

TABLE OF CONTENTS

General	1
Description and Operation	1
General	1
Lifting	2
Lowering	2
Safety Procedures When Working Near Mast	2
Forks Repair	3
Adjust	3
Remove	3
Install	3
Low-Mount Fork	3
Carriage Repair	4
General	4
Remove	4
Disassemble	7
Clean and Inspect	9
Assemble	9
Install	11
Carriage Side Blocks	11
Adjust	11
Mast Repair	12
Remove	12
Disassemble	13
Clean and Inspect	15
Assemble	16
Install	18
Lift Cylinders Repair	18
Remove	18
Disassemble	18
Clean and Inspect	19
Assemble	19
Install	19
Fork Positioner Cylinders Repair	20
Remove	20
Disassemble	20
Clean and Inspect	20
Assemble	20
Install	20
Sideshift Cylinder Repair	21
Remove	21
Disassemble	21
Clean and Inspect	21
Assemble	21
Install	21
Header Hoses Replacement	21
Carriage Side Blocks Adjustment	23
Mast Side Blocks Adjustment	23
Mast Load Rollers Adjustment	23
Lift Chains Adjustment	24
Lift and Tilt Cylinders Leak Check	24
Troubleshooting	25

General

This section has the description and the service procedures for the mast. The parts of the mast include the forks, carriages, lift cylinders, and the mast weldments.

Description and Operation

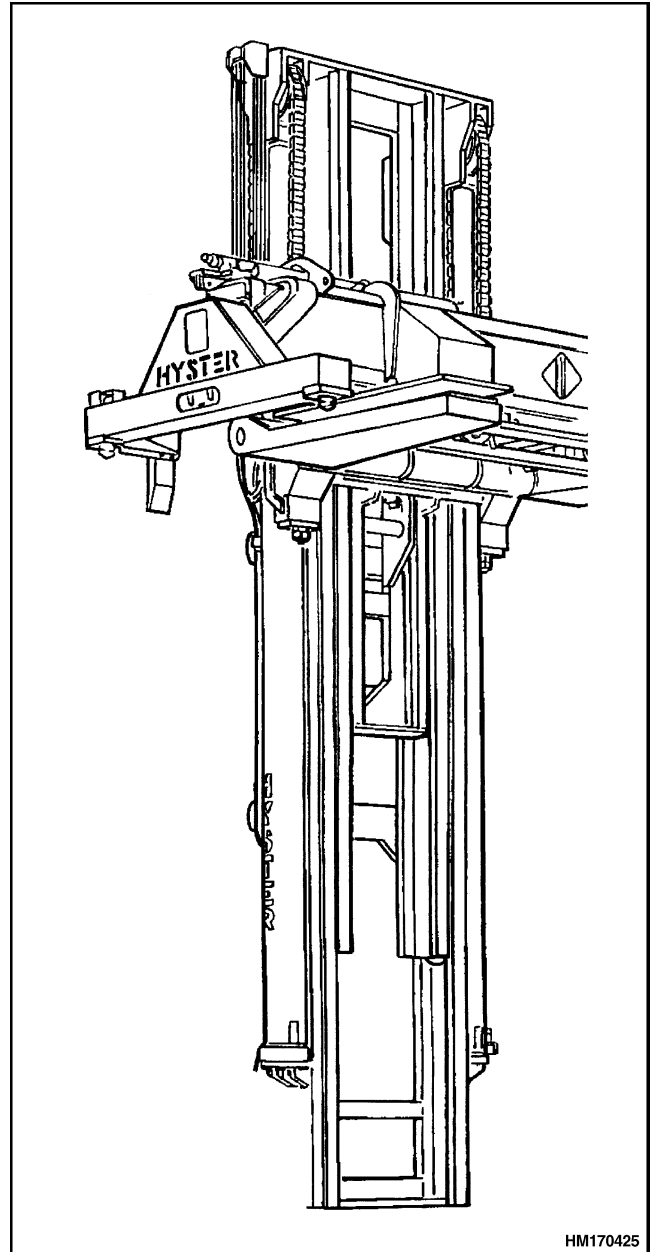
GENERAL

The vertical frames of a mast are called channel weldments. See Figure 1. All of the masts have telescopic weldments. The outer weldment is mounted on support pins in the frame to let the mast tilt forward and backward. The tilt cylinders connect the outer weldment of the mast to the frame.

