4.1 (System Configuration Troubleshooting).

A "D" may be shown as the last character in the SYSTEM CONFIG display if the MILES XXI has been configured for use in Instrumented Mode. See Task 8 for instrumented mode configuration.

Sub-task 4.3 Configure Detector Belts Using the MILES XXI Controller Device

NOTE

This Sub-task is an alternate for Sub-task 4.2, and can only be performed if a MILES XXI Controller Device is available.

a. If a detector belt needs to be configured, perform the following steps.

b. Using the MILES XXI CD, pull the trigger to power it on. Using the **UP/DOWN** scroll push-buttons, select the **"CVS MENU"** from the list of menus and pull the trigger.

c. In the CVS menu, select the **"CVS BELT1 CMD IR"** and beginning with the front detector belt, fire the CD at the detector belt using the **"CVS BELT1 CMD IR"**. Ignore the CVKI flashes at this time.

d. While standing in front of the vehicle, move in a clockwise manner around the vehicle and fire the CD at each belt with the corresponding command. For example the next belt, you would select **"CVS BELT2 CMD IR",** then **3** and **4**.

- **BELT1** - Front detector belt
- **BELT2** - Right detector belt
- **BELT3** - Rear detector belt
- **BELT4** - Left detector belt

e. Continue until all four detector belts have been fired at.

f. Once the detector belts have been fired at, conduct the following procedures.

g. Turn VCU power **OFF** and back **ON** again.

h. Using the CD, **RESET** the vehicle to an **ALIVE** status.

i. In the CVS menu, select the **"CVS BELT1 CMD IR"** and beginning with the front detector belt, fire the CD at the detector belt using the **"CVS BELT1 CMD IR"**. The CVKI should flash the appropriate number of times corresponding to the number of the detector belt (in this case 1 flash). The VDA should beep the appropriate number of times corresponding to the number of the detector belt (in this case 1 beep).

j. While standing in front of the vehicle, move in a clockwise manner around the vehicle and fire the CD at each belt with the corresponding command. For example the next belt, you would select **"CVS BELT2 CMD IR",** then **3** and **4**. The CVKI should flash the appropriate number of times corresponding to the number of the detector belt (2 - 4 flashes). The VDA should beep the appropriate number of times corresponding to the number of the detector belt (2 - 4 beeps).

k. Scroll through the VDA main menus and select **"SELECT AUX MENU"** from the VDA display.

l. Scroll through the **"SELECT AUX MENU"** sub-menus until you find the **"SELECT SYSTEM CONFIG"** display.

m. Select **"SELECT SYSTEM CONFIG"** sub-menu and the display will display the following text:

Figure 3-4 "SYSTEM CONFIG" Display

- 1-4 - denotes the total number of belts expected for the current vehicle.
- M - denotes MGLT.
- L - denotes VDA.
- R - denotes RIA.
- C - denotes CVKI CONTROLLER.
- F - denotes FCI.
- S - denotes M240 SAT.
- 2 - denotes M2 SAT.

n. All items highlighted with an **"+"** denote the VCU has recognized those components connected within the system configuration. A **"-"** indicates that the component has not been recognized in the configuration of the vehicle kit. Additionally, the VDA will display a "-" for any component that fails during operations.

NOTES

Confirmation of the system config should be conducted initially after the completion of BIT.

If the vehicle cannot be configured refer to paragraph 4.4.1 (System Configuration Troubleshooting).

A "D" may be shown as the last character in the SYSTEM CONFIG display if the MILES XXI has been configured for use in Instrumented Mode. See Task 8 for instrumented mode configuration.

TASK

5 Set Vehicle Player Identification (PID)

NOTE

Either procedure can be utilized to set the vehicle PID. However, Sub-task 5.2 requires the use of a MILES XXI CD.

Sub-task 5.1 Set Vehicle PID Using the VDA

a. Use a CD to fire the "**CTRL ON**" command (or MILES code 35, PID 315) at any detector belt.

b. **"ADMIN FUNCTIONS"** is displayed on the VDA.

c. Scroll to select the **"SELECT TO SET VEHICLE PID"** menu.

d. Press "**SELECT**" and the following display will appear:

UP/DOWN/SELECT
TO SET PID - - - -

e. Press the **UP/DOWN** push-buttons to select the first number of the PID, press the "**SELECT**" push-button to continue.

f. Continue the procedure above (step e.), for the remaining three digits. When the last digit is entered and the "**SELECT**" push-button is pressed, the VDA will display the screen below.

SELECT CONFIRMS
SET PID TO XXXX

g. Press "**SELECT**" to confirm the setting. The VDA will beep twice and the display will show the new PID.

NOTE

Pressing **UP** or **DOWN** will abort this function.

Sub-task 5.2 Set Vehicle PID Using the MILES XXI Controller Device (CD)

NOTE

This Sub-task is an alternate for Sub-task 5.1, and can only be performed if a MILES XXI Controller Device is available.

a. Use the CD to link to the VCU via RF. Scroll thru the CD menus to the **"CD FUNCTIONS MENU"**. Pull the trigger and scroll to the **"CD ACQUIRE MENU"**. Point the CD at a detector

belt and pull the trigger. The VDA beeps twice. The CD will display the acquired PID of the VCU. Check the VDA to insure the PID matches the PID acquired.

b. To change the vehicle PID using the CD, scroll through the menus and locate the **"PID MENU"** menu. Once located, pull the trigger.

c. Scroll to select the **"PID SELECT"** menu.

d. In the **"PID SELECT"** menu, pull the trigger and scroll using the **UP/DOWN** push-buttons to select the first digit of the PID, then press the **SEL** push-button to continue.

e. Continue selecting the other three digits using the **UP/DOWN** push-buttons. Press the **SEL** push-button each time to progress to the next digit.

f. When the last digit is entered, the following the menu will appear on the CD: **"PID SEND"**.

g. Pull the trigger to send the RF command to the VCU. Confirm the PID is displayed on the VDA display window.

h. Setting the vehicle PID using the CD is complete.

TASK

6 Test Detector Belts

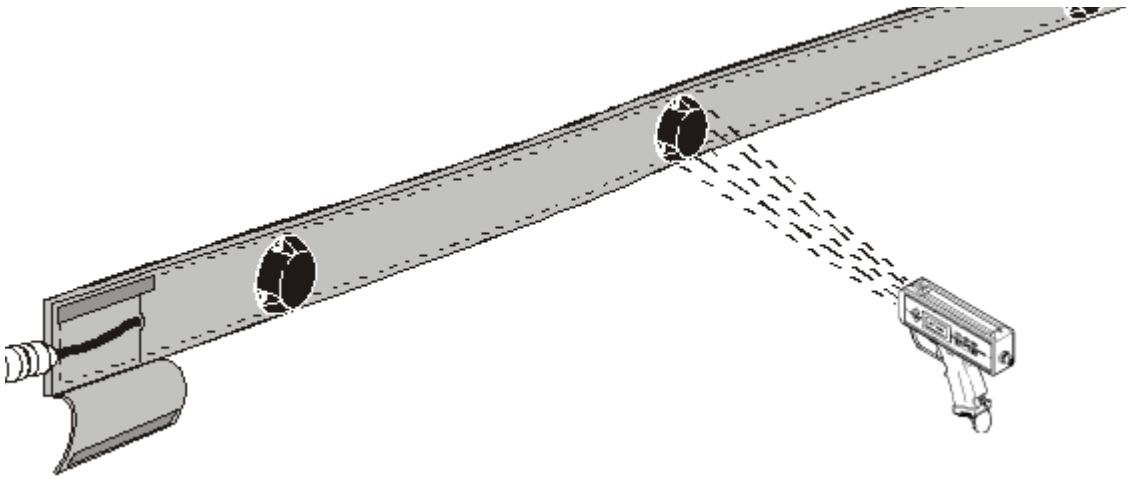


Figure 3-5 Detector Belt Testing

a. Ensure vehicle master power is ON.

b. Ensure that all cable connections to the detector belts and VCU are secure.

c. Obtain a Controller Device (CD) to test your detector belts. Fire a **NEAR MISS** code (Heavy Near Miss, MILES Code **28**) at each detector from a distance of **3 to 10** feet.

d. Each time the CD fires, the VCU should flash 2 times and the VCI will alert with a **NEAR MISS** message.

NOTE

A belt segment is serviceable if **ONE** detector is bad.

e. If more than one detector per belt segment fails the test (VCU does not flash), perform troubleshooting per Chapter 4, Table 4-2 (TROUBLESHOOTING) of this manual.

TASK

7 Select Weapon Fire Mode (Optional)

This optional task describes the MILES XXI capability to select the fire mode (Blank Fire or Dry Fire) of the simulated vehicle weapons. The selected fire mode will apply to all vehicle weapons (COAX, TOW, M2, M240) except the Main Gun, which is always in dry fire mode.

a. Use a CD to fire the "**CTRL ON**" command (or MILES code 35, PID 315) at any detector belt.

b. "**ADMIN FUNCTIONS**" is displayed on the VDA

c. Scroll down to "**SELECT TO CHOOSE FIRE MODE**"and press **SELECT**.

d. The following is displayed on the VDA:

PRESS SELECT FOR
BLANK FIRE MODE

or

PRESS SELECT FOR
DRY FIRE MODE

e. Use the **UP/DOWN** buttons to display the desired mode, then press **SELECT** to display the confirmation screen:

SELECT CONFIRMS
BLANK FIRE MODE

NOTE

If the Fire Mode displayed is not the one desired, press **UP** or **DOWN** to abort this function.

f. Exit to the main menu by pressing **SELECT** from:

ADMIN FUNCTIONS
SELECT TO EXIT

g. Confirm the fire mode setting for all installed weapons (except MAIN GUN) on the main menu. "**DRY**" will be displayed after the weapon name as shown below. No text after the weapon name indicates Blank Fire Mode.

WPN: COAX DRY
M1 ALIVE

TASK

8 Select DCI Mode (Optional)

This optional task describes the MILES XXI capability to select the instrumented mode of the the vehicle operations. When the DCI mode is **ON**, the CVS system will expect an instrumentation package attached to the P2 connector of the VCU cable at J3.

a. Use a CD to fire the "**CTRL ON**" command (or MILES code 35, PID 315) at any detector belt.

b. "**ADMIN FUNCTIONS**" is displayed on the VDA.

c. Scroll down to "**SELECT TO CHOOSE DCI MODE**" and press **SELECT.**

d. The following is displayed on the VDA:

SELECT TO SET DCI MODE TO ON

or

SELECT TO SET DCI MODE TO OFF

e. Use the **UP/DOWN** buttons to display the desired mode, then press **SELECT** to display the confirmation screen:

SELECT CONFIRMS SET DCI ON

f. Press **SELECT** to confirm the selection.

NOTE

If the DCI mode displayed is not the one desired, press **UP** or **DOWN** to abort this function.

g. To verify DCI operation, scroll to "**SELECT TO SHOW SYSTEM CONFIG**" (or "**SELECT SYSTEM CONFIG**" in the main menu). The display will include a "**D**" when DCI mode is "**ON**". If the MILES XXI system is in communication wIth the instrumentation package, a "**+**" will be displayed below the "**D**" otherwise a "**-**" will be shown.

TASK

9 Load Coax Machine Gun

NOTE

Blank ammunition is not required for dry fire vehicle configuration.

a. Load the Coax machine gun with blank ammunition.

b. Refer to the Operator's Manual for loading procedures.

TASK

10 M1A1 Alignment Procedures

a. Ensure tank is parked on level ground.

b. Ensure MILES XXI equipment has been properly installed and configured for the M1A1.

c. Turn on Vehicle Power

(1) Master Power ON

(2) Turret Power ON

(3) Turret Utility Power (on TNB) ON

d. Prepare gunner's station for operation. (Refer to TM 9-2350-264-10-2)

NOTE

Record zero data for future reference.

e. Set **FIRE CONTROL MODE** switch to **MANUAL** and perform the following:

(1) Set **THERMAL MODE** switch to **STBY**.

(2) Clear main gun.

(3) Clear coax machine-gun.

(4) Clear loader's machine-gun.

(5) Clear tank commander's machine-gun.

f. Set up target at **1200** meters.

NOTE

Alignment will require use of the fire control system in NORMAL mode for certain steps. When hydraulic pressure drops below 1500 psi, NORMAL mode operation can be erratic.

g. With engine running, ensure turret hydraulic pressure reads between **1500-1700** psi.

h. Set **GUN SELECT** switch to **MAIN.**

i. Set **MAGNIFICATION** lever to **10X.**

j. Make sure **FLTR/CLEAR/SHTR** switch is set to **CLEAR.**

k. Make sure ballistic doors are open.

l. Set **FIRE CONTROL MODE** switch to **EMERGENCY,** squeeze gunner's palm switches and check for drift. Observe for 20 seconds, if rate of drift exceeds 0.5 mil per second-Notify unit maintenance.

m. Set **FIRE CONTROL MODE** switch to **NORMAL.**

n. Open **CCP** door and turn on **CCP.**

(1) Press **WIND** key and enter 0.0, leave lit.

(2) Press **CANT** key and enter 0.0, leave lit.

(3) Press **LEAD** key and enter 0.0, leave lit.

(4) Select **SABOT,** Press **AMMO SUBDES** enter **59** press **ENTER** key.

(5) Select **HEAT**, Press **AMMO SUBDES** enter **59** press **ENTER** key.

(6) Select **COAX,** Press **AMMO SUBDES** enter **59** press **ENTER** key.

(7) Press **RANGE** key and enter 1200 (RANGE TO BORESIGHT TARGET).

(8) Press **ENTER** key.

(9) Depress **Gunner's** or **Commander's Palm Switch**. This induces the range.

o. Set **FIRE CONTROL MODE** switch to **MANUAL**.

p. Select **COAX**.

q. Press **BORESIGHT** on the **CCP** and enter **MAIN GUN MILES BORESIGHT READINGS** and push **ENTER**.

r. Press **ZERO** on the **CCP** and enter **0.0, 0.0** and push **ENTER**.

s. Select **SABOT.**

t. Press **ZERO** on the **CCP** and enter **0.0, 0.0** and push **ENTER**.

u. Have gunner move day reticle to an alignment aiming point. **(GUNNER USES THE MANUAL TRAVERSE AND ELEVATION TO MOVE THE GUN TO THE ALIGNMENT AIMING POINT).**

Figure 3-6 MGLT Locking Knobs and Alignment Knobs

v. Unlock the elevation and azimuth knobs on the MGLT (refer to Appendix C). Have the Loader look through the 12X scope on the MGLT. Use azimuth and elevation alignment knobs to adjust the MGLT to the vehicles alignment aiming point. Lock down azimuth and elevation locking knobs.

w. Verify that MGLT has not moved from alignment point when locked down. If necessary, readjust with necessary offset, so that MGLT is accurately aligned after the azimuth and elevation locking knobs are secure.

x. Using **MANUAL** controls move the gun off target and re-lay back on target using a **G** pattern and verify the aiming point of the **SIGHTS** and the **MGLT** are the same.

y. Refer the **Thermal** sight to the aiming point.

z. Refer the **GAS** sight to the aiming point.

aa. Set **FIRE CONTROL MODE** switch to **NORMAL** and verify alignment of all sights to the MGLT.

ab. Fire at a **MILES** target with the **MAIN GUN** and **COAX** to confirm **Alignment**.

NOTE

See TASKS 12 and 13 for procedures on firing main gun and coax.

TASK

11 M1A2 Alignment Procedures

a. Place tank on level platform with target placed at 1200 meters.

b. Ensure MILES XXI has been properly installed and configured for M1A2.

c. Turn on MILES XXI Power.

d. Turn on Master Power.

e. Turn on Turret Power.

CID INPUTS

a. Turn on Turret Utility Power UJ1.

(1) From the CID **"SELECT"** Pre Post

(2) **"SELECT"** Aux Systems

(3) **"SELECT"** Aux Controls

(4) Place **"TUR UTIL"** to ON

GDCP INPUTS

a. On the GDCP **"SELECT"** Adjust.

b. **"SELECT"** SABOT Ammunition.

c. **"SELECT"** AMMO Subdes.

(1) Using UP/DOWN toggle switch **"SELECT"** MILES on GDCP and **"SELECT"** ENT on Keypad

d. **"SELECT"** HEAT Ammunition.

e. **"SELECT"** AMMO Subdes.

(1) Using up/down toggle switch **"SELECT"** MILES on GDCP and **"SELECT"** ENT on Keypad

f. **"SELECT"** COAX Ammunition.

g. **"SELECT"** AMMO SUBDES.

(1) Using up/down toggle switch **"SELECT"** MILES on GDCP and **"SELECT"** ENT on Keypad

(2) Return to MAIN MENU

h. **"SELECT"** METRL DATA.

i. **"SELECT"** CROSSWIND.

(1) **"SELECT"** Manual

(2) **"SELECT"** 0000 and ENT on Keypad

(3) Return to MAIN MENU

j. **"SELECT"** SENSORS.

k. **"SELECT"** ATTD.

(1) **"SELECT"** Pitch and Roll to select OFF

l. **"SELECT"** CANT.

(1) **"SELECT"** Manual Mode and **"SELECT"** ENT on keypad

(2) Return to MAIN MENU

m. **"SELECT"** LEAD.

(1) **"SELECT"** Manual

(2) **"SELECT"** ENT on keypad

(3) Return to MAIN MENU

n. Select target Alignment Aiming Point.

o. Lay main gun on Alignment Aiming Point.

p. Refer to Figure 3-6 (MGLT Locking Knobs and Alignment Knobs). Unlock the elevation and azimuth knobs on the MGLT. Have the Loader look through the 12X scope on the MGLT. Use azimuth and elevation adjustment knobs to move the MGLT to vehicles alignment aiming point. Lock down azimuth and elevation locking knobs.

q. Verify that MGLT has not moved from alignment point when locked down. If necessary, readjust with necessary offset, so that MGLT is accurately aligned after the azimuth and elevation locking knobs are secure.

r. Using **MANUAL** controls move the gun off target and relay back on target using a **G** pattern and verify the aiming point of the **SIGHTS** and the **MGLT** are the same.

s. Refer the **Thermal** sight to the aiming point.

t. Refer the **CITV** to the aiming point.

u. Refer the **GAS** sight to the aiming point.

v. Set **FIRE CONTROL MODE** switch to **NORMAL**, and verify alignment of all sights to the MGLT.

w. Fire at a **MILES** target with the **MAIN GUN** and **COAX** to confirm **Alignment**.

x. See TASKS 12 and 13 for procedures on firing main gun and coax.

TASK

12 Load Vehicle Weapons

a. Load all small arms with blank ammunition.

b. Refer to the appropriate Operator's Manual for loading procedures.

Sub-task 12.1 Main Gun Ammunition Reload

NOTES

The following procedures pertain to both MAIN GUN and COAX loading procedures. Load times are 5 second for the **MAIN GUN** and **20 seconds** for **COAX**.

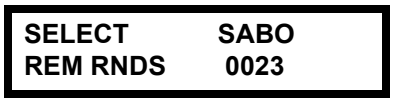
The displayed ammo type and rounds counts will vary from the examples shown below, based on user selection and actual ammo levels.

a. To select weapon type press **"SELECT"** while in the main menu (below):

(1) Scroll through the sub-menus to select the weapon type.

b. From the main menu, scroll to view weapon basic load and rounds remaining (below), and press "**SELECT"**.

(1) Scroll through the sub-menus to view the ammunition types. Press the **"SELECT"** push-button to select the ammunition to be loaded.



c. Once the ammunition is selected the VDA will return to the main menu.

d. To load ammunition, scroll to the Reload menu (below) and press “SELECT”.

e. If a round of the selected ammo is currently loaded, the following menu will appear.

f. If the round needs to be loaded the following menu will appear.

g. Press the **“SELECT”** push-button and the following menu will appear.

h. Once the round has loaded, the display will return to the Reload menu shown in step d. Loading sequence complete.

TASK

13 Test Fire Weapons

Sub-task 13.1 Test Fire Main Gun

a. Arm main gun and fire at another MILES equipped vehicle or target to ensure the MGLT is functioning properly.

b. If a Hit, Kill, or Near Miss is achieved, the MGLT is functioning properly.

