

**ARTEP 44-635-15-DRILL**

**PATRIOT CREW DRILLS  
FOR THE  
PAC-2/PAC-3  
LAUNCHING STATION (LS)  
FORKLIFT MISSILE RELOAD  
OCTOBER 2003**

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\*This publication supersedes ARTEP 44-635-15-Drill dated 3 October 1995

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## **PREFACE**

1. A standardized drill is an essential element to the success of the Patriot LS and missile reload on the battlefield. This drill provides performance measures and a collective sequential set of procedures that when applied Army-wide, will minimize the impact caused by turnover in personnel. This drill is for the use by trainers at the platoon level to train their crews to do the selected collective tasks correctly and rapidly. Drill training is an inseparable part of peacetime combat-oriented training, which improves proficiency in mission-oriented individual and collective tasks, maintains high combat readiness, and promotes cohesive teamwork and esprit de corps.
2. This drill publication is one of a set of books that includes ARTEPs 44-635-11-Drill, 44-635-12-Drill, 44-635-13-Drill, and 44-635-14-Drill, all of which contain Patriot standardized drill procedures.
3. This drill publication addresses the use of the forklift to perform missile reload procedures for the LS. This drill book is separated into sections with the applicable information to assist the platoon leader in training his crew.
4. The target audience for this drill includes leaders, trainers, and evaluators of Patriot battalions organized under TOE 44-635.
5. Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.
6. The proponent for this publication is HQ, TRADOC. To improve this publication, submit recommended changes on DA Form 2028 to Commandant, United States Army Air Defense Artillery School, ATTN: ATSA-DT-WF, Fort Bliss, Texas 79916-3802.

## CHAPTER 1

### UNIT TRAINING

1-1. General. This drill publication provides a standardized crew drill for the collective tasks, which must be done by Patriot LS crews rapidly, instinctively, and without hesitation. It also lists in matrix format the individual tasks that support the drill.

A crew's ability to accomplish its mission depends on the ability of the crew members to operate effectively as a unit. United States Army drills are US Army standards and your unit must be able to execute them without deviation and precisely as described. The trainer must emphasize both individual and collective training. The transition from training individuals to training crews has caused problems for trainers. Drills integrate individual and collective training. They also help a crew perform critical tasks quickly by repeated practice, reduce confusion by assigning specific tasks to each crew member, and build teamwork.

1-2. Training Guidance. Train drill using a crawl-walk-run principle. First the trainer must master the drill and then train the crew members on their prerequisite individual soldier's manual tasks that are included in the drill. Next, train the crew by talking them through the drill, explaining each member's role in the drill. Once all members understand their role in the drill have them perform it slowly for familiarity. Correct any mistakes as they occur. Do not proceed until they can do the drill correctly. Then practice the drill to improve speed. Observe carefully to ensure every performance measure is performed correctly. After the crew demonstrates initial proficiency, make the drill more challenging by practicing on terrain you would expect to find in combat and at different MOPP levels. When all members master each drill in their assigned positions, rotate them for cross training in other positions. Cross training leads to flexibility that allows the crew to adjust as the situation dictates. Concentrate on precision and speed. Be tough on yourself and your soldiers. A well-trained unit executes drills instantly and correctly on cue.

1-3. Safety Considerations. Crew drills are trained using a talk-through, walk-through, and run-through method. You, of course must be a master of the drill to train your soldiers to execute it. You may wish to periodically talk your soldiers through the drill, explaining each soldier's role. Then have them go through it slowly, on open ground, correcting any mistakes as they go. Whenever possible, train in an environment in which you would expect to execute the drill in wartime. Train frequently in MOPP and be tough on yourself and your soldiers. Good teams execute instantly and with precision. Your team will pay a high price for failure.

1-4. Evaluation Information. The best location for an evaluator is one in which he can observe the actions of the entire crew. Use the drill book as a checklist. The purpose of evaluating a drill is to determine if the crew can perform the performance measure within the allowed time standard. Realistic training requires units to train to survive on the battlefield. This includes training under all NBC conditions. On a drill by drill basis the unit must attain proficiency with each drill at the highest MOPP. This drill is designed to provide the trainer with an outline to be used in conducting the training. This drill is set up in the following format:

- a. Title of the drill.
- b. Training objectives (tasks, cues, conditions, and standards) for the drill.
- c. Individual soldier's tasks.

- d. Instructions for setting up the training.
- e. Directions for talking the crew through the drill.
- f. A standard reminder to practice the drill until it is mastered.
- g. A standard reminder that training is not finished until immediate supervisor has evaluated your crew's performance.
- h. Performance measures including illustrations.

## CHAPTER 2

### FORKLIFT MISSILE RELOAD CREW DRILL

2-1. General. A crew drill is a collective action that a crew for a weapon or piece of equipment must perform to use the weapon or equipment successfully in combat or to preserve life. The crew drill task is initiated on a cue and performed to specific standards.

2-2. Crew Drill 44-5-D015

**TASK:** Perform GM Reload of a Patriot Missile Using a 10,000-Pound Capacity Full Articulating Forklift (44-5-D015).

**CONDITIONS:** Friendly-perform this crew drill from either a centralized (designated location) or decentralized (tactical) positions. The LS is emplaced, operational, and in remote control. A crew has been assigned for forklift missile reload in a non-chemical environment. The primary threat is from air attack or tactical ballistic missiles (TBMs).

**STANDARD:** Perform the GM reload procedures by the performance measures as sequenced in this drill. Complete this drill within the maximum time allowed when in a training environment

Note: The time required to perform this drill in MOPP IV is increased.

**SUPPORTING INDIVIDUAL TASKS:** Supporting individual tasks for this drill are listed in Appendix A.

**ILLUSTRATIONS:** Figures 2-1 through 2-7.

**SETUP INSTRUCTIONS:** The following equipment, areas, and personnel must be provided for the drill to be trained correctly.

a. Resources: As a minimum, the following are required:

- (1) One LS GM semi-trailer mounted, 10,000-pound capacity full articulating forklift with all basic issue items, and a guided missile carrier (GMC) (for example, Guided Missile Transporter (GMT), flatbed trailer, or flatbed rail car).
- (2) Missile round cable test set (MRCTS).
- (3) Two 30 to 150 foot pound torque wrenches.
- (4) Two 30/36-inch extensions.
- (5) Two ¾ inch deep well sockets.
- (6) Hearing protection (one set for each crew member).



- (7) Work gloves (one pair for each crew member).
- (8) Protective head gear (combat helmet for each crew member).
- (9) The following tools are needed for removal of the DLU antenna storage tube when reload is performed from the road side:
  - (a) Extension socket wrench, 3/8-inch drive, 9/16 inch
  - (b) Handle socket wrench ratchet, 3/8-inch drive
  - (c) Socket, socket wrench, 3/8-inch drive, 9/16 inch
- b. Training Site: Emplace the LS in an area large enough for the GMC, forklift, and missile reloading and off loading (40X50 meters). The site should be as level and as firm as possible.
- c. OPFOR: None are required due to the standard employment of a Patriot Battalion.
- d. Unit Instructions: Prepare the LS for GM reload with an available crew from the launcher section.

**TALK-THROUGH INSTRUCTIONS:** The unit has ordered the LS to be reloaded in either the centralized or decentralized positions. The CMs have the responsibility to perform forklift missile reload as directed.

- a. Orientation. Before beginning drill training, ensure that each CM knows the purpose of the drill and is briefed on safety awareness.
- b. Safety. Be extremely careful when working around the LS, GMC, and the forklift. Observe all dangers, warnings, and cautions required to properly perform missile reload. To prevent death or injury every CM must know what safety hazards exist and how to avoid them. Accidents happen primarily because personnel are not aware of potential safety hazards or carelessness.

Note: Forklifts used to move GMs must have a load test performed before performing this procedure.

- c. Demonstration (Optional). If a nearby crew has successfully performed forklift missile reload, have that crew demonstrate the drill. Explain what is being done and why, using the performance measures as a guide. After the demonstration, summarize the drill.
- d. Explanation. Explain the drill in the following manner: Using a diagram, Figures 1 through 7, a sand table, or a simple sketch in the dirt, show the CMs how forklift missile reload should be performed.
  - (1) Tell the CMs what their duties are in the drill.
  - (2) Read the performance measures of the drill to the crew.

(3) Have CMs explain their performance measures to ensure that they understand them.

