TABLE OF CONTENTS

This section is for the following models:

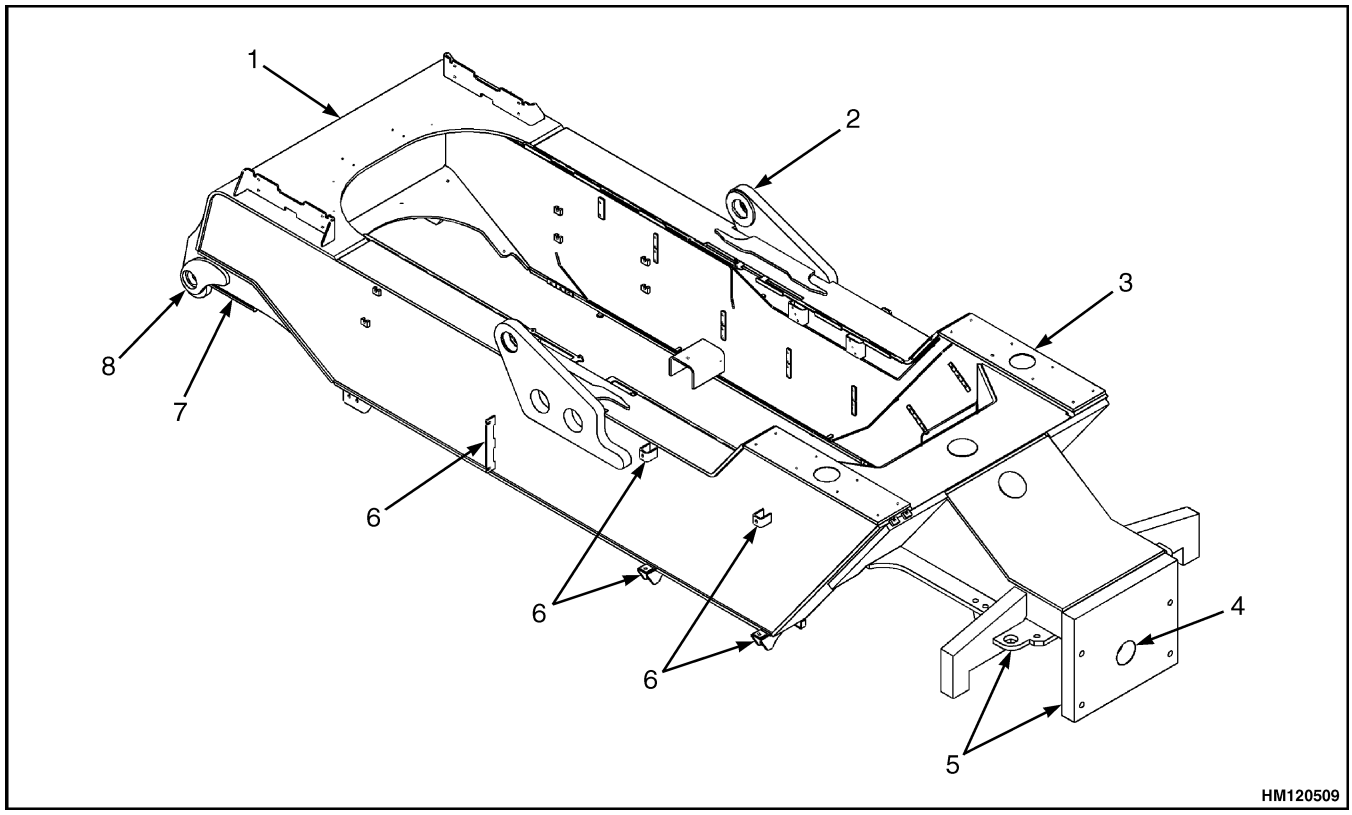
H40.00-52.00XM-16CH (H1050HD-CH, 1150HD-CH) [F117]

General

This section has the description and repair procedures for the lift truck frame and connected parts. Included in this section are the frame, counterweight, covers, floor plates, handrails and steps, hydraulic tank, and fuel tank. The instructions for removal and installation of the engine are also included in this section.

Description

The frame is a one-piece weldment and has mounts for the main counterweight, engine, transmission, axles, hydraulic and fuel tanks, operator's compartment, and other parts. See Figure 1.



1. MAIN FRAME
2. TILT CYLINDERS MOUNT
3. CAB SUPPORT MOUNT
4. STEER AXLE MOUNT
5. MAIN COUNTERWEIGHT MOUNT
6. FUEL/HYDRAULIC TANK MOUNT
7. DRIVE AXLE MOUNT
8. MAST MOUNT

Figure 1. Frame

Counterweight Repair

GENERAL

The shape of the main counterweights is the same, however the weight will be different for each model. The model weights are shown in Table 1.

Table 1. Counterweight Weights

Model	Weight
H40.00XM-CH	11,500 kg (25,353 lb)
H44.00-48.00XM-CH	13,500 kg (29,762 lb)
H50.00XM-CH	15,500 kg (34,171 lb)
H52.00XM-CH	19,300 kg (42,549 lb)
H1050HD-CH	18,000 kg (39,683 lb)
H1150HD-CH	19,300 kg (42,549 lb)

REMOVE

WARNING

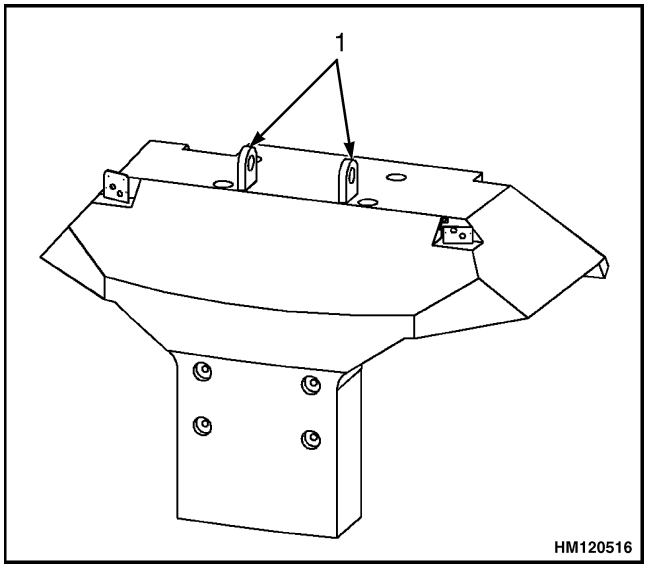
The counterweight is very heavy. Verify that the lifting device has the capacity to lift the main counterweight. See Table 1 for counterweight weights.

1. Place truck on solid, level surface.
2. Lower the mast completely.
3. Shut down the engine.
4. Apply parking brake.
5. Put forks of another lift truck under the counterweight.
6. Attach a lifting device to the two lift points of the counterweight. See Figure 2.
7. Remove the eight tie rods, washers, and nuts that hold the counterweight to the frame. See Figure 3.

WARNING

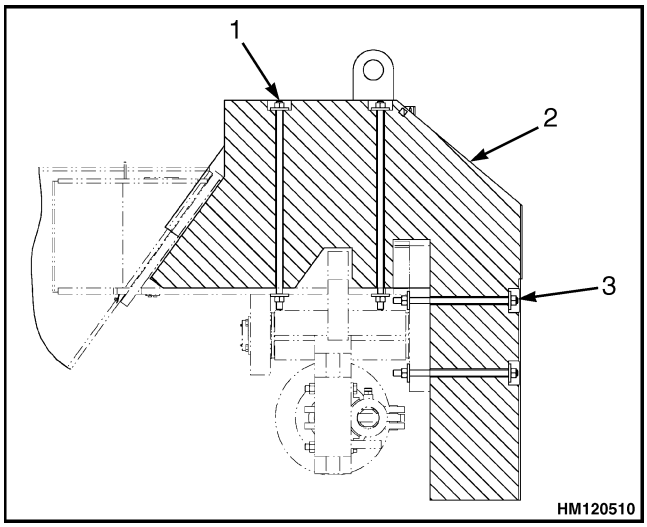
Never lift the counterweight straight up. This will cause damage to the frame and may cause personal injury.