NOTE

Periodically clean the MGLT lens with a clean, soft cloth to prevent the transmitter from firing erratically due to residue/dust build-up.

Sub-task 13.2 Test Fire M2 Machine Gun

a. Fire a 10 - 15 round burst from the machine gun.

b. Fire the machine gun at a target (vehicle or manworn system), to ensure the SAT is functioning properly.

c. If a Kill or Near Miss is achieved the SAT is functioning properly.

d. Place weapon on SAFE and check to ensure the BFA and SAT remain securely attached.

NOTE

Periodically clean weapon with oil and a clean cloth. Residue buildup will occur more rapidly firing blank ammunition. Clean transmitter with a soft cloth after every 500 rounds fired or as often as possible to prevent the transmitter from firing erratically due to residue buildup.

Sub-task 13.3 Test Fire M240 Machine Gun

a. Fire a 20 - 30 round burst from the machine gun.

b. Fire the machine gun at a target (manworn system), to ensure the SAT is functioning properly.

c. If a Kill or Near Miss is achieved the SAT is functioning properly.

d. Place weapon on SAFE and check to ensure the BFA and SAT remain securely attached.

NOTE

Periodically clean weapon with oil and a clean cloth. Residue buildup will occur more rapidly firing blank ammunition. Clean transmitter with a soft cloth after every 500 rounds fired or as often as possible to prevent the transmitter from firing erratically due to residue buildup.

TASK

14 Evaluate Incoming Fire

NOTE

The VDA will display a particular Zone indicating where the vehicle sustained a Hit, Near Miss or a Kill as depicted in the illustration.

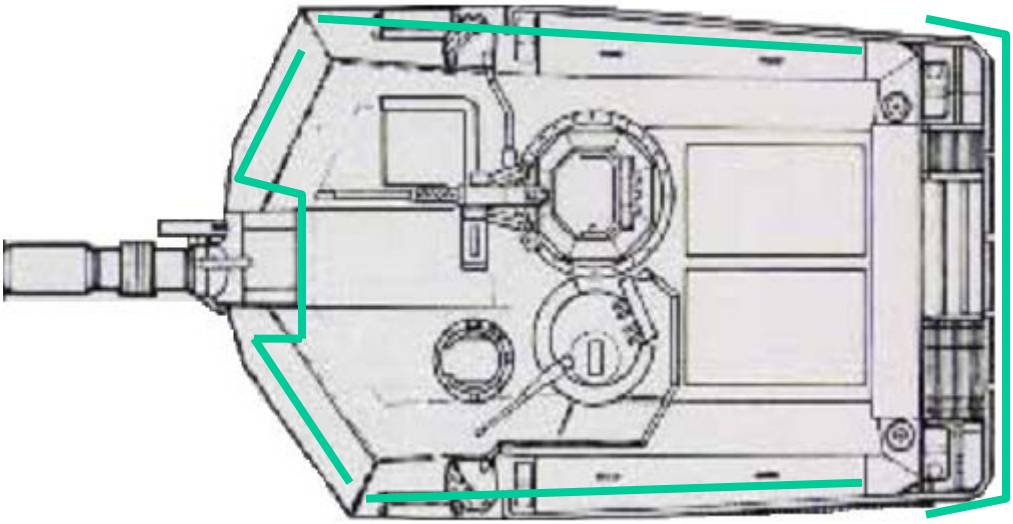


Figure 3-7 Vehicle Hit Zones

Sub-task 14.1 Vehicle Zones

The circumference of the vehicle is broken into eight zones. These zones come into play whenever the vehicle receives fire. The appropriate zone will be displayed in the VDA depending on where the vehicle was engaged. The zones adjust the probability of kill (PK) data used to determine whether the firing vehicle has the capability to kill or disable the target vehicle.

The purpose of the MILES XXI system is to realistically simulate force on force weapons training. When direct fire “hits” the vehicle, the system performs **3 distinct functions**:

• **Evaluate**	When the system detects direct fire LASER beams, the VCU evaluates the effects of that event based on a number of factors such as the vulnerability of the vehicle, the type of weapon, and where a direct fire HIT occurred and then determines whether the vehicle receives a **NEAR MISS, HIT**, or **KILL.**
• **Signal**	Each VCU has a CVKI, which flashes when the vehicle receives a **NEAR MISS, HIT**, or **KILL** so the crew and others in the training area can see the effects of incoming fire on vehicle. The system inserts voice messages into the vehicle intercom so the crew members can hear the effects to the vehicle. When connected, the DIFCUE will fire to present the indication that a kill occurred.
• **Disable**	To simulate damage, the system affects some vehicle functions for example: ● **COMMUNICATIONS KILL** requires you to stop using the radios. For safety reasons communications are not actually disabled. ● **FIREPOWER KILL** disables all vehicle weapons from firing the LASER transmitter. ● After receiving a **MOBILITY KILL**, the crew has 20 seconds to stop vehicle movement. After 20 seconds the vehicle position is recorded in the VCU and if the vehicle is moved more than 100 meters, the system will initiate a Cheat Kill. ● If you attempt to move the vehicle after a **MOBILITY KILL**, the system initiates a **CATASTROPHIC KILL,** that will be recorded in the event memory as a **CHEAT KILL.**

Sub-task 14.2 Effects of Incoming Fire

The vehicle can be **KILLED**, **HIT**, or **NEAR MISSED** by opposing direct fire. When the MILES XXI system detects a LASER engagement the VCU evaluates the effects of the event and decides if the vehicle is **KILLED,** received a **FIREPOWER KILL, COMMUNICATIONS KILL, MOBILITY KILL, HIT** no damage**,** or **NEAR MISS.**

• **KILL**	There are five types of **KILLS:** ● **CATASTROPHIC KILL -** This simulates damage that destroys the vehicle and kills its occupants. ● **FIREPOWER KILL -** Simulates a hit that knocks out the vehicles weapon systems. ● **MOBILITY KILL -** Causes you to stop vehicle movement. ● **COMMUNICATIONS KILL -** Requires you to stop using vehicle radios. ● **CHEAT KILL -** If you attempt to move your vehicle after receiving a Mobility Kill, or tamper with/disconnect MILES XXI components, the system will present a Catastrophic Kill on the VDA and display a Cheat Kill in the event log memory.
• **HIT**	Causes no vehicle damage.
• **NEAR MISS**	Indicates incoming fire that hits close to the vehicle but does not hit the vehicle itself or cause any damage. Take evasive action and return fire or move to another position.

NOTE

A combination of a Firepower Kill and a Mobility Kill will produce a Catastrophic Kill. Combinations of Mobility Kill, Firepower Kill, and Communications Kill are possible.

The visual message on the Vehicle Display Assembly (VDA) will display the attackers weapon code, zone and PID. The attacking weapons codes and event time are stored in the events list. This event information is stored in the VCU and downloaded after the exercise is complete. This data is used to develop the After Action Review (AAR).

Each of these “receiving fire” assessment events will be displayed in the VDA display until “acknowledged” by pressing any VDA button, or until it is overwritten by a new event. Following the event, you will receive voice messages over the vehicle intercom identifying the event.

Sub-task 14.3 VCU Visual Signals

The Combat Vehicle Kill Indicator on each VCU is bright enough that it can be seen by crew members from other vehicles in the training area. The results of firing events at opposing vehicles can be determined by observing the CVKI to see what damage was inflicted on target vehicles. The CVKI displays **three** conditions**:**

• **NEAR MISS**	The CVKI flashes **2 times** and then stops.
• **MOBILITY KILL** • **COMMO KILL** • **FIREPOWER KILL** • **HIT**	The CVKI flashes **4 times** and then stops.
• **CATASTROPHIC KILL** • **CHEAT KILL**	The CVKI flashes **continuously** until the vehicle is **RESURRECTED** or **RESET.**

NOTES

The CVKI will stop flashing after 10 minutes if vehicle power is turned off and will restart when vehicle power is turned on.

Once the vehicle has been initialized, if you attempt to disconnect MILES XXI components, the system will initiate a **CHEAT KILL** which will be stored in the event log memory. A **CHEAT KILL** will be displayed in the VDA display window.

Sub-task 14.4 Audio Messages

The MILES XXI system inserts voice messages into the vehicle intercom so crew members can hear what incoming fire is doing to the vehicle, without interfering with the crew's normal operation.

a. ***VOICE MESSAGES***: A voice message informs the crew of incoming fire effects, preceded by a short tone.

"Near Miss"	"Vehicle Kill"
"Hit"	"Reset"
"Resurrect"	"Audio Check"
"Commo Kill"	"Mobility Kill"
"Firepower Kill"	

Sub-task 14.5 Display Messages

When an assessment message is generated it will appear on the display. The VDA will return to the previous menu when one of the VDA push-buttons is pressed or another alert message occurs.

a. Use the **UP/DOWN** scroll push-button to display **"PRESS SELECT FOR EVENT STATUS"**, and press the **"SELECT"** push-button on the VDA. If you have events, the VDA will display:

```
TIME-HHMMSS
YYYY IS XXXX
```

HHMMSS	=	Hour:Minutes:Seconds
YYYY	=	PID
XXXX	=	Status (ALIVE, DEAD, FPK, MOBK, COMK)

b. Scroll down to display the most recent event in the form of:

```
##  -HHMMSS EEEEE
YYYYY
```

## =	EVENT NUMBER	1 - 99 (stores up to 500 events)
HHMMSS =	HOUR:MIN:SEC	
EEEEE =	EVENT TYPE	(See Table 3-3, (MILES XXI EVENT TYPES)
YYYYY =	EVENT INFO	SUPPORTING DATA

c. A casualty assessment event will be in the form of:

```
## HHMMSS EEEEZ
CC  PID-A####
```

## =	EVENT NUMBER	1 - 99 (stores up to 500 events)
HHMMSS =	HOUR:MIN:SEC	
EEEEZ =	EVENT and HIT ZONE	EVENT type (MISS, HIT, KILL, FPK, MOBK and COMK) and HIT ZONE 1 - 8
CC =	ATTACKING WEAPON	(See Table 3-4 (MILES WEAPON CODES)
A =	AMMO TYPE	A - P
PID =	ATTACKERS PID (####)	1-3330

d. When the oldest event has been reached, the VDA will return to the most recent event.

NOTES

The following event types may be viewed in the VDA.

***** Denotes those associated with an instrumented range system.

Table 3-3 EVENT TYPES

Event Displayed	Definition
*CHEM	Indirect fire occurred.
*DECON	Decon occurred.
*TRIGRD	Trigger pulled.
ACQUIR	An individual SAT has been learned.
BIT	Displayed during a BIT event.
CHEAT	Cheat event has occurred.
COMK	Commo Kill occurred.
DEVICE	Displayed when a component is missing.
EVTCLR	Events cleared.
FAILUR	Failure of component during BIT.
FIRED	Weapon has been fired.
FPK	Firepower Kill occurred.
GPSFIX	VCU GPS is tracking.
HIT	Hit occurred.
INITIALIZED	System initialized, all detector belts configured and ready for use.
KILL	Kill occurred.
LOWBAT	VCU or SAT low battery.
MISS	Near Miss occurred.
MOBK	Mobility Kill occurred.
PLASUM	Player summary for the AAR.
POWER	Status od VCU battery.
PWR ON	Power On (VCU).
RE-ACQ	An individual SAT has been re-learned.
READY	All expected SAT's have been learned.
RESET	Reset has been conducted.
RESUR	Resurrect has been conducted.
SETPID	Set player identification.
TIME	Current time displayed.
VEH ON	Vehicle On (vehicle power).
VEHOFF	Vehicle Off (vehicle power).
WPNDRP	Weapon learned has been dropped.

Table 3-4 MILES WEAPON CODES

Code	Weapon Simulation
00	UNIVERSAL KILL - Controller Device
01	MAVERICK
02	HELLFIRE
03	AT-3 SAGGER
04	MORTAR
05	MINE M15
06	WEAPON X
07	TOW
08	DRAGON
09	FIRE AND FORGET MISSILE
10	M21 ANTITANK MINE
11	CLAYMORE
12	105mm
13	152mm
14	ROCKET
15	AT4
16	120mm
17	90mm
18	ARTILLERY
19	GRENADE
20	ROCKET CLUSTER BOMB
21	30mm
22	25mm
23	20mm
24	HEAVY MACHINE GUN
25	CHAPPARRAL
26	STINGER
27	LIGHT MACHINE GUN
28	HEAVY MISS
29	LIGHT MISS
30	OPTICAL RESURRECT
31	HEAVY SPARE MISS
32	INDIRECT FIRE SIMULATOR
33	SA-14
34	RADAR
35	ADMIN
36	RESET

TASK 15 Evaluate Direct Fire Events

Sub-task 15.1 Direct Fire Events

After the vehicle has been engaged by direct fire, one or more of the following assessment messages will be displayed.

ACTION:

a. **KILL --** When the vehicle has been killed, the following indications will occur:

NOTE

If the RIA is present the VDA will not beep, however, if the VDA beeps that indicates the RIA is not being recognized by the system (conduct troubleshooting).

VDA	=	Continuous tone
Audio Message	=	Tone\"VEHICLE KILL"
CVKI	=	Flashes Continuously.
VDA Displays:		

```
## HHMMSS  EEEEZ
CC   PID-A####
```

## =	EVENT NUMBER	1 - 99 (stores up to 500 events)
HHMMSS =	HOUR:MIN:SEC	
EEEEZ =	EVENT and HIT ZONE	EVENT type KILL, and HIT ZONE 1 - 8
CC =	ATTACKING WEAPON	(See Table 3-4 (MILES WEAPON CODES)
A =	AMMO TYPE	A - P
PID =	ATTACKERS PID (####)	1-3330

(1) The event log will display:

```
TIME-HHMMSS
YYYY IS DEAD !
```

HHMMSS	=	Hour:Minute:Second
YYYY	=	PID
STATUS	=	IS DEAD !

ASSESSMENT:

- **CATASTROPHIC KILL --** Simulates damage that destroys the vehicle and kills its occupants.

ACTION:

b. **FIREPOWER KILL --** Disables all vehicle weapons from firing and the following indications will occur:

VDA	=	emits 4 beeps
Audio Message	=	Tone\"FIREPOWER KILL"
CVKI	=	Flashes 4 times then stops.
VDA Displays:		

```
## HHMMSS EEEEZ
CC  PID-####
```

## =	EVENT NUMBER	1 - 99 (stores up to 500 events)
HHMMSS =	HOUR:MIN:SEC	
EEEEZ =	EVENT and HIT ZONE	EVENT type FPKILL and HIT ZONE 1-8
CC =	ATTACKING WEAPON	(See Table 3-4 (MILES WEAPON CODES)
A =	AMMO TYPE	A - P
PID =	ATTACKERS PID (####)	1-3330

(1) The event log will display:

```
TIME-HHMMSS
YYYY IS FPKILL
```

HHMMSS	=	Hour:Minute:Second
YYYY	=	PID
STATUS	=	FIREPOWER KILL

ASSESSMENT:

- **FIREPOWER KILL --** Disables all vehicle weapons from firing.

ACTION:

c. **MOBILITY KILL --** Assesses vehicle damage that requires the vehicle to stop moving. In the event of a Mobility Kill, the following indications will occur:

VDA	=	emits 4 beeps
Audio Message	=	Tone\"MOBILITY KILL"
CVKI	=	Flashes 4 times then stops.
VDA Displays:		

```
## HHMMSS EEEEZ
CC   PID-A####
```

## =	EVENT NUMBER	1 - 99 (stores up to 500 events)
HHMMSS =	HOUR:MIN:SEC	
EEEEZ =	EVENT and HIT ZONE	EVENT type MOBKILL and HIT ZONE 1-8
CC =	ATTACKING WEAPON	(See Table 3-4 (MILES WEAPON CODES)
A =	AMMO TYPE	A - P
PID =	ATTACKERS PID (####)	1-3330

(1) The event log will display:

```
TIME-HHMMSS
YYYY IS MOBK
```

HHMMSS	=	Hour:Minute:Second
YYYY	=	PID
STATUS	=	MOBILITY KILL

ASSESSMENT:

- **MOBILITY KILL --** You must stop vehicle within 20 seconds. The crew may use the vehicle weapons and radio. If you do not stop the vehicle within 20 seconds, the intercom will beep, the vehicle will receive a Cheat Kill and the VDA will display “DEAD” until the vehicle has been **RESURRECTED** or **RESET**.

ACTION:

d. **COMMUNICATIONS KILL --** Causes vehicle damage and the crew must stop using the radios except in an emergency:

VDA	=	emits 4 beeps
Audio Message	=	Tone\“COMMO KILL”
CVKI	=	Flashes 4 times then stops.
VDA Displays:		

```
## HHMMSS EEEEZ
CC PID-A####
```

## =	EVENT NUMBER	1 - 99 (stores up to 500 events)
HHMMSS =	HOUR:MIN:SEC	
EEEEZ =	EVENT and HIT ZONE	EVENT type COMKILL and HIT ZONE 1 - 8
CC =	ATTACKING WEAPON	(See Table 3-4 (MILES WEAPON CODES)
A =	AMMO TYPE	A - P
PID =	ATTACKERS PID (####)	1-3330

(1) The event log will display:

```
TIME-HHMMSS
YYYY IS COMK
```

HHMMSS	=	Hour:Minute:Second
YYYY	=	PID
STATUS	=	COMMUNICATIONS KILL

ASSESSMENT:

- **COMMUNICATIONS KILL --** Requires the crew to stop using vehicle radios except in an emergency.

ACTION:

e. **HIT --** When the vehicle has been HIT but sustains no damage, the following indications will occur:

VDA	=	emits 4 beeps
Audio Message	=	Tone\"HIT".
CVKI	=	Flashes 4 times then stops.
VDA Displays:		

```
## HHMMSS EEEEZ
CC  PID-A####
```

## =	EVENT NUMBER	1 - 99 (stores up to 500 events)
HHMMSS =	HOUR:MIN:SEC	
EEEEZ =	EVENT and HIT ZONE	EVENT type HIT and HIT ZONE 1 - 8
CC =	ATTACKING WEAPON	(See Table 3-4 (MILES WEAPON CODES)
A =	AMMO TYPE	A - P
PID =	ATTACKERS PID (####)	1-3330

ASSESSMENT:

- **HIT --** Vehicle was struck by incoming fire but no damage occurred.

ACTION:

f. **NEAR MISS --** When a NEAR MISS occurs to the vehicle, the following indications will occur:

VDA	=	emits 2 beeps
Audio Message	=	Tone\"Near MISS".
CVKI	=	Flashes 2 times then stops.
VDA Displays:		

```
## HHMMSS EEEEZ
CC   PID-A####
```

## =	EVENT NUMBER	1 - 99 (stores up to 500 events)
HHMMSS =	HOUR:MIN:SEC	
EEEEZ =	EVENT and HIT ZONE	EVENT type MISS and HIT ZONE 1 - 8
CC =	ATTACKING WEAPON	(See Table 3-4 (MILES WEAPON CODES)
A =	AMMO TYPE	A - P
PID =	ATTACKERS PID (####)	1-3330

ASSESSMENT:

- **NEAR MISS --** This indicates incoming fire hits close to the vehicle but does not hit the vehicle itself or cause any damage.

Sub-task 15.2 Resurrect

- Bring players "Alive" -- **DOES NOT restore ammunition loads**.

a. To conduct a **RESURRECT,** fire the MILES XXI CD using the **RESURRECT** HOTKEY (F2) at one of the detector belts.

- If the vehicle has been killed, a resurrect will cause the CVKI to stop flashing. You will hear a voice message announcing “Resurrect” over the intercom.

b. The VDA will display:

```
TIME-HHMMSS
YYYY IS ALIVE !
```

HHMMSS	=	Hour:Minute:Second
YYYY	=	PID
STATUS	=	IS ALIVE !