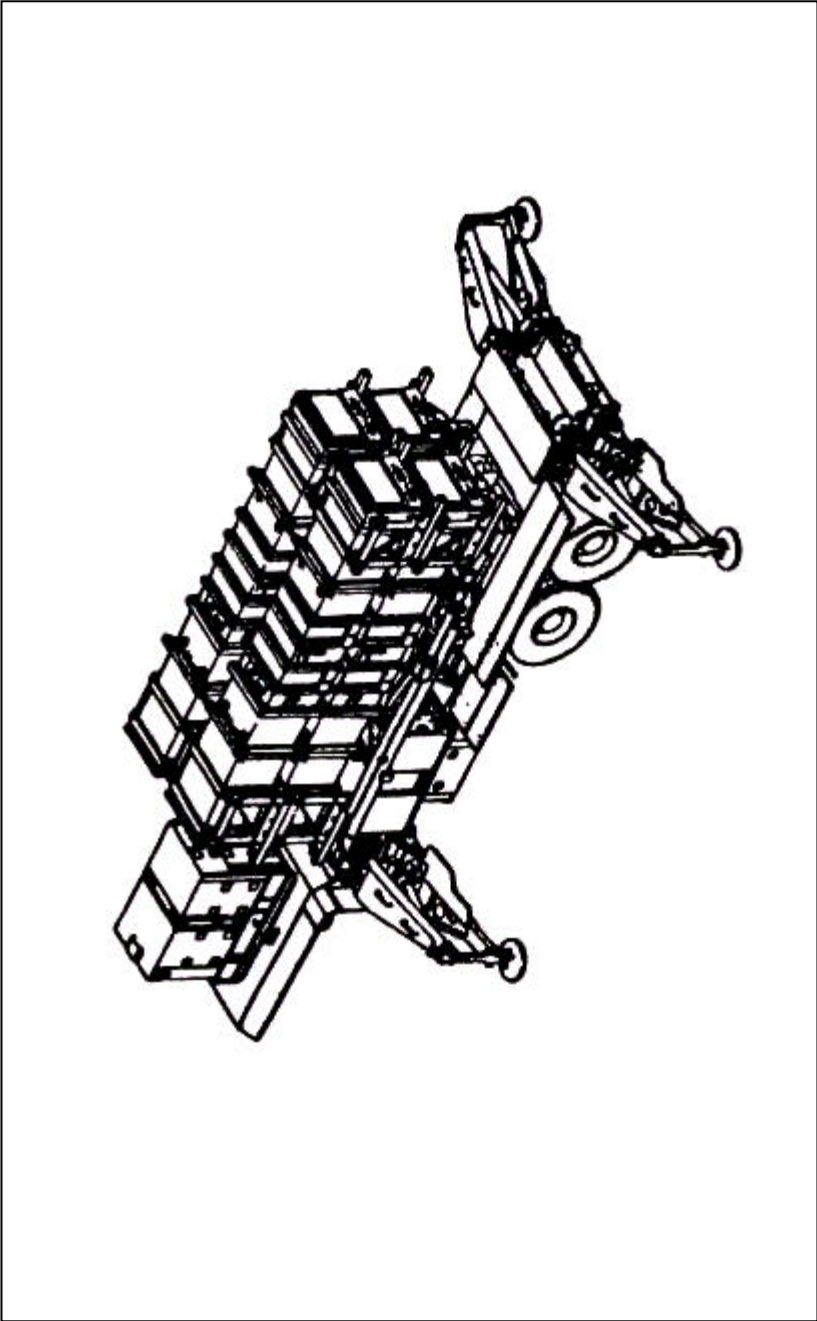


Figure 2-1. Missile reload position LS

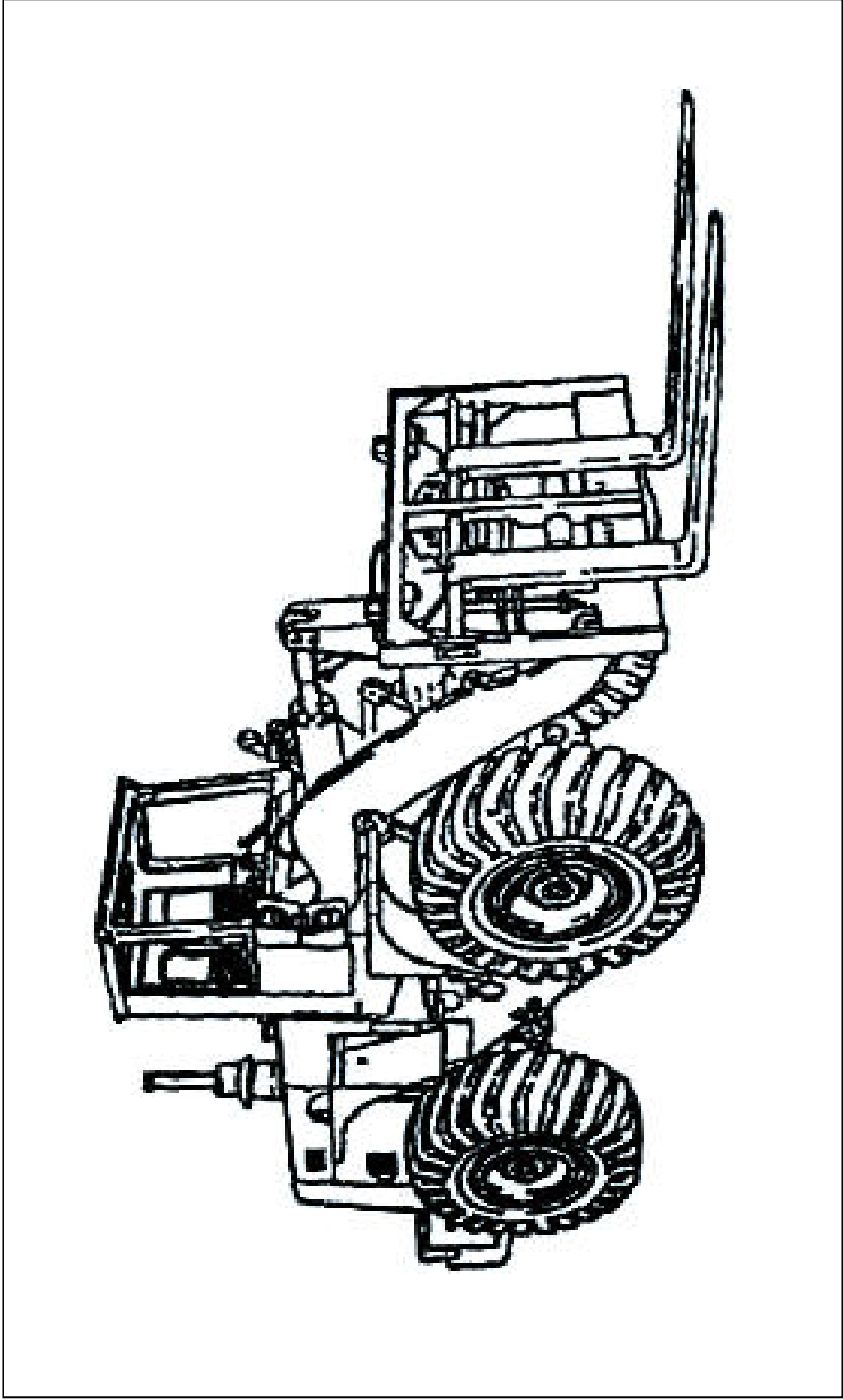


Figure 2-2. Forklift without canister(s)

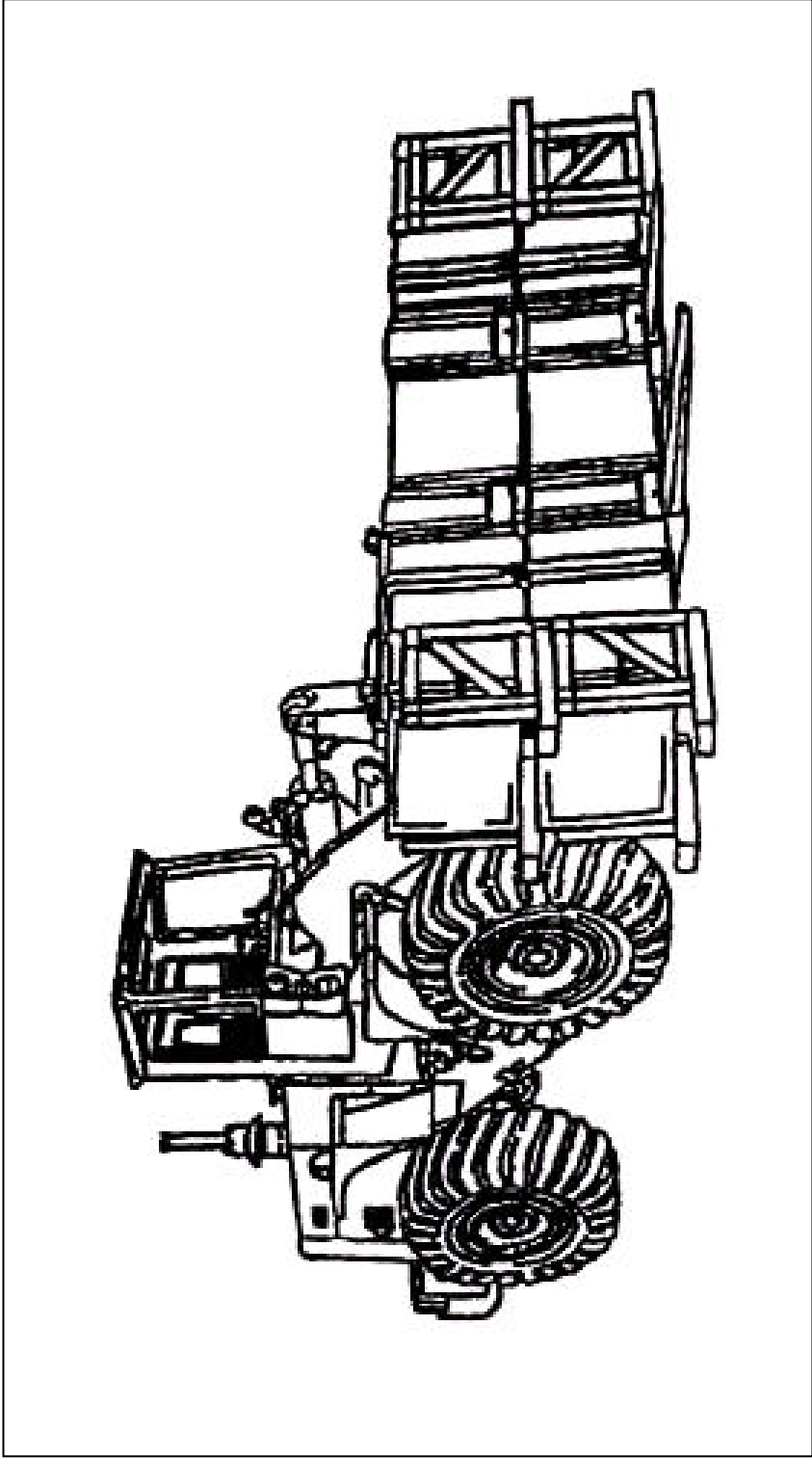


Figure 2-3. Forklift with canister(s)