Hydraulic lift cylinders are installed vertically at each side of the outer channel weldments. The lift cylinders and lift chains raise and lower the inner weldment and the carriage. The base of each lift cylinder fits into a mount near the bottom of the outer weldment. The top of each lift cylinder (cylinder rod) fits into a guide at the top of the inner weldment. Operation of the lift cylinders extends and retracts the inner weldment.

Two lift chains control the movement of the carriage. The chains fasten to mounts near the top of the outer weldment. The chains go up and over the chain sheaves and then connect to the carriage. The chain sheaves are installed near the top of the inner weldment. When the lift cylinders extend, the lift chains transfer the force from the lift cylinders to the carriage.

When the telescopic weldments and the carriage lift a load, forces are put on the mast assembly. To decrease the friction caused by these forces, load rollers and side blocks are installed between the moving parts. The load rollers and side blocks travel along the channels within the weldments.



HM170425

Figure 1. Mast

LIFTING

Oil from the main control valve enters the lift cylinders at the lowering control valves. Because of the heavy load on the mast, pressure in the base of the lift cylinders is higher when there is a load. There is no oil in the top of the lift cylinders, but there is a drain line attached on top of the lift cylinders which connects to the hydraulic tank.

LOWERING

During lowering, the oil from the lift cylinders flows through the lowering control valves to the main control valve. See the section **Diagrams** 8000 SRM 1153 for E117 lift trucks and **Diagrams** 8000 SRM 1236 for A917 and F117 lift trucks. The lowering control valves permit easy entry of hydraulic oil into the lift cylinders, but give a restriction when the lift cylinders are lowered. This restriction controls the speed that a load can be lowered.

Safety Procedures When Working Near Mast

The following procedures must be used when inspecting or working near the mast. Additional precautions and procedures can be required when repairing or removing the mast. See the correct Service Manual section for the specific mast being repaired.



WARNING

Mast parts are heavy and can move. Distances between parts are small. Serious injury or death can result if part of the body is hit by parts of the mast or the carriage.

- **Never put any part of the body into or under the mast or carriage unless all parts are completely lowered or a safety chain is installed. Also make sure that the power is OFF and the key is removed. Put a DO NOT OPERATE tag in the operator's compartment.**
- **Be careful of the forks. When the mast is raised, the forks can be at a height to cause an injury.**
- **Do NOT climb on the mast or lift truck at any time. Use a ladder or personnel lift to work on the mast.**
- **Do NOT use blocks to support the mast weldments nor to restrain their movement.**
- **Mast repairs can require disassembly and removal of parts and can require removal of the mast or carriage. Follow the repair procedures in the correct Service Manual for the mast.**

WHEN WORKING NEAR THE MAST ALWAYS:

1. Lower the mast and carriage completely. Push the lift/lower control lever forward and verify there is no movement in the mast. Verify that all parts of the mast that move are fully lowered.

OR

2. If parts of the mast must be in raised position, install a safety chain to restrain the moving parts of the mast. Connect moving parts to a part that does not move. Follow these procedures:
 - a. Put the mast in a vertical position.
 - b. Raise the mast to align the bottom cross-member of the inner weldment with a cross-member on the outer weldment.
 - c. Use a safety chain, which can hold a minimum of 20,000 kg (44,093 lb), with a hook to fasten the crossmembers together so that the movable member cannot lower. Put the hook on the back side of the mast. Verify the hook is completely engaged with a link in the chain. Verify the safety chain does not touch lift chains or chain sheaves, tubes, hoses, fittings, or other parts on the mast. See Figure 2.
 - d. Lower the mast until there is tension in the safety chain. If running, stop the engine. Apply the parking brake. Install a **DO NOT REMOVE** tag on the safety chain(s).
 - e. Install another safety chain (1/2 inch minimum) between the top or bottom crossmember of the carriage and a crossmember on the outer weldment.
3. Apply the parking brake. After lowering or restraining the mast, shut off the power and remove the key. Put a **DO NOT OPERATE** tag in the operator's compartment.