Sub-task 15.3 Reset

- Bring players “Alive” -- **Will restore ammunition loads**.

a. To conduct a **RESET**, fires the CD using the **RESET** function, at one of the detector belts.

b. When a **RESET** is initiated, one of the following will occur:

- If the vehicle has been killed, the CVKI will stop flashing and the crew will hear the alert tone followed by a voice message which will announce “Reset” over the intercom.
- If the vehicle was already alive, only the voice message “Reset” will be heard over the intercom.

c. The VDA will display:

```
TIME-HHMMSS
YYYY IS ALIVE !
```

d. Then return to the main menu:

```
WPN:      MAINGUN
M1          ALIVE
```

SECTION III LIVE FIRE OPERATION TASKS

MILES XXI can be used during Live Fire Training, either as an additional safety measure for Range Control to Crew communications, or for modified “live fire” Targetry, i.e. firing Coax, M2, and M240 on live-fire targets while firing Main Gun on MILES targets to conserve 120 mm ammunition.

For Live Fire operations, the following additional tasks should be performed.

TASK 1 Configure Vehicle for Main Gun Live Fire

If using MILES XXI while firing live 120mm rounds, perform the following:

a. Power the MILES XXI system OFF.

b. Disconnect and stow the Main Gun Laser Transmitter (MGLT).

c. Power the MILES XXI System ON, and **RESET** it using a Controller Device (CD).

d. Use the procedure described in Section II, Task 3 - Vehicle Configuration, to change the vehicle type to “M1.lf”. This “Live Fire” configuration permits the MILES XXI to operate without the MGLT properly.

SECTION IV POST OPERATION TASKS

TASK 1 Power Down and Remove MILES XXI Equipment

a. To power down the vehicle and MILES XXI system, turn off VCU power, vehicle Master and Turret power.

b. Clear all weapons and simulators of blank ammunition and cartridges.

CAUTION

Never pack detector belts when they are wet or damp.

Remove all MILES equipment prior to washing vehicles. High water pressure can damage and or destroy the equipment.

c. Remove all MILES XXI equipment, in reverse order of installation.

d. Ensure equipment is dry and free of dirt and oil.

NOTE

Do not remove the fastener tape from vehicle.

TASK 2 Perform PMCS and Return MILES XXI Equipment

a. Refer to Chapter 4, SECTION II (PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) and Perform After Operation Checks and Services.

b. Ensure all installation hardware (nuts, bolts, washers, etc.) are reattached to the appropriate bracket and components.

c. Ensure all brackets and components are placed back in the transit case.

d. Return all equipment to the point of issue.

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CHAPTER 4
MAINTENANCE INSTRUCTIONS

SECTION I GENERAL MAINTENANCE INFORMATION

4.1 GENERAL

The maintenance procedures for the MILES XXI equipment are divided into two sections. The first section is Preventive Maintenance Checks and Services (PMCS). This section covers the Before, During and After checks conducted by the crew to ensure the safe and proper operation of the equipment. Most problems can be avoided by performing proper installation and PMCS of the equipment.

The second section is Troubleshooting. Listed in this section are some of the common malfunctions the crew might encounter while operating the equipment. The Troubleshooting table is divided into three columns. The first column lists the System/Subsystem, the second lists a Malfunction and the third lists the appropriate figure for the troubleshooting procedures. Follow the steps to isolate and correct the malfunction. When you think you have solved the problem go back and recheck all steps. Check to ensure the original malfunction is no longer there. The manual cannot list all possible malfunctions, nor all the corrective actions. If a malfunction is not listed, or is not corrected by the listed corrective action, report the malfunction IAW unit procedures.

SECTION II PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

4.2 GENERAL

Proper PMCS will ensure the MILES XXI equipment will be ready for operation and will perform throughout the training mission. PMCS consist of performing a systematic inspection to discover problems before they result in operational failure of the equipment. Component malfunctions discovered during training or as a result of performing PMCS, will be reported using DA Form 2404.

a. Before operation, follow all **WARNINGS** and **CAUTIONS**.

b. Perform your “During” (D) PMCS periodically during the training exercise.

c. At the conclusion of training inspect equipment and perform “After” (A) PMCS.

d. If your equipment fails to operate, troubleshoot using proper test equipment and procedures.

4.3 EXPLANATION OF PMCS COLUMNS

4.3.1 Item To Be Inspected

Description of the equipment or portion of equipment to be checked or serviced.

4.3.2 Interval

Each column is identified with a letter corresponding to the required interval: **B** - Before Operation, **D** - During Operation, **A** - After Operation, **W** - Weekly, **M** - Monthly. Each column will be marked by an "x" to show when checks or services should be performed.

4.3.3 Procedures: Check for and Have Repaired

Describes the actions and procedures to accomplish checks and services, including information on tools, materials to be used, gauge readings, etc.

4.3.4 Equipment Is Not Ready/Available If

Identifies conditions that make the equipment not ready/available for training. Identified equipment shall not be used until corrective maintenance has been performed.

Table 4-1 PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

NOTE

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

B - Before Operation D - During Operation A - After Operation W - Weekly Operation M - Monthly Operation

Item To Be Inspected	Interval					Procedures: Check For And Have Repaired	Equipment Is Not Ready/ Available If:
	B	D	A	W	M		
System Cables and Connectors	x	x	x			Inspect for worn or bare wires. Inspect connectors for bent or damaged pins.	Bare wires are present. Connectors or pins are damaged.
VDA	x	x	x			Inspect for cracks in display window. Inspect for evidence of status switch damage. Inspect connectors for bent or damaged pins.	Display window broken. Status switch broken. Connectors or pins are damaged.
VCU	x	x	x			Inspect for cracks in CVKI plastic lens. Check for mounting hardware. Check for receptacle and switch damage. Inspect connector for bent or damaged pins. Inspect fuse holder for damage and presence. Inspect antennas for damage and presence.	Cracks are evident. VCU strobe light does not work. Connections cannot be made. Connector or pins are damaged. Fuse is missing from fuse holder or blown.

Table 4-1 PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) (Continued)

NOTE

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

B - Before Operation **D - During Operation** **A - After Operation** **W - Weekly Operation** **M - Monthly Operation**

Item To Be Inspected	Interval					Procedures: Check For And Have Repaired	Equipment Is Not Ready/ Available If:
	B	D	A	W	M		
Detector Belts	x	x	x			Wipe all detectors clean. Inspect for damage that would prevent normal operation. Inspect connectors for bent or damaged pins.	Detectors or connectors broken, bare wires exposed. If more than one detector is bad. Connectors or pins are damaged.
RIA	x	x	x			Inspect RIA for deep dents or evidence of crushing, or missing hardware. Inspect connectors for broken or bent pins.	Holes in casing or other damage that causes box not to be water tight. Any damaged, missing, or broken pins.
Terminators	x	x	x			Inspect connectors for bent or damaged pins.	Connectors or pins are damaged.
FCI	x	x	x			Inspect RIA for deep dents or evidence of crushing, or missing hardware. Inspect connectors for broken or bent pins.	Holes in casing or other damage that causes box not to be water tight. Any damaged, missing, or broken pins.
MGLT	x	x	x			Inspect connectors for bent or damaged pins. Inspect LASER XMTR for cracks or missing hardware. Clean laser output lens.	Connectors or pins are damaged. LASER XMTR assembly is cracked or hardware is missing to prevent normal operation.
Mounting Brackets	x		x			Inspect brackets for burrs or obstructions that would prevent secure mounting to the vehicle. Inspect to ensure all mounting hardware is available and that the fastener tape is present (when applicable).	If the mounting bracket cannot be mounted to the vehicle, or the component cannot be mounted to the bracket.
SAT (M2 and M240)	x	x	x			Clean laser output lens. Inspect mounting bracket for damage	Cracked laser output lens. Missing or damaged mounting hardware.

SECTION III TROUBLESHOOTING

4.4 GENERAL

NOTE

Do not connect or disconnect cables when VCU power is ON.

Table 4-2 (TROUBLESHOOTING) lists malfunctions that you may encounter during operation or maintenance of the MILES XXI system. Perform the tests or inspections listed.

If a malfunction is not listed or is not corrected by the recommended troubleshooting procedure, report the malfunction IAW unit procedures.

For all failures:

a. Ensure all equipment is properly installed.

b. Check all cable connections and ensure cables are properly installed and connections are tight.

c. Ensure vehicle master power, turret power, and utility power is “ON”.

d. Verify the proper “Vehicle Type” is selected on the VDA.

e. If you receive BIT failure messages, go immediately to the section in the troubleshooting table that covers that piece of equipment and perform the troubleshooting procedures.

f. If any piece of equipment fails, report the malfunction IAW unit procedures.

4.4.1 System Configuration Troubleshooting

Once the equipment is powered on and the vehicle configuration is correct and the detector belts have been initialized, do the following procedures. The procedures listed will allow the operator to determine if the VCU has recognized all connected components within the vehicle system.

a. Scroll through the VDA main menus and press **“SELECT”** to select **“SELECT AUX MENU”** from the VDA display.

b. Scroll through the **“SELECT AUX MENU”** sub-menus until you find the **“SELECT SYSTEM CONFIG”** display.

c. Press **"SELECT"** to **"SELECT SYSTEM CONFIG"** sub-menu and the display should display the following text:

1	2	3	4	M	L	R	C	F	S	2
+	+	+	+	+	+	+	+	+	+	+

Figure 4-1 "SELECT SYSTEM CONFIG" Display

- 1-4 - denotes the total number of belts expected for the configured vehicle,
- M - denotes MGLT
- L - denotes VDA
- R - denotes RIA
- C - denotes CVKI DRIVER
- F - denotes FCI
- S - denotes M240 SAT
- 2 - denotes M2 SAT

d. All items highlighted with an **"+"** denote the VCU has recognized those components connected within the system configuration. A **"-"** indicates that the component has not been recognized in the configuration of the vehicle kit. Additionally, the VDA should display any component that has not been recognized during BIT.

NOTE

A "D" may be shown as the last character in the SYSTEM CONFIG display if the MILES XXI has been configured for use in Instrumented Mode. If an Instrumentation set is not connected for vehicle tracking, the "D" may be ignored.

e. Any BIT failure, or lack of vehicle power, generates 5 beeps from the VDA or vehicle intercom system. The VDA generates the following display when vehicle power is off or not connected:

```
NO VEHICLE POWER
TO MILES
```

Table 4-2 TROUBLESHOOTING

System/Subsystem	Malfunction	Figure
SYSTEM POWERED		
BIT	Failure	Figure 4-2 (General MILES XXI Troubleshooting)
VDA	No Display	Figure 4-3 (VDA Has No Display)
	Up and Down Buttons Not Operational	Figure 4-4 (VDA Push-buttons Not Operational)
	No Backlight	Figure 4-5 (VDA Has No Backlight)
	Buzzer Does Not Sound	Figure 4-6 (VDA Buzzer Does Not Sound)
VCU	No Power	Figure 4-7 (VCU Will Not Power Up)
	No Strobe Light	Figure 4-8 (VCU Strobe CVKI Will Not Flash)
	Cannot Communicate With The CD	Figure 4-9 (No RF Communication Between VCU and CD)
GENERAL FAULTS	Locks Up	Figure 4-10 (General Faults, System Not Responding)
INCOMING FIRE DETECTION		
Detector Belts	Does Not Detect MILES Codes	Figure 4-11 (Detector Belt Not Functioning)
HUTT	HUTT Failure Or Not Functioning	Figure 4-12 (HUTT Not Functioning Properly)
COMMUNICATIONS		
RIA	No Audio Cues	Figure 4-13 (Audio Cues Not Being Heard)
OUTGOING FIRE		
Coax	Does Not Fire	Figure 4-14 (COAX Does Not Fire)
120mm Main Gun	For All MGSS Failures Refer To The Operators Manual	Figure 4-15 (Main Gun Will Not Fire)
SAT	Will Not Acquire/Learn	Figure 4-16 (SAT Will Not Acquire/ Learn)
VERIFICATION CHECKS		
All Systems and Subsystems	Operational Verification Checks After All Faults Have Been Corrected	Figure 4-17 (Operational Verification of the MILES XXI System)