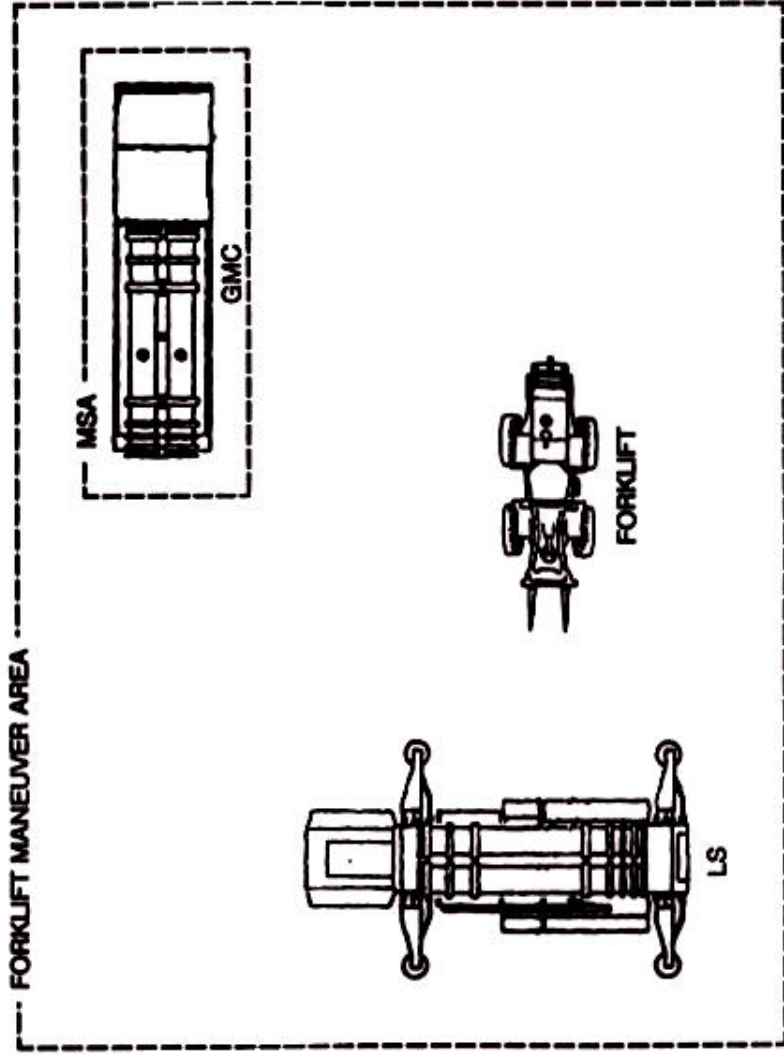


Figure 2-4. Perpendicular reloads LS/forklift/GMC or MSA

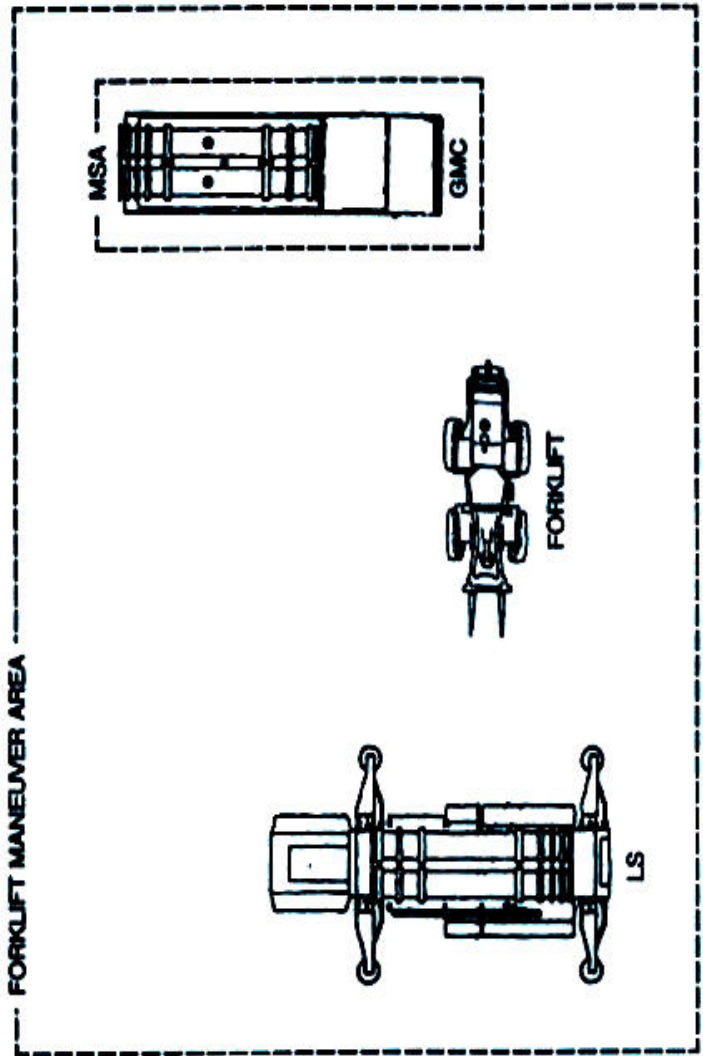


Figure 2-5. Parallel reload LS/forklift/GMC or MSA

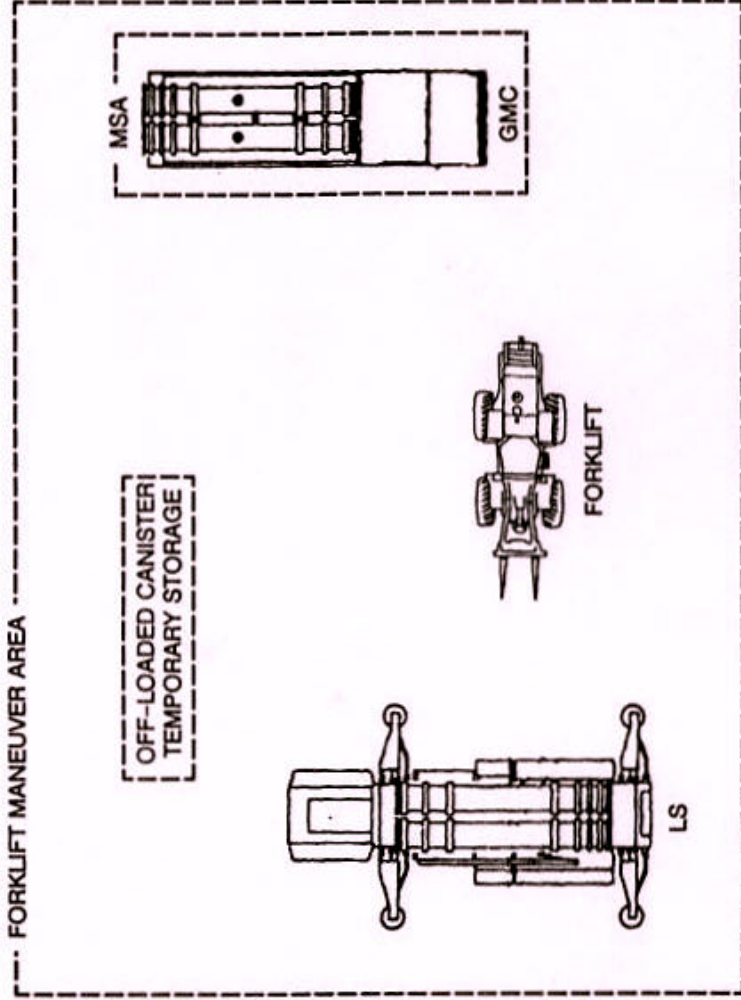


Figure 2-6. Perpendicular reload LS/forklift/GMC or MSA empty canister positioning

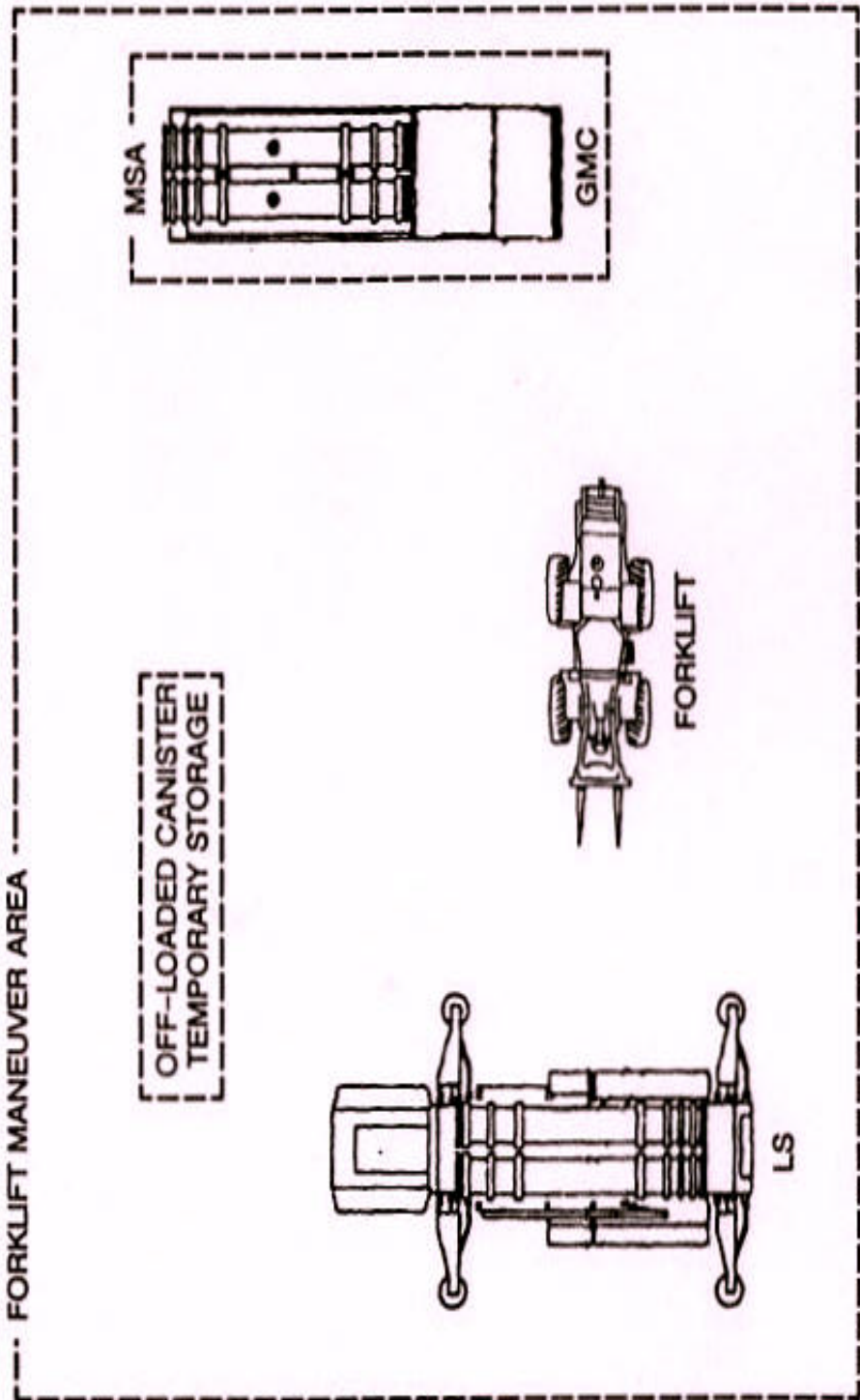


Figure 2-7. Perpendicular reload LS/forklift/GMC or MSA empty canister positioning



## WALK-THROUGH INSTRUCTIONS:

- a. Use the Crawl-Walk-Run Method of Training. Start the training slowly. Correct any mistakes the CMs make as they go. Do not proceed until the drill is done right. After the CMs demonstrate their proficiency at a slow pace, let them do it faster. Watch carefully to make sure the crew members achieve all of the standards for the drill.
- b. Initiating Cue. The command missile reload has been received.
- c. Coaching Point. The performance measures are done in the sequence outlined. All CMs do their like numbered tasks at the same time.
- d. Practice. When all individual tasks have been mastered and all CMs can do their jobs without coaching, go for speed and remember to be safety conscious. The more the drill is performed the better the crew members will perform together.
- e. Performance and Evaluation. When the CMs can perform this forklift missile reload drill to standards, inform the platoon sergeant or platoon leader that the crew members are ready to be evaluated.
- f. General Missile Reload: The LS can be transported to a predetermined reload area (centralized) other than its tactical deployment position (decentralized). Canisters on the LS are empty. The LS is grounded before reload procedures.
  - (1) Centralized: The LS march order procedures and LS emplacement procedures, steps 1 through 10 for CMs 1 and 2, are complete according to ARTEP 44-635-14-DRILL. Crew members 1 and 2 will begin with step 9 of this forklift missile reload procedure.

Note: Deviation Authorized: Empty GM canisters may be removed from LS before LS road march to centralized reload point. LS and HEMMT may remain hooked up during reload depending on mission requirements.

(2) Decentralized: Crew members 1 and 2 will begin with step 1 of this forklift missile reload drill procedure and perform steps 1 through 9 before the GMC and forklift arrive. If time permits, perform appropriate cable tests before reload.

Note: All dangers, warnings, and cautions will be observed throughout this forklift missile reload drill. Usually each canister removed from the LS is empty. Under certain conditions, live rounds may be off loaded from the LS.

- Crew member (CM) Identification:
  - CM 1 – LS crew member
  - CM 2 – LS crew member
  - CM 3 – LS section chief (safety NCO)
  - CM 4 – Forklift operator
  - CM 5 – Forklift signaler
- CMs 4 and 5 may be interchanged as signaler or forklift operator.

- The following forklift missile reload procedure is used to perform missile reload for the Patriot launching station(s). However, this Procedure may be modified to use the forklift to unload missile(s) from a GMC (for example, flatbed trailer or flatbed rail car), to load missile(s) onto a guided missile transporter (GMT), or (to move guided missile(s) from a centralized point to a decentralized position).
- All CMs should have as much eye contact as possible with each other during forklift missile reload.
- Light-all operations should be authorized to prevent personnel injury and equipment damage when performing forklift missile reload operations during hours of darkness.

**PERFORMANCE MEASURES:** The CMs will complete their performance measures as they are stated and in the sequence shown. They synchronize the completion of like numbered performance measures.

Note: Before proceeding with this drill read all the DANGERS, WARNINGS, and CAUTIONS in this drill.

**WARNING**

**Operation of this equipment presents a noise hazard to personnel in the area. The noise level exceeds the allowable limits for unprotected ears. Hearing protection must be worn while working around this equipment.**

**WARNING**

**Keep hands and feet away from forklift forks to prevent injury.**

**CAUTION**

Crew members must be watched by other crew members and warned of unsafe conditions to prevent injury.

Note: If centralized reload is to be conducted, LS march order procedures, and LS emplacement procedures steps 1 through 10 are complete; begin missile reload at step 13 of this Drill. If decentralized reload is conducted, CMs 1 and 2 will perform steps 1 through 13 before the GMC or forklift reload team arrives. Time permitting, perform applicable cable check following step 13. Perform before, during, and after operation forklift PMCS for safe operations. Ensure the terrain for forklift missile reload movement operations is level and firm. Guided Missile Carrier and launching station (L-S) must be correctly checked before proceeding with the forklift missile reload crew drill. Verify the forklift to be used is load-tested before performing this procedure.

**WARNING**

Stay clear of launcher mechanics' plane of rotation until LOCAL-REMOTE switch on LCU display is set to LOCAL, and LOCAL light is on and key is removed. If LOCAL-REMOTE switch is set to REMOTE, the turntable can be rotated remotely causing injury to personnel.

**WARNING**

Canister damage may indicate an unserviceable missile. Report canister damage immediately. The commander will determine if the missile will be replaced or used.

Note: Before advancing to the selected LS for reload, notify and verify with the ECS that reload procedures need to be done. Confirm that the LS is repositioned to stow and placed in standby.

**CREW MEMBER 1**

**CREW MEMBER 2**

Note: Performs step 1 for a PAC-2 LS; Performs step 2 for a PAC-3 LS.

1. Prepares PAC-2 LS for reload
  - a. Assists CM 2.
  1. Prepares PAC-2 LS for reload.
    - a. Opens LEM doors.
    - b. Sets LOCAL/REMOTE switch to LOCAL.
    - c. Verifies the local light comes on.
    - d. Removes key from LOCAL/RMT switch
  2. Prepares PAC-3 LS for reload.
    - a. Assists CM 2.
    - b. Sets LOCAL/REMOTE switch to LOCAL.
    - c. Verifies local light comes on.

- d. Removes key from LOCAL/REMOTE switch.
- e. Sets ENABLE/DISABLE switch to DISABLE.

**DANGER**

**Ensure the area is clear before rotating the LS turntable and lowering the platform. Injury or death can result if struck by moving mass.**

Note: Performs step 3 for a PAC-2 LS; performs step 4 for a PAC-3 LS.

- 3. Assists as needed on PAC-2.
  - a. Clears area of personnel before rotation.
- 3. Electrically rotates PAC-2 LS platform, if required, to the STOW POSITION, if required.
  - a. Checks on the LCU display panel that PLATFORM RAISED light is on.
  - b. Verifies ENGAGEMENT CONTROL handle is set to ROTATE.
  - c. Verifies on the LCU display that the AZIMUTH READY light is on.
  - d. Holds CCW/STOP/CW switch to CCW or CW to align 180-degree position pointer with stow mark.
  - e. Turns MCU circuit breaker off.
  - f. Places ECH in elevate.
- 4. Assists as needed on PAC-3.
  - a. Clears area of personnel before rotation.
- 4. Electrically rotates PAC-3 LS platform, if required, to the STOW POSITION, if required.
  - a. Verifies ENGAGEMENT CONTROL HANDLE is set to ROTATE and the PLATFORM AZIMUTH READY LIGHT is on.
  - b. Selects LS SET-UP on the main menu.

**CREW MEMBER 1**

**CREW MEMBER 2**

- c. Selects MOVE PLATFORM on the LS SET-UP menu.
- d. Selects ROTATE PLATFORM on the MOVE PLATFORM menu.
- e. Selects STOW AZIMUTH to align the LS in the stow position on the MOVE PLATFORM menu.
- f. Places ECH in ELEVATE.