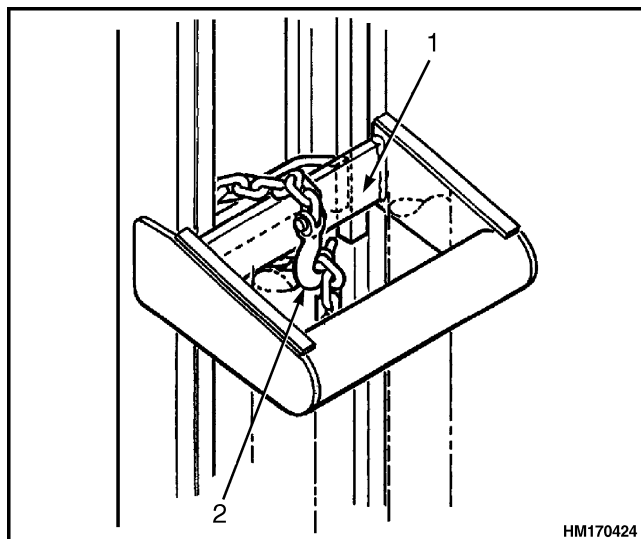


Figure 2. Mast Safety Chains

Legend for Figure 2

1. OUTER WELDMENT
2. HOOK

Forks Repair

The identification of a fork is determined by how it is connected to the carriage. See Figure 3. These lift trucks have pin forks. These forks can be low-mount forks or high-mount forks.

ADJUST

Pin forks are fastened to the carriage with large fork pins. The carriage can be equipped with fork positioner cylinders to move the forks.

REMOVE

A fork can be removed from the carriage for replacement of the fork or other maintenance.



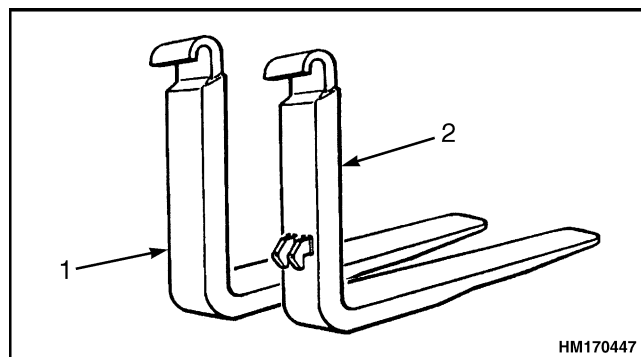
WARNING

The forks can weigh up to 1360 kg (3000 lb) each. Do not try to remove a fork without a lifting device.

Low Mount Fork: Put the lift truck on a level surface and lower the forks. Tilt the mast so that the forks have stability. If the forks have hooks at the pins, lower the carriage and tilt forward. Remove the fork retainers. Back the lift truck away from the forks. For standard pin forks, remove the retainers for the fork pins and push the pins from the carriage. Move the lift truck away from the forks.

High Mount Fork: Move the forks toward the center of the carriage. Remove the fork retainers. Verify

the hooks are free of the carriage. Use a lifting device to remove the forks from the fork pins. The forks can weigh up to 1250 kg (2670 lb).



1. STANDARD FORK (LOW MOUNT)
2. SIDESHIFT FORK (LOW MOUNT)

Figure 3. Types of Forks

INSTALL

Low-Mount Fork

1. Put the forks approximately 1 m (3 ft) in front of the carriage.
2. For standard pin forks, slowly move the lift truck toward the forks until the fork pins can be installed. Install the fork pins, fork guides, and the retainers.

- For forks with hooks for the pins, tilt the mast forward and lower the carriage completely. Move the lift truck toward the forks. Carefully raise the carriage until the fork pins fit into the hooks of the forks. Verify the forks are completely

engaged with the fork pins. Install the fork retainers.

- Connect the fork positioner cylinders to the fork guides.

Carriage Repair

GENERAL

These procedures are for the following carriage types.

- Dedicated carriage. See Figure 4.
- Gantry carriage PPS (Power Pile Slope). See Figure 5.
- Gantry carriage MPS (Mechanical Pile Slope). See Figure 6.
- Standard Forklift Carriage See Figure 7.
- Sideshift Forklift Carriage See Figure 8.

REMOVE

NOTE: When a container attachment is attached, proceed with Step 1. When forks are attached, proceed with Step 2.

- Remove the dedicated container attachment or gantry container attachment. See the section **Extendable Container Attachment (Elme), 812, 813, 815, and 818 Series 5000 SRM 723 (E117 and F117 only)**.
- Remove the forks as described in Forks Repair.
- Place lift truck on solid, level surface.
- Lower carriage completely.
- Apply parking brake.
- Shut down the engine.

- Put blocks on both sides (front and back) of the tires to prevent movement of the lift truck.