8. Raise and move backward the main counterweight slowly at the same time.
9. Lower the main counterweight to the floor.



1. LIFT POINTS

Figure 2. Lift Points



1. TOP TIE RODS
2. COUNTERWEIGHT
3. REAR TIE RODS

Figure 3. Tie Rods

INSTALL

1. Put the forks of a lift truck under the counterweight.

2. Attach a lifting device to the two lift points of the counterweight. See Figure 2.
3. Install the counterweight on the frame by aligning the flange over the frame member.
4. Install the tie rods, washers, and nuts. Tighten the top and rear tie rods to 1500 N•m (1106 lbf ft).

Covers

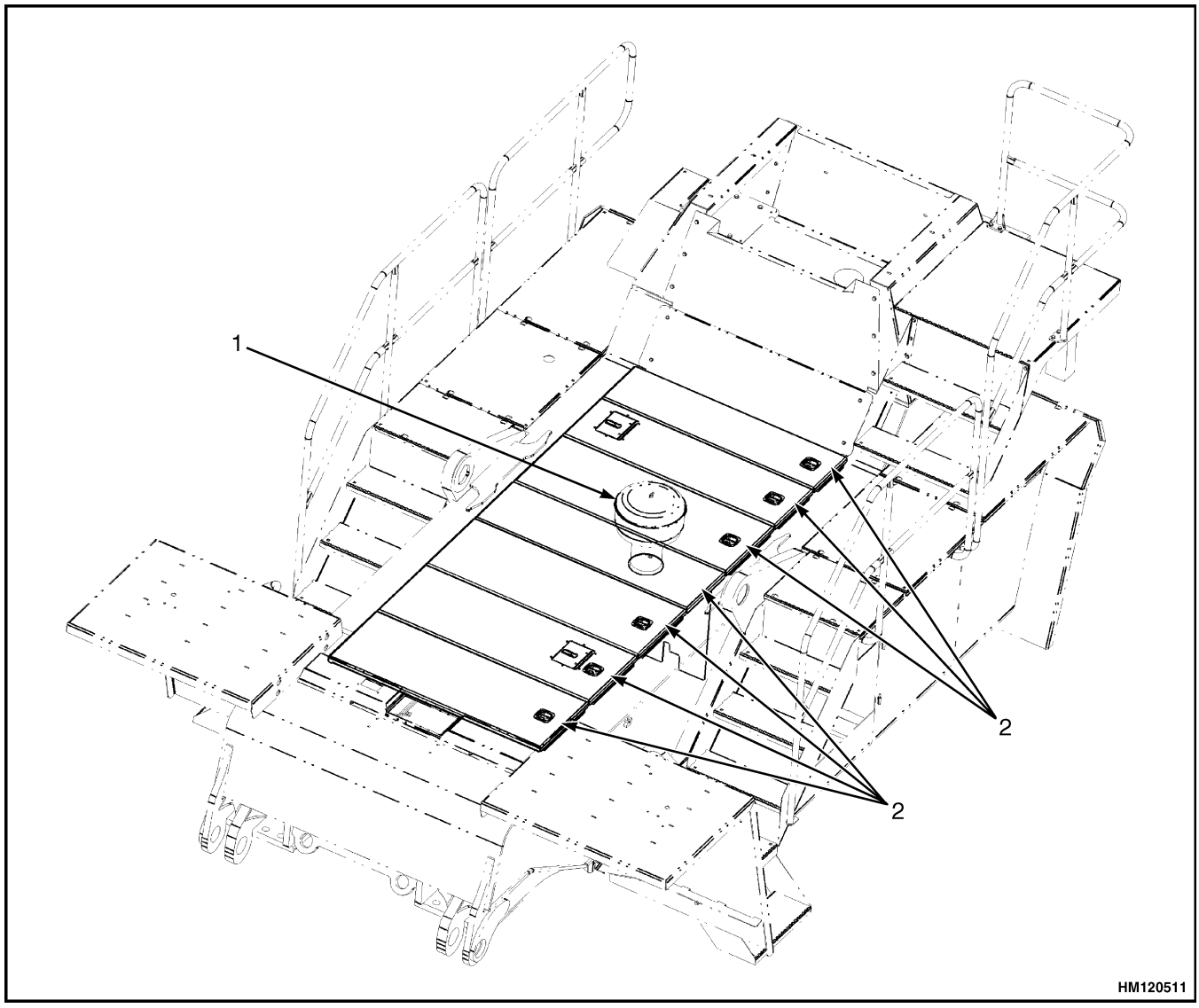
REMOVE

NOTE: The covers can be removed easily from the frame using a lock/unlock system.

1. Unlock the cover. See Figure 4.

NOTE: If necessary, remove the precleaner. See Figure 5.

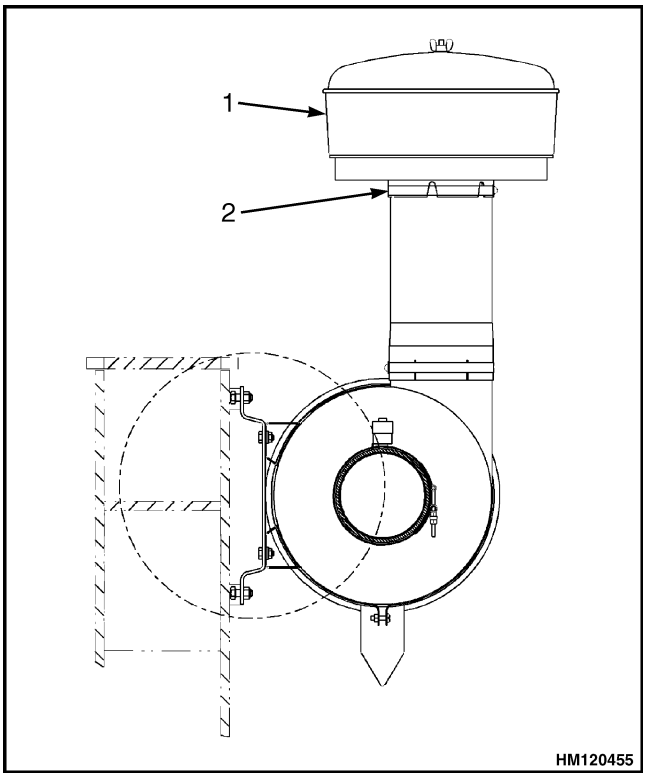
2. Remove the cover.



1. PRECLEANER
2. COVERS

Figure 4. Covers

(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)



1. PRECLEANER 2. CLAMP

Figure 5. Precleaner

INSTALL

NOTE: If necessary, install the precleaner. See Figure 5.

1. Install the cover. See Figure 4.
2. Lock the cover.

Floor Plates, Handrails, and Steps

The floor plates, handrails, and steps can be removed from the frame for access to components. See Figure 6.

Hydraulic Tank Repair

The hydraulic tank is installed on the right side of the frame. See Figure 7.

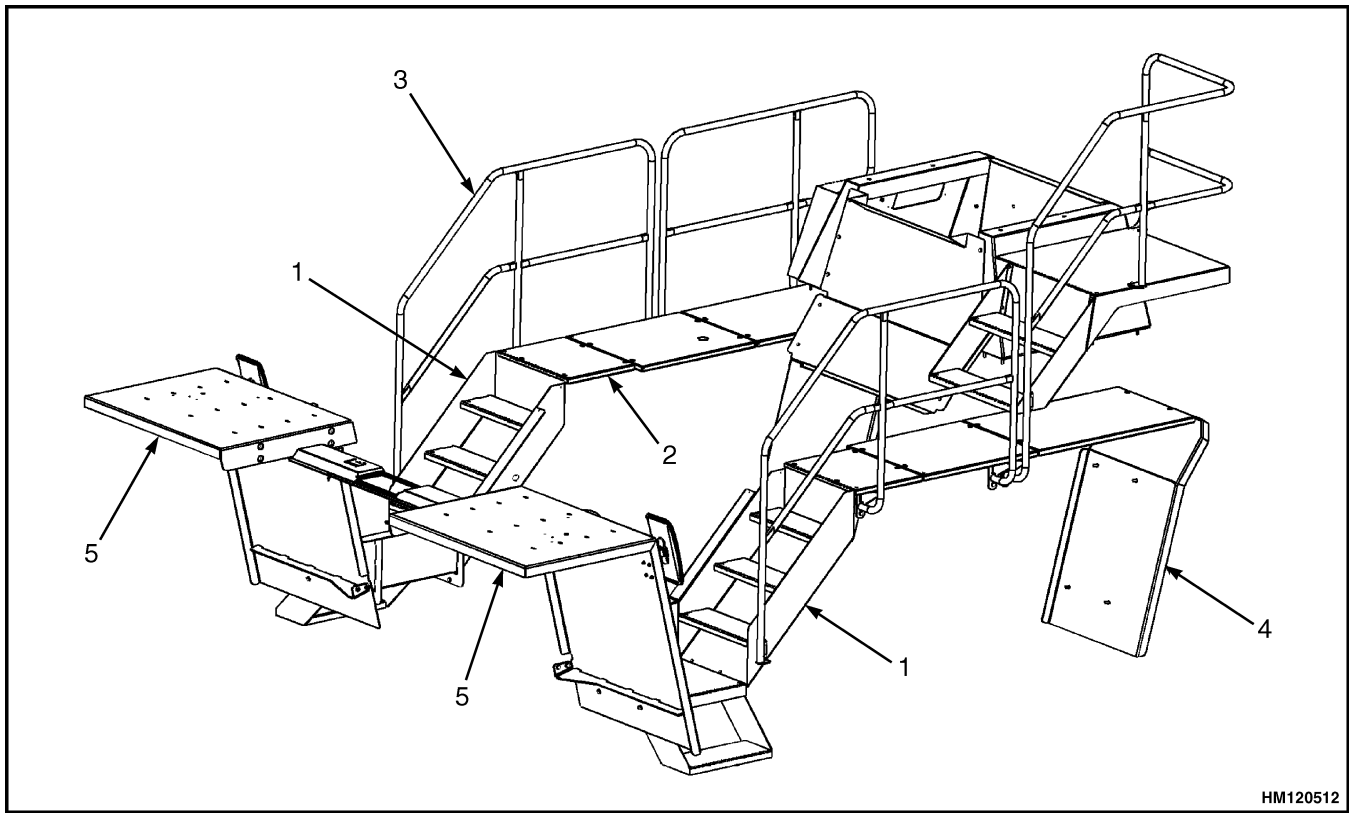
REMOVE

WARNING

The hydraulic oil tank contains 700 liter (185 gal) of hydraulic oil. Drain the oil from the tank before removing the hydraulic tank. Failure to drain the tank could result in an oil spill.

After use of the hydraulic system, the hydraulic oil is very hot. Do not begin any maintenance procedures until the hydraulic oil has cooled. Monitor the temperature of the hydraulic oil by observing the temperature gauge on the outside of the hydraulic tank.

1. Place truck on solid, level surface.
2. Lower the mast completely.
3. Shut down the engine.
4. Apply the brake.
5. Close shutoff valves on bottom of hydraulic tank.
6. Disconnect the hoses at the shutoff valves.
7. Put caps in the open holes of the valves.
8. Use a pan to catch the oil that is in the hydraulic lines.



1. STEPS
2. FLOOR PLATES
3. HANDRAILS
4. REAR FENDER
5. FRONT FENDER

Figure 6. Floor Plates, Handrails, and Steps

9. Remove the drain plug at the bottom of the tank to drain the oil into clean barrels.

10. Disconnect the hydraulic lines at the bottom of the hydraulic tank.

11. Disconnect the hydraulic return lines at the upper front of the hydraulic tank.

12. Use a pan to catch the oil that is in the hydraulic lines.

13. Put tags on the lines for identification.

14. Put caps on the open lines and fittings.

CAUTION

These lift trucks have a 24-volt electrical system (two 12-volt batteries in series). The higher voltage can cause an electrical shock. Always move battery disconnect switch to disconnected position (pointer to left) before working on electrical system.

For trucks with ECM (engine control module), battery disconnect should only be performed after switching OFF ignition for 30 seconds.

15. Disconnect all electrical connectors from the hydraulic tank and tag connectors to aid in the installation.

WARNING

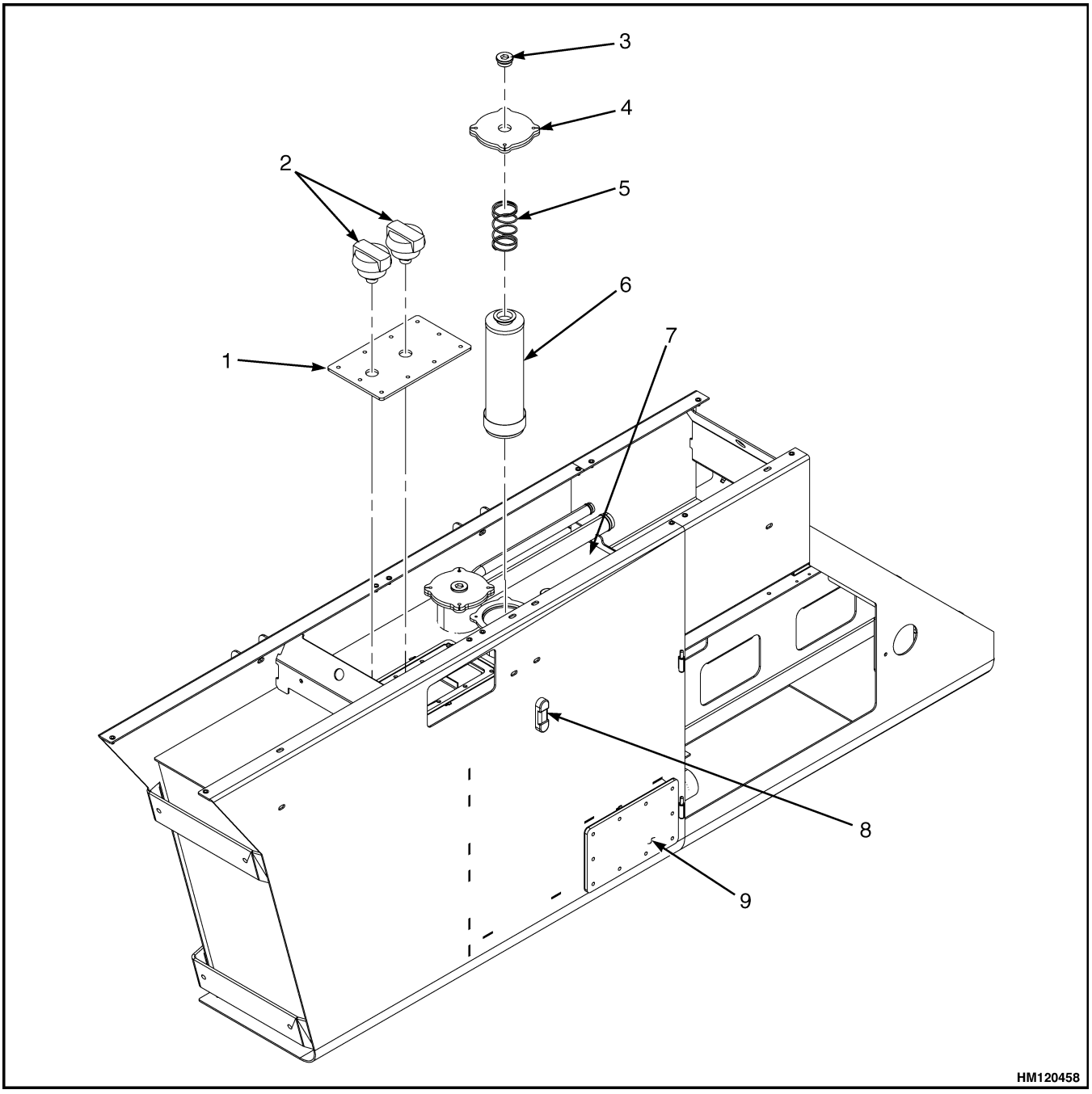
Batteries are very heavy and should not be lifted without assistance or personal injury may occur.

16. Disconnect the cables from the batteries, and remove the batteries through the access door.

17. Remove handrails, walkway covers, and lower step from the hydraulic tank.

18. Remove rear fender.

19. Attach a lifting device to the hydraulic tank at the two lifting eyes.



1. COVER
2. BREATHER
3. PLUG
4. COVER AND GASKET
5. SPRING
6. FILTER
7. HYDRAULIC TANK
8. INDICATOR
9. INSPECTION COVER

Figure 7. Hydraulic Tank Assembly

20. Create tension on the chains.

21. Position the lifting device so hydraulic tank will be moved a little toward the frame.

22. Remove the six capscrews holding hydraulic tank to the frame.

WARNING

The hydraulic tank weighs 600 kg (1323 lb). Verify the lifting device has the rated capacity to remove the hydraulic tank.

CAUTION

Verify the hydraulic hose and electrical cables are not damaged during the removal of the hydraulic tank.

23. Carefully lift the hydraulic tank from the lift truck frame.

REPAIR

Small Leaks

NOTE: See the section Steam Method for preparations for leak repairs.

WARNING

Do not use tools that can make sparks, heat, or static electricity. The vapors in the tank can cause an explosion.

1. Use steam to clean the area around the leak. Remove all paint and dirt around the leak.

2. Apply Loctite 290® to the leak. Follow the instructions of the manufacturer.

Large Leaks

NOTE: See the section Steam Method for preparations for leak repairs.

1. Use acceptable welding practices to repair the tank. See the American National Standard Safety in Welding and Cutting AWS Z 49.1 - 1999.

CLEAN

WARNING

The power connect to the ECM (electronic control module) must be disconnected before welding on the vehicle. This is accomplished by disconnecting the 50-pin OEM interface connector. Ground for the welder must be located as near as possible to the welding location. Never attach the welder ground clamp to the ECM.

Special procedures must be followed when large leaks or other repairs need welding or cutting. All work must be done by authorized personnel. If the tank is cleaned inside of a building, make sure there is enough ventilation. See the following manuals for additional information:

- **"Safe Practices for Welding and Cutting Containers That Have Held Combustibles" by the American Welding Society, F4.1 - 1999.**
- **"Safety In Welding and Cutting," American National Standard, AWS Z 49.1 - 1999.**

When cleaning the tank, do not use solutions that make dangerous gases at normal temperatures or when heated. Wear device for the protection of the eyes. Protect the body from burns.

When cleaning with steam, use a hose with a minimum diameter of 19 mm (0.75 in.). Control the pressure of the steam by a valve installed at the nozzle of the hose. If a metal nozzle is used, it must be made of a material that does not make sparks. Make an electrical connection between the nozzle and the tank. Connect a ground wire to the tank to prevent static electricity.

Steam Method

1. Remove all the parts from the hydraulic tank, except inspection cover.

2. Install the drain plug.

3. Fill the tank 1/4 full with a solution of water and sodium bicarbonate or sodium carbonate. Mix 0.5 kg (1 lb) per 4 liter (1 gal) of water.

4. Mix the solution in the tank using compressed air. Verify all the surfaces on the inside of the tank are flushed with the solution.

5. Drain the tank.

6. Put steam into the tank until the tank does not have odors and the metal is hot. Steam vapors must come from all the openings.

7. Flush the inside of the tank with boiling water. Verify all the loose material is removed from the inside of the tank.

8. Make an inspection of the inside of the tank. If it is not clean, repeat Step 6 and Step 7 and

make another inspection. When making inspections, use light that is approved for locations with flammable vapors.

9. Put plugs in all the openings in the tank. Wait 15 minutes; then remove the inlet and outlet plugs. Test a sample of the vapor with a special indicator for gas vapors. If the amount of flammable vapors is above the lower flammable limit, repeat the cleaning procedures.

Chemical Solution Method

NOTE: If the tank cannot be cleaned with steam, use the following procedure:

1. Mix a solution of water and trisodium phosphate or a cleaning compound with an alkali base. Follow the instructions given by the manufacturer.
2. Fill the tank with the cleaning solution. Use compressed air to mix the solution in the tank.
3. Drain the tank. Flush the inside of the tank with hot (boiling) water. Make sure all the cleaning compound is removed.
4. Make an inspection of the inside of the tank. If the tank is not clean, repeat Step 1, Step 2, and Step 3. Make another inspection of the tank. When making inspections, use a light that is approved for locations with flammable vapors.
5. Check the tank for flammable vapors using a special indicator for gas vapors. If the amount of flammable vapors is not below the lower flammable limit, repeat the cleaning procedures.

OTHER METHODS OF PREPARATION FOR REPAIR

If nitrogen gas or carbon dioxide gas is available, prepare the tank for welding using these gases. See the manual *Safe Practices for Welding and Cutting Containers That Have Held Combustibles* by the American Welding Society, F4.1 - 1999. If these gases are not available, another method using water can be used as follows:

1. Fill the tank with water to just below the point where the work will be done. Make sure the space above the level of the water has a vent.
2. Use acceptable welding practices to repair the tank. See the American National Standard *Safety In Welding and Cutting* AWS Z 49.1 - 1999.

INSTALL

WARNING

The hydraulic oil tank contains 700 liter (185 gal) of hydraulic oil. Drain the oil from the tank before removing the hydraulic tank. Failure to drain the tank could result in an oil spill.

1. Attach a lifting device to the hydraulic tank at the two tank mounts.
2. Raise the hydraulic tank and put the hydraulic tank in position on the frame.
3. Install the six capscrews that hold the hydraulic tank to the frame.
4. Install lower step, walkway covers, and handrail onto hydraulic tank.
5. Install rear fender onto hydraulic tank
6. Connect all electrical connectors as tagged during removal.

WARNING

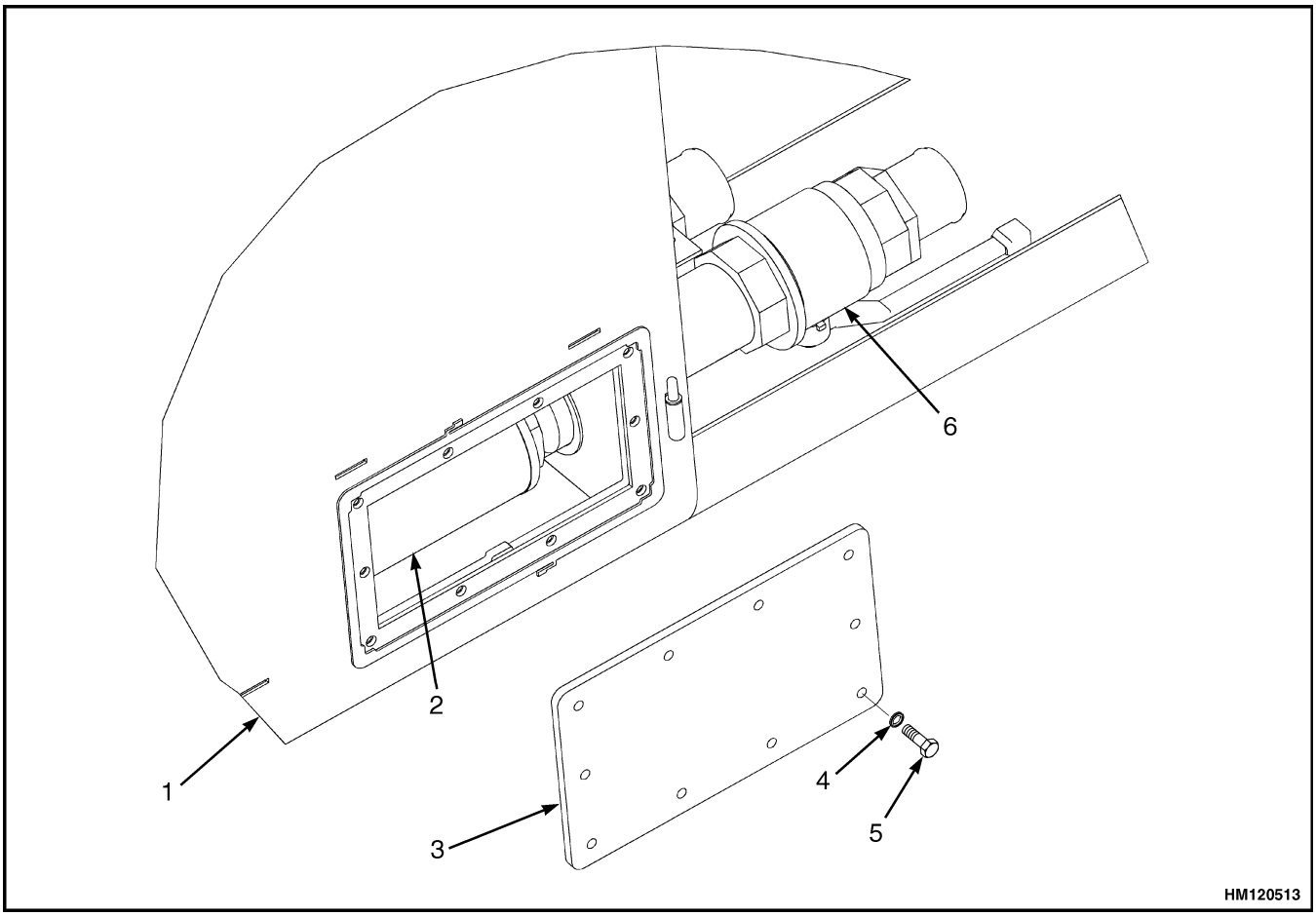
Batteries are very heavy and should not be lifted without assistance or personal injury may occur.

7. Install the batteries through the access door, and connect the cables to the batteries.
8. Connect the hydraulic return lines located at the upper front of the hydraulic tank.
9. Connect the hydraulic lines at the bottom of the hydraulic tank.

WARNING

Before filling the hydraulic tank with hydraulic oil, replace the seal rings and gasket to avoid oil leakage. See Figure 8.

10. Fill the hydraulic tank to the correct level with the oil specified in the Maintenance Schedule table in the section **Periodic Maintenance** 8000 SRM 1237.



1. HYDRAULIC TANK
2. SUCTION FILTER
3. INSPECTION COVER
4. SEAL RING (10)
5. BOLT (10)
6. SHUTOFF VALVES

Figure 8. Suction Filters and Inspection Cover

CAUTION

Never start the engine with closed shutoff valves. Open the shutoff valves before starting the engine to prevent damage to hydraulic components.

11. Start the engine and operate the hydraulic system. Verify all functions work correctly.

WARNING

Do not try to locate hydraulic leaks by putting hands on pressurized hydraulic components. Hydraulic oil can be injected into the body and cause personal injury.

12. Check for leaks.

13. Bleed the system.

SUCTION FILTERS AND INSPECTION COVER

Remove

NOTE: To drain hydraulic oil from the tank, see Remove, Step 9.

1. Drain hydraulic oil from the hydraulic tank.

2. Remove the bolts of the inspection cover. See Figure 8.

3. Remove seal rings.

4. Remove inspection cover.

NOTE: Remove suction filters by turning counterclockwise.

5. Remove suction filters.

Clean and Inspect

NOTE: Verify seal rings are in good condition. Replace, if necessary.

1. Clean seal rings.

NOTE: Verify gasket is in good condition. Replace, if necessary.

2. Clean gasket.

NOTE: If condition of the suction filters is in doubt, replace suction filters.

3. Inspect suction filters.

Install

NOTE: Only use seal rings specified by your lift truck dealer. Using seal rings or washers other than specified will lead to hydraulic oil leakage.

NOTE: Install suction filters by turning clockwise.

1. Install suction filters.
2. Install gasket and inspection cover using seal rings and bolts.
3. Tighten bolts to 51 N•m (38 lbf ft).

Fuel Tank Repair

The fuel tank is installed on the left-hand frame channel. See Figure 9.

REMOVE

1. Place truck on solid, level surface.
2. Lower the mast completely.
3. Shut down the engine.
4. Apply the parking brake.

WARNING

When removing the fuel tank, do not use tools that can make sparks, heat, or static electricity. The vapors in the tank can cause an explosion and personal injury may occur.

5. Put a drain pan under the fuel tank.
6. Remove drain plug to drain the fuel from the tank.

WARNING

If the fuel is drained from the fuel tank, put the fuel in a can or barrel that has a sealed cap to prevent contamination.

7. Disconnect the fuel lines at the tank.
8. Remove handrails, walkway covers, and steps from the fuel tank.
9. Remove rear fender.

CAUTION

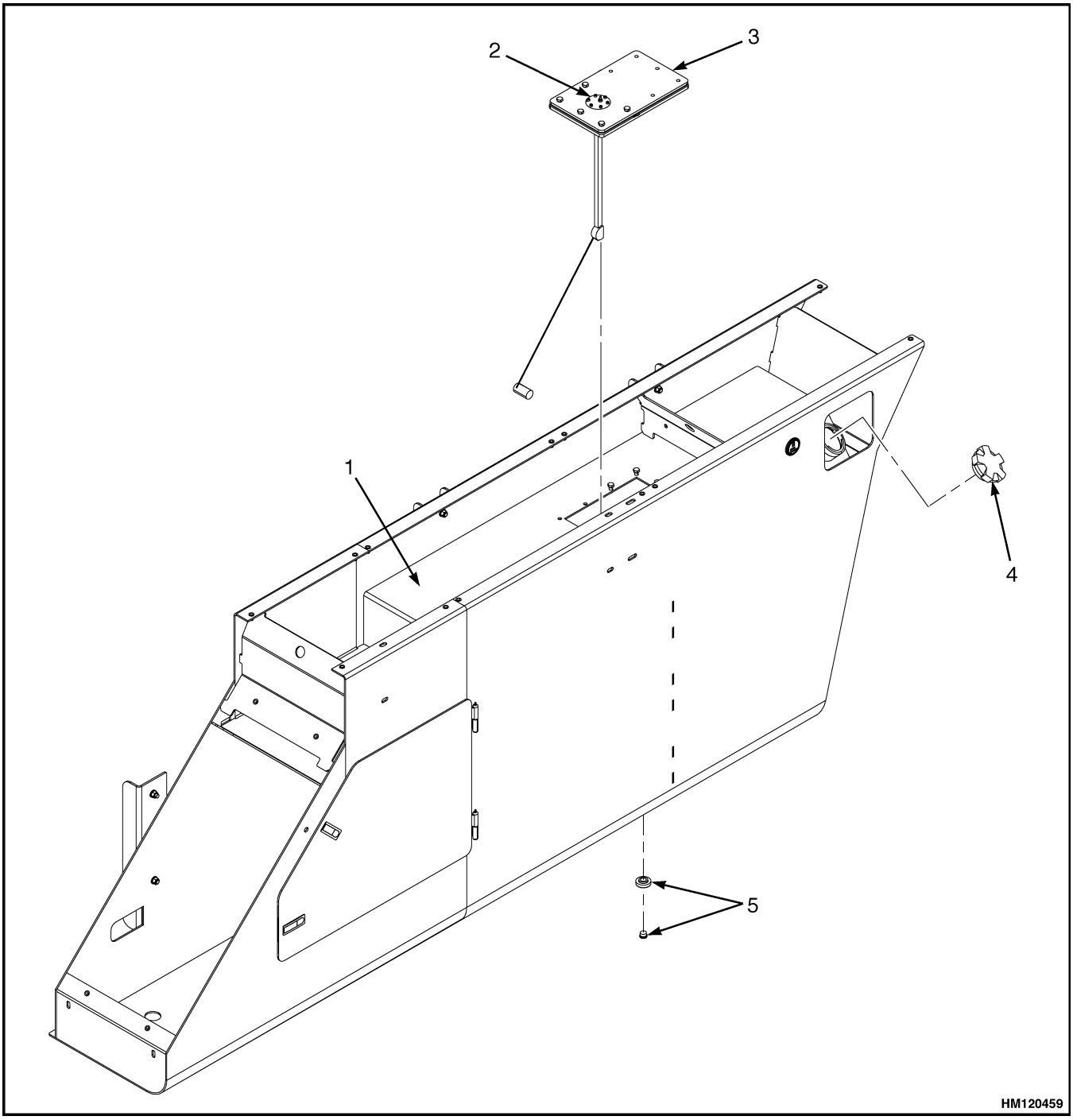
These lift trucks have a 24-volt electrical system (two 12-volt batteries in series). The higher voltage can cause an electrical shock. Always move battery disconnect switch to disconnected position (pointer to left) before working on electrical system.