**DANGER**

**GM is free to move in canister if torque tube handle is not properly locked. Sudden stops during road march could cause the missile to penetrate the tractor cab resulting in injury or death.**

Note: Omit step 5 if there are no live GMs on the LS or if it is a PAC-3 LS loaded with PAC-3 GMCs. Lock GM torque tube handles in the following order: UR, LR, UL, AND LL.

- 5. Locks GM torque tube handle on each live canister as follows.
  - a. Goes to rear of LS platform and removes the quick release pin next to the torque tube handle.
  - b. Pulls out and holds the spring-loaded plunger; rotates the torque tube handle clockwise to the LOCK position
  - c. Releases plunger. Checks plunger seats in left detent hole to secure torque tube handle.
  - d. Ensures no red paint shows to the left of torque tube handle and inserts quick release pin.
  - e. Verifies with CM 1 that MISSILE READY light is off.
    - e. Observes MISSILE READY light on LCU display panel. Lights should go out as GM torque tube handles are placed in locked position.
  - f. Repeats step 5 for each live GM.
- f. Repeats step 5 for each live GM.

**CREW MEMBER 1**

**CREW MEMBER 2**

**CAUTION**

Before lowering LS platform ensure the guardrail is not installed around the generator set. Equipment damage may result.

Note: Perform step 6 if lowering a PAC-2 LS, and step 7 if lowering a PAC-3 LS.

6. Assists as needed on PAC-2.
  - a. Clears area of personnel.
  - b. Electrically lowers launcher mechanics platform on a PAC-2 LS.
    - a. Sets ENGAGEMENT CONTROL handle to ELEV.
    - b. Checks that AZIMUTH READY light is off on LCU display panel.
    - c. Sets RAISE/STOP/LWR switch to LWR. Momentarily, holds the START switch to UP. Note: Platform will lower to steady rest and stop.
    - d. Checks that PLATFORM RAISED light is off. Sets the RAISE/STOP/LWR switch to STOP.
    - e. Sets ENGAGEMENT CONTROL handle to ROAD MARCH if road march is to be performed.
7. Assists as needed on PAC-3.
  - a. Clears area of personnel.
  - b. Electrically lowers launcher mechanics platform on a PAC-3 LS.
    - a. Sets ENGAGEMENT CONTROL handle to ELEV.
    - b. Verifies the azimuth ready light is off at the ELES.

**CREW MEMBER 1**

**CREW MEMBER 2**

- c. Selects LS SETUP From MAIN MENU.
  - d. Selects MOVE PLTFRM From MAIN MENU.
  - e. Selects LOWER PLTFRM From MOVE PLTFRM<sub>i</sub>.
  - f. Selects START From LOWER PLTFRM<sub>i</sub>.
  - g. Observes PLTFRM MOVING is displayed, then PLTFRM LOWRD when platform reaches steady rest position.
  - h. Verifies PLTFRM RAISED light goes out, selects MENU<sub>1</sub> and returns to MAIN MENU.
- 8. Assists CM 2 extend the launcher work platforms.
  - 9. Powers down LEM/ELES per applicable TM.
  - 8. Extends fender and side work platforms into work positions.
  - 9. Powers down DLTM per TM.

**WARNING**

**Radio access cover is heavy. To avoid injury when open, ensure cover is locked and close cover carefully.**

- 10. Sets MAIN POWER AC CB to OFF at the ELES/LEM-PCP.
- 11. Powers down generator set per applicable TM.

Note: Stores antenna under launcher or in a safe place during reload to prevent damage from errant forklift movements.

**WARNING**

**While on the LS crew members must watch for and warn each other of unsafe conditions that could cause injury.**

**CREW MEMBER 1**

**CREW MEMBER 2**

12. Stows data link mast assembly.

12. Assists CM 1.

**WARNING**

**Data link mast assembly may be hot. Wear protective gloves to prevent injury to hands.**

**CAUTION**

Handle antenna carefully to prevent damage.

**DANGER**

**Connect shorting plug of each live GM immediately after cable is disconnected. Static charges may explode ordnance devices.**

13. Disconnects canister cables.

13. Disconnects canister cables.

a. Proceeds to roadside rear of LS platform.

a. Proceeds to curbside rear of LS platform.

b. Loosens hand knob and removes clamp assembly that secures upper left canister cable to lower canister.

b. Loosens hand knob and removes clamp assembly that secures upper right canister cable to lower canister.

**WARNING**

**Ground cable must be connected to each live GM until just prior to moving canister.**



<b>CREW MEMBER 1</b>	<b>CREW MEMBER 2</b>
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- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>c. Disconnects cables from upper left GM and installs shorting plug.</li> <li>d. Connects GM cables to dummy connectors at applicable position.</li> <li>e. Removes ground cable if round is expended.</li> <li>f. Installs dust cover on ground cable. Stows in spring clip at applicable position.</li> <li>g. Repeats steps 13c through f for lower left GM.</li> </ul> | <ul style="list-style-type: none"> <li>c. Disconnects cables from upper right GM and installs shorting plug.</li> <li>d. Connects GM cables to dummy connectors at applicable position.</li> <li>e. Removes ground cable if round is expended.</li> <li>f. Installs dust cover on ground cable. Stows in spring clip at applicable position.</li> <li>g. Repeats steps 13c through f for lower right GM.</li> </ul> |
|---|---|

<b>CREW MEMBER 1</b>	<b>CREW MEMBER 2</b>	<b>CREW MEMBER 3</b>	<b>CREW MEMBER 4</b>	<b>CREW MEMBER 5</b>
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Note: Forklift missile reload may be performed from a missile storage area (MSA), flatbed type carrier, or GMT. The GM carrier position to the LS is determined by the physical conditions of the terrain area around the LS. Several configurations are possible; use the one that will be the safest for the terrain area. During forklift movement, ensure the movements are safe and deliberate. If time permits, perform the applicable missile cable checks at this time. If time does not permit missile cable checks, continue with forklift reload procedures. Verify the forklift is load tested before performing this procedure.

- |  |  |   |  |  |
|--|--|---|--|--|
| <ul style="list-style-type: none"> <li>14. Assists as needed.</li> </ul> | <ul style="list-style-type: none"> <li>14. Assists as needed.</li> </ul> | <ul style="list-style-type: none"> <li>14. Supervises the positioning of the GM carrier.</li> <li>a. Informs CMs 4 and 5 where to position the GM carrier.</li> </ul> | <ul style="list-style-type: none"> <li>14. Positions the GM carrier.</li> <li>a. Coordinates with CM 5 on the position of GM carrier.</li> </ul> | <ul style="list-style-type: none"> <li>14. Positions the GM carrier.</li> <li>a. Coordinates with CM 3 on the position of GM carrier.</li> </ul> |
|--|--|---|--|--|

CREW MEMBER 1	CREW MEMBER 2	CREW MEMBER 3	CREW MEMBER 4	CREW MEMBER 5
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b. When signaled by CM 5 drives GM carrier into position.

b. At front roadside corner of GM carrier, signals CM 4 and guides vehicle into position.

c. Verifies GM carrier is properly positioned.

c. Positions GM carrier; place transmission to neutral, and sets parking brake. Turns off engine.

c. When GM carrier is positioned notifies CM 3.

d. Inspects GM(s) and verifies that the live GMs for reload are safe and serviceable. (Appendix D)

d. Chocks vehicle

e. When notified by CM 5 that wheels are chocked, exits vehicle.

e. When wheels are chocked notifies CM 4 to exit cab.

f. Assists CM 3.

f. Assists CM 3.

f. If applicable, removes vehicle ladder from stowed position.

f. If applicable, removes GM tie down straps.

Note: Deviation authorized: Empty LS canister(s) may be removed from LS before LS road march to a centralized reload point.

15. Prepares canister(s) on LS for off loading.
15. Prepares GMs on GMC for off loading or ensures GMs from the MSA are safe and usable.
15. Observes operations for safety hazards.
15. Lowers side rails on GMC (if applicable).
15. Assists CM 4.

CREW MEMBER 1	CREW MEMBER 2	CREW MEMBER 3	CREW MEMBER 4	CREW MEMBER 5
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Note: When live GMs are to be off loaded from GMC ensures-

- Torque tube handles are in the LOCK position.
- Torque tube handles are in the LOCK position.
- Quick release pin is installed on the right side of torque tube handle.
- Quick release pin is installed on the right side of torque tube handle.
- No red paint shows left of the torque tube handle.
- No red paint shows left of the torque tube handle.

Note: Download canisters from LS (curbside or roadside) in the following order:

- Two canisters nearest the GM carrier or missile storage area.
- Remaining two canisters.

Note: Off load GMs from missile carrier in the following order:

- Two GMs nearest the LS.
- Remaining two GMs.

Note: It may be necessary to change the direction the GM(s) are pointing upon removal from the MSA/GMC. This is done by placing them on the ground and picking them up from the opposite side. Failure to do so could result in GM(s) being placed on the LS backwards.

CREW MEMBER 1	CREW MEMBER 2	CREW MEMBER 3	CREW MEMBER 4	CREW MEMBER 5
---------------	---------------	---------------	---------------	---------------

a. Using a 1/2 inch drive ratchet, 30 to 150 foot-pound torque wrench, 30/36" extension, and 3/4 inch deep well socket, loosens the four bottom canister tie down bolts on canisters to be off loaded.

a. Using a 1/2 inch drive ratchet, 30 to 150 foot-pound torque wrench, 30/36" extension, and 3/4 inch deep well socket, loosens the four bottom canister tie down bolts on canisters to be off loaded.

b. Removes quick release pins; rotates tie down bolts to raised position and installs quick release pin.

b. Removes quick release pins; rotates tie down bolts to raised position and installs quick release pin.

Note: If necessary to download/upload GM(s) from LS roadside, the DL T antenna storage tube must be removed.

12. If necessary, removes DL T antenna storage tube; places under LS.

12. If necessary, removes DL T antenna storage tube; places under LS.

12. Prepares forklift for reload operations. Positions forklift forks for safe travel height.

12. Prepares forklift for reload. Signals CM 4 to position forks to safe travel height (12 inches).

**WARNING**  
To prevent injuries ensure all personnel are clear before moving forklift.

**WARNING**  
Two ground guides are required at all times to safely move GMs with the forklift.

<b>CREW MEMBER 1</b>	<b>CREW MEMBER 2</b>	<b>CREW MEMBER 3</b>	<b>CREW MEMBER 4</b>	<b>CREW MEMBER 5</b>
----------------------	----------------------	----------------------	----------------------	----------------------

**CAUTION**

A damaged GM canister can indicate an unusable missile. Report any damage immediately.

**CAUTION**

Forks should not exceed more than 6 inches past the edge of GM canister.

- |  |  |  |  |   |
|--|--|--|--|---|
| 13. Assists CM 5 to guide forklift to LS. Ensures area is clear.         | 13. Assists CM 5 to guide forklift to LS. Ensures area is clear.         | 13. Observes operation for safety hazards. | 13. Maneuvers forklift to LS.  | 13. Signals CM 4 to maneuver forklift to LS.  |
| 14. Assists CM 5 to ground guide forklift to approximately 6 feet of LS. | 14. Assists CM 5 to ground guide forklift to approximately 6 feet of LS. | 14. Observes operation for safety hazards. | 14. Centers on canister forklift cavities and stops forklift approximately 6 feet from LS. | 14. Signals CM 4 to center on canister forklift cavities and stops forklift approximately 6 feet from LS. |
| 15. Observes operation from the rear of forklift for safety hazards.     | 15. Observes operation from side of forklift for safety hazard.          | 15. Observes operation for safety hazards. | 15. Raises forklift forks until they clear LS platform.                                    | 15. Signals CM 4 to raise forklift forks until they clear LS platform.                                    |

Note: For LS without canisters to download, skip steps 16 through 26 and proceed to step 27.

- |  |  |  |   |   |
|--|--|--|---|---|
| 16. Observes operation from the rear of forklift for safety hazards. | 16. Climbs on LS and ensures forklift forks do not come in contact with the other canister(s) or LS. Notifies CM 5 that forks are through and to stop. | 16. Ensures forklift does not come in contact with the LS. | 16. Slowly moves forklift forward; inserts forks into canister forklift cavities and stops. | 16. Signals CM 4 to slowly move forklift forward, inserts forklift forks into canister forklift cavities and stops when notified by CM 2. |
|--|--|--|---|---|

CREW MEMBER 1	CREW MEMBER 2	CREW MEMBER 3	CREW MEMBER 4	CREW MEMBER 5
---------------	---------------	---------------	---------------	---------------

Note: CMs 2 and 5 must work closely together to ensure no equipment damage occurs.