- Connect a lifting device to the lifting eyes at each side of the top crossmember of the carriage. Operate the lifting device until the carriage just begins to move.

NOTE: Tag all hoses, hydraulic lines, or wiring harnesses before removal.

- Disconnect any header hoses, hydraulic lines, or wiring harness at the carriage.

- Put caps on open lines.



WARNING

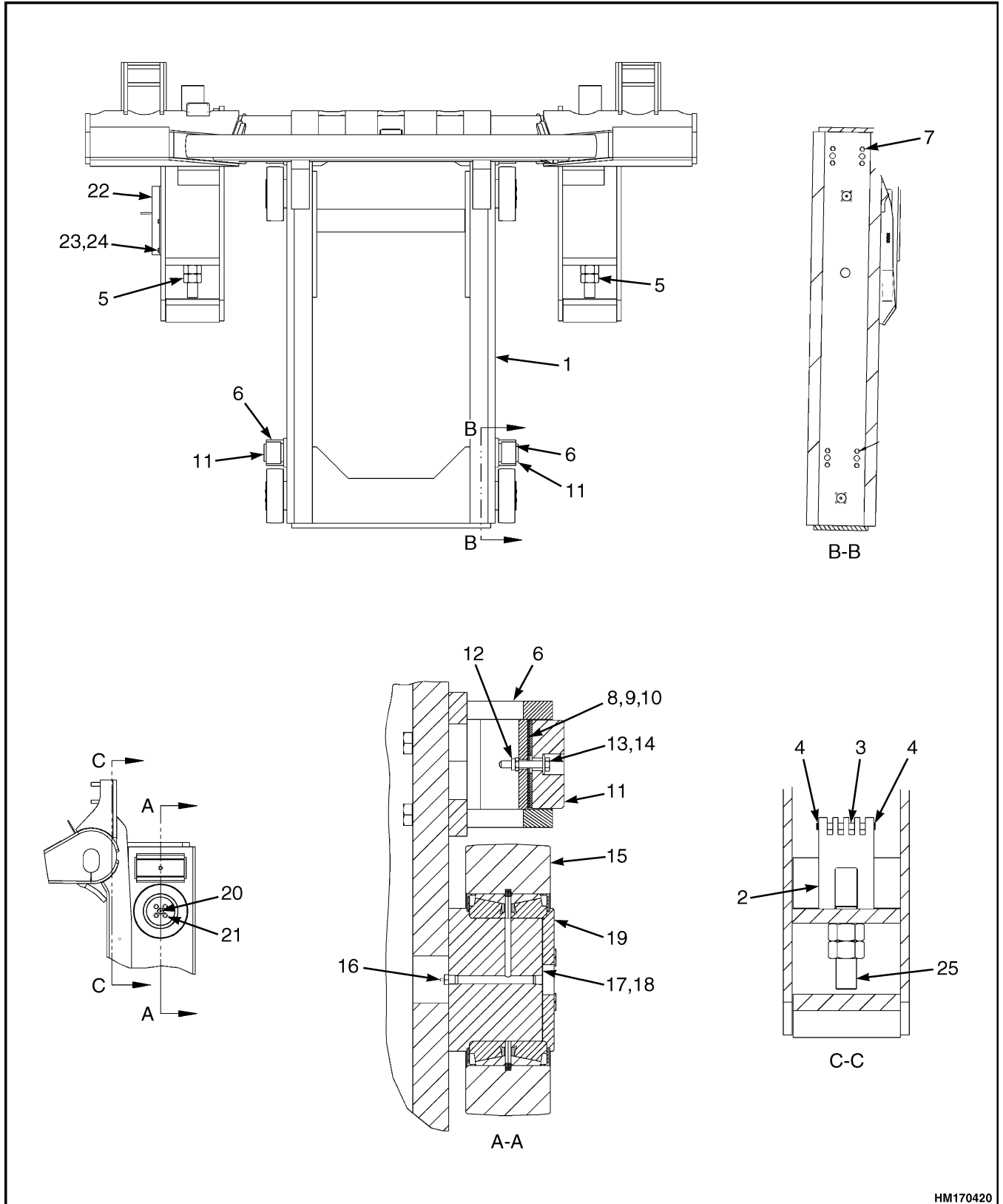
When disconnecting the lift chains, maintain control of the ends. Use wire to temporarily connect the ends of the lift chains to the mast. This procedure will prevent the lift chains from falling and causing injury or damage.