GENERAL MILES XXI TROUBLESHOOTING

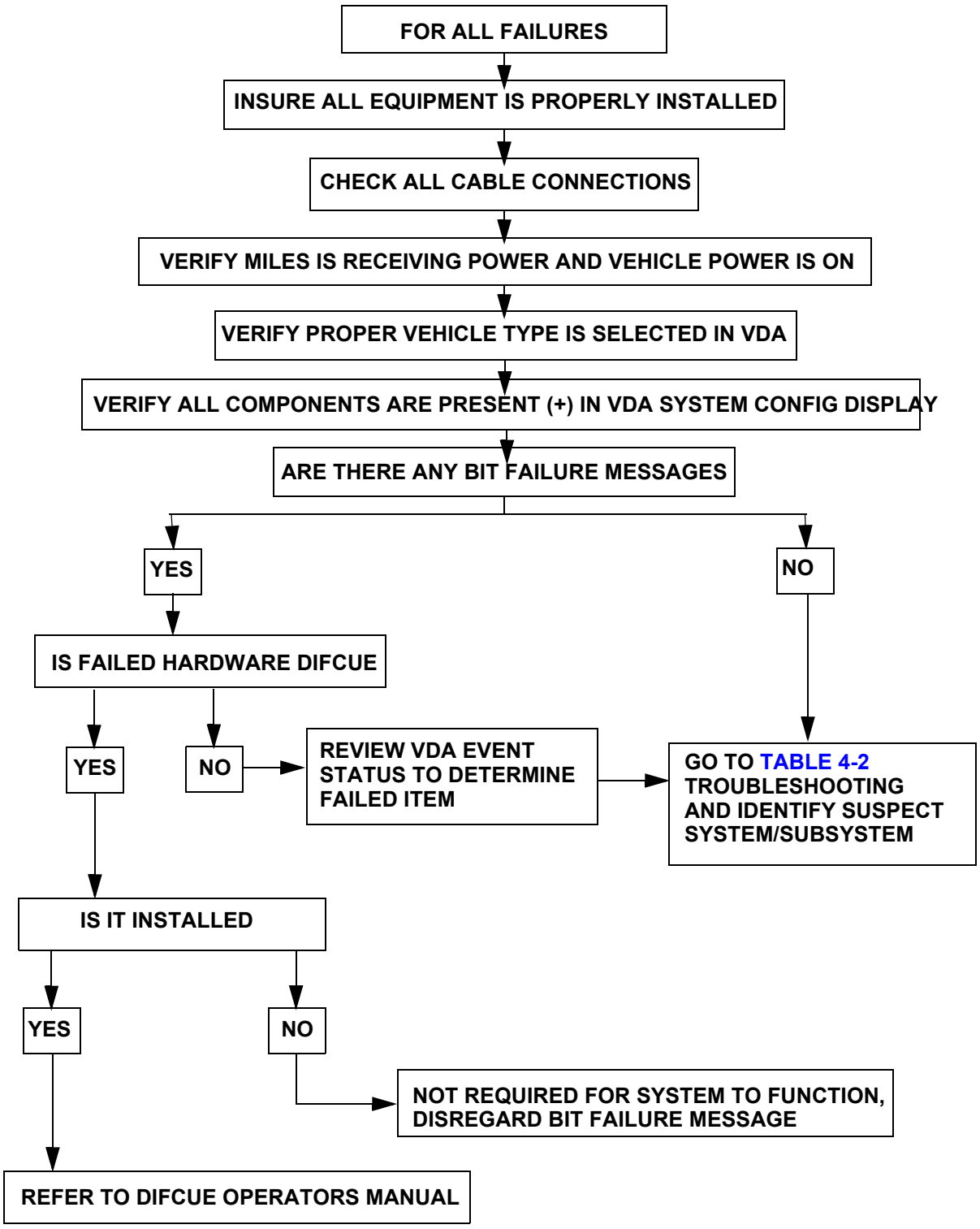


Figure 4-2 General MILES XXI Troubleshooting

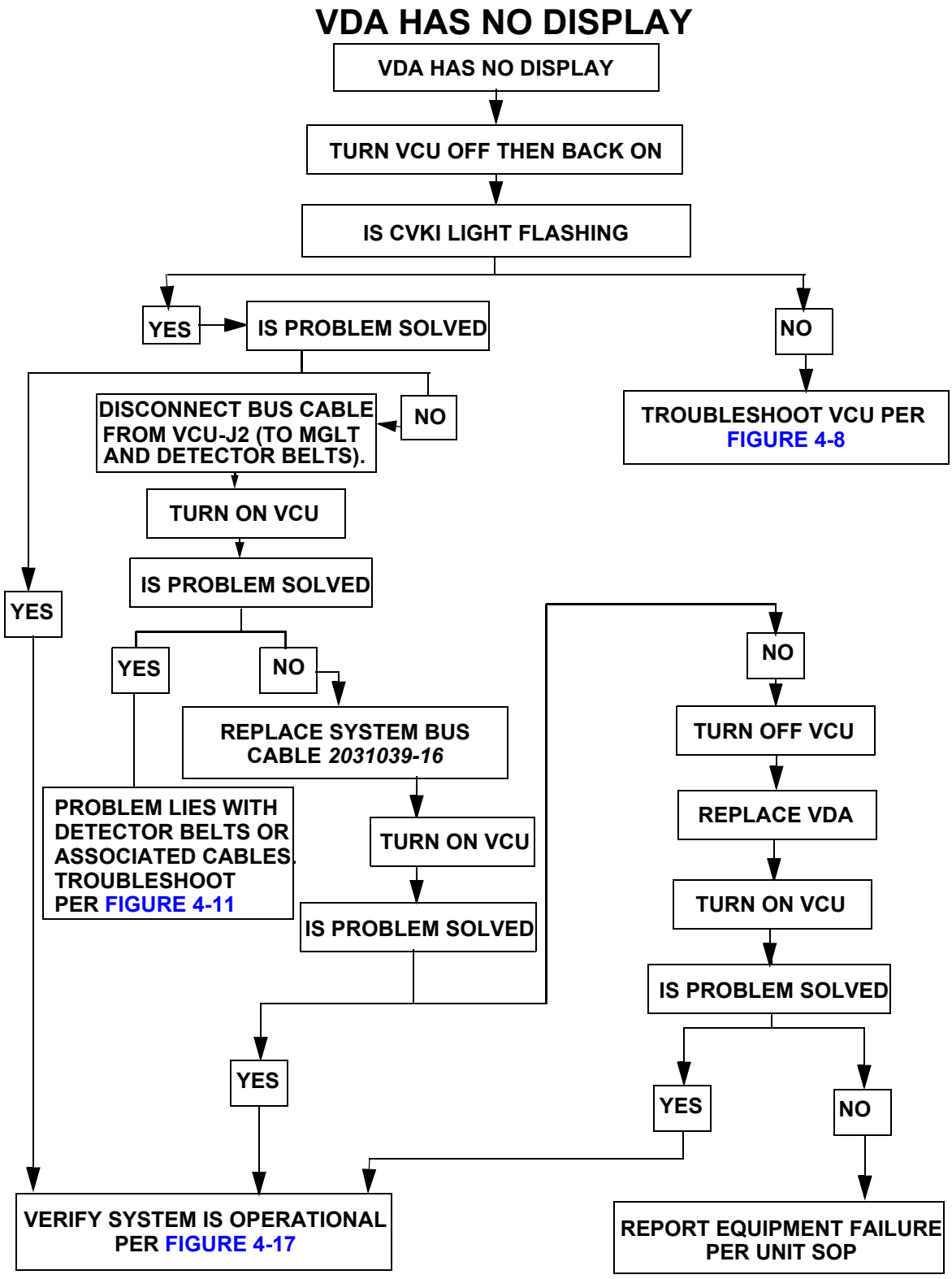


Figure 4-3 VDA Has No Display

VDA PUSH-BUTTONS NOT OPERATIONAL

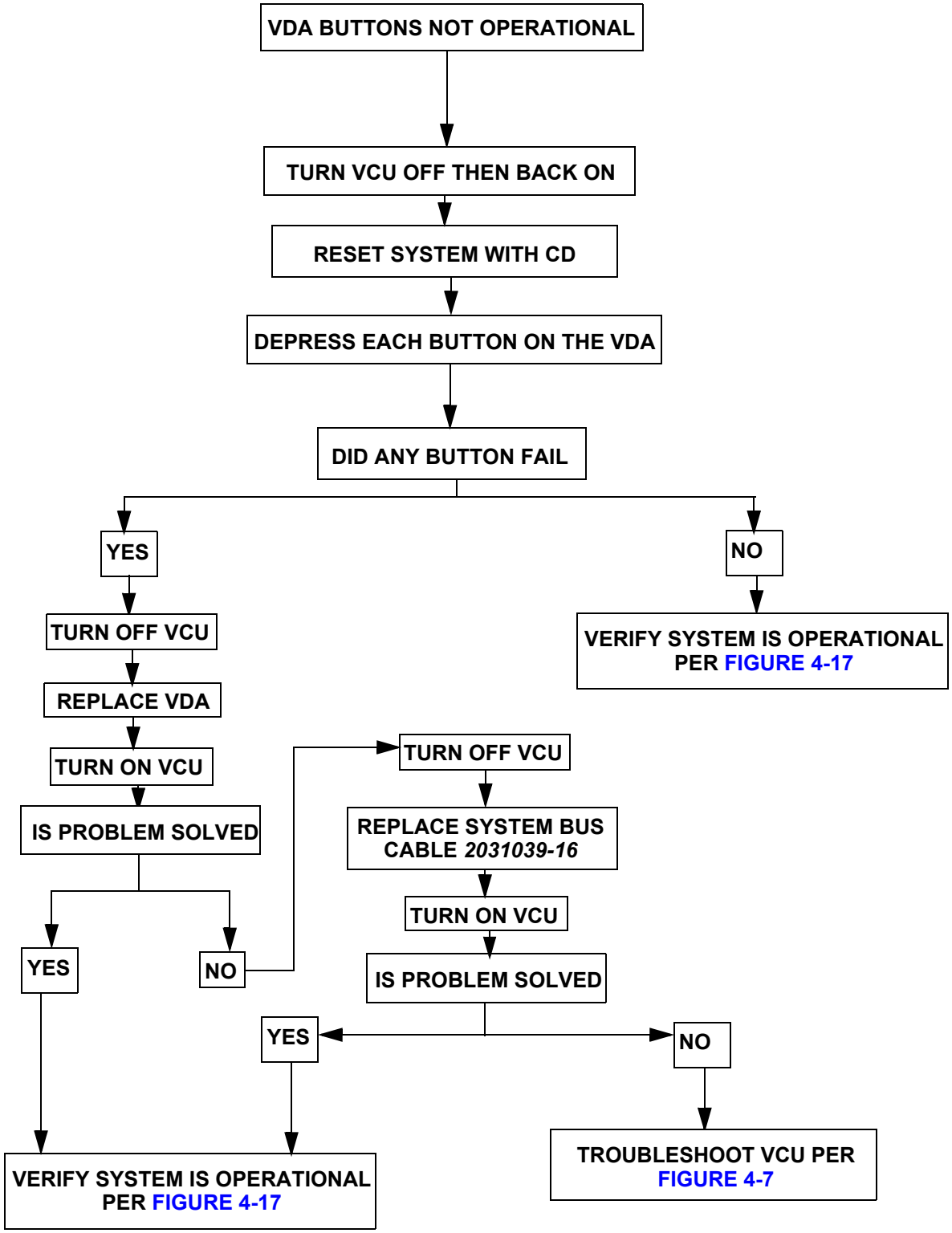


Figure 4-4 VDA Push-buttons Not Operational

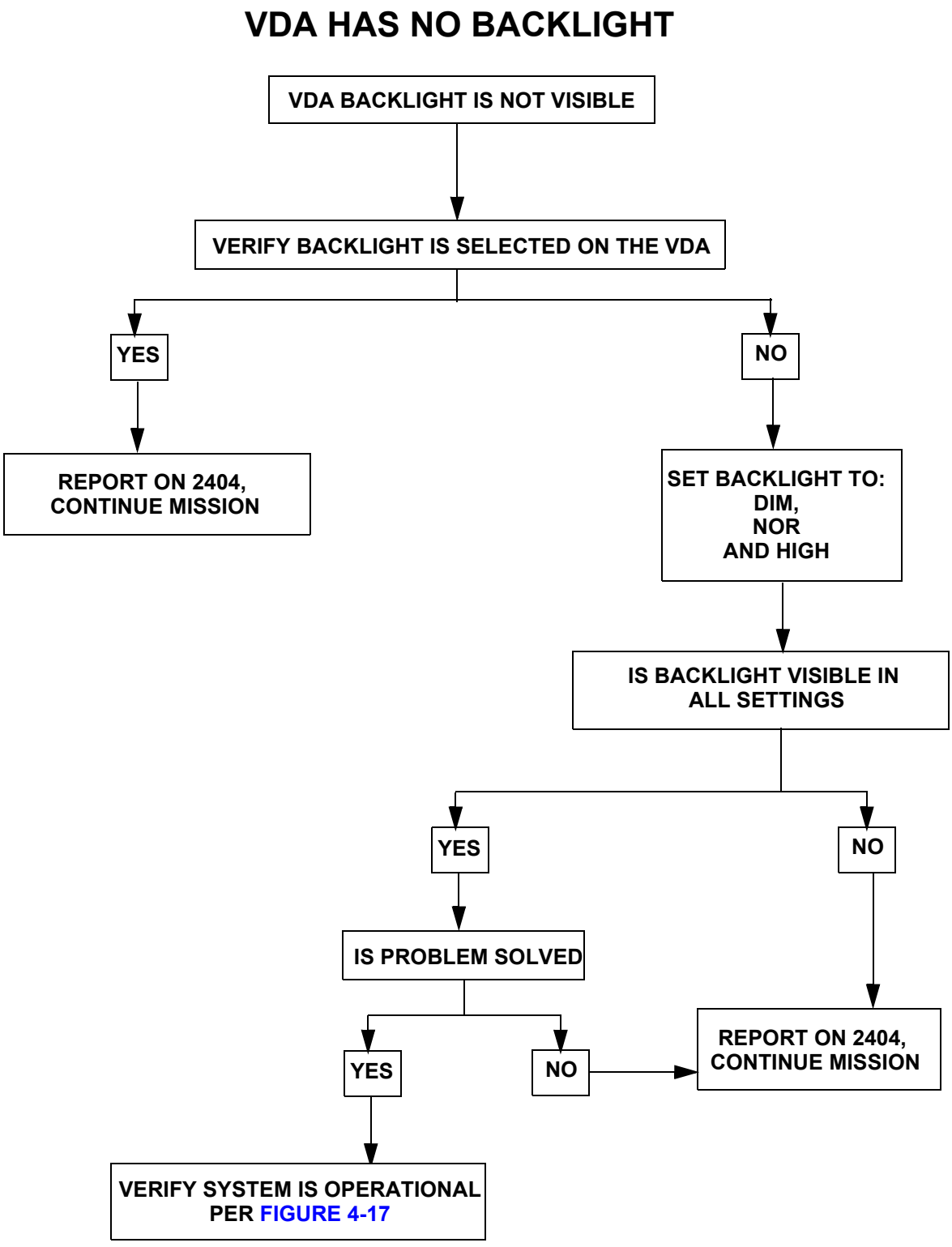


Figure 4-5 VDA Has No Backlight

VDA BUZZER DOES NOT SOUND

NOTE: Buzzer will not sound if the RIA has been detected within the system and vehicle power is on.