**DANGER**

**Do not stand under or in path of raised load; serious injury or death may result if struck by moving load.**

- |  |   |  |  |  |
|--|---|--|--|--|
| 17. Assists as needed.   | 17. From up on the LS, observes operation for safety hazards. | 17. Observes operation for safety hazards.                                   | 17. When notified, slowly tilts forklift forks slightly upward; then raises canister(s) approximately 6 inches above alignment pins. | 17. Signals CM 4 to tilt forklift forks slightly and raises canister(s) approximately 6 inches above alignment pins. |
| Note: CM 3 will verify the canister grounds are disconnected <u>before</u> GM removal. |   |  |  |  |
| 18. Assists as needed.   | 18. Assists as needed.  | 18. Observes operation for safety hazards, and verifies grounds are removed. | 18. Tilts forklift slightly upward (to the rear) before movement.  | 18. Removes ground and signals CM 4 to tilt forklift forks slightly upward (to the rear) before movement.            |

**WARNING**  
Do not elevate or lower canister(s) while forklift is in motion.

**CAUTION**  
Crew members must be watched by other crew members and warned of unsafe conditions to prevent injury.

CREW MEMBER 1	CREW MEMBER 2	CREW MEMBER 3	CREW MEMBER 4	CREW MEMBER 5
---------------	---------------	---------------	---------------	---------------

Note: Never attempt to change direction (forward or reverse) until the forklift has come to a complete stop.

- |  |   |   |   |   |
|--|---|---|---|---|
| <p>19. Confirms with CM 5 that backup area is clear and assists with ground guide.</p> | <p>19. Assists CM 5.</p>                                    | <p>19. Observes operation for safety hazards.</p> | <p>19. Slowly moves away from LS until GM(s) are clear of outriggers and stops.</p>                               | <p>19. Verifies with CM 1 that area is clear. Signals CM 4 to slowly move away from LS until GM(s) are clear of the outriggers and stops.</p>             |
| <p>20. Assists as needed.</p>  | <p>20. Prepares other set of canisters for off loading.</p> | <p>20. Observes operation for safety hazards.</p> | <p>20. Lowers canister(s) to the ground and drives forks all the way through the lift points on the canister.</p> | <p>20. Signals CM 4 to lower canister(s) to the ground and reposition forks all the way through the lift points on the canister(s) for safe movement.</p> |
| <p>21. Assists as needed.</p>  | <p>21. Assists as needed.</p>                               | <p>21. Observes operation for safety hazards.</p> | <p>21. Raises forklift forks to safe travel height (approximately 12 inches).</p>                                 | <p>21. Signals CM 4 to raise forklift forks to safe travel height approximately 12 inches.</p>  |

**WARNING**  
Two ground guides are required at all time to safely move munitions with the use of a forklift.

**WARNING**  
Forklift travel speed will not exceed ground guide's normal walking pace.

Note: Places off loaded canisters as far enough away from the LS, GMC, or MSA so that they do not interfere with the reload.

CREW MEMBER 1	CREW MEMBER 2	CREW MEMBER 3	CREW MEMBER 4	CREW MEMBER 5
---------------	---------------	---------------	---------------	---------------

- |   |   |  |   |   |
|---|---|--|---|---|
| 22. Assists as needed; prepares next set of canisters to be removed from LS, if applicable. | 22. Assists as needed; prepares next set of canisters to be removed from LS, if applicable. | 22. Observes operation for safety hazards, and assists CM 5 with ground guiding to the temporary storage area. | 22. Slowly moves forklift with canister(s) to temporary storage area. | 22. Verifies with CM 1 that area is clear. Signals CM 4 to slowly move forklift with canister(s) to temporary storage area. |
| 23. Assists as needed.  | 23. Assists as needed.  | 23. Observes operation for safety hazards.   | 23. Slowly lowers canister(s) on level ground.                        | 23. Signal CM 4 to slowly lower canister(s) on level ground.  |

Note: It may be necessary to reposition the canisters on the forks before placing them at the storage area.

- |   |                        |  |   |   |
|---|------------------------|--|---|---|
| 24. Upon completion of preparing the next set of canisters for movement on the LS, assists with ground guiding. | 24. Assists as needed. | 24. Observes operation for safety hazards. | 24. Slowly backs away from canister(s) on ground.   | 24. Confirms that area is clear. Signals CM 4 to slowly back away from canister(s) on ground. |
| 25. Assists as needed.  | 25. Assists as needed. | 25. Observes operation for safety hazards. | 25. Positions forklift forks to safe travel height. | 25. Signals CM 4 to position forklift forks to safe travel height (12 inches above ground).   |

26. Repeat steps 13 through 25 for additional download of canister(s) from the LS to the temporary storage area.

Note: Reposition the forks back to the center of the carriage to allow for maximum shift in either direction to ease alignment with the next set of GM(s); adjust oscillation back to center for the same reason.

The following steps are for loading GMs to the LS.

Load GMs in the following order: (1) Load far side. (2) Load near side.



CREW MEMBER 1	CREW MEMBER 2	CREW MEMBER 3	CREW MEMBER 4	CREW MEMBER 5
---------------	---------------	---------------	---------------	---------------

**DANGER**

**Shorting plug(s) must be connected to each live missile. Otherwise, static charges may explode ordnance devices resulting in death or injury.**

**WARNING**

**Two ground guides are required at all times to safely move GM(s) with the use of a forklift.**

**WARNING**

**Forklift travel speed will not exceed ground guide's normal walking pace.**

- |  |  |  |  |   |
|--|--|--|--|---|
| 27. Assists CM 5 to ground guide forklift to GMC or MSA.   | 27. Assists CM 5 to ground guide forklift to GMC or MSA. | 27. Observes operation for safety hazards. | 27. Maneuvers forklift to GMC or MSA.        | 27. Signals CM 4 to maneuver forklift to GMC or MSA.        |
| 28. Ensures the tiedown bolts (all four) connecting the two canisters together are torqued to 60 ft lbs. | 28. Assists as needed.                                   | 28. Observes operation for safety hazards. | 28. Centers forklift on GMs to be up loaded. | 28. Signals CM 4 to center forklift on GMs to be up loaded. |

Note: Ensure GM tie down bolts on the bottom of are in the raised position before movement with the quick release pin installed.

- |  |   |  |  |  |
|--|---|--|--|--|
| 29. Observes operation from rear of forklift for safety hazards. | 29. Ensures the GMs are ready for forklift movement; notifies CM 5. | 29. Observes operation for safety hazards. | 29. Raises forklift forks until they clear GMC platform or ground. | 29. When notified by CM 2, signals CM 4 to raise forklift forks until they clear GMC platform or ground. |
|--|---|--|--|--|

**CAUTION**

**Forks should not extend more than 6 inches past the edge of GM canister(s) when being placed on the LS.**

CREW MEMBER 1	CREW MEMBER 2	CREW MEMBER 3	CREW MEMBER 4	CREW MEMBER 5
<p>30. Assists as needed.</p>	<p>30. Climbs on GMC; ensure the forks do not come in contact with the other GM(s) or GMC. Notifies CM 5 forks are through and stopped.</p>	<p>30. Observes operation for safety hazards. Ensures forks do not come in contact with GMC.</p>	<p>30. Slowly moves forward, inserts forklift forks into GM forklift cavities and stops.</p>	<p>30. Signals CM 4 to slowly moves forward, inserts forklift forks into GM forklift cavities, and stops when notified by CM 2.</p>
<p>Note: Crew members 2 and 5 must work closely together to ensure no equipment damage occurs.</p>				
<p>31. Assists as needed.</p>	<p>31. From up on GMC observes operation for safety hazards.</p>	<p>31. Observes operation for safety hazards.</p>	<p>31. Slowly tilts forks slightly and raises GM(s) approximately 6 inches above platform or ground.</p>	<p>31. Signals CM 4 to tilt forks slightly and raises GM(s) 6 inches above platform or ground.</p>
<p>32. Assists as needed.</p>	<p>32. Removes ground cables (if applicable) once canisters are lifted slightly by the forks.</p>	<p>32. Observes operation for safety hazards. Ensures ground cables are removed before any further movement.</p>	<p>32. Tilts forks slightly upward (to the rear) before movement.</p>	<p>32. Signals CM 4 to tilt forks slightly upward (to the rear) before movement.</p>
<p>33. Confirms with CM 5 that backup area is clear and ground guide.</p>	<p>33. Assists CM 5 to ground guide.</p>	<p>33. Observes operation for safety hazards.</p>	<p>33. Slowly moves away from GMC approximately 6 feet and stops.</p>	<p>33. Verifies with CM 1 that area is clear. Signals CM 4 to slowly move away from GMC approximately 6 feet and stop.</p>

CREW MEMBER 1	CREW MEMBER 2	CREW MEMBER 3	CREW MEMBER 4	CREW MEMBER 5
34. Assists as needed.	34. Assists as needed.	34. Observes operation for safety hazards.	34. Lowers GM(s) to the ground and reposition forks all the way thru GM lift cavities.	34. Signals CM 4 to lower GM(s) to the ground and reposition forks all the way thru GM lift cavities.
35. Assists as needed.	35. Assists as needed.	35. Observes operation for safety hazards.	35. Raises forklift forks for safe travel (approximately 12 inches above ground).	35. Signals CM 4 to raise forklift forks for safe travel (12 inches above ground).

**WARNING**  
Do not elevate or lower GM(s) while the forklift is in motion.

**WARNING**  
Forklift travel speed will not exceed ground guide's normal walking pace.

**WARNING**  
Two ground guides are required at all times to safely move GM(s) with the use of a forklift.

**WARNING**  
To prevent injuries, ensure all personnel are clear before moving forklift.

CREW MEMBER 1	CREW MEMBER 2	CREW MEMBER 3	CREW MEMBER 4	CREW MEMBER 5
---------------	---------------	---------------	---------------	---------------

- |  |  |  |   |   |
|--|--|--|---|---|
| 36. Confirms with CM 5 that backup area is clear and ground guide. | 36. Assists CM 5 to ground guide CM 4 to LS. | 36. Observes operation for safety hazards. | 36. Slowly maneuvers forklift with GM(s) to LS. | 36. Verifies with CM 1 that area is clear; signals CM 4 to slowly maneuver forklift with GM(s) to LS. |
|--|--|--|---|---|

Note: It may be necessary to change the direction the GM(s) are pointing upon removal from the MSA/GMC. This is done by placing them on the ground and picking them up from the opposite side. Failure to do so could result in GM(s) being placed on the LS backwards.

- |  |   |  |  |  |
|--|---|--|--|--|
| 37. Observes operation for safety hazards. | 37. Climbs up on LS; assist CM 5 to position GM(s). | 37. Observes operation for safety hazards. | 37. Slowly maneuvers forklift to center position on LS and stops approximately 6 feet from LS. | 37. Signals CM 4 to slowly maneuver forklift to center position on LS and stop approximately 6 feet from LS. |
|--|---|--|--|--|

**DANGER**  
**Do not stand under or in the path of raised load; serious injury or death may result if struck by moving load.**

- |                                      |                                      |  |   |   |
|--------------------------------------|--------------------------------------|--|---|---|
| 38. Assists as needed.               | 38. Assists as needed.               | 38. Observes operation for safety hazards. | 38. Lowers GM(s) to the ground and repositions forks under GM(s) for movement. (No more than six inches of the forks extending beyond canister) | 38. Signals CM 4 to lower GM(s) to the ground and reposition forks under GM(s) for movement. (No more than six inches of the forks extending beyond canister) |
| 39. Ensures GM(s) clear LS platform. | 39. Ensures GM(s) clear LS platform. | 39. Observes operation for safety hazards. | 39. Raises GM(s) slowly until they clear the LS platform.   | 39. Signals CM 4 to raise GM(s) slowly until they clear LS platform.  |

CREW MEMBER 1	CREW MEMBER 2	CREW MEMBER 3	CREW MEMBER 4	CREW MEMBER 5
---------------	---------------	---------------	---------------	---------------

- |                        |   |  |   |  |
|------------------------|---|--|---|--|
| 40. Assists as needed. | 40. Assists CM 5 with the alignment of the GM(s) over the alignment pins. | 40. Observes operation for safety hazards. | 40. Slowly maneuvers GM(s) over the alignment pins. | 40. Signals CM 4 to slowly maneuver GM(s) over the alignment pins. |
|------------------------|---|--|---|--|

Note: Crew member 2 must work very closely with CM 5 to position GM(s) over alignment pins.

**WARNING**

**Keep hands and feet away from forklift forks to prevent injury.**

- |   |   |  |   |   |
|---|---|--|---|---|
| 41. Assists CM 5.   | 41. Assists CM 5.   | 41. Observes operation for safety hazards.   | 41. Slowly lowers GM(s) onto alignment pins.                  | 41. Signals CM 4 to slowly lower GM(s) onto alignment pins.   |
| 42. Assists as needed.  | 42. Assists as needed.  | 42. Observes for safety hazards, ensures missiles are grounded.  | 42. Remains stopped while missiles are being grounded.        | 42. Ground missiles with LS missile ground cables.  |
| 43. Stays in backup area. Notify CM 5 that area is clear.                 | 43. When forklift is clear of LS, secures torque wrench and mount LS.                   | 43. Observes operation for safety hazards.   | 43. Slowly moves forklift away from the GM forklift cavities. | 43. Verifies with CM 1 that area is clear. Signals CM 4 to slowly move forklift away from the GM forklift cavities. |
| 44. Assists CM 2 with torquing canister tiedown bolts to LS at 60 ft lbs. | 44. Positions tie down bolts and torque to 60 foot pounds. Installs quick release pins. | 44. Observes operation for safety hazards. Once forks clear the LS, assumes duties as 2 <sup>nd</sup> ground guide to pick up next set of canisters. | 44. Slowly moves forklift away from LS approximately 6 feet.  | 44. Signals CM 4 to slowly move forklift away from LS approximately 6 feet and assumes duties as ground guide.      |

CREW MEMBER 1	CREW MEMBER 2	CREW MEMBER 3	CREW MEMBER 4	CREW MEMBER 5
---------------	---------------	---------------	---------------	---------------

- |                        |  |  |  |  |
|------------------------|--|--|--|--|
| 45. Assists as needed. | 45. Climbs down from LS and assists with picking up next set of GM(s). | 45. Observes operation for safety hazards. | 45. Lowers forklift forks for safe travel (approximately 12 inches above ground). Applies a slight tilt to the rear before movement. | 45. Signals CM 4 to lower forklift forks for safe travel (approximately 12 inches above ground). |
|------------------------|--|--|--|--|

46. Repeats steps 27 through 45 for additional up load of GM(s) from GMC or MSA to LS.

Note: If forklift missile reload is complete, procedures performed at this point depend on orders received: whether or not to perform GM cable tests, move LS to next location, or bring LS back to firing configuration.

- |                        |                        |  |   |   |
|------------------------|------------------------|--|---|---|
| 47. Assists as needed. | 47. Assists as needed. | 47. Assists CM 5 to ground guide forklift. | 47. Maneuvers forklift to designated safe area as directed. | 47. Signal CM 4 to a designated safe area away from LS. |
|------------------------|------------------------|--|---|---|

Note: It may be necessary to march order or emplace the LS depending on the location of the reload. Perform necessary procedures per ARTEP 44-635-14-Drill.

## APPENDIX A

### INDIVIDUAL TASK-TO-DRILL MATRIX

A-1. General. The following matrix identifies individual tasks from STP 44-14T14-SM-TG, which support each LS and missile reload crew drill. A "B" or a "D" in the column below indicates individual tasks that support a drill. A "B" indicates tasks that are trained before the drill, and a "D" indicates tasks that are trained during the drill. Skill levels 1, 2 and 3 tasks are shown for these drills.

Individual Task Number and Soldier Manual Task Title	44-5-D015 Launching Station (LS) Forklift Missile Reload
441-082-1104 Perform Operator PMCS/Corrective Maintenance on GMC	D
441-082-1105 Perform Operator/Organizational PMCS on the LS	B
441-082-1106 Load a GMC Onto the GMT	D
441-082-1107 Load a GMC Onto the LS	D
441-082-1108 Remove GMC From the LS	D
441-082-1110 Perform Operator/Organizational Maintenance on the Launching Station Diagnostic Unit (LSDU)	B
441-082-2056 Supervise PMCS/Corrective Maintenance on GMC	D
441-082-3028 Supervise Missile Reload	D
441-082-3029 Supervise Operator /Organizational PMCS on Launching Section Equipment	B

## APPENDIX B

### SERVICE UPON RECEIPT AND DROPPED CANISTER PROCEDURES

B-1. Service Upon Receipt Procedures. When the GM is received at the site, the unit commander is responsible for making sure that—

- The GM is properly identified (identification per TM 9-1410-600-14 and markings per TM 9-1425-601-12).
- The canister records card is brought up-to-date.
- The GM is in good condition upon receipt.

Note: The GM must be inspected when it is received to ensure it is serviceable and not damaged from shipment per TM 9-1410-600-14. Canisters must have all required parts and show no signs of rust, peeling paint, or frame weakness. If the inspected GM canister is considered unserviceable, the unit commander must be notified of any damage to the canister structure, missile, and or conditions, which may interfere with GM storage or launcher.

B-2. GM Canister. Visually inspect the following items for damage as described (Figure B-1):

- Forward fly-through or rear blow-away covers are ripped or torn.
- Cracked, bent, or out-of-place alignment pins.
- Wood runners are broken off.
- Punctures and or holes in canister are greater than 1/8 inch in diameter or length, or appear to be caused by gunfire or shrapnel. Note: Punctures are permissible in forklift channel and bottom plate if they do not extend into canister wall. Cracks in forklift channel metal or weld joints are not cause for rejection.
- Dents ½ inch or more in depth on any longitude canister edge.
- Cracks, deformations, or wrinkles 2 inches or more in length or depth in any canister sidewall.
- Bends or distortions 1/8 inch or more in any missile support shoe frame.
- Vertical or horizontal bends, distortions, or deformations on the entire canister along the axis of launch.



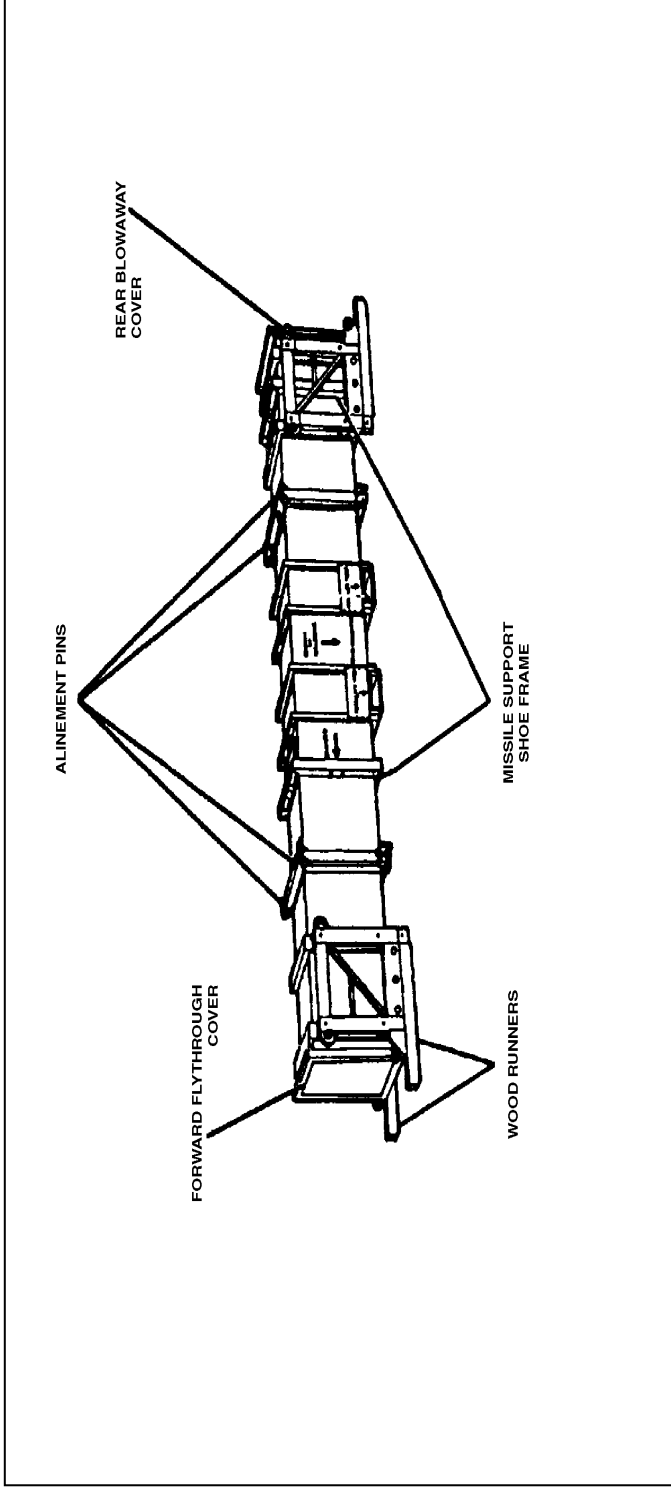


Figure B-1. GM canister

B-3. GM Canister Instrument Panel. Perform the following inspection checks on the instrument panel:

- Check that the grounding plug is connected to electrical connector J1 (Figure B-2).
- Verify that the canister ground terminal J3 is connected to the transport vehicle's ground terminal by a grounding cable.
- Ensure torque tube handle is pinned to the locked position.

**CAUTION**

The GM may be damaged if torque tube handle was unlocked while in shipment. In locked position, torque handle is left of center with quick-release pin in right travel restraint hole. When unlocked, torque tube handle is right of center and a red warning patch can be seen on the instrument panel.

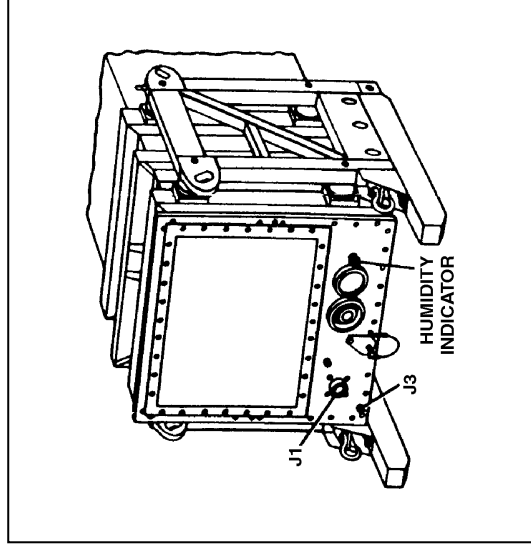


Figure B-2. GM Canister instrument panel

B-4. GM Canister Humidity Indicator. Ensure that the humidity indicator on the canister instrument panel shows a light to dark blue color in all sectors (20, 40, and 60) (Figure B-3).

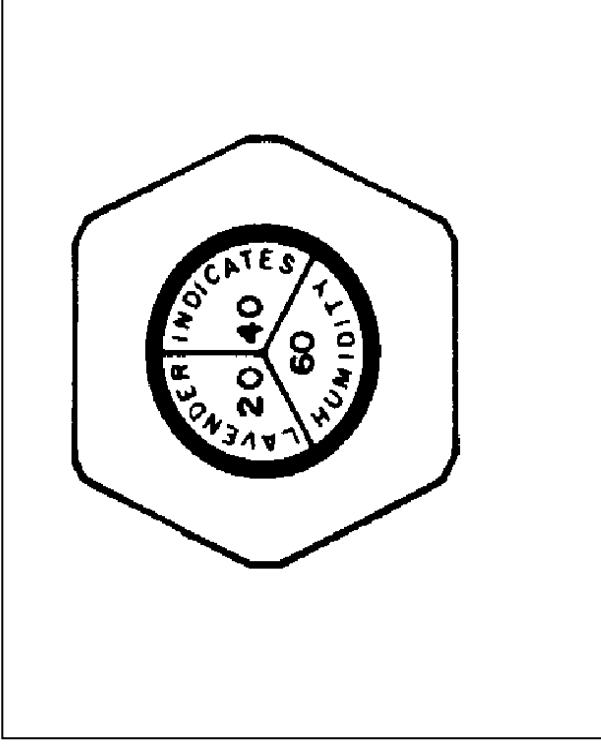


Figure B-3. GM canister humidity indicator

B -5. Dropped Canister Procedures. Procedures for a canister that has been dropped 12 inches or more are as follows—

- If the missile remains in the canister, it must be considered unarmed. The crew will log the time for a one-hour wait and inform the unit commander. The unit commander will acknowledge the crew report, log the time, and, after a one-hour wait, direct removal and replacement of the GM canister.
- If the missile is partly or completely out of the canister, it will be considered hazardous. The crew will log the time for a one-hour wait, inform the unit commander, leave the area at once, and report when they have evacuated the area. The unit commander will acknowledge the crew report(s), close the launching station area to incoming troops and traffic, and call explosive ordnance disposal for assistance.

## APPENDIX C

### CANISTER TIE-DOWN BOLT TORQUE VERIFICATION PROCEDURES

Missile canister tie-down bolt torque verification procedures must be performed before and after launcher operations to ensure that canisters, tie-down bolts, and washers have not loosened or shifted during any launcher movement.