- Verify the lifting device is holding the carriage. Disconnect lift chains at the carriage. Disconnect chains by removing the pins from the chain anchors or remove the nuts from the chain anchors. Connect the ends of the chain to the mast.

- Start the engine.

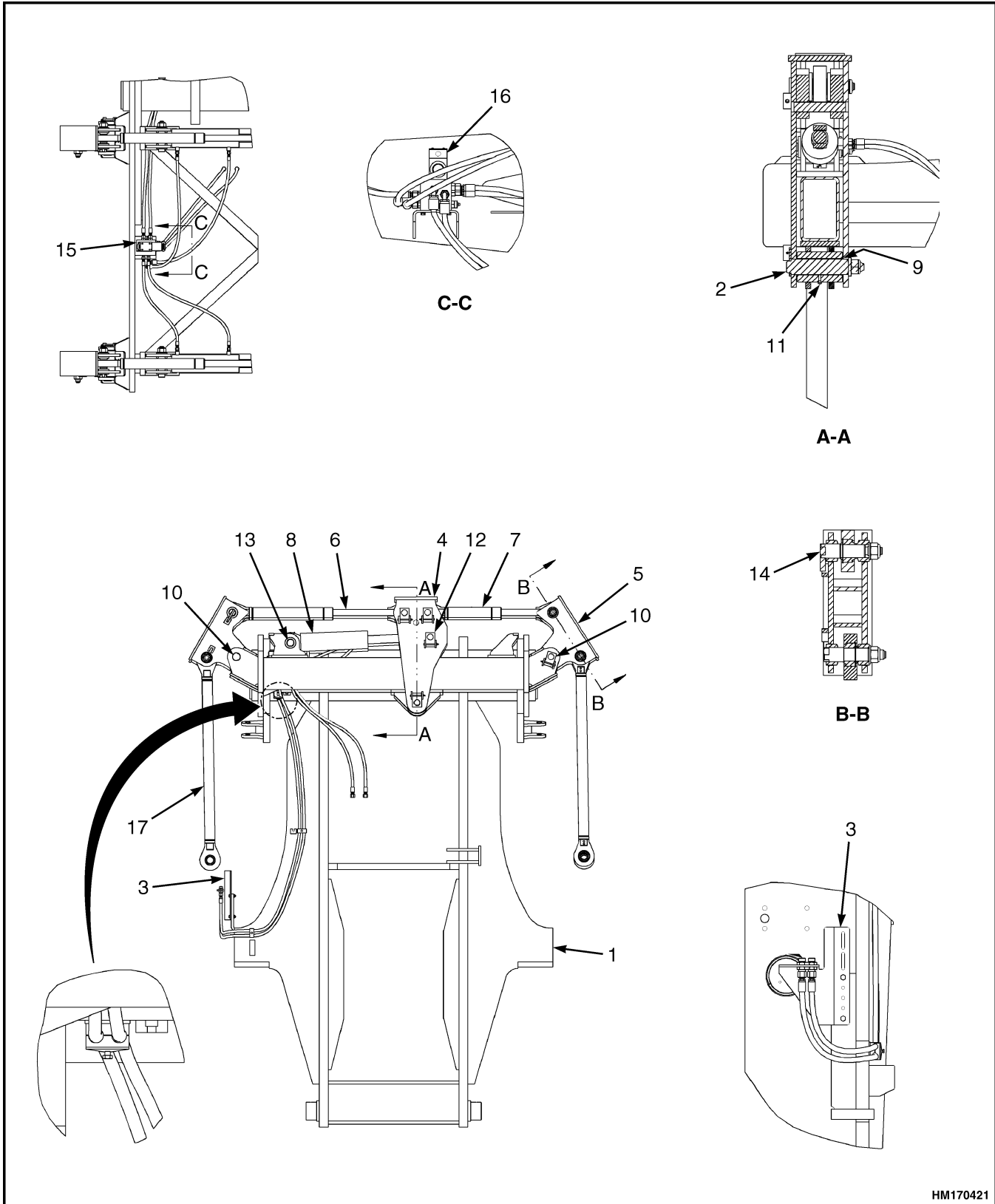
Legend for Figure 4

- | | |
|-----------------------|---------------------|
| 1. DEDICATED CARRIAGE | 14. CAPSCREW |
| 2. CHAIN ANCHOR | 15. ROLLER ASSEMBLY |
| 3. PIN | 16. LUBE FITTING |
| 4. SNAP RING | 17. SHIM |
| 5. NUT | 18. SHIM |
| 6. BEARING BRACKET | 19. CAP |
| 7. CAPSCREW | 20. PIPE FITTING |
| 8. SHIM | 21. CAPSCREW |
| 9. SHIM | 22. BRACKET |
| 10. SHIM | 23. CAPSCREW |
| 11. BEARING BLOCK | 24. NUT |
| 12. NUT | 25. LUBRICANT |
| 13. WASHER | |



HM170420

Figure 4. Dedicated Carriage Assembly



HM170421

Figure 5. Gantry Carriage PPS (Power Pile Slope)

Legend for Figure 5

- | | |
|-----------------------------------------|-----------------------------------------|
| 1. GANTRY CARRIAGE | 10. PIN WELDMENT |
| 2. PIN WELDMENT | 11. LUBE FITTING |
| 3. BRACKET | 12. PIN WELDMENT |
| 4. PIVOT ARM | 13. PIN |
| 5. PIVOT ARM | 14. PIN WELDMENT |
| 6. TELESCOPIC ROD ASSEMBLY | 15. MANIFOLD ASSEMBLY, POWER PILE SLOPE |
| 7. ROD | 16. SOLENOID VALVE |
| 8. HYDRAULIC CYLINDER, POWER PILE SLOPE | 17. HANGER SET, FIXED LENGTH |
| 9. BUSHING | |

**CAUTION**

Raising the inner weldment will cause the chain sheaves to raise the lift chains. Verify the lift chains are connected loosely enough so the inner weldment can raise with the chains still connected.

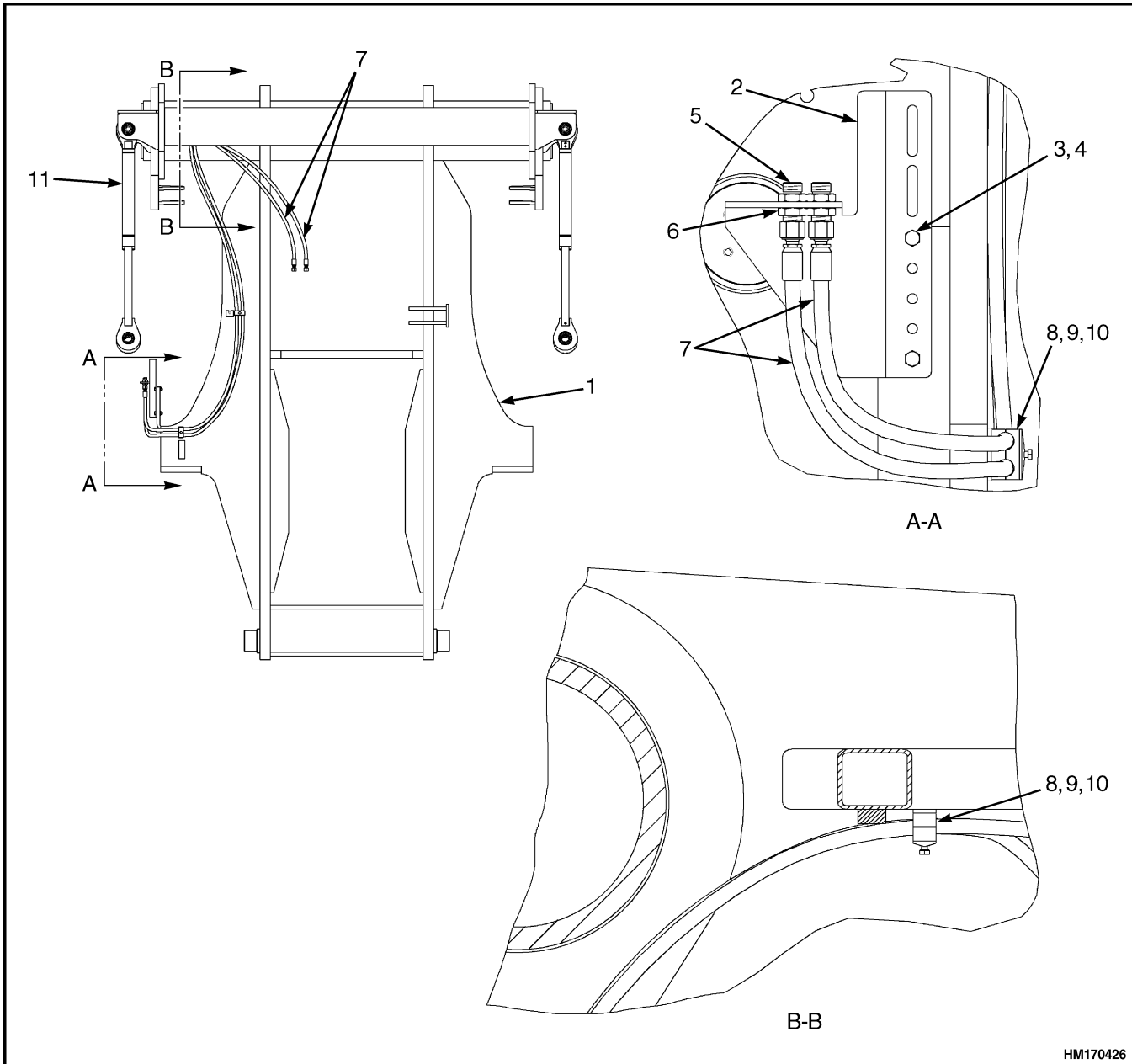
13. Operate the lift cylinders to raise the inner weldment. Verify the lifting mechanism is directly over the carriage. Raise inner weldment just past the top load rollers of the carriage.
14. Shut down the engine.
15. Remove the carriage from the lift truck. Lower the carriage to the floor so that the load rollers are up.

DISASSEMBLE

1. Remove the load rollers as follows:
 - a. Remove the four capscrews that hold retainer to the stub shafts. Remove retainer.
 - b. Remove the shims.
 - c. Make identification marks on the shims so that they will be installed in the same order.
 - d. Remove the load roller from the stub shaft. Remove the shields and bearings from the load roller.
2. Remove side blocks as follows:

NOTE: If necessary, it is possible to equip the carriage with side rollers as an option.

- a. Remove the capscrews that hold the side block to the carriage.
 - b. Remove the capscrew that holds the wear plate.
 - c. Remove the shims.
3. If the carriage has fork positioner cylinders, remove the cylinders as follows:
 - a. Disconnect the hydraulic lines at the cylinders. Put caps on the open lines
 - b. Connect a lifting device to the cylinder. Remove anchor pins from the ends of the cylinder. Use the lifting device to remove the cylinder
 4. If the carriage is a sideshift carriage, disassemble as follows:
 - a. Leave the carriage on the lift truck or remove the carriage and put it on the surface so that the rollers are on the floor.
 - b. Remove the anchor pin from the rod end of the cylinder. Remove the retainers from the bottom of the apron. Connect a lifting device to the apron. Lift the apron from the carriage.
 - c. Disconnect the hydraulic lines at the sideshift cylinder. Remove the anchor pin and remove the cylinder.
 5. Remove the chain anchor as follows:
 - a. Remove nuts that hold the chain anchor to the carriage.



HM170426

- | | |
|--------------------|------------------------------|
| 1. GANTRY CARRIAGE | 7. HOSE ASSEMBLY |
| 2. BRACKET | 8. CLAMP |
| 3. CAPSCREW | 9. PLATE |
| 4. NUT | 10. CAPSCREW |
| 5. FITTING | 11. HANGER SET, FIXED LENGTH |
| 6. NUT | |