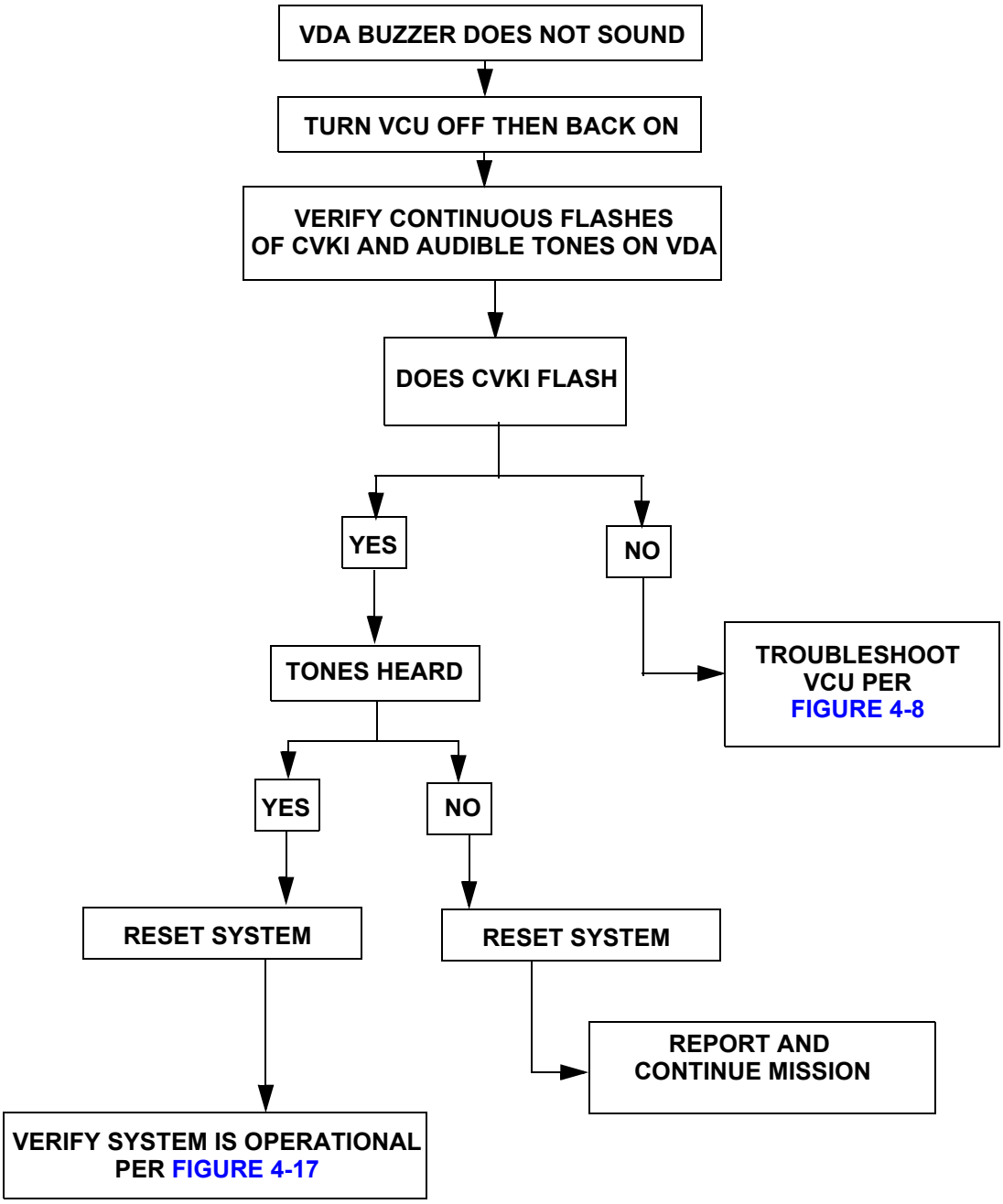


Figure 4-6 VDA Buzzer Does Not Sound

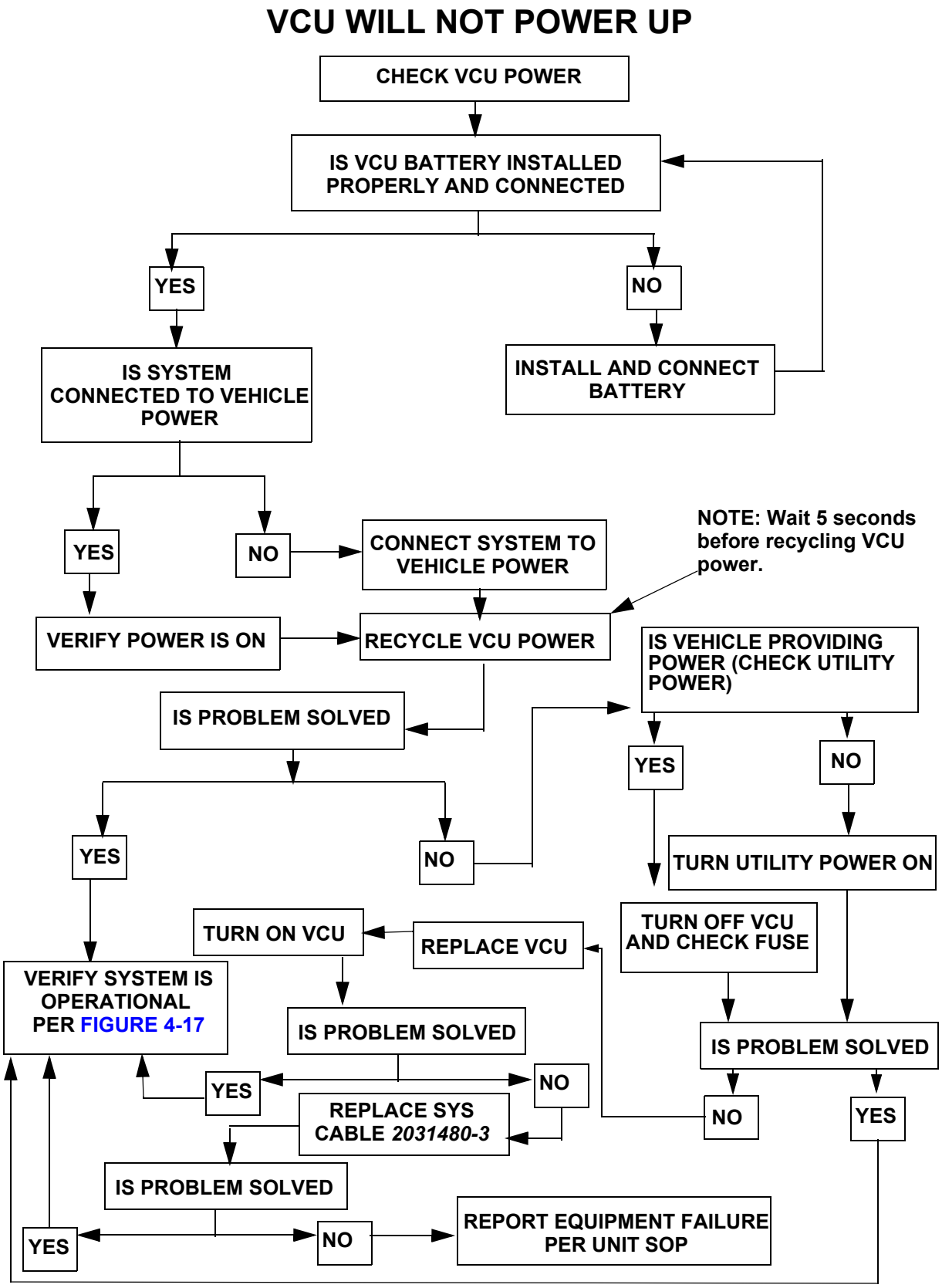


Figure 4-7 VCU Will Not Power Up

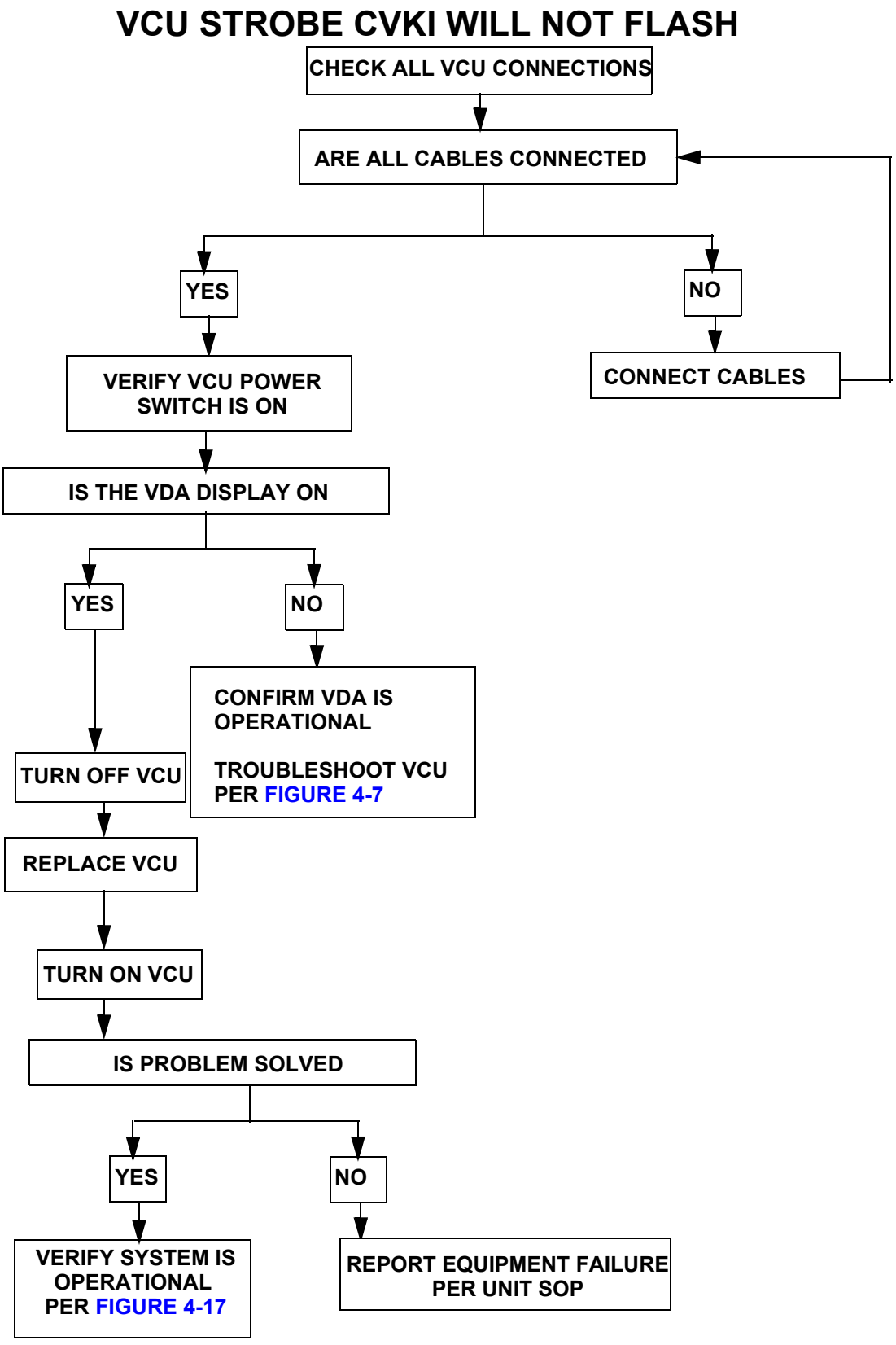


Figure 4-8 VCU Strobe CVKI Will Not Flash

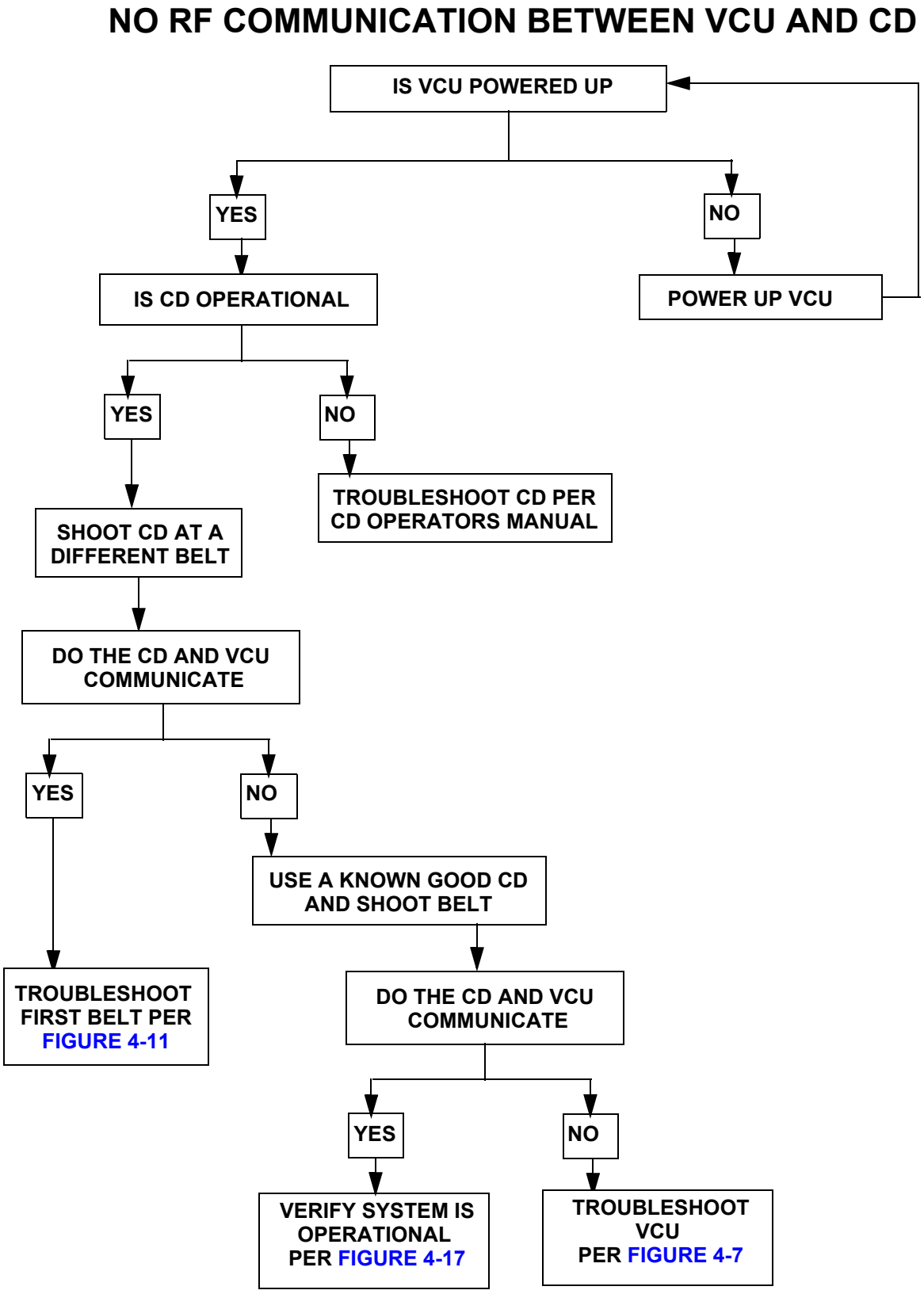


Figure 4-9 No RF Communication Between VCU and CD

GENERAL FAULTS, SYSTEM NOT RESPONDING

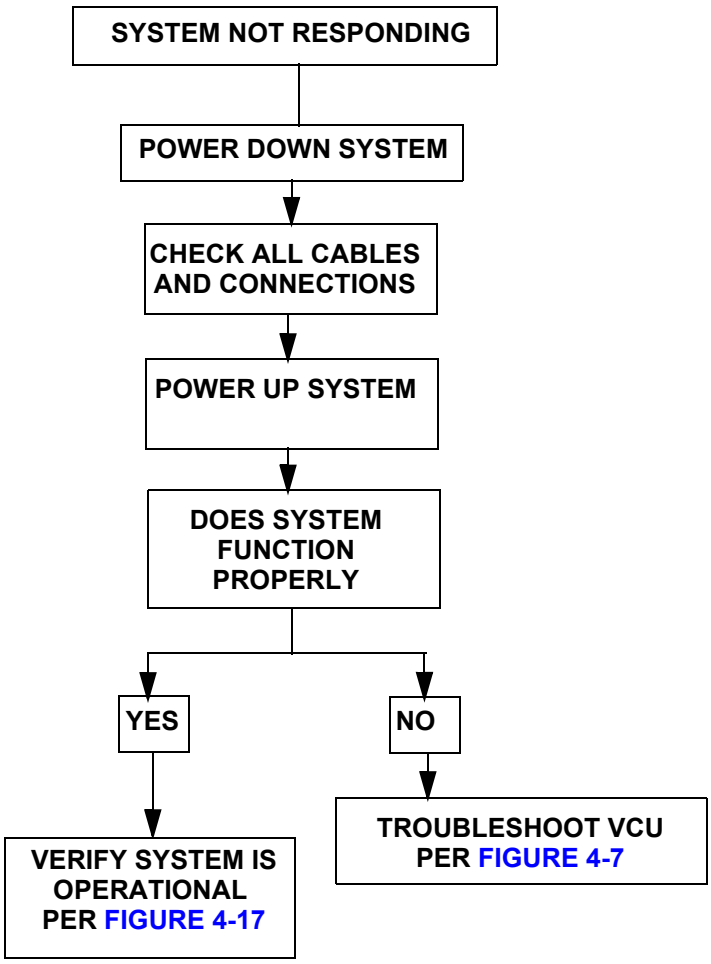


Figure 4-10 General Faults, System Not Responding

DETECTOR BELT NOT FUNCTIONING

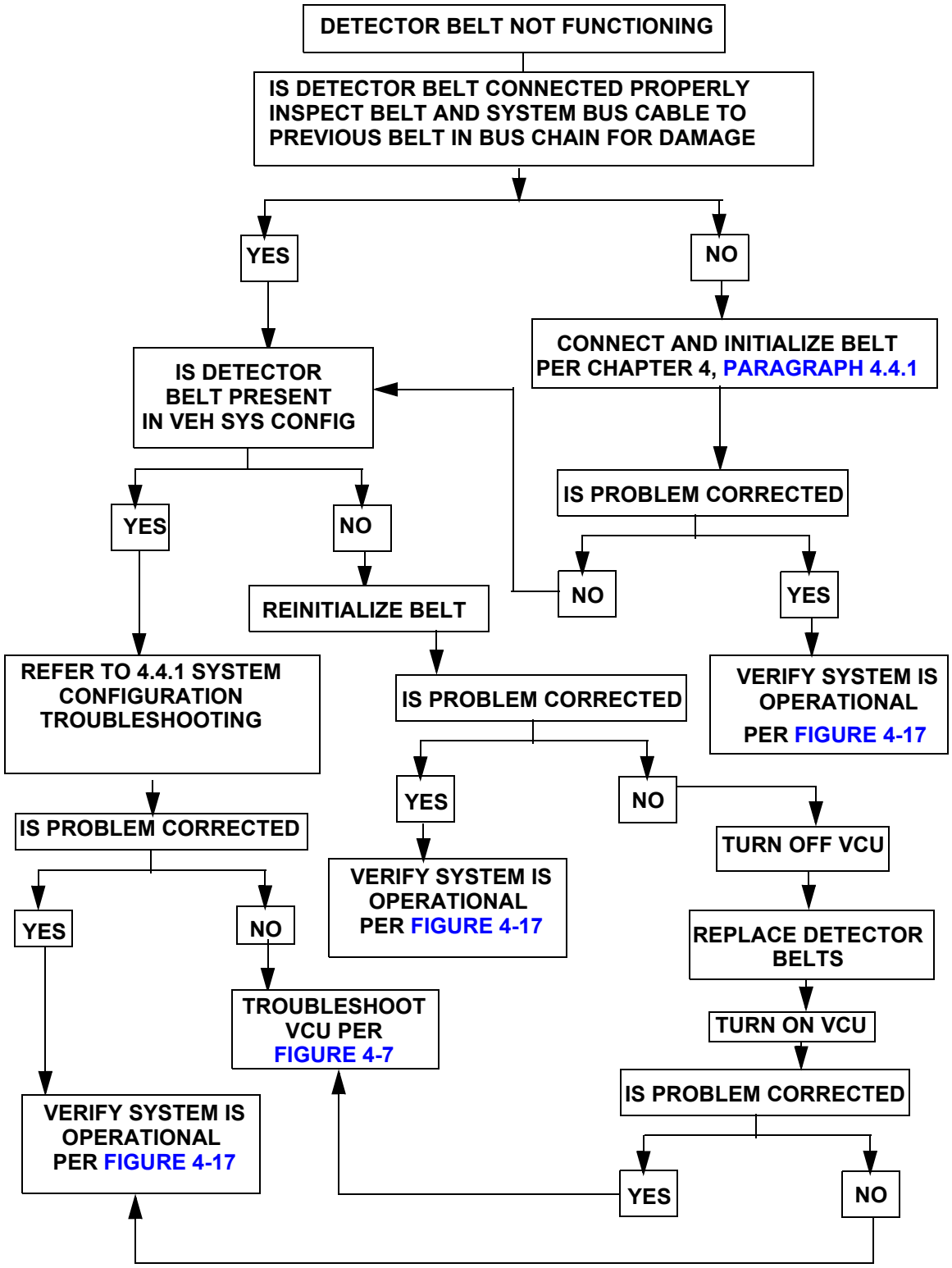


Figure 4-11 Detector Belt Not Functioning

HUTT NOT FUNCTIONING PROPERLY

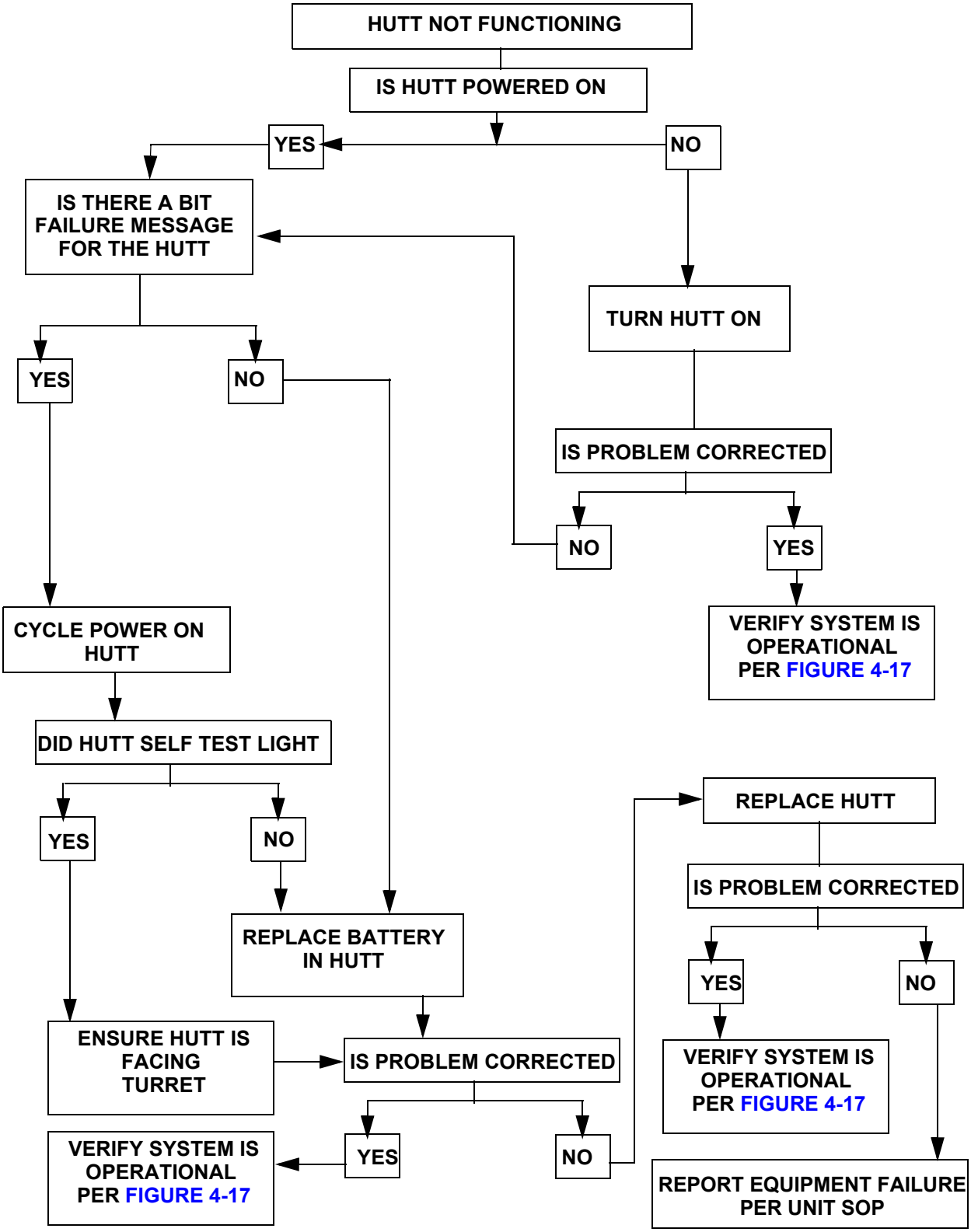


Figure 4-12 HUTT Not Functioning Properly

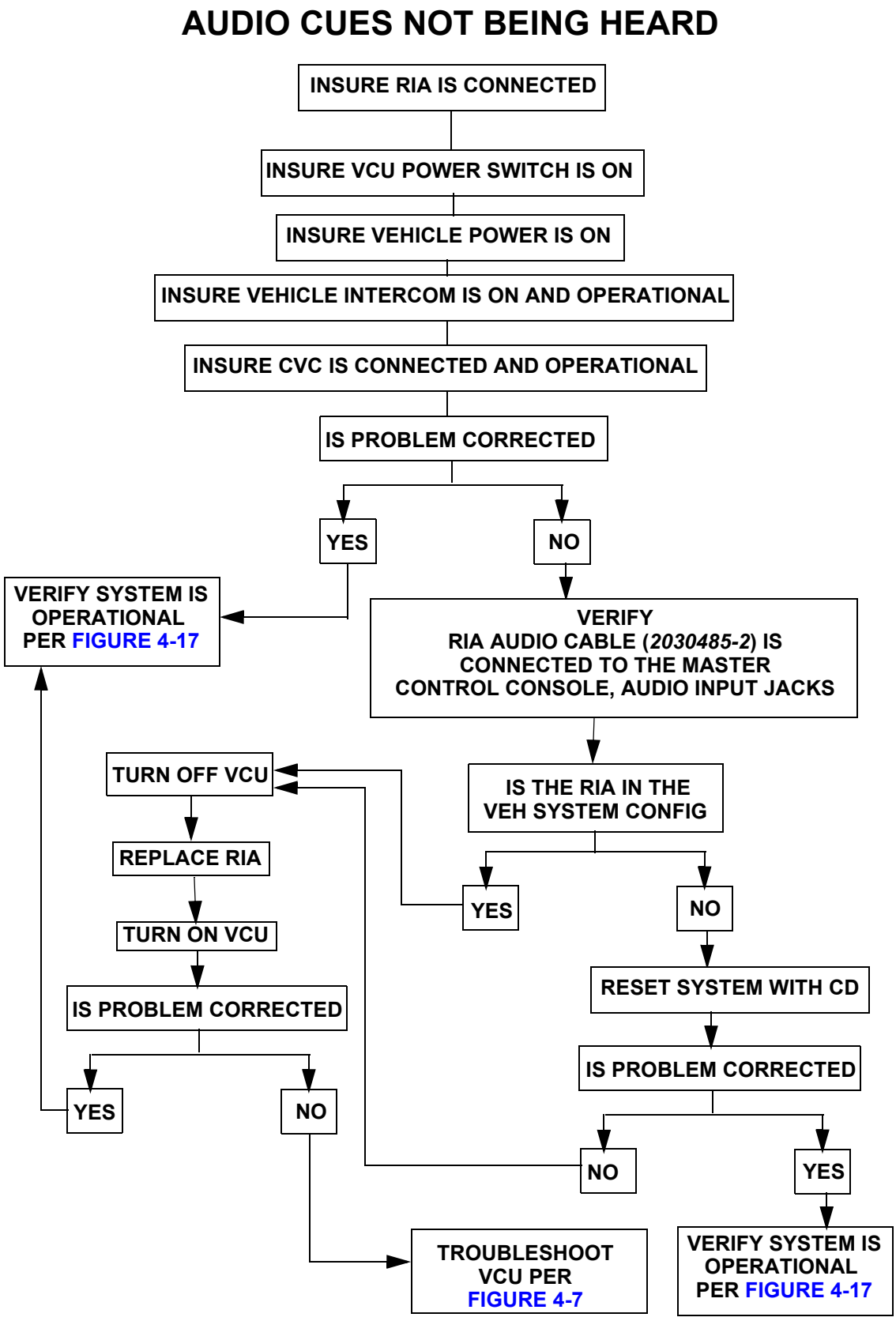


Figure 4-13 Audio Cues Not Being Heard

COAX DOES NOT FIRE

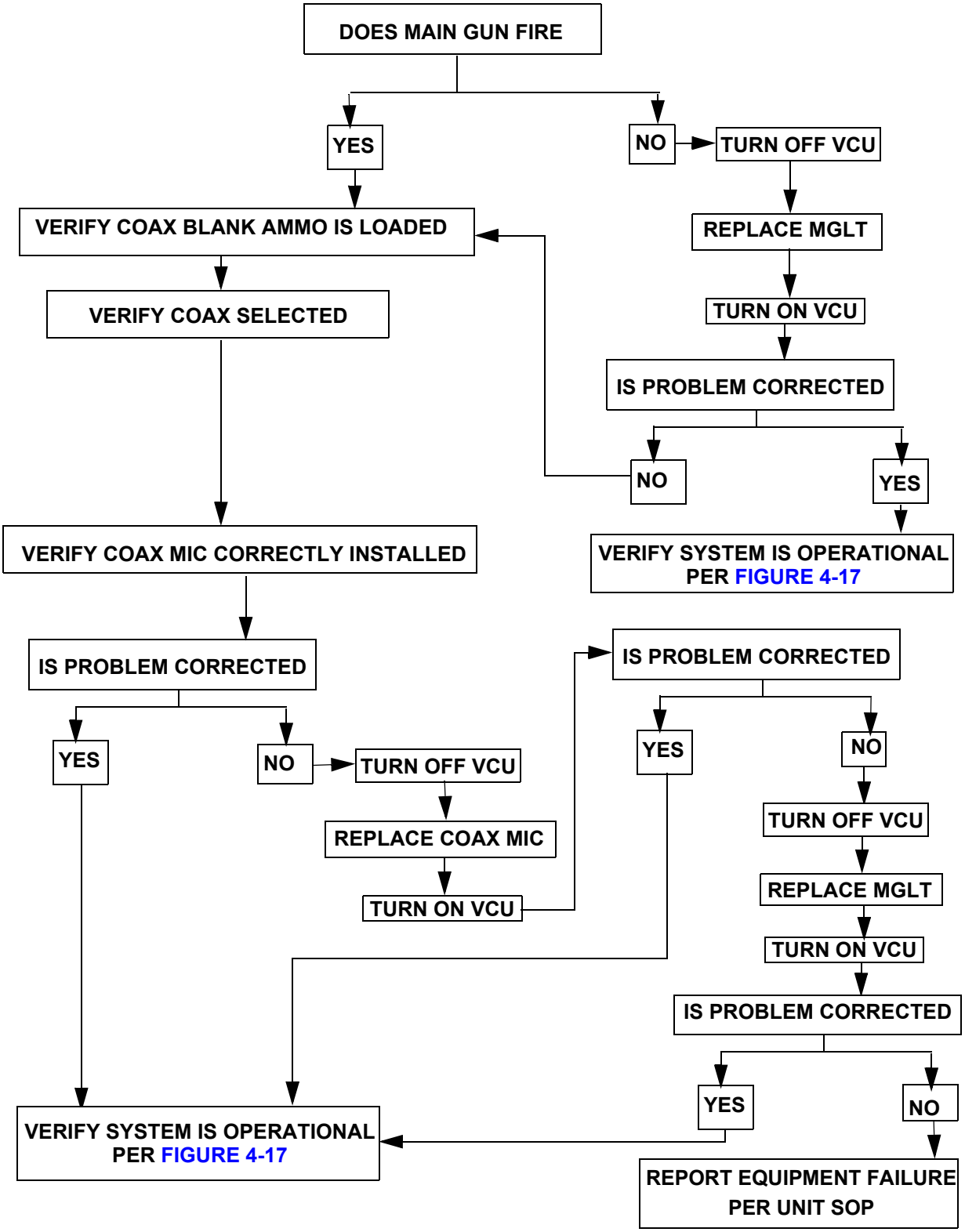


Figure 4-14 COAX Does Not Fire

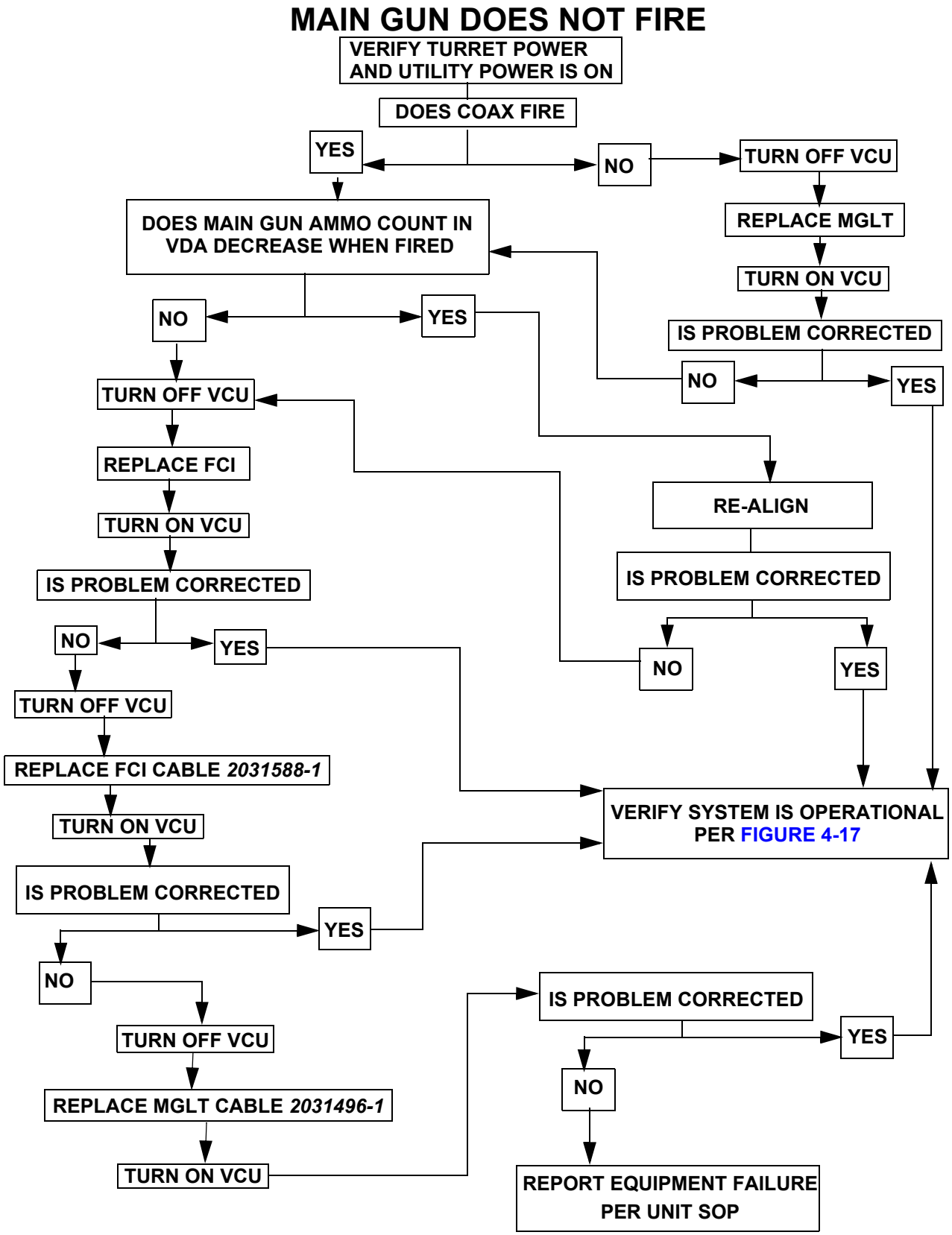


Figure 4-15 Main Gun Will Not Fire

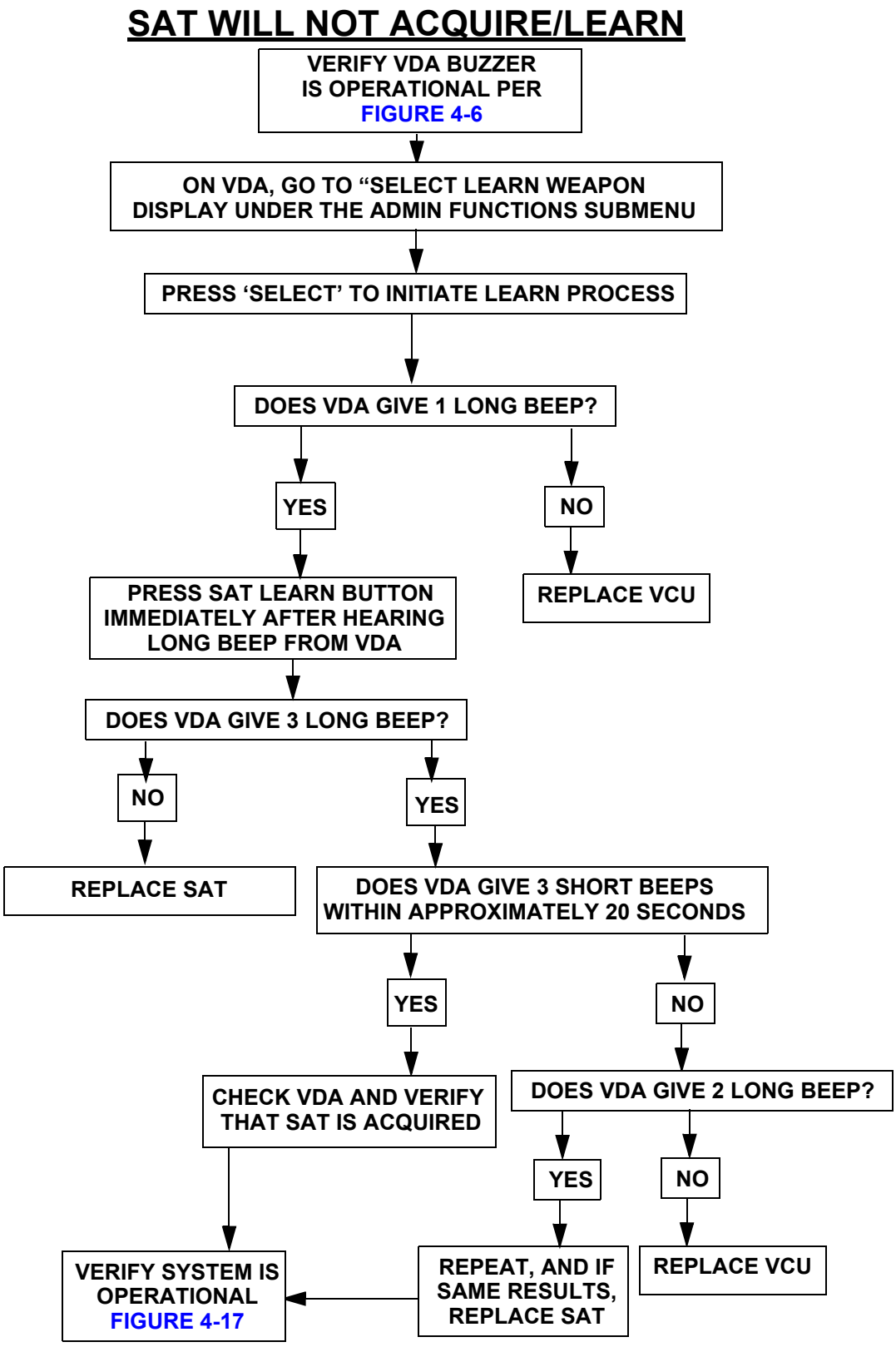


Figure 4-16 SAT Will Not Acquire/Learn

OPERATIONAL VERIFICATION OF THE MILES XXI SYSTEM

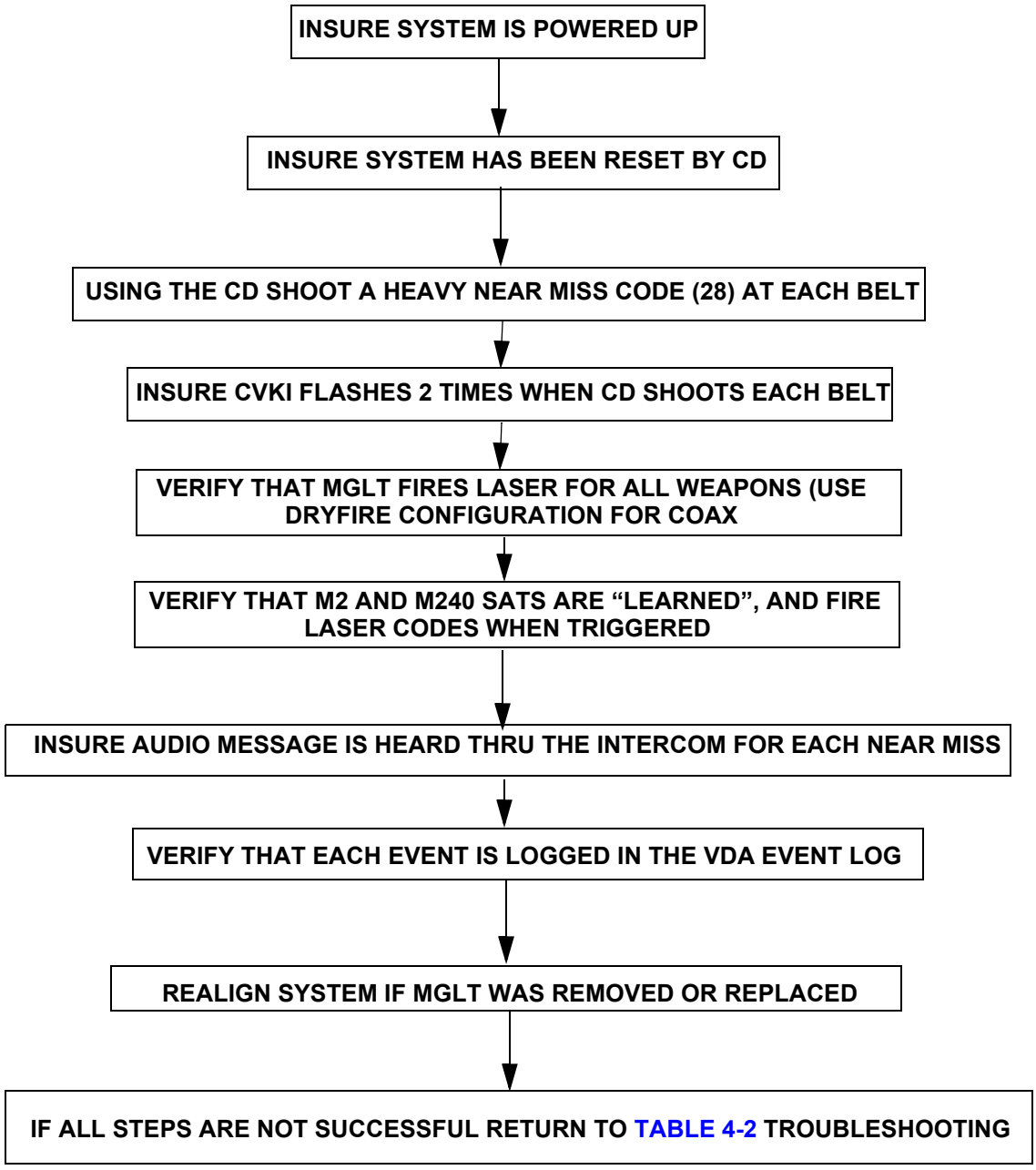


Figure 4-17 Operational Verification of the MILES XXI System

APPENDIX A
REFERENCES

A.1 SCOPE

Appendix A lists forms, field manuals, technical manuals, and miscellaneous publications that are referenced in this manual and or related to the MILES XXI equipment.

A.2 FORMS

SF 368	Quality Deficiency Report
DA Form 2028-2	Recommended Changes to DA Publications
DA Form 2404	Equipment Inspection and Maintenance Work Sheet
DA Form 2062	Hand Receipt

A.3 FIELD MANUALS

FM 4-25.11	Field Manual: First Aid for Soldiers

A.4 TECHNICAL MANUALS

TM 9-6920-210-10	Operator’s Manual: MILES XXI, CVS kit for M113 Armored Personnel Carriers
TM 9-6920-211-10	Operator’s Manual: MILES XXI, CVS kit for M2/M3A2 and M2/M3A3 Bradley Fighting Vehicles
TM 9-6920-913-10	After Action Review
TM 9-6920-3659-10	Controller Device (CD) Operator’s Manual
TM 9-6920-893-10	Operator’s Manual: MILES 2000 TESS For Direct/Indirect Fire Cue
TM 9-1005-215-10	Operator's Manual: M2 Machine Gun
TM 9-2350-264-10	Operator’s Manual: M1A1 Main Battle Tank
TM 9-2350-288-10	Operator’s Manual: M1A2 Main Battle Tank
TM 9-2350-388-10	Operator’s Manual: M1A2 SEP Main Battle Tank
TM 38-750	The Army Maintenance Management System -TAMMS
TM 9-1005-314-12&P	Operator’s and Organizational Maintenance Manual: Blank Firing Adapter (BFA) M19 for Cal 50 M2 Machine Gun
SMM 9-6920-908-24&P	System Maintenance Manual, for MILES XXI CVS

A.5 MISCELLANEOUS PUBLICATIONS

AR 310-2	Identification and Distribution of DA Publications
DA PAM 738-750	The Army Maintenance Management System (TAMMS)

SB 11-6	Dry Battery Supply Data
CTA 50-970	Expendable/Durable Items (Except: Medical, Class V, Repair Parts and Heraldic Items)
TB 43-1034	Batteries, Disposition and Disposal

APPENDIX B
EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

SECTION I INTRODUCTION

B.1 SCOPE

This appendix lists the expendable supplies and materials needed to operate and maintain the MILES XXI equipment. This listing is for informational purposes only.

B.2 EXPLANATION OF COLUMNS

a. Column (1) - Item Number; this number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material.

b. Column (2) - Level; this column identifies the lowest level of maintenance that requires the listed item (e.g., C - Operator/Crew).

c. Column (3) - National Stock Number; this is the National Stock Number assigned to the item.

d. Column (4) - Description Federal Supply Classification for Manufacturers (FSCM) & Part Number. Indicates the federal item name and, if required, a description to identify the item. The last line for each item indicates the FSCM in parentheses followed by the part number.

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

SECTION II EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description FSCM & Part Number	(5) U/M
1	C	7920-00-255-7536	Brush, Cleaning (81348) H-B-181	EA
2	C	9150-01-079-6124	Cleaner, Lubricant (65983) CLP-4	OZ
3	C	6640-00-240-5851	Paper, Lens (81348) NNNP40	PK
4	C	5975-00-570-9598	Strap, Tiedown, Electric (96906) MS3367-7-9	HD
5	C	*	Tape, Fastener Glue Adhesive (19200) 11749034	OZ
6	C	*	Fastener Tape, Hook (19200) 2031219-1	YD
7	C		Tie Wraps	PK

APPENDIX C
EQUIPMENT DESCRIPTION

SECTION I DESCRIPTION

Figure C-1 M1A1 Abrams Series Vehicle

C.1 M1A1/M1A2/M1A2 SEP COMMON COMPONENTS

NOTE

The following provides a brief description of the Abrams series tank MILES XXI components. Numbers to the right of the component name correspond to the item number of the component graphic at the end of this section.

Vehicle Control Unit (VCU) (1)

NOTE

The VCU battery requires an initial charge upon receipt of the equipment. Additionally, the VCU battery is shipped disconnected from the VCU.

The VCU contains the master computer for the MILES XXI system. The VCU interprets the effects of direct fire simulation on the vehicle. Audio and visual responses to the effect of direct fire are generated by the VCU and made available to the crew through the vehicle intercom system, the Vehicle Display Assembly, and the Combat Vehicle Kill Indicator (CVKI).

The VCU contains a strobe light (CVKI) that provides the visual responses in the form of flashes to the effects of incoming direct fire as follows: two flashes for a **NEAR MISS** and four flashes for a **FIREPOWER KILL**, **MOBILITY KILL**, **COMMUNICATIONS KILL**, and a **HIT** and continuous flashes for a **CATASTROPHIC KILL**. The audio messages through the intercom system report a: **VEHICLE KILL, MOBILITY KILL**, **COMMUNICATIONS KILL**, **HIT,** or **NEAR MISS.**

The VCU houses a GPS which is used in conjunction with the Mobility Kill, to track vehicle movement following a Mobility Kill. The RF antenna is used to communicate with the CD.

The VCU operates on vehicle power and also contains a 14.4-volt lithium-Ion rechargeable battery for back up power. When the vehicle Turret Utility power and VCU power are both ON, the VCU battery is continually being charged. The unit interfaces with the MILES XXI system through the use of system BUS cables that route to various components and detector belts.

VCU Mounting Bracket (2)

The VCU Bustle Rack Mounting Bracket is used to mount the VCU to the bustle rack of the vehicle. The bracket is equipped with all hardware necessary to securely mount the VCU to the vehicle.

Main Gun Laser Transmitter (MGLT) (3)

The MGLT is a single LASER tube assembly used to simulate various types of main guns and coaxial machine guns. The MGLT projects an eye safe LASER beam onto a target out to the effective range of each weapon. The MGLT is comprised of an environmentally sealed compartment containing the LASER tube and associated electronics. The MGLT also contains a 12X telescope and an X-Y adjustment mechanism used to align the transmitter with the vehicle main gun.

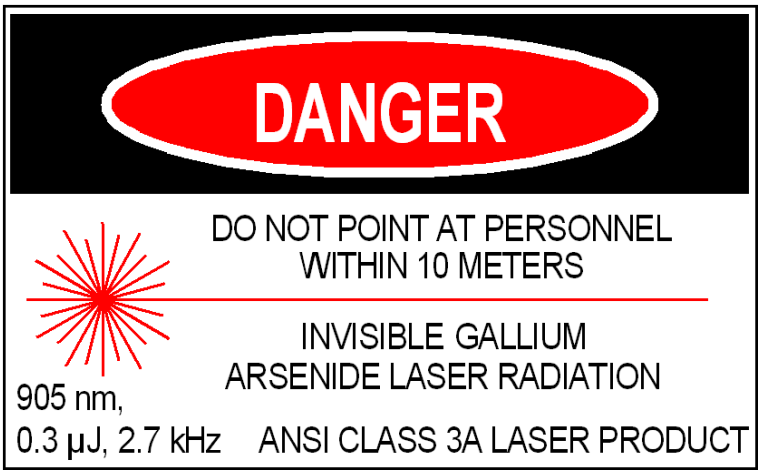


Figure C-2 Class 3A LASER Label

Main Gun Laser Transmitter (MGLT) Mounting Bracket (4)

The MGLT Mounting Bracket is used to mount the transmitter to the coax flash hider extension. The bracket is equipped with all hardware necessary to securely mount the MGLT.

Vehicle Display Assembly (VDA) (5)

The VDA is located inside the vehicle and provides the interface between the soldier and MILES XXI equipment. The VDA contains a 2-row by 16-character backlit Liquid Crystal Display (LCD), an audio alarm, three small push-button switches and two System Bus connectors. The switches are used for scrolling, selecting functions and displaying data.

The VDA is also used by the crew to view current vehicle configuration, vehicle status, previous events, Built In Test (BIT) status and software version. Up to 500 recorded events may be stored in the VCU and can be viewed on the VDA by using the push-button switches. The VDA provides an audio alarm when no intercom is used.

Vehicle Detection System (VDS) (6)

The VDS is comprised of four independent detector belt segments. Each detector belt is equipped with IR photo detectors mounted on webbed fabric with Velcro backing for easy attachment to the vehicle. The VDS consists of one detector belt segment for each of the four belt locations (front, rear, left side and right side). Their are eight primary hit zones on the vehicle which are displayed on the VDA during incoming firing events, refer to Chapter 3, Figure 3-7 (Vehicle Hit Zones). The detector belts are connected together and cabled into the system BUS via the system BUS cabling.

Radio Interface Assembly (RIA) (7)

The RIA allows the crew to hear current vehicle status. The RIA, through the interface cabling, provides the necessary electrical interface to inject voice cues into the vehicle intercom system.

Fire Control Interface (FCI) (8)

The FCI interfaces with the fire control system. The FCI uses an electrically isolated interface circuit to receive weapon system signals from the vehicles fire control system.

Power Cable Assembly (9)

The Vehicle Power/Interface Cable connects the VCU to the vehicle utility power (UJ1) on the Turret Networks Box (TNB) in the M1A1. The Vehicle Power/Interface Cable connects the VCU to the Commander's Remote Switching Module (RSM) 5 or UJ1 in the M1A2/M1A2 SEP.

RIA Cable Assembly (10)

The RIA cable connects the vehicle intercom system Master Control Station (MCS) with the RIA assembly.

System BUS Cables (11)

The System BUS Cables carry data and power between the VCU and other components of the MILES XXI system. The cables are 4 wire conductors with identical connectors at both ends. Only the length of the cables vary. The System BUS Cable interconnects all modular assemblies in a daisy chain fashion.

Terminators (12)

Terminators are used to provide network impedance matching for the System BUS. Two terminators are used in the MILES XXI kit.

Hull-to-Turret Transmitter (HUTT) (13)

The HUTT determines which way the turret is pointing by transmitting a continuous signal to the VDS. The VCU uses turret orientation to determine the zone from which fire was received.

M240 Coax Microphone Trigger Assembly (14)

A specially designed microphone that attaches to the coax BFA. The microphone transforms the percussion of blank ammunition being fired by the coax into an electrical signal that is sent to the MGLT. The MGLT then emits a coded LASER beam onto a target out to the effective range of the coax machine gun.

Transit Case (15)

The Transit Case provides a means of transporting and storing the MILES XXI system. It is constructed of durable, high-density polyethylene thermoplastic material. The case has firm foam inserts with cutout areas designed to accommodate the various types of MILES XXI components, providing maximum protection to the equipment.

M2 Machine Gun (MG) Small Arms Transmitter (SAT) (16)

The SAT mounts to the commanders machine gun to simulate firing. The SAT is activated by firing blank ammunition, or by the use of a Dry Fire Trigger cable. The M2 MG SAT projects an eye safe LASER beam onto a target out to the effective range of the weapon. See Figure C-2, Class 3A LASER Label.

M240 Machine Gun (MG) Small Arms Transmitter (SAT) (17)

The SAT mounts to the loaders machine gun to simulate firing. The SAT is activated by firing blank ammunition, or by use of a Dry Fire Trigger cable. The M240 SAT projects an eye safe LASER beam onto a target out to the effective range of the weapon. See Figure C-2, Class 3A LASER Label.

C.1.1 M1A1 Specific Components

FCI Cable Assembly (18)

The M1A1 FCI cable assembly connects the FCI to the fire control system through TJ1 and TJ2 on the TNB.

C.1.2 M1A2/M1A2 SEP Specific Components

FCI Cable Assembly (19)

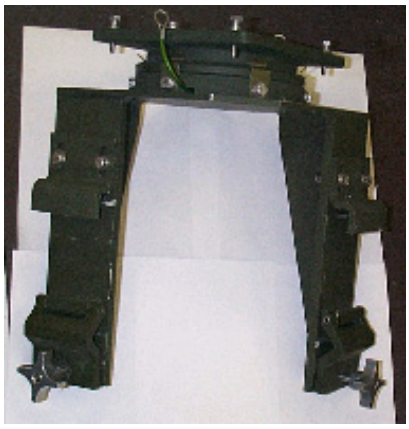
The M1A2/M1A2 SEP FCI cable assembly connects the FCI to the fire control system through TJ2 on the Fire Control Electronics Unit (FCEU).

C.2 COMPONENT GRAPHICS

1

VCU

2

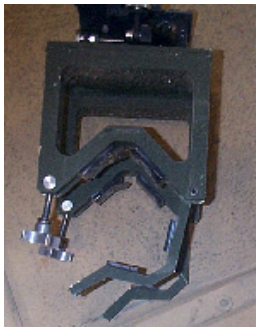


VCU Mounting Bracket

3

MGLT

4

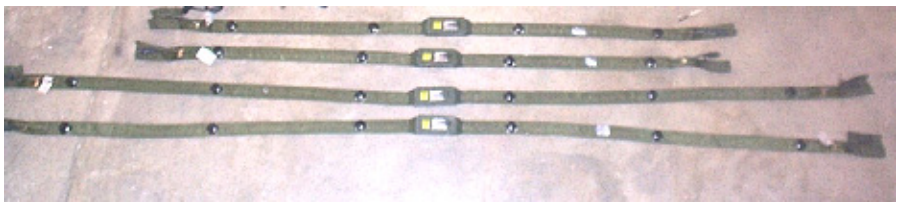


MGLT Mounting Bracket

5

VDA

6



VDS

Figure C-3 Component Graphics (Sheet 1 of 3)

7

RIA

8

FCI

9

Power Cable Assembly

10

RIA Cable Assembly

11

System BUS Cables

12

Terminator (2)

13

HUTT

14

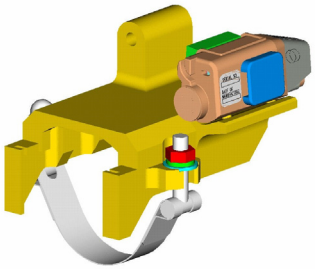
COAX MIC Trigger Assembly

Figure C-3 Component Graphics (Sheet 2 of 3)

15

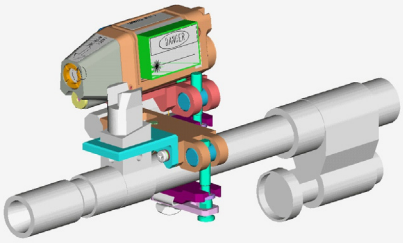
Transit Case

16



M2 SAT

17



M240 SAT

18

M1A1 FCI Cable Assembly

19

M1A2/M1A2 SEP FCI Cable Assembly

Figure C-3 Component Graphics (Sheet 3 of 3)

SECTION II EQUIPMENT INSPECTION

C.3 M1A1/M1A2/M1A2 SEP COMMON COMPONENTS

TASK

1 Inspect Detector Belts

.

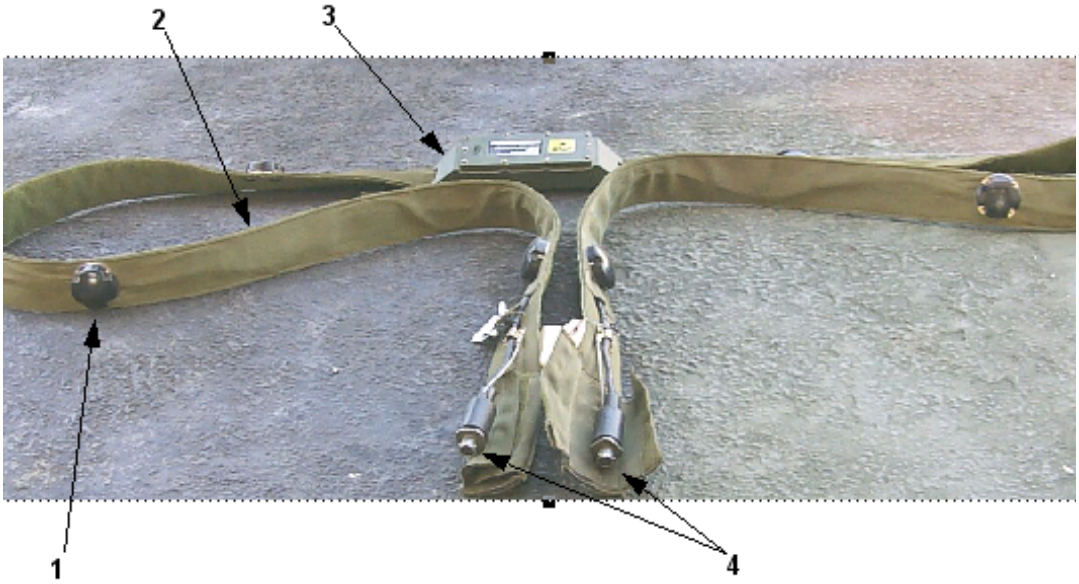


Figure C-4 Detector Belt Inspection

a. Wipe all detectors (1) clean and inspect for any visible damage.

b. Inspect the cloth harness (2) for fraying or other damage.

c. Look for cuts, tears or other obvious damage. Inspect the electronics module (3) for cracks, dents or other obvious damage.

d. Check the connector (4) for bent pins or other damage.

e. Inspect the back of the belts to make sure the “fuzzy” fastener tape is in good condition and there is enough, to install the belts.

TASK

2 Inspect Cables

Before installation, inspect all cables for any damage that would prevent normal operation. Inspect connectors for bent or damaged pins. Inspection instructions are the same for all cables.

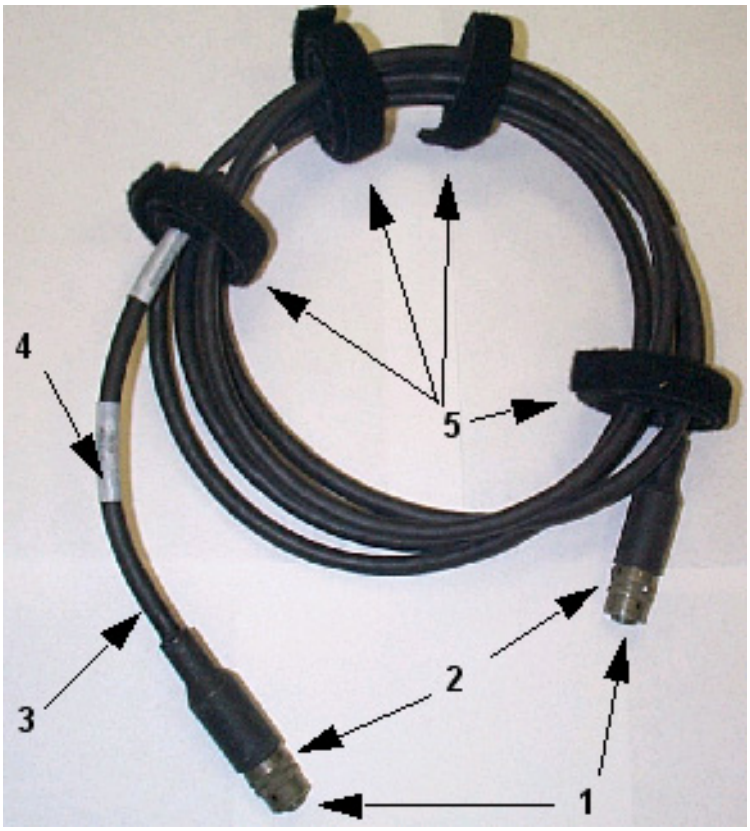


Figure C-5 Cable Inspection

a. Inspect connectors (1) for bent or damaged pins.

b. Inspect connector rings (2) for damage.

c. Check each cable (3) for worn insulation, bare wires, or other defects.

d. Look for labels (4) on the cable at each end, displaying connector identification.

e. Ensure the fastener tape straps (5) are attached to cables.

f. If there is any damage, report the problem and exchange the cable for a new one.

TASK

3 Inspect Vehicle Control Unit (VCU)

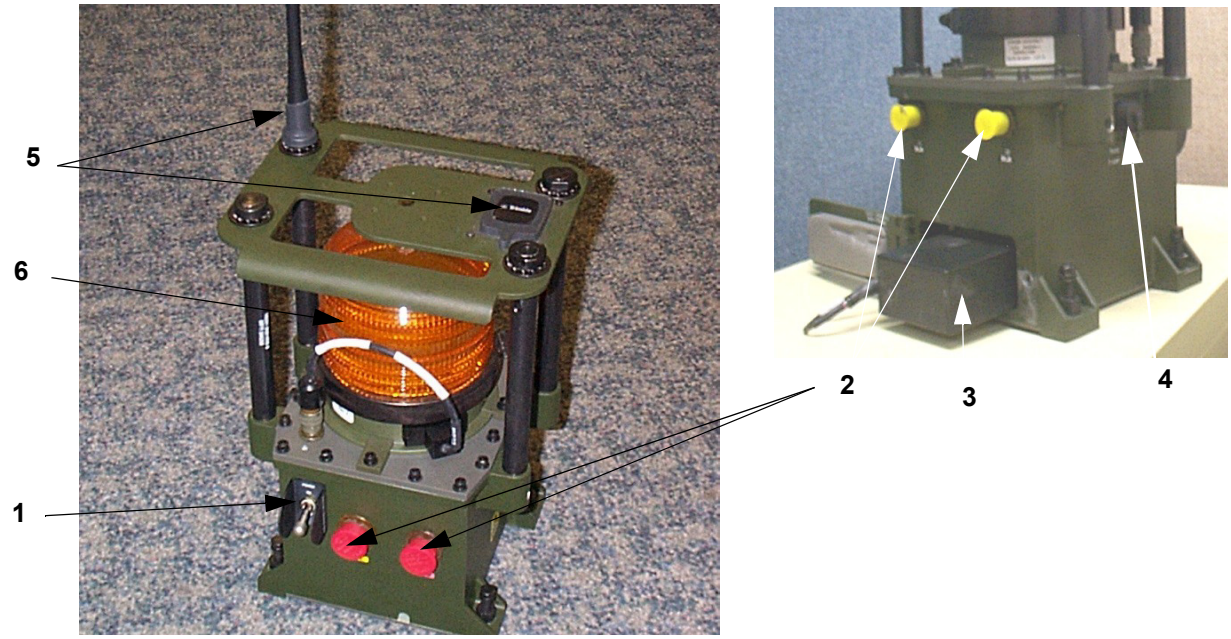


Figure C-6 VCU Inspection

a. Inspect the VCU for any damage that could prevent normal operation. If there is any damage that could keep the assembly from working, exchange it for a new one.

b. Inspect On/Off toggle switch (1) to ensure it is not bent to prevent the VCU from being turned On and Off.

c. Inspect connectors (2) for bent or damaged pins.

d. Inspect the battery compartment (3) for corrosion or any damage. If there is any damage, report the problem and exchange the VCU for a new one. The battery requires an initial charge upon receipt of the equipment.

NOTE

When inserting the battery, insert the widest end of the battery first, with the cable connector on the same side as the cable to allow for ease of installation and removal.

e. Inspect fuse holder (4) for damaged or missing fuse.

f. Inspect for missing or damaged antennas (5).

g. Inspect the CVKI (6) for cracks or other damage.

h. Report any damage and exchange the VCU for a new one.

TASK

4 Inspect Vehicle Display Assembly (VDA)

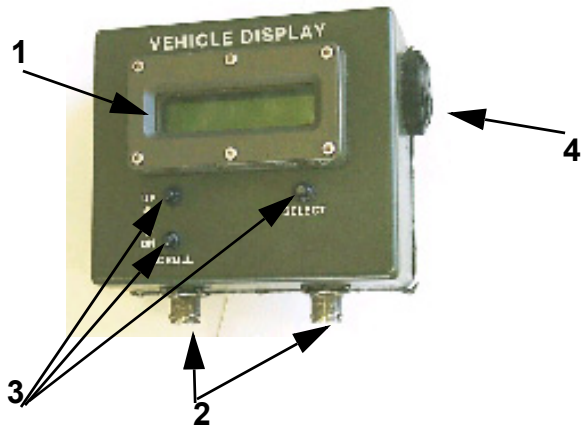


Figure C-7 VDA Inspection

a. Inspect the VDA for any damage that could prevent normal operation.

b. Inspect the display window (1) for cracked or broken glass.

c. Inspect the connectors (2) for damage and debris.

d. Inspect the push-button switches (3) for damage and operability.

e. Inspect the audio alarm (4) for cracks or other damage.

f. If there is any damage, report the problem and exchange the VDA for a new one.

TASK

5 Inspect Main Gun Laser Transmitter (MGLT)

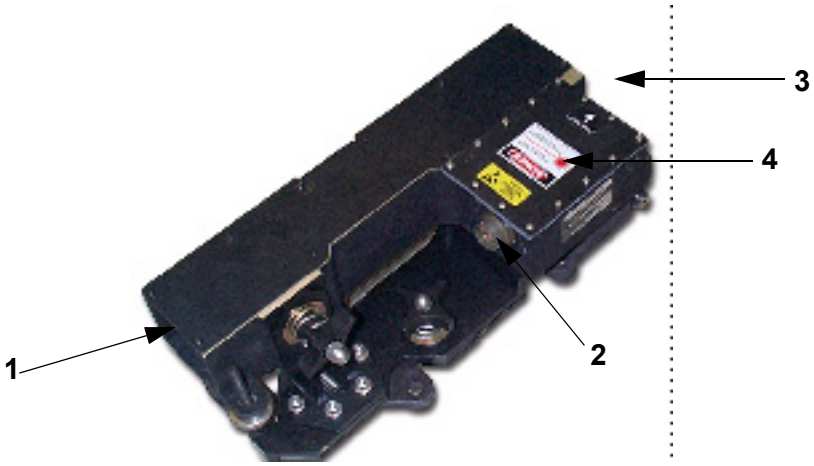


Figure C-8 MGLT Inspection

a. Inspect case and mounting bracket for any damage that could prevent normal installation or operation.

b. Look through the transmitter telescope (1) to ensure you can view distant objects.

c. Inspect the connector J1 (2) for bent pins or other damage.

d. Inspect the LASER tube lens (3) to ensure it is clean and undamaged. If there is dirt, oil, or grease present, clean the lens with lens paper.

e. Check the cover (4) for damage to seals or missing mounting screws.

f. If there is any damage, report the problem and exchange the transmitter for a new one.

TASK

6 Inspect Fire Control Interface (FCI) Assembly

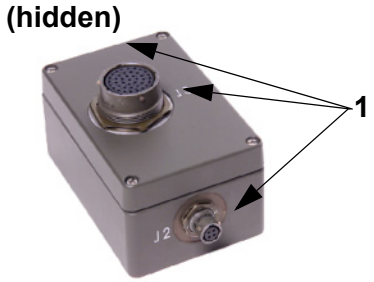


Figure C-9 FCI Inspection

a. Inspect the FCI Assembly for any damage that could prevent normal operation.

b. Inspect the connectors (1) for damage and debris.

c. If there is any damage, report the problem and exchange the FCI Assembly for a new one.

TASK

7 Inspect Terminator

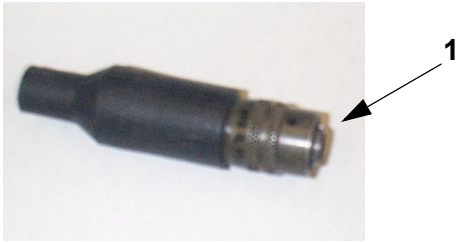


Figure C-10 Terminator Inspection

a. Inspect the Terminators for any damage that could prevent normal operation.

b. Inspect the connector (1) for bent or damaged pins.

c. If there is any damage, report the problem and exchange the Terminator for a new one.

TASK

8 Inspect Hull To Turret Transmitter (HUTT)

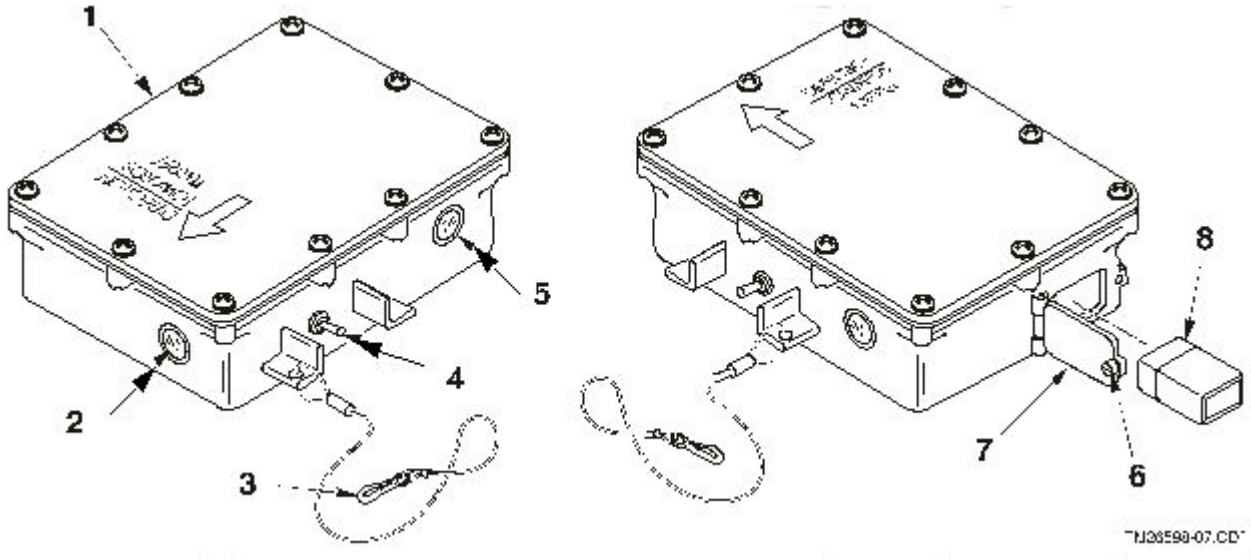


Figure C-11 HUTT Inspection

a. Check the case (1) for any damage that would prevent installation or operation.

b. Make sure the fastener tape on the bottom of the HUTT is in good condition.

c. Ensure the IR window plastic (2), is not cracked or broken.

d. Ensure the lanyard (3) is present and attached securely to the case.

e. Ensure the ON/OFF switch (4) is operable.

f. Ensure the battery indicator light (5) is not cracked or broken.

g. Loosen the thumb screw (6) in the battery compartment door (7) and inspect the battery compartment to ensure it is clean, dry and the battery contacts are not corroded.