#### CAUTION

Do not loosen canister tie-down bolts to check torque. Verification of the torque is an inspection to assure the washer is properly seated (flat rather than cocked) and that the bolts have at least 60 foot-pounds of torque. Loosening the bolts to retorque will cause excessive wear on the bolts.

Note: Deep socket goes over nut and fits on driver beneath the nut.

1. Using 1/2-inch drive ratchet head, 30- to 150-foot-pound torque wrench handle, 30-inch extension, (PAC-2), 36-inch (PAC-3) and 3/4-inch-deep socket, verify torque value of each canister tie-down bolt as follows:
  - a. Set torque wrench handle micrometer to 60 foot-pounds.
  - b. Using the torque wrench, tighten each of the four tie-down bolts until torque wrench clicks off.
2. Repeat step 1 until torque values for tie-down bolts are verified on all four-missile canisters.

## APPENDIX D

### MRCTS TEST PROCEDURES

MRCTS test procedures are used to ensure that the system is safe before connecting a signal cable to GM. It has a self-test feature and requires power from launcher electronics.

1. Energize power.
2. Energize DLTM.
3. Energize LEM.
4. Check that all five BITE lights are off.
5. Set BITE TEST/OFF/STATUS LAMP TEST switch to STATUS LAMP TEST. Check that all BITE lights are on.
6. Set switch to BITE TEST. BITE lights cycle on and off for six seconds. If all BITE lights remain on, test passed.
7. Set switch to OFF.
8. De-energize LEM.
9. Set MRCTS on work platform behind LMRD in position to test GM cables.
10. Press PRESSURE RELIEF valve to relieve pressure in case.
11. Release six latches and remove cover.
12. Release two push-button fasteners on inner lid, swing open, and remove cable.
13. Close and secure inner lid.
14. Set MRCTS POWER switch to OFF.
15. Remove cover from LMRD connector and from MRCTS connector.
16. Connect MRCTS cable to LMRD.

17. Connect MRCTS cable to MRCTS.
18. Open dimmers on each of four MRCTS lights by rotating lens cover fully counterclockwise.
19. Disconnect large GM cable from large dummy connector at applicable position.
20. Connect large GM cable to MRCTS connector.
21. Energize LEM.
22. Set POWER switch to ON.
23. Check to see if POWER ON and SAFE TO TEST lights are on.
24. Press to test NO-GO and GO lights; lights come on when pressed.
25. Momentarily hold RESET switch up. Step display indicates OO.
26. Momentarily hold START switch to START. Step display starts counting.
27. After about 35 seconds, step display indicates 99 and GO light comes on. Test has passed.
28. Set POWER switch to OFF.
29. De-energize LEM.
30. Disconnect GM cable from MRCTS.
31. Connect cable to GM.
32. Repeat steps 19 through 31 to test and connect all cables for all four GIMs.

## APPENDIX E

### TEST LAUNCH PROCEDURES

Test launch procedures provide for the testing of functions not tested by ELES built-in test (BIT) and performs a test-on-test that rechecks functions previously checked by BIT. This test ensures all signals meet the minimum requirements to fire a PAC-2 or PAC-3 missile. It tests all missile inputs (signal and power) at the canister connector end of the umbilical cables.

#### SETUP FOR TEST LAUNCH.

1. Obtain canister-shorting plugs.

#### **WARNING**

**Install shorting plugs immediately after cable connector is disconnected. Otherwise, static charges may explode ordnance devices.**

2. Connect all umbilical and heater cables to stowage points.
3. Energize the generator.
4. Ensure A1A3 CANISTER CONNECT/DISCONNECT switches are set to DISCONNECT.
5. Set DIAGNOSTIC UNIT switch to ON.
6. Set LOCAL/REMOTE switch to LOCAL. Verify that the LOCAL light comes on.
7. Launch ENABLE/DISABLE to DISABLE.
8. Energize the ELES.
9. After completion of PBIT test, status menu displays ELES GO.
10. Set ELES POWER switch to OFF.

## TEST LAUNCH

1. Disconnect umbilical cable(s) from stowage points.
2. Connect cables to:
  - (PAC-2) J-BOX/LSDU J18.
  - (PAC-3) J-BOX/LSDU J13 and J15.
3. Energize the ELES.
4. Set respective CANISTER CONNECT/DISCONNECT to CONNECT. Verify that the DISCONNECT light goes off.
5. Set LAUNCH ENABLE/DISABLE to ENABLE.
6. Select MAIN MENU.
7. On the MAIN menu select RELOAD.
8. On the RELOAD menu select the respective canister.
9. On the RELOAD menu select ACCEPT.
10. On the RELOAD menu select MENU.
11. On the MAIN menu select LS SETUP.
12. On the LS SETUP menu select HTRS.

Note: Selecting each respective heater will turn that heater ON. Selecting a heater again will turn that heater OFF.

13. On the HEATER menu select the respective canister.
14. HEATER menu is displayed with respective canister heater shown ON. Select MENU.
15. On the LS SETUP menu select MENU.
16. On the MAIN menu select DIAG.



17. On the DIAG menu select TEST LAUNCH.
  18. On the TEST LAUNCH menu select START.
- Notes:
- TEST LAUNCH indicates test in progress.
  - IN PROG indicator is flashing.
  - MISSILE READY light is on.
19. On the TEST LAUNCH menu select CONT.
- Notes:
- TEST LAUNCH indicates test in progress.
  - IN PROG indicator is flashing.
  - TEST PASSED is displayed after test completes cycling.
20. Set LAUNCH ENABLE/DISABLE switch to DISABLE.
  21. Set respective CANISTER CONNECT/DISCONNECT switch to DISCONNECT. MISSILE DISCONNECT light comes on.
  22. Set ELES POWER switch to OFF.
  23. Set DIAGNOSTIC UNIT switch to OFF.
  24. Disconnect cables from:
    - (PAC-2) J-BOX/LSDU connector J18.
    - (PAC-3) J-BOX/LSDU connector J13 and J15.
  25. Return cables to respective stowage points.
- Notes:
- If test launch is to be performed on other canister paths repeat this procedure for the respective canister path.
  - If test launch has been performed on other canister paths, perform Stray/No Voltage Test (Appendix F).

## APPENDIX F

### STRAY/NO VOLTAGE TEST PROCEDURES

Stray/no-voltage tests are performed before connecting umbilical cables to the munition canister. These tests ensure safety-critical pyrotechnic lines are safe for connection.

#### NO VOLTAGE

1. Deenergize the ELES.
2. Remove all umbilical cables from canisters.

Note: Place shorting plugs on all canister connectors.

3. Connect:
  - (PAC-2) umbilical cable to J-BOX/LSDU connector J17
  - (PAC-3) power and signal cable to J-BOX/LSDU connector J14 and J16.
4. Ensure LOCAL/REMOTE switch is set to LOCAL.
5. Ensure LAUNCH ENABLE/DISABLE switch is set to DISABLE.
6. Ensure CANISTER CONNECT/DISCONNECT switches are set to DISCONNECT.
7. Ensure MISSILE DISCONNECT lights are on.
8. Set DIAGNOSTIC UNIT switch to ON.
9. Set ELES POWER switch to ON.

Note: ELES GO is displayed after PBIT test.

10. Select MAIN MENU.
11. On the MAIN menu select DIAG.
12. On the DIAG menu select CABLE TEST.

Note: Ensure PMP displays correct canister: PAC-2 or PAC-3.

13. On the CABLE TEST menu select VOLT TESTS.
14. On the SELECT CABLES menu select respective canister. VOLT TESTS menu appears.
15. On the VOLT TESTS menu select CONT.

Notes:

- IN PROG flashes during test.
- TEST PASSED is displayed after test passes.

16. Perform stray voltage procedures.

#### STRAY VOLTAGE PROCEDURES

1. Set ELES POWER switch to TEST. DIAG menu is displayed.
2. On the DIAG menu select CABLE TESTS.

Note: Ensure PMP displays correct canister: PAC-2 or PAC-3.

3. On the CABLE TESTS menu select VOLT TESTS.
4. On the SELECT CABLES menu select respective canister. VOLT TESTS menu appears.
5. On the VOLT TESTS menu select CONT.

Notes:

- IN PROG flashes during test.
- TEST PASSED is displayed after test passes.

6. Set DIAGNOSTIC UNIT switch to OFF.
7. Set ELES POWER switch to OFF.

8. Disconnect:

- (PAC-2) umbilical cable from J-BOX/LSDU connector J17.
- (PAC-3) signal and power cable from J-BOX/LSDU connector J14 and J16.

9. Remove shorting plugs from canisters and immediately connect tested cables.

10. Place shorting plugs in stowage points.

Note: If test is needed on other cables, repeat this procedure for respective canister.

## APPENDIX G

### CONVERTING LS TO LOAD MIM 104 OR PAC-3 MUNITIONS

1. Verify A1 is de-energized per paragraph 2-42, TM 9-1440-600-10.
2. If converting to launch MIM-104 GM, continue with to step 3. If converting to launch PAC-3 munitions, skip to step 4.
3. Convert LS to launch MIM- 104 GM:
  - a. Remove protective cap from A1A2J104.
  - b. Disconnect 5A5W7P2 from A1A2J108 and connect to A1A2J104.
  - c. Install protective cap on A1A2J108.
  - d. Remove protective cap from A1A2J103.
  - e. Disconnect 5A5W6P2 from A1A2J108 and connect to A1A2J103.
  - f. Install protective cap on A1A2J107.
  - g. Remove protective cap on A1A2J102.
  - h. Disconnect 5A5W6P2 from A1A2J106 and connect to A1A2J102.
  - i. Install protective cap on A1A2J106.
  - j. Remove protective cap from A1A2J101.
  - k. Disconnect 5A5W8P2 and connect to A1A2J101.
  - l. Install protective cap on A1A2J105.
4. CONVERT LS TO LAUNCH PAC-3 MUNITIONS:
  - a. Remove protective cap from A1A2J108.
  - b. Disconnect 5A5W7P2 from A1A2J104 and connect to A1A2J108.

- c. Install protective cap on A1A2J104.
- d. Remove protective cap from A1A2J107.
- e. Disconnect 5A5W6P2 from A1A2J103 and connect to A1A2J107.
- f. Install protective cap on A1A2J103.
- g. Remove protective cap from A1A2J106.
- h. Disconnect 5A5W5P2 from A1A2J102 and connect to A1A2J106.
- i. Install protective cap on A1A2J102.
- j. Remove protective cap from A1A2J105.
- k. Disconnect 5A5W8P2 from A1A2J101 and connect to A1A2J105.
- l. Install cap on A1A2J101.

## APPENDIX H

### ADDITIONAL FORKLIFT PROCEDURES

#### WARNING

**Before starting engine and operating forklift, be thoroughly familiar with the information in this manual. Review all warnings and safety precautions.**

Note: This appendix pertains to controls and specifications of the most common forklift used for this task; the forklift model 10,000 LB, 10A, NSN: 3930-01-054-383, however there are other 10,000 LB forklift models in use throughout the world for this task. Ensure that any other model used is within the load limit and reaches the capabilities required for this Patriot Missile Movement.

1. Initial Adjustments, Daily Checks, and Self-Test.
  - a. Lubrication. Refer to LO 10-3930-643-12.
  - b. Perform (B) before operations PMCS.
  - c. Mounting and dismounting.
    - (1) Use steps and grab irons when mounting or dismounting the forklift.
    - (2) Face the forklift when mounting or dismounting.
    - (3) Do not use the steering wheel as a handhold. The forklift could articulate if running.
    - (4) Do not jump off the forklift.
  - d. Adjust the seat. Pull the adjustment lever back and adjust forward or rearward as desired. Do not adjust the seat while the forklift is in motion.
    - e. Fasten and adjust the seat belt.
      - (1) Lengthen. Hold the single strap and pull the slide toward the buckle. Adjust the buckle to the correct extension.
      - (2) Shorten. Hold the slide and pull the bottom loop toward the buckle. Adjust the buckle to the correct extension.

2. Starting.

a. Start the engine. Check logbook to determine period of non-operation. If engine has been idle for 30 days or more, the turbocharger must be primed before starting the engine. Notify organizational maintenance.

- (1) Before entering the cab, turn the MASTER DISCONNECT SWITCH to ON. Do not use foot.

**WARNING**

**To prevent movement of the forklift, apply parking/emergency brake and place transmission directional lever in lock position before starting engine.**

- (2) Apply the parking brake and place the transmission directional lever in neutral.

(3) Depress the accelerator to the one half engine speed position for temperatures above +50 degrees Fahrenheit or to the full speed position for temperatures below +50 degrees Fahrenheit.