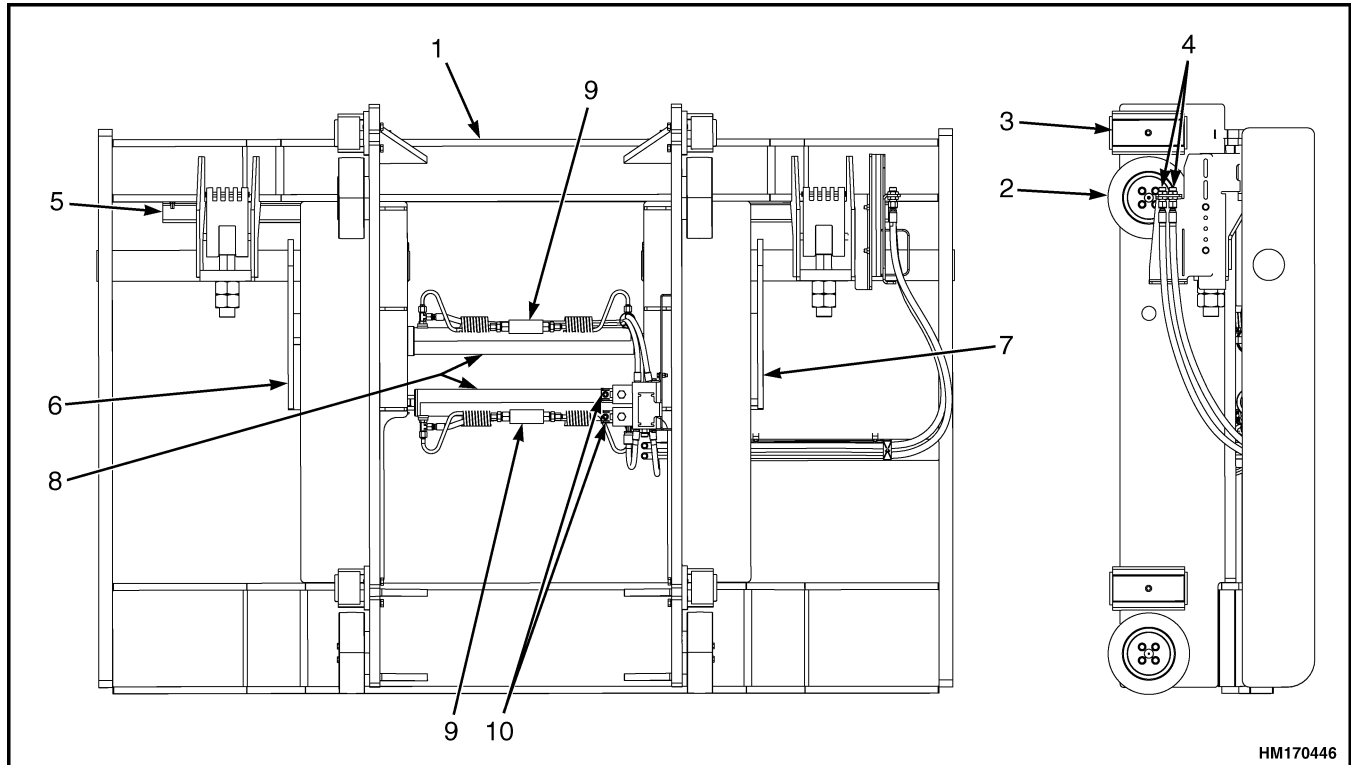
Figure 6. Gantry Carriage MPS (Mechanical Pile Slope)

(More Content includes: Brake system, Capacities, and specifications, Frame, Hydraulic, System, Industrial battery, Main control, Valve, Mast repair, Fasteners, Schematics diagrams, Steering axle, Steering system, Wire harness repair And more)

[Click Here](#)

**Get all the content
after purchase**

**Thank you very
much.**



HM170446

- | | |
|-------------------------|----------------------------------|
| 1. CARRIAGE | 7. GUIDE-FORK RIGHT HAND |
| 2. LOAD ROLLER | 8. CYLINDER FORK POSITIONER |
| 3. SIDE BLOCK | 9. MANIFOLD |
| 4. TO HEADER HOSE | 10. SOLENOID VALVE |
| 5. RETAINER-FORK | 11. VALVE MANIFOLD (2 FUNCTIONS) |
| 6. GUIDE-FORK LEFT HAND | |

Figure 7. Standard Forklift Carriage

CLEAN AND INSPECT

Use steam or solvent to clean the parts of the carriage.

CAUTION

Do not use steam to clean the side blocks, side rollers, and load rollers. Steam will cause corrosion and damage to the parts.

Inspect the carriage weldments, side blocks, and load rollers for wear or damage. Inspect the welds for cracks.

ASSEMBLE

1. Install the load rollers as follows:

- a. Install the snap rings in the center of the load roller. Install the bearing cups.

- b. Lubricate the bearing cones and install them in the load roller. Install the shields on the bearings.
- c. Lubricate the stub shaft and install the load roller on the shaft.
- d. Install the retainer (without shims) and capscrews on the stub shaft. Tighten the capscrews to 47 N•m (35 lbf ft) while rotating the load roller.
- e. Loosen the capscrews that hold the retainer.
- f. Tighten the capscrews evenly again while checking the load roller for side movement. Tighten the capscrews until there is no side movement.
- g. Measure the clearance between the stub shaft and the retainer. Remove the retainer. Install shims equal to the measurement.