CAUTION

Excessive force can damage the battery compartment. Do not force the battery compartment door closed.

h. Insert a 9-volt battery (8) into the compartment, close the door (7), and tighten the screw (6). The battery will fit either way, polarity is not important.

i. Turn the ON/OFF switch (4) to the **ON** position. After approximately 1 second, the red battery indicator light should light for 1 to 3 seconds. If the light does **not** come on, replace the battery with a new one and perform the test again.

j. After the battery indicator light does come on (battery test is good), turn the ON/OFF switch to the **OFF** position.

k. If there is any damage report the problem and exchange the HUTT for a new one.

TASK

9 Inspect MGLT Mounting Bracket Assembly

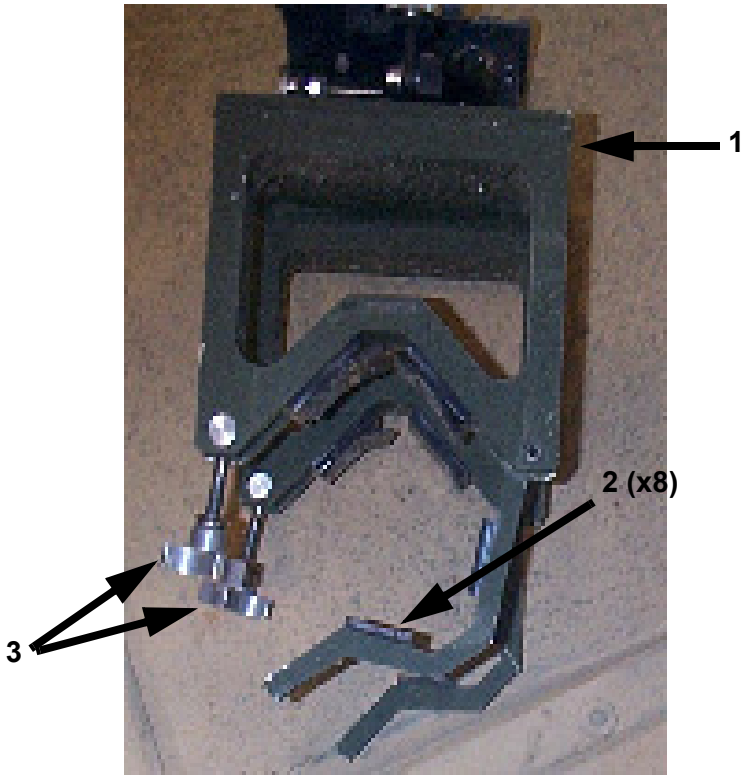


Figure C-12 Main Gun Mount Assembly Inspection

a. Inspect MGLT mounting plate (1) for damage that could prevent secure mounting of the MGLT.

b. Inspect pads (2) (8 ea.) for damage.

c. Inspect tightening knobs (3) for functionality.

d. Report any damage that would prevent secure mounting of the MGLT to the vehicle and exchange the MGLT Mounting Bracket for a new one.

TASK

10 Inspect Coax Microphone Trigger Assembly

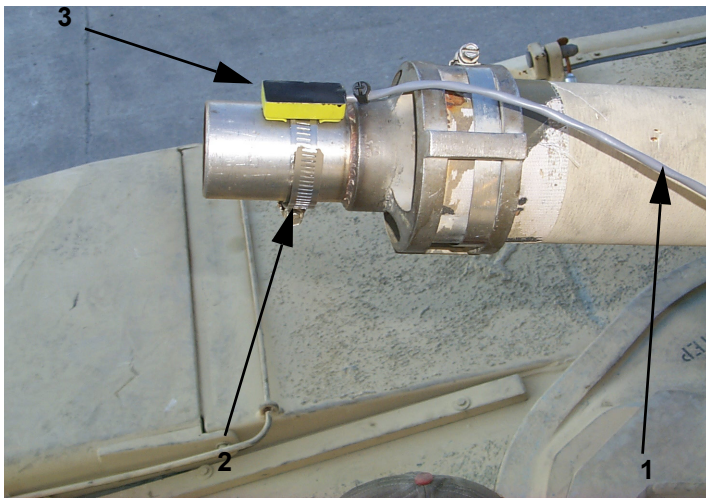


Figure C-13 Coax Microphone Trigger Assembly Inspection

a. Inspect cable (1) for bare or frayed wires.

b. Inspect clamp (2) for damage.

c. Inspect microphone (3) for damage that could prevent it from securely attaching to the clamp.

TASK

11 Inspect Radio Interface Assembly, (RIA)

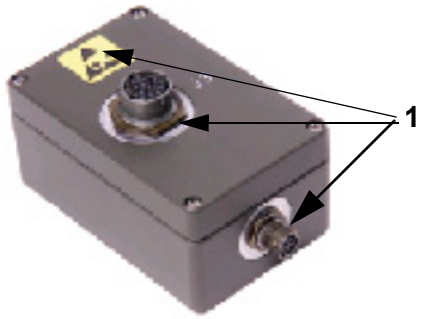


Figure C-14 RIA Inspection

a. Inspect the RIA for any damage that could prevent normal operation. Inspect for missing screws and or loose or missing connectors.

b. Inspect the connectors (1) (3 ea.), for damage and debris.

c. If there is any damage, report the problem and exchange the RIA for a new one.

TASK

12 Inspect VCU Mounting Bracket Assembly

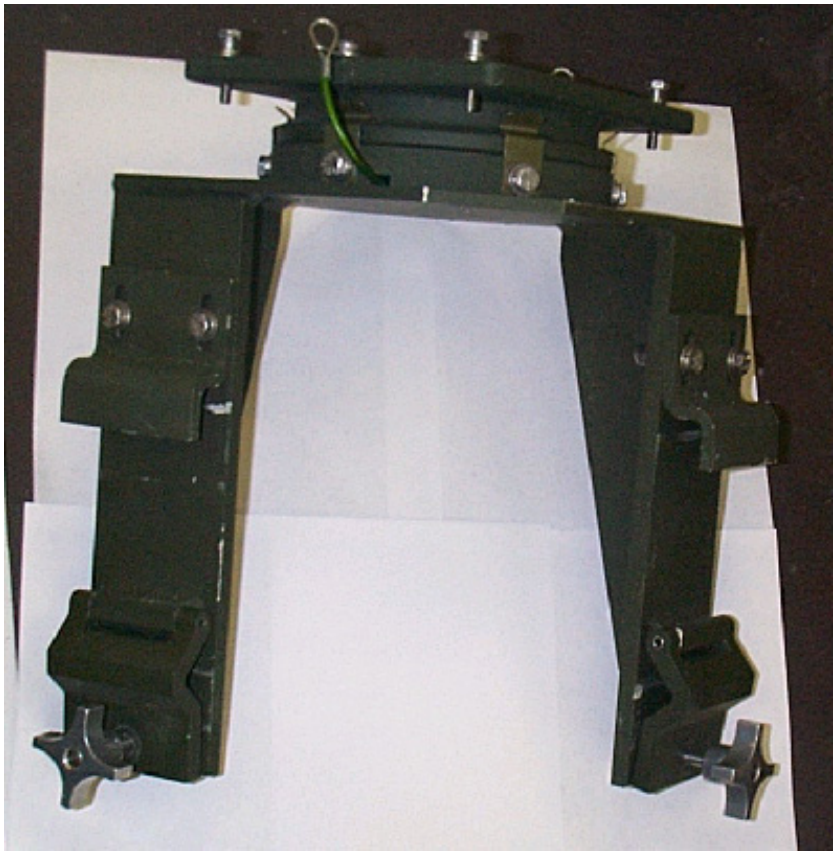


Figure C-15 VCU Mounting Bracket Assembly Inspection

a. Inspect the VCU Mounting Bracket for damage that would prevent secure mounting.

b. Ensure all hardware is available and undamaged.

c. If there is any damage exchange the mounting bracket for a new one.

TASK

13 Inspect MILES XXI Transit Case

Figure C-16 MILES XXI Transit Case Inspection

NOTE

All transit cases are similar in appearance however, the size may vary depending on the amount of equipment contained inside.

a. Inspect for presence of carrying handles and latches. Inspect interior for presence and condition of packing foam.

b. Inspect the MILES XXI Transit Case for any damage that would prevent proper closing or indicate equipment damage.

c. If there is any damage to the Transit Case report the problem.

TASK

14 Inspect M2 Machine Gun Small Arms Transmitter (SAT)

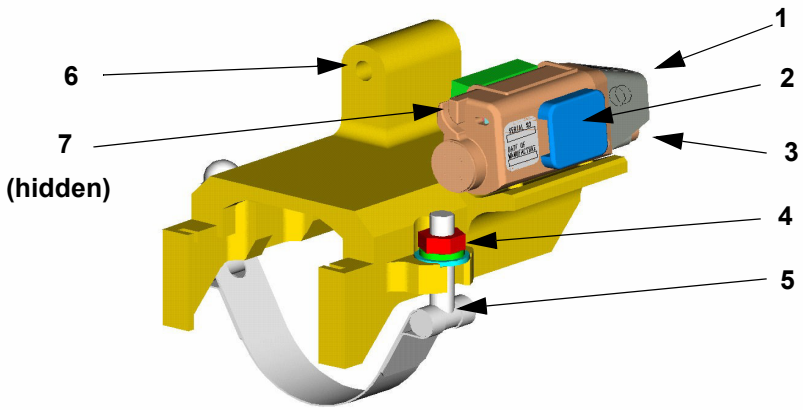


Figure C-17 M2 SAT

a. Inspect the SAT for any damage that could prevent normal operation.

b. Ensure the transmitter lens (1) is clean and free from any debris that may reduce LASER effectiveness.

c. Inspect Dry Fire connector (2) to ensure it is not cracked or clogged with debris.

d. Inspect the microphone port (3) for cracks or any damage that may prevent proper functioning.

e. Inspect the lock nut (4) for presence and or damage that may prevent secure mounting of the SAT mounting bracket to the machine gun barrel support.

f. Inspect the strap bolt (5) for damage that may prevent secure mounting of the SAT mounting bracket to the machine gun barrel support.

g. Inspect alignment device holder (6) for damage that would prevent accommodating the alignment device.

h. Inspect the SAT “POWER ON/LEARN” push-button (7) for presence and ensure the push-button releases when pushed.

TASK

15 Inspect M240 Small Arms Transmitter (SAT)

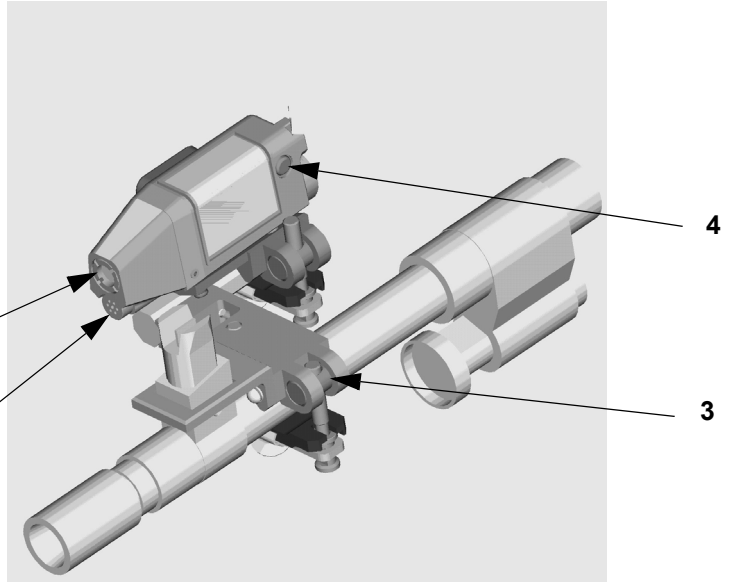


Figure C-18 M240 SAT Inspection

a. Inspect the M240 SAT for any damage that could prevent normal operation.

b. Ensure the transmitter lens (1) is clean and free from any debris that may reduce LASER effectiveness.

c. Inspect microphone (2) for cracks, debris, and damage.

d. Inspect the mounting clamp (3) for cracks or other damage that may prevent secure mounting of the transmitter to the gun barrel.

e. Inspect the SAT **"POWER ON/LEARN"** push-button (4) for presence and ensure the push-button releases when pressed.

f. If there is any damage, report the problem and exchange the SAT for a new one.

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APPENDIX D
ACRONYMS

Table D-1 ACRONYM LIST

ACRONYM	DEFINITION
AAR	After Action Review
AMMO	Ammunition
ASSY	Assembly
BFA	Blank Fire Adapter
BII	Basic Issue Items
BIT	Built-In Test
BLUFOR	Blue Forces (Friendly Forces)
BUS	Background Utility System
CD	Controller Device
CLP	Cleaner, Lubricant, and Preservative
CLS	Contractor Logistics Support
COAX	Coaxial Machine Gun
COMK	Communications Kill
COMMO	Communications
CONFIG	Configure
CPC	Corrosion Prevention and Control
CVC	Combat Vehicle Crewman
CVKI	Combat Vehicle Kill Indicator
CVS	Combat Vehicle System
DA	Department of the Army
DIFCUE	Direct, Indirect Fire Cue
DRMO	Defense Reclamation Management Office
DRV’s	Driver’s
DSP	Display
ea./EA	Each
FCI	Fire Control Interface
FM	Field Manual
FPK	Fire Power Kill
FSCM	Federal Stock/Supply Classification/Code for Manufacturers
GFE	Government Furnished Equipment
HD	Hundred
HE	High Explosive

Table D-1 ACRONYM LIST (Continued)

ACRONYM	DEFINITION
IAW	In Accordance With
IN or in	Inch
INT	Intercom
IR	Infrared
IWS	Individual Weapon System
J	Jack
KM	Kilometer
LASER	Light Amplification by Stimulated Emission of Radiation
LAN	Local Area Network
LCD	Liquid Crystal Display
MAG	Magnification
MALF	Malfunction
MAX	Maximum
MCS	Master Control Station
MG	Machine Gun
MGLT	Main Gun LASER Transmitter
MGSS	Main Gun Signature Simulator
MILES	Multiple Integrated LASER Engagement System
mm	Milli Meter
MOBK	Mobility Kill
MOD	Module
NOR	Normal
NSN	National Stock Number
OC	Observer Controller
OPFOR	Opposing Forces
OZ	Ounce
PCU	Power Control Unit
PEOSTRI	Program Executive Office, for Simulation, Training and Instrumentation
PID	Player Identification. Also known as “Player ID”
PK	Probability of Kill or Package
PMCS	Preventive Maintenance Checks and Services
PN or P/N	Part Number
PWR	Power
RIA	Radio Interface Assembly
REM	Remaining
RNDS	Rounds
RSM	Remote Switching Module

Table D-1 ACRONYM LIST (Continued)

ACRONYM	DEFINITION
SAT	Small Arms Transmitter
SC	System Controller
SEP	System Enhancement Package
SF	Standard Form
SOP	Standard Operating Procedures
TB	Technical Bulletin
TEU	Turret Electronics Unit
TGT	Target
TM	Technical Manual
TNB	Turret Networks Box
U/M	Unit of Measure
VDC	Volts Direct Current
VCU	Vehicle Control Unit
VDA	Vehicle Display Assembly
VDS	Vehicle Detection System
VER	Version
WPN	Weapon
XMTR	Transmitter
YD	Yard

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APPENDIX E
GLOSSARY

Table E-1 GLOSSARY DEFINITIONS

TERM	EXPLANATION
Controller	An umpire or referee in a MILES training exercise. Also referred to as an “Observer/Controller” (OC).
Controller Device	Device used to test MILES XXI detector systems, disqualify soldiers or vehicles from the exercise, and **RESURRECT/RESET** soldiers and vehicles. There are many functions of the CD not covered in this manual.
Combat Vehicle Kill Indicator	A MILES XXI Device that flashes when a vehicle is hit by incoming fire. This signals other players in the exercise that the vehicle has incurred damage.
Detector Belt	A canvas belt containing detectors that senses the coded LASER beams fired at it. Also known as VDS.
Domain	A group of networked devices that share a common communications address.
Dry Fire	A setting that allows the MILES XXI system to fire LASER beams without firing blank ammunition.
Fastener Tape	Type of tape used to hold detector belts and other MILES equipment in place.
HIT	An event that simulates a direct hit upon the vehicle that causes some damage but does not result in a **KILL**. There are four types of **HIT** -- one causes no damage, each of the other “Kills” a certain vehicle function. **HIT -- NO DAMAGE** alerts the crew that the vehicle is under fire and should take evasive action.
KILL	An event that simulates a direct hit upon the vehicle that causes the vehicle to be totally disabled. **MOBILITY KILL** simulates a track or engine hit, but allows the vehicle to communicate and fire weapons. **FIREPOWER KILL** simulates a hit to the vehicle’s weapon systems, but allows the vehicle to move and to communicate. **COMMO KILL** simulates an antenna hit, the crew must stop vehicle movement.
Laser Beam	A narrow beam of infrared light fired from transmitters mounted on various weapons to simulate weapon fire.
Laser Detector	MILES device that detects incoming LASER beams.
Laser Transmitter	MILES device that transmits LASER beams.
MILES Code	A number used by MILES to identify each type of simulated weapon.

Table E-1 GLOSSARY DEFINITIONS (Continued)

TERM	EXPLANATION
NEAR MISS	An event that is "close" enough to be detected by a MILES system, but not close enough to cause a **HIT** or **KILL**.
Player Identification	A letter followed by a 4-digit code used by the MILES XXI system, to identify individual soldiers or vehicles during an exercise.
Reset	Makes a MILES XXI equipped vehicle **"Alive"** after a Kill and restores FULL ammunition basic loads to the VDA.
Resurrect	To restore a MILES XXI equipped vehicle or individual to operable condition following a **KILL** but does not restore ammunition basic loads.
Simulator	Training device that takes the place of real equipment and imitates the equipment in training exercises.
Transmitter	Simulates firing capability of a variety of main guns, machine guns, and missiles that are programmed into the MILES XXI VCU.
Zone	The LASER detectors on the outside of the turret are divided into ZONE 1-8, which correspond to different sides of the vehicle. MILES XXI uses this information (Probability of Kill), in assessing the severity of damage when hit by incoming fire. If the VCU cannot determine the zone accurately, the VCU and VDA displays will show ZONE 0. The Zone (s) engaged will be displayed on the VDA.

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS **For use of this form, see AR 310-1; the proponent agency is the US Army Adjutant General Center.**	Use Part II *(reverse)* for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
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PUBLICATION/FORM NUMBER	DATE	TITLE
TM 9-6920-912-10	11 MAY 2012	Operator's Manual MILES XXI Combat Vehicle System Kit for M1A1/ M1A2 and M1A2 SEP Abrams Main Battle

ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON *(Exact wording of recommended change must be given)*

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TM 9-6920-912-10	11 MAY 2012	

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05 July 2011 PEO STRI

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