**CAUTION**

After 30 seconds of cranking allow 2 minutes for the starter to cool.

**CAUTION**

If the oil pressure gauge does not register within 10 seconds after starting, stop the engine and notify organizational maintenance.

**CAUTION**

Engine fan must be operating when engine is running or engine will overheat. Check engine fan switch to make sure it is on.

- (4) Turn the start switch to the START position and release it the instant the engine starts.

- (5) Reduce engine speed and keep the engine at a low idle until the systems are warm.





b. Starting aids.

- (1) Winter oils. To determine the oil for winter use refer to lubrication specifications in the lube order. Use the recommended oil for the temperature range indicated. Refer to LO 10-3930-643-12.

**WARNING**

**Ether is toxic and flammable. Use only in well ventilated areas. Avoid contact with eyes, skin, and clothes. Do not use ether or discard ether container near an open flame, sparks, or heat. Failure to follow these instructions could result in severe injury.**

**CAUTION**

Excessive use of ether will cause piston and ring damage. Use it sparingly and only for starting purposes in temperatures below freezing.

(2) Using ether injector.

- (a) Turn the start switch to the RUN position.
- (b) Depress accelerator to FULL SPEED.
- (c) Move ether injector switch to ON position and hold 2 or 3 seconds, filling ether valve chamber with a measured amount of ether.
- (d) Turn start switch to start position.

Note: In extreme cold weather if engine fails to start after 30 seconds of cranking, it may be necessary to repeat this procedure. Wait 2 to 3 minutes to allow start motor to cool before starting again. S/N 2001 and above has a lever type starting switch and must be turned to the OFF position before repeating this procedure. If engine fails to start after second ether injection, call organizational maintenance.

(3) Slave starting the engine. Contact organizational maintenance, if required.

c. After starting.

- (1) Perform (D) during operations PMCS.

(2) Operate the engine at low idle until the hydraulic oil is warm. When the temperature is below +35 degrees Fahrenheit, move all hydraulic controls slowly to warm them up. Move each cylinder several times to warm it up.

(3) Test the hydraulic controls. Allow extra warm up time if controls are sluggish.

d. Moving the forklift.

(1) Ensure seat belt is fastened.

(2) Before moving or operating the boom or forks, ensure all personnel are clear of the area.

(3) Move the transmission directional lever lock to the unlock position before shifting the transmission directional lever.

**WARNING**

**The air pressure gauge must be in the green area. If it is not, stop the engine, apply parking/emergency brake, and lock transmission directional lever. Notify organizational maintenance of the problem.**

(4) Depress the brake pedal.

**WARNING**

**Brake damage can occur if the forklift is moved with the brake applied.**

(5) Release the parking/emergency brake.

(6) Partially accelerate the engine and raise the forks enough to clear the ground. Release the accelerator pedal.

(7) Place the transmission direction lever in the desired position.

(8) Place the transmission direction lever in the first gear position.

(9) Release the brake pedal and gradually depress the accelerator.

(10) Select the desired work speed.

3. Forklift shifting.

a. Shifting transmission gears.

Note: The transmission has 3 forward gear ranges, 3 reverse gear ranges, and a neutral, which are manually selected with the transmission gear range and direction lever.

- First gear is the lowest and main working gear range. Second gear can be used for working and roading the forklift. Third gear is used to road the forklift for longer distances at the maximum forklift speeds.
- The direction lever "R" (reverse) also has first, second, and third gear ranges.
- The direction lever "N" (neutral) position has a neutral start safety switch incorporated in it. The direction lever must be in the "N" before the engine can be started.

**DANGER**

**When traveling downhill never shift transmission into neutral. You could lose control of the forklift resulting in injury or death.**

**CAUTION**

Never shift transmission into neutral when traveling downhill. This could cause loss of control of forklift or damage to the drivetrain when shifting back into gear.

- (1) Down-shifting. A downshift from 3 to 2, 2 to 1, or 3 to 1 can be made at any time to maintain an efficient engine speed.
  - (2) Up-shifting. An up-shift from 1 to 2, 2 to 3, or 1 to 3 can be made at any time. The most efficient use of gear range is achieved when maximum engine RPM is reached in the gear range before an upshift is made.
  - (3) Direction change. Forklift must come to a complete stop before changing forward or reverse direction.
- b. Stopping the forklift.
- (1) Apply the service brakes to stop the forklift.
    - (a) Fully release the accelerator pedal.

- (b) Apply the service brake and transmission disconnect pedal until the vehicle comes to a complete halt.
  - (c) Move the directional lever to the neutral position.
  - (d) Lower forks to the ground.
  - (e) Apply the parking brake.
- (2) If the service brakes fail, the vehicle can be stopped by applying the parking/emergency brake.
- c. Steering. The forklift is articulated and steering is accomplished by hydraulic power, which pivots the main frames at the center hinge. Turn the steering wheel until reaching the desired angle of turn. Hydraulic power holds the angle of turn until the steering wheel is again turned.
- d. Fork carriage operation.

### **WARNING**

**Do not hold second control lever in any other position except hold for an extended period. Failure to follow these instructions will damage the hydraulic system and affect forklift performance.**

- (1) Lift control lever, first lever to the right of the operator's seat. It has three control positions: RAISE, HOLD, and LOWER.
  - RAISE-Pull the lever back until desired height is reached. Return to HOLD position is automatic when the lever is released.
  - HOLD-Lever automatically returns to HOLD when released. Forks remain at the height allowed when the lever is placed in HOLD.
  - LOWER-Push the lever forward until desired height is reached. Return to HOLD is automatic when the lever is released.
- (2) Tilt control lever, second lever to the right of the operator's seat. It has three control positions: Return to HOLD is automatic when the lever is released.
  - (a) TILT BACK - Pull the lever back until the desired upward tilt angle is reached. Return to HOLD is automatic when the lever is released.
  - (b) HOLD - Lever automatically returns to HOLD when released. Forks remain at the height allowed when the lever is placed in hold.

(c) TILT FORWARD-Push the lever forward until the desired downward tilt angle is reached. Return to HOLD is automatic when lever is released.

(3) Slideshift, oscillate, and fork positioner control lever. Third lever to the right of the operator's seat. Together with the attached mode selector switch it has nine-fork control positions: FORKS APART, HOLD, FORKS TOGETHER, OSCILLATE CARRIAGE LEFT SIDE DOWN, HOLD, OSCILLATE CARRIAGE RIGHT SIDE DOWN, CARRIAGE SIDESHIFT LEFT, HOLD, and CARRIAGE SIDESHIFT RIGHT.

(4) Mode selector switch forward. Lift up on mode selector switch and push switch forward.

(5) FORKS TOGETHER - Pull lever back to move forks toward each other. Return of the lever to HOLD is automatic when the lever is released. FORKS APART-Push lever forward to move forks away from each other. Return of the lever to HOLD is automatic when lever is released.

(a) Mode selector switch in center position.

- OSCILLATE RIGHT - Pull lever back to rotate carriage in a lowering of the right fork and raising the left fork direction. Return of the lever to HOLD is automatic when lever is released. HOLD-Lever automatically returns to HOLD WHEN released. Forks remain stationary at spacing attained when lever is placed in HOLD.

- OSCILLATE LEFT-Push lever forward to rotate carriage in a lowering of the left fork and raising of the right fork direction. Return of the lever to HOLD is automatic when lever is released.

(b) Mode selector switch back.

- SIDESHIFT RIGHT - Pull lever back to move the fork carriage to the right. Return of the lever to HOLD is automatic when lever is released. HOLD-Lever automatically returns to HOLD when released. Forks remain stationary at spacing attained when lever is placed in HOLD.

- SIDESHIFT LEFT-Push lever forward to move the fork carriage to the left. Return of the lever to HOLD is automatic when lever is released.

#### 4. FORKLIFT SHUTDOWN PROCEDURES.

a. Park the forklift.

(1) Move the forklift to a safe level location.

(2) Lower forks to the ground.

(3) Move the lock over the transmission direction lever.



**CAUTION**

Stopping the engine immediately after the forklift has been under a load could result in overheating and accelerated wear. To prevent mechanical problems use the following procedure to allow engine to cool.

- b. Shut down the forklift engine.
  - (1) Park the forklift and operate at a low idle for five minutes.
  - (2) Turn the start switch to the OFF position.
  - (3) Perform (A) after operation PMCS.



## APPENDIX I

### GUIDED MISSILE RELOAD SAFETY BRIEFING

The following procedure is for unit guidance only; it is a not all-inclusive procedure. The unit may or may not use all or any part of this procedure. The unit must have some form of missile reload safety briefing prior to reload operations.

- a. For minimum missile reload operations four 5-pound B: C or two 10-pound B: C (sodium bicarbonate) fire extinguishers are located in the reload area.
- b. Personnel on the LS, forklift, GMT, or GMC must be watched by other members and warned of any unsafe conditions. If anyone observes an unsafe act or condition, he will stop operations immediately.
- c. The unit will set the maximum number of personnel authorized in the reload area. The entry control point guard will monitor the number of personnel in the reload area at all times to ensure the limit is not exceeded. The CO can authorize exceptions to the proposed limit.
- d. Smoking is prohibited within 100 feet of the designated reload operations area. All heat producing operations, such as welding, drilling, and cutting are prohibited on GM canister(s) or on any LS, GMT, GMC, or forklift loaded with guided missiles.
- e. Only one designated crew member, who must always be visible to the forklift operator, will give signals to the forklift operator. If the forklift operator loses visibility of the signalman during movement operations, forklift movements will stop immediately.
- f. No one at any time will pass under the forklift forks. Be careful not to place body parts between objects such as the missile skids and the canister(s).
- g. Personnel will not place themselves between the forklift and the LS during the conduct of the reload operations.
- h. All forklift movements will be performed in deliberate, slow, and smooth manner. All forklift movement will cease while crew members are mounting or dismounting the LS, GMT, or GMC.
- i. Tools used during reload operations will be properly handled. Tools will not be laid on the ground, struck, banged, or otherwise misused for any purpose other than what is intended. When handing tools to another crew member, only one piece will be passed at a time. This not only protects the tools and its calibration, but also will prevent inadvertent sparking. If the torque wrench is misused dropped, or not functioning properly, it must be turned in for recalibration. Proper torquing procedures will be used at all times.
- j. Ensure that torque tube handles remain locked and pinned while in the horizontal position. Shorting plugs must remain connected to J1 of each live missile until just prior to connection of guided missile cable.
- k. Gloves will be readily available; Kevlar helmets will be worn at all times during missile reload operations.

l. Ensure ground cables remain connected to live missiles until just prior to lifting the canister. Ensure that they are immediately reconnected as soon as the canister is correctly positioned on the LS, GMT, GMC, or placed in the missile storage area. If a live missile is dropped more than 12 inches, evacuate the area of all personnel to the required distance. Notify the TCO or CO and refer to Dropped Missile Procedures in Appendix B.

m. If a missile or transport vehicle (GMT or GMC) or cetera catches fire, fight the fire until the senior NCO or officer deems the situation unsafe. Crew members will evacuate the area of all personnel and move to the required safe distance. If a fire should occur during missile movement, the safety NCO or officer will designate the safest location to temporarily place the missile. Above all, safety, common sense, and crew drill and/or TM procedures will be followed during reload operations.

n. Are there any questions related to this reload operation at this time?

## GLOSSARY

<b>AC, ac</b>	Active Component; assistant commandant; alternating current; aircraft
<b>AEE</b>	Automatic emplacement enhancement
<b>ARTEP</b>	Army Training and Evaluation Program
<b>B</b>	before
<b>ccw</b>	counterclockwise
<b>CM</b>	crew member; cruise missile
<b>CW (cw)</b>	clockwise
<b>D</b>	during; daily; demonstration
<b>DC, dc</b>	District of Columbia; direct current
<b>DLT</b>	data link terminal
<b>DTLM</b>	data link terminal module
<b>ECS</b>	engagement control station

<b>ELES</b>	enhanced launcher electronic system
<b>GM</b>	guided missile
<b>GMT</b>	guided missile transporter
<b>HEMTT</b>	heavy expanded mobility tactical truck
<b>LCU</b>	launcher control unit; lightweight computer unit
<b>LEM</b>	launcher electronics module
<b>LS</b>	launcher station; launching section
<b>LSDU</b>	launching station diagnostic unit
<b>MOPP</b>	mission-oriented protective posture
<b>MRCTS</b>	missile round cable test set
<b>MSA</b>	missile storage area
<b>PMCS</b>	preventive maintenance checks and services
<b>STP</b>	soldier training publication

**TM, tm**

technical manual; theater missile; team

**TRADOC**

Training and Doctrine Command

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1 OCTOBER 2003

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