10. Disconnect all electrical connectors from the fuel tank and tag connectors to aid in the installation.
11. Attach a lifting device to the fuel tank at the two tank mounts.
12. Create tension on the chains.
13. Position the lifting device so fuel tank will be moved a little toward the frame.
14. Remove the six capscrews that hold fuel tank to the frame.

WARNING

The fuel tank weighs 600 kg (1323 lb). Verify the lifting device has the rated capacity to lift the fuel tank.

15. Carefully lift the fuel tank from the lift truck frame.



1. FUEL TANK
2. FUEL GAUGE SENDER
3. COVER
4. FILLER CAP
5. DRAIN PLUG

Figure 9. Fuel Tank Assembly

REPAIR

WARNING

Do not use tools that can make sparks, heat, or static electricity. The vapors in the tank can cause an explosion.

Repair the fuel tank as described in the repair procedures for the hydraulic tank.

INSTALL

1. Attach a lifting device to the fuel tank at the two tank mounts.

WARNING

The fuel tank weighs 600 kg (1323 lb). Verify the lifting device has the rated capacity to lift the fuel tank.

2. Raise fuel tank and put in position on the frame.
3. Install the six capscrews that hold fuel tank to the frame. Tighten to 51 N•m (38 lbf ft).
4. Install the steps, walkway covers, and handrails to the fuel tank.
5. Install rear fender to the fuel tank.
6. Connect all electrical connectors as tagged during removal.
7. Connect fuel lines to the tank.
8. Fill fuel tank to correct level with fuel specified in the Maintenance Schedule of the section **Periodic Maintenance** 8000 SRM 1237.
9. Start engine.
10. Check for leaks.

Engine Repair

REMOVE

CAUTION

Battery disconnect should only be performed at least 30 seconds after switching OFF ignition.

Remove the engine as follows:

1. Place truck on solid, level surface.
2. Lower the mast completely.
3. Shut down the engine.
4. Apply parking brake.

CAUTION

Remove the ground cable first.

5. Disconnect the cables at the battery.

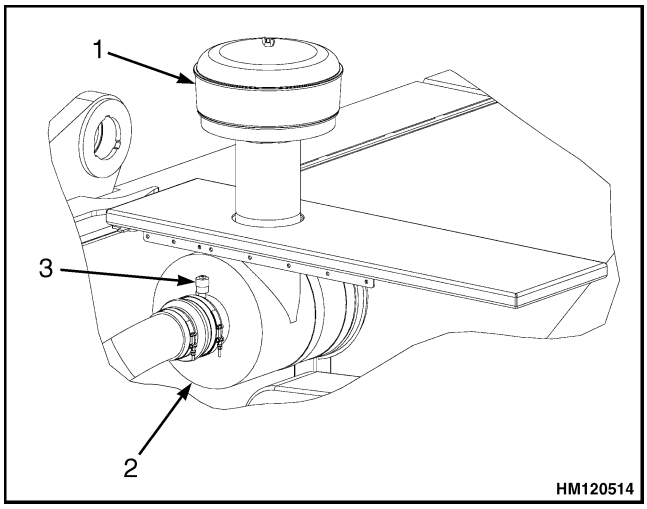
WARNING

Verify the lifting device has the rated capacity of 2500 kg (5512 lb).

6. Attach a lifting device and sling to the hood panels.

NOTE: Do not remove the hood panel located above the air cleaner.

7. Remove the hood panels.
8. Remove the precleaner and pipe from the air cleaner. See Figure 10.



1. PRECLEANER
2. AIR CLEANER
3. ELECTRONIC RESTRICTION INDICATOR

Figure 10. Engine Air Cleaner

9. Remove the hood panel located above the air cleaner.

10. Remove the rubber elbow between the engine and air cleaner.

11. Remove the air cleaner.

12. Drain the coolant from the cooling system.

NOTE: Do not disconnect the cooling lines from the radiator.

13. Disconnect the cooling lines from the engine.

14. Remove the capscrews to the fan through the inspection cover.

15. Remove the fan.

16. Close shutoff valves on the bottom of the hydraulic tank.

NOTE: Use a pan to catch the oil in the hydraulic lines.

17. Disconnect the hydraulic lines at the pumps.

18. Put tags on the lines for identification.

19. Put caps on open lines and fittings.

20. Disconnect the flexible tube, attached to the engine, from the exhaust pipe. See Figure 11.

21. Disconnect fuel lines at the fuel filter.

22. Disconnect electric wires and wiring harnesses from the engine.

23. Disconnect the starter cable from the starter.

24. Disconnect the electrical wires from the transmission.

25. Disconnect the cooling lines from the transmission.

26. Remove the U-joint from the transmission.

27. Disconnect hydraulic lines from the transmission to the hydraulic filter.

28. Put caps on the hydraulic lines.

29. Disconnect the charge air cooler lines from the charge air cooler core on the radiator.

30. Disconnect the lines from the expansion tank.

31. Disconnect the drive shaft from the transmission.

WARNING

Verify the lifting device has the rated capacity of at least 2500 kg (5512 lb) or personal injury may occur.

32. Connect a lifting device to the engine and transmission.

33. Remove the engine mount capscrews that hold the engine mount at the fan end of the engine. See Figure 12.

34. Remove the front mount capscrews that hold the two front mount brackets to the engine. See Figure 12.

35. Carefully lift the engine and transmission assembly from the frame. See Figure 13. Verify all the connections to the engine or transmission have been removed.

INSTALL

WARNING

Verify the lifting device has the rated capacity of at least 2500 kg (5512 lb).

1. Connect a lifting device to the engine and transmission.

2. Install the engine and transmission assembly in the frame.

3. Install and tighten the nuts and bolts for the engine mounts to 235 N•m (173 lbf ft).

4. Connect the U-joint to the torque converter.

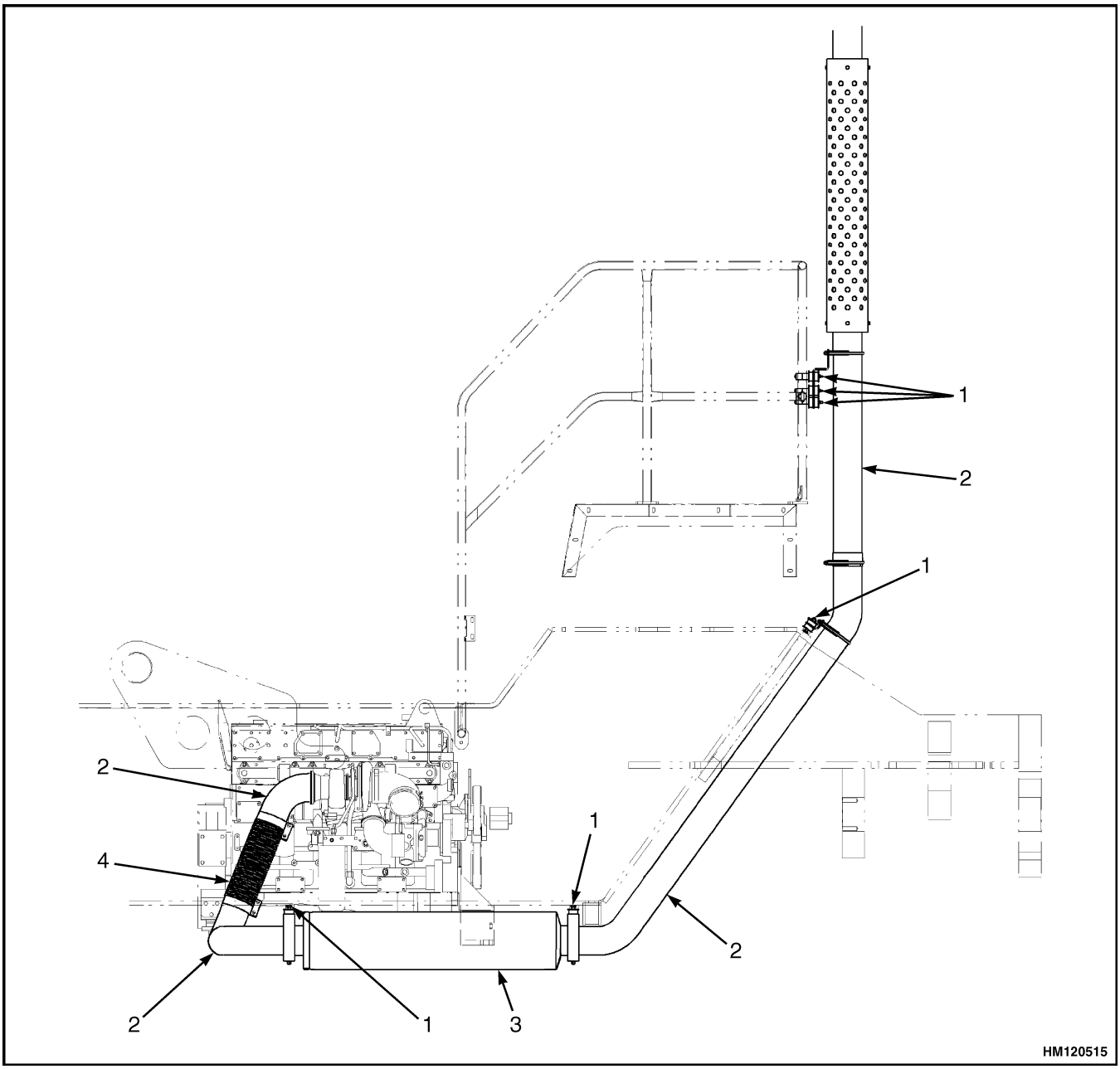
5. Tighten the bolts for the universal joint to 68 N•m (50 lbf ft).

6. Connect the lines to the expansion tank.

7. Connect the charge air cooler lines to the charge air cooler core on the radiator.

8. Connect hydraulic lines from the transmission to the hydraulic filter.

9. Connect the cooling lines to the transmission.



1. LOCK NUT
2. EXHAUST TUBE
3. MUFFLER
4. FLEX TUBE

Figure 11. Exhaust System

10. Connect the electric wires to the transmission.

11. Connect the starter cable to the starter.

12. Connect electric wires and wire harnesses to the engine.

13. Install the fuel lines between the fuel filter on the engine assembly and fuel tank and water separator.

14. Connect the flexible tube, attached to the engine, from the exhaust pipe using a new pipe clamp.

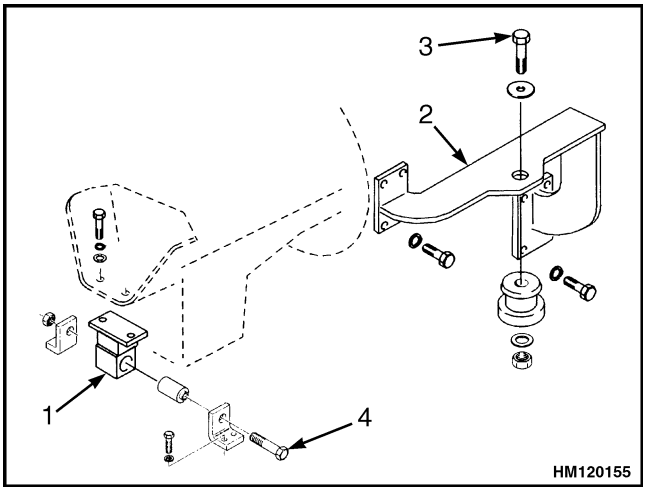


Figure 12. Engine Mounts

Legend for Figure 12

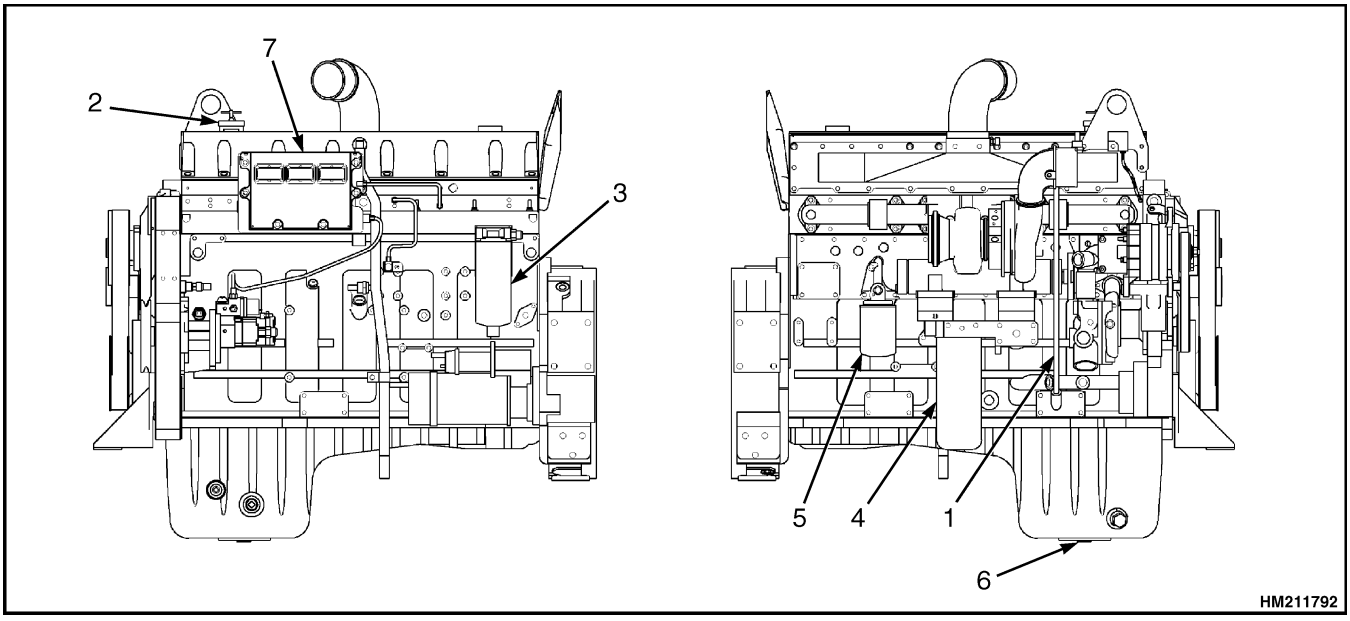
1. REAR MOUNT (FAN END OF ENGINE)
2. FRONT MOUNT
3. FRONT MOUNT CAPSCREW
4. ENGINE MOUNT CAPSCREW

15. Connect the hydraulic lines to the hydraulic pumps.

CAUTION

Never start the engine with closed shutoff valves. Open the shutoff valves before starting the engine to prevent damage to hydraulic components.

16. Open the valves on the hydraulic tank.



1. DIPSTICK
2. ENGINE OIL FILL CAP
3. FUEL FILTER
4. OIL FILTER
5. COOLANT FILTER
6. ENGINE OIL DRAIN PLUG
7. ECM

Figure 13. Engine Assembly

17. Mount the fan to the engine.

18. Install the capscrews to the fan through the inspection cover.

19. Install the air cleaner.

20. Connect the rubber elbow between the engine and air cleaner.

21. Connect the cooling lines to the engine.

22. Fill cooling system with coolant.

23. Connect the drive shaft to the transmission.

24. Check all oil levels.

CAUTION

Install the power cable first or lift truck damage may occur.

25. Connect the cables to the battery.

26. Install the hood panel above the air cleaner.

27. Install the precleaner and pipe from the air cleaner.

28. Start the engine and check for leaks and correct operation.

WARNING

Verify the lifting device has the rated capacity of 5512 kg (2500 lb).

29. Attach a lifting device and sling to the hood panels.

30. Install the hood panels.

Label Replacement

WARNING

If labels that have warnings or cautions are damaged, they must be replaced. See Figure 14.

If a mast of a different size or an accessory carriage is installed, the capacity rating can change. Changes in the size or number of drive tires will change the capacity rating. See a dealer for Hyster lift trucks for a replacement nameplate. The nameplate information is a safety item and must be correct.

1. Make sure the surface is dry and has no oil or grease. Do not use solvent on new paint. Clean the surface of old paint using a cleaning solvent.

2. Remove the paper from the back of the label. Do not touch the adhesive surface.

3. Carefully hold the label in the correct position above the surface. The label cannot be moved after it touches the surface. Put the label on the surface. Make sure all air is removed from under the label and the corners and edges are tight.

NOTE: If the labels or information plates are missing or damaged, they must be replaced.

Legend for Figure 14

1. HYDRAULIC STOP SWITCH LABEL
2. EXTEND AND RETRACT LABEL
3. TWIST LOCK/UNLOCK LABEL
4. JOYSTICK LABEL
5. HOIST LABEL
6. TILT LABEL
7. POWER PILE SLOPE SWITCH LABEL
8. SIDESHIFT SWITCH LABEL
9. NAMEPLATE
10. PARK BRAKE WARNING LABEL
11. PARK BRAKE LABEL
12. OPERATOR MANUAL LABEL
13. BATTERY DISCONNECT LABEL
14. OPERATOR WARNING LABEL
15. HYSTER LABEL
16. FAN WARNING LABEL
17. OPERATOR RESTRAINT LABEL
18. DOOR RELEASE LABEL
19. FUEL FILL LABEL
20. US PATENTS AND TRADEMARKS LABEL
21. HYSTER LABEL
22. ETHER WARNING LABEL
23. MODEL LABEL
24. NO RIDERS LABEL
25. MAST WARNING LABEL
26. HYSTER CONTAINER HANDLER LABEL
27. MAST WARNING LABEL
28. BORON FREE ANTI-FREEZE ONLY LABEL
29. ANTI-FREEZE LABEL
30. HYDRAULIC OIL FILL LABEL
31. NAMEPLATE LABEL
32. HYSTER MAST LABEL
33. NAMEPLATE COVER
34. PLASTIC RIVET
35. NAMEPLATE (INCOMPLETE)
36. STRAP CLAMP
37. NOTICE TO USER LABEL
38. HYSTER MAST LABEL
39. NAMEPLATE (INCOMPLETE)
40. HYDRAULIC STOP SWITCH LABEL
41. HYDRAULIC OIL FILL LABEL

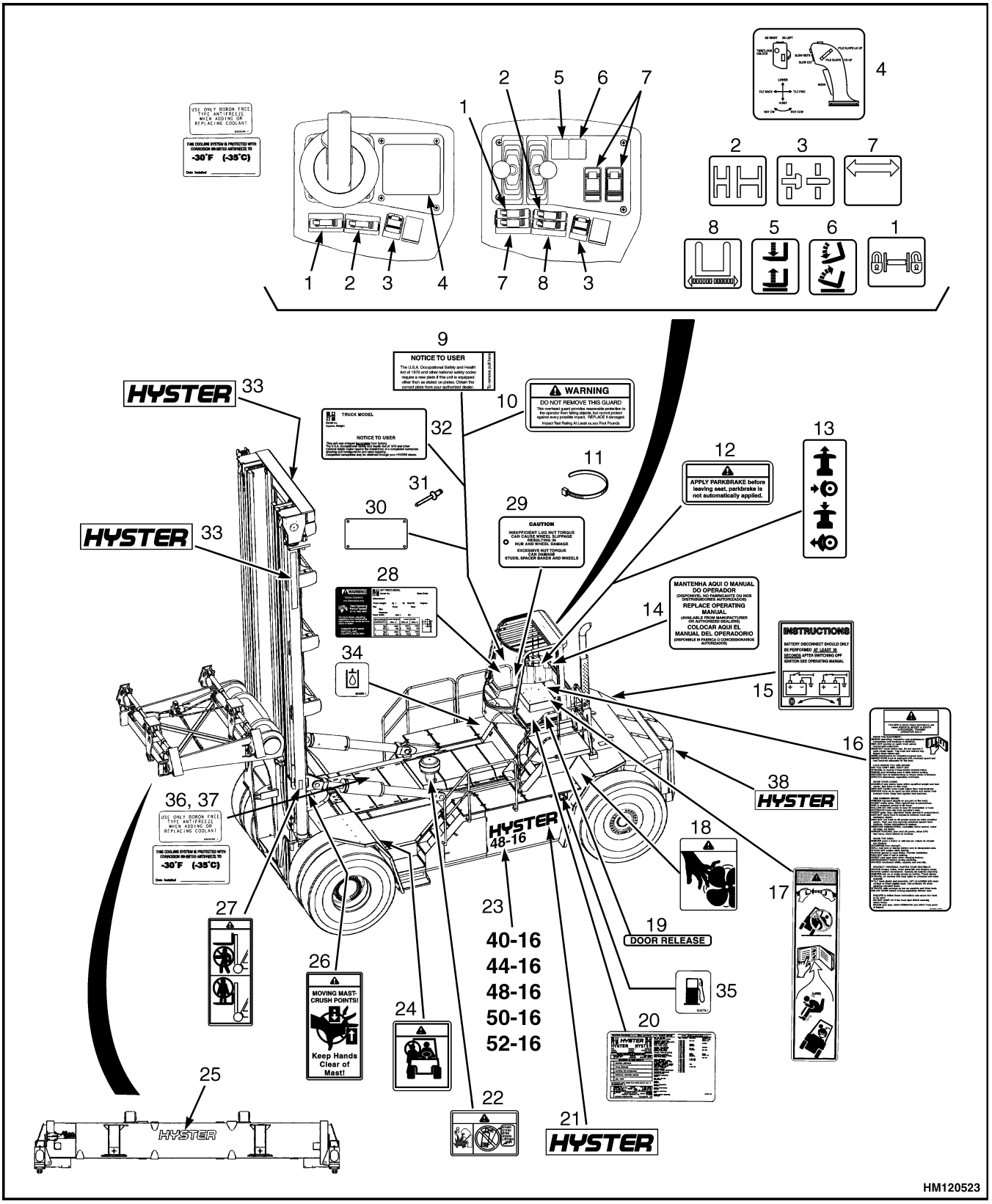


Figure 14. Label Positions

NOTES