SERVICE REPAIR

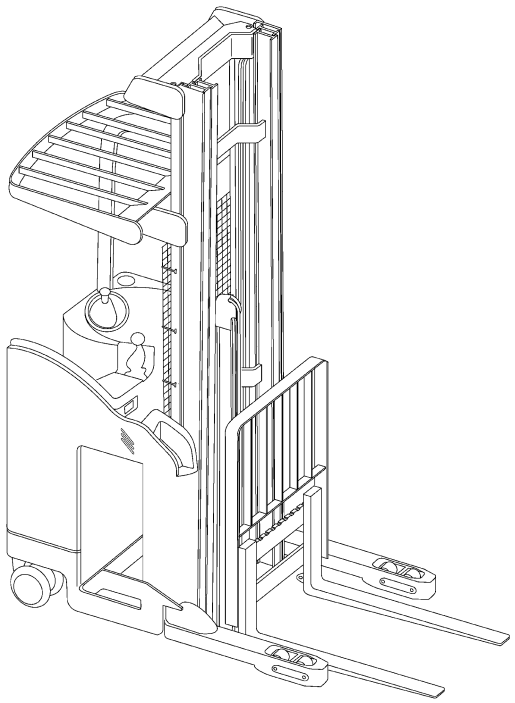
MANUAL

Hyster D470 (N35ZR, N40ZR, N30ZDR) Forklift

HYSTER

PERIODIC MAINTENANCE

N35ZDR, N45ZR [C264];
N30ZDR, N35-40ZR [D470];
N30ZDRS, N35-40ZRS [A265]



HYSTER

PART NO. 1590959

8000 SRM 1197

SAFETY PRECAUTIONS
MAINTENANCE AND REPAIR

- When lifting parts or assemblies, make sure all slings, chains, or cables are correctly fastened, and that the load being lifted is balanced. Make sure the crane, cables, and chains have the capacity to support the weight of the load.
- Do not lift heavy parts by hand, use a lifting mechanism.
- Wear safety glasses.
- DISCONNECT THE BATTERY CONNECTOR before doing any maintenance or repair on electric lift trucks. Disconnect the battery ground cable on internal combustion lift trucks.
- Always use correct blocks to prevent the unit from rolling or falling. See HOW TO PUT THE LIFT TRUCK ON BLOCKS in the **Operating Manual** or the **Periodic Maintenance** section.
- Keep the unit clean and the working area clean and orderly.
- Use the correct tools for the job.
- Keep the tools clean and in good condition.
- Always use **HYSTER APPROVED** parts when making repairs. Replacement parts must meet or exceed the specifications of the original equipment manufacturer.
- Make sure all nuts, bolts, snap rings, and other fastening devices are removed before using force to remove parts.
- Always fasten a DO NOT OPERATE tag to the controls of the unit when making repairs, or if the unit needs repairs.
- Be sure to follow the **WARNING** and **CAUTION** notes in the instructions.
- Gasoline, Liquid Petroleum Gas (LPG), Compressed Natural Gas (CNG), and Diesel fuel are flammable. Be sure to follow the necessary safety precautions when handling these fuels and when working on these fuel systems.
- Batteries generate flammable gas when they are being charged. Keep fire and sparks away from the area. Make sure the area is well ventilated.

NOTE: The following symbols and words indicate safety information in this manual:

WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury and property damage.

On the lift truck, the WARNING symbol and word are on orange background. The CAUTION symbol and word are on yellow background.

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This section is for the following models:

N35ZDR, N45ZR [C264];
N30ZDR, N35-40ZR [D470];
N30ZDRS, N35-40ZRS [A265]

General

WARNING

DO NOT make repairs or adjustments unless you have been properly trained and specifically authorized to do so. Repairs and adjustments that are not correct can create dangerous operating conditions.

DO NOT operate a lift truck that needs repairs. Report the need for repairs to your supervisor immediately. If repair is necessary, disconnect the battery and attach a DO NOT OPERATE tag to the control handle.

CAUTION

Electrical components on this truck are polarity sensitive and may be damaged if wired incorrectly. Make sure each electrical wire connection is tagged and properly identified before removal or installation. If the proper location for connection is unclear, consult the wiring diagram for the truck. Make sure testing meters have adequate voltage and current capacities to handle the output of the electrical components they are used to check. Never wire aftermarket components to this truck without factory approval.

Certain welding repairs require factory approval. Structural members such as base arms, axle weldments, and mast components require written Hyster® engineering approval before repairing or replacing. Contact your local dealer for assistance.

This section contains a Maintenance Schedule and the instructions for maintenance and inspection.

The Maintenance Schedule is divided into three time intervals which call for particular maintenance procedures to be performed. The intervals are 1 Day or 8 hours, 3 Months or 500 Hours, and 1 Year or 2000 Hours for normal operations (whichever comes first). **Normal** operation is considered one 8-hour shift per day, in a relatively clean environment, on an improved surface. Operating a lift truck for more than eight hours per day is considered **Heavy** operation and requires the 3-month checks to be performed at **350** hours. Lift trucks operating in freezer environments or dirty conditions are considered **Severe** operation and require the 3-month checks to be performed at **200** hours.

Your lift truck dealer has the facilities and trained personnel to perform required maintenances. A complete program of inspection, lubrication, and maintenance will help your lift truck perform efficiently and operate over a longer period of time.

Some users have service personnel and facilities to perform the tasks listed in the Maintenance Schedule. **Service Manuals** are available from your lift truck dealer to help users who do their own maintenance.

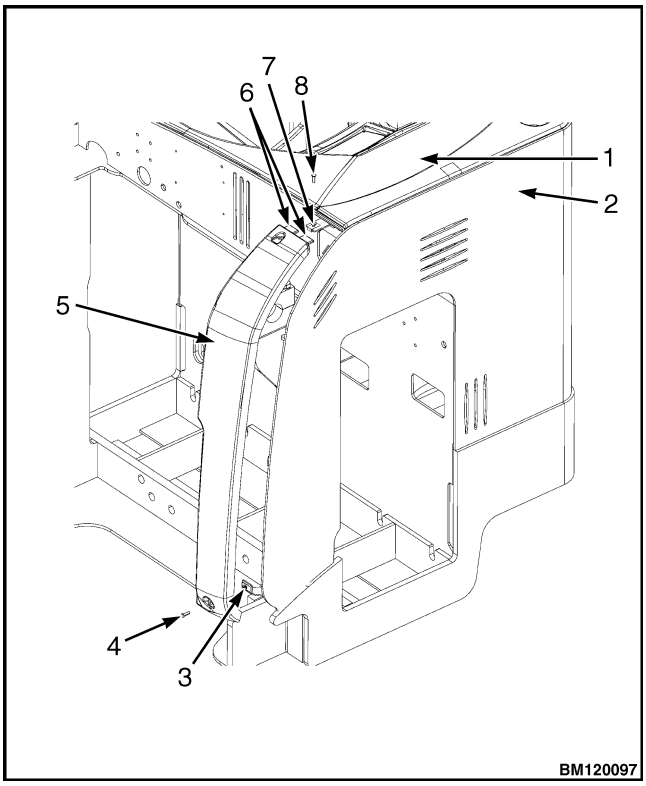
DO NOT make repairs or adjustments unless you have been properly trained and specifically authorized to do so.

Put the lift truck on a level surface. Lower the carriage and forks, apply the parking brake, and turn the key switch to the **OFF** position. Open the access panels and inspect for leaks and conditions that are not normal. Clean any oil spills. Make sure that lint, dust, paper, and other materials are removed from the compartments.

REMOVING COVERS

Front Frame Panel (Left and Right)

Remove the screws from the upper and lower ends of the front frame panel. Pull the lower end of the panel away from the frame of the lift truck and gently work up the side of the panel to pull it from the retainer clips securing the panel to the frame. Pull the top end tabs out of the operator compartment cover. Repeat for opposite side as necessary. See Figure 1.



1. OPERATOR COMPARTMENT COVER
2. FRAME
3. LOWER BRACKET
4. LOWER SCREW
5. FRONT FRAME PANEL (LEFT)
6. TABS
7. UPPER BRACKET
8. UPPER SCREW

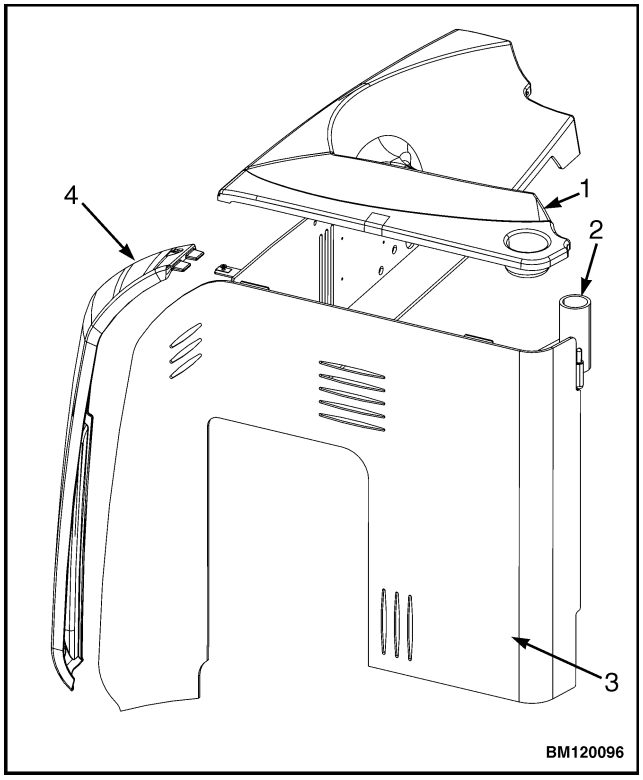
Figure 1. Front Frame Panel (Left Side)

NOTE: On right side front frame panels, ensure the diagnostic connector cap is positioned to allow the cover to seat properly.

To install the panel, position the upper end of the panel partially into the retaining clip on the frame. Insert the tabs on the upper end of the panel into the slots in the operator compartment cover. Work the sides of the panel into the retaining clips until all areas of the panel are aligned with the frame. Align the holes in the panel with the mounting brackets on the frame and loosely install the screws into the upper end and lower end of the panel. Make certain the panel is seated correctly against the frame and tighten the screws to secure in place. See Figure 1.

Operator Compartment Cover

Remove the front frame panels from the lift truck. Refer to Front Frame Panel (Left and Right). Remove the two screws securing the operator cover to the frame brackets. One is located on the lower right side of the operator compartment above the operator presence switch. The other is located beside the overhead guard post mount, at the bottom of the cup holder. Pull the operator compartment cover up from the front right corner. Continue pulling the cover up along the edge of the frame in both directions until the cover is free from the retaining clips. See Figure 2.



1. OPERATOR COMPARTMENT COVER
2. OVERHEAD GUARD POST MOUNT
3. FRAME
4. FRONT FRAME PANEL (LEFT)

Figure 2. Operator Compartment Cover

To install, position the cover over the electrical compartment. See Figure 2. Align the lip of the cover to the retaining clips. Press the lip of the cover into the retaining clips starting at the overhead guard post and continue around until completely seated. Align the holes in cover with the mounting brackets and install retaining screws as removed. Install the front frame panels to complete assembly. Refer to Front Frame Panel (Left and Right) in this section.

Drive Unit Compartment Door

Completely loosen the two socket head capscrews securing the drive unit compartment door closed. The screws are spring loaded and retained to the door by clips. Pull the door open on its hinges. To close, push the door closed and start both socket head capscrews loosely into the mounting holes. When both screws are started, verify that the door seats properly against the frame and tighten the screws.

Caster Wheel Cover

Remove the socket head capscrews on top of the caster wheel cover and lift cover from the clips securing it to the frame.

To replace, fit the bottom of the cover into the clips inside the opening and slide the cover into place. Install two socket head capscrews to secure the top of the cover in place.

DISCHARGING THE CAPACITORS

WARNING

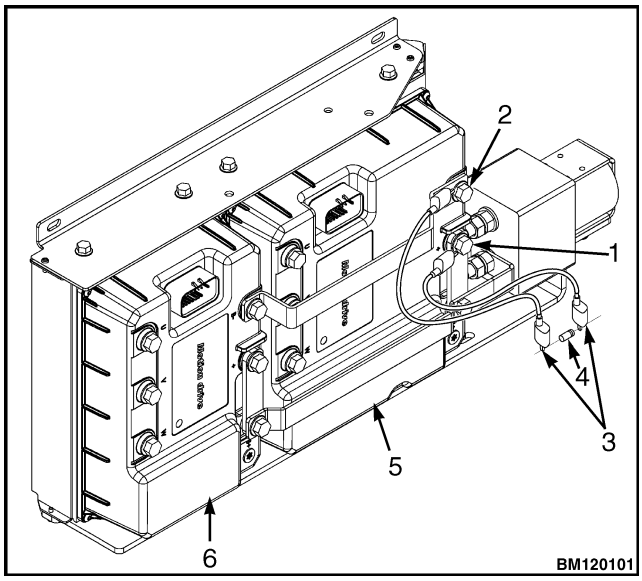
Capacitors inside the controllers can hold an electrical charge after the battery is disconnected. Discharge the capacitors before servicing the electrical system to prevent injury or electronic damage.

1. Move the lift truck to a safe, level area and completely lower the mast. Turn the key switch to the **OFF** position and attach a **DO NOT OPERATE** tag to the control handle. Block the drive wheel to prevent unexpected movement.

2. Disconnect the battery power cable connector from the truck connector located on the right side of the frame. Pull the battery cable connector handle to separate the battery connector from the truck connector.

3. Remove the operator compartment cover.

4. Discharge the capacitor in the controllers by connecting a 200-ohm, 2-watt resistor across the controller B+ and B− terminals of the motor controller for 10 seconds. Remove the resistor after discharging the capacitors. See Figure 3.



1. POSITIVE CONNECTION (B+)
2. NEGATIVE CONNECTIONS (B−)
3. INSULATED JUMPER WIRES
4. 200-OHM, 2-WATT RESISTOR
5. PUMP MOTOR CONTROLLER
6. TRACTION MOTOR CONTROLLER

Figure 3. Discharging the Capacitors

HOW TO MOVE DISABLED TRUCK

How to Tow Lift Truck

WARNING

Use extra care when moving a lift truck during the following conditions:
- **Brakes do not operate correctly.**
- **Steering does not operate correctly.**
- **Tires are damaged.**
- **Traction conditions are bad.**
- **The lift truck must be moved on a steep grade.**

Poor traction can cause the disabled lift truck or towing vehicle to slide. Steep grades will require additional brake force to stop the lift truck.

Never carry a disabled lift truck unless the lift truck MUST be moved and cannot be towed. The mast MUST be removed before the lift truck can be lifted. The lift truck used to carry the disabled lift truck MUST have a rated capacity equal to or greater than the weight of the disabled lift truck. The capacity must be for a load center equal to half the width of the disabled lift truck. See the nameplate of the disabled lift truck for the approximate total weight. The forks must extend the full width of the disabled lift truck. Center the weight of the disabled lift truck on the forks and be careful not to damage the under side of the lift truck.

If towing a lift truck equipped with a steered caster, the caster may resist tracking with the drive wheel.

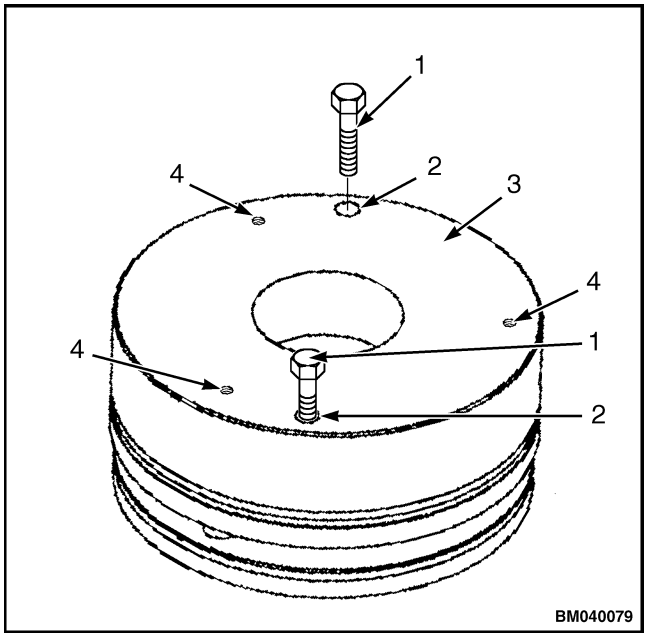
If there is no electrical power to the lift truck, the electric parking brake will not automatically release and the steering will not operate.

NOTE: The parking brake can be manually released by installing two service capscrews into the brake assembly. Ensure the two capscrews are removed prior to returning to the lift truck to service.

1. Manually release the parking brake if problems prevent it from releasing normally.

a. Insert two 1/4-20 × 1 (UNC) capscrews into the two holes on the outer edge of the top of the parking brake assembly. See Figure 4.

b. Tighten the capscrews alternately until the brake is released.



1. CAPSCREWS (1/4-20 × 1)
2. MANUAL RELEASE HOLE
3. BRAKE ASSEMBLY
4. ASSEMBLY HOLES

Figure 4. Manual Release

2. Raise the carriage and forks approximately 30 cm (12 in.) from the surface. Use safety chains to secure in place if the mast is not functional.

3. Attach a towing strap of adequate capacity to the **LOWER** truck frame beneath the operator's compartment.

4. If a counterbalanced lift truck is used to tow the disabled lift truck, that lift truck must have an equal or larger capacity than the disabled lift truck. If an increased load will increase the load on the drive tire(s), install an approximate half-capacity load on the forks of the lift truck that is being used to tow the disabled lift truck. This half-capacity load will increase the traction of the lift truck. Keep the load as low as possible.

WARNING

If towing a lift truck equipped with a steered caster, the caster may resist tracking with the drive wheel.

The towed lift truck must have an operator.

5. Tow the lift truck slowly.

6. Remove the capscrews from the brake, lower the mast, and disconnect the towing strap when complete.

HOW TO PUT LIFT TRUCK ON BLOCKS

WARNING

The lift truck must be put on blocks or an approved stand for some types of maintenance and repair. The removal of the following assemblies will cause large changes in the center of gravity: mast and load axle, battery, and the counterweight. When the lift truck is put on blocks, put additional blocks under the rear of the frame before removing the mast so the lift truck cannot fall backward or to the side.

DO NOT raise any point of the truck more than 50 mm (2 in.) without raising the opposite side to level the truck. If raising the frame above 150 mm (6 in.) remove the mast first and raise both ends of the frame in 50 mm (2 in.) increments.

DO NOT raise the lift truck by attaching an overhead crane to the overhead guard or areas of the mast that will be damaged. Some of these components and other lift points are not designed to support the weight of the lift truck. The truck can be damaged or it can fall on someone causing serious injury. Attach a chain or sling to a support structure of the lift truck frame.

Put the lift truck on blocks only if the surface is solid, even, and level. Make sure that any blocks used to support the lift truck are solid, one-piece units. Put blocks in front and back of the tires to prevent movement of the lift truck.

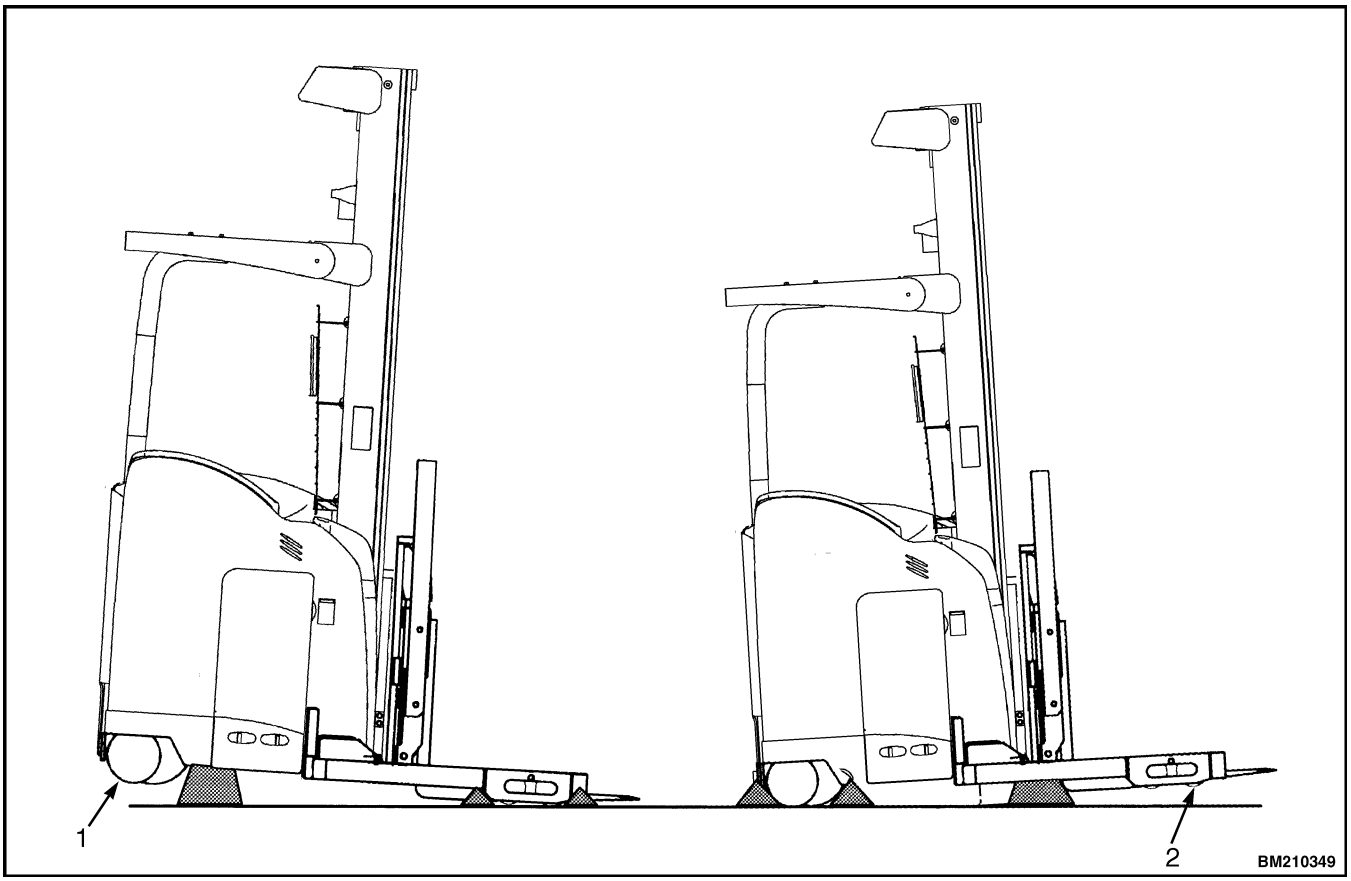
How to Raise Load Wheels

Refer to the precautions at the beginning of the How to Put Lift Truck on Blocks instructions in this section before attempting to raise the lift truck.

1. Put blocks on both sides (front and back) of the drive/steer tire and the caster wheels to prevent movement of the lift truck. See Figure 5.

2. Use an overhead crane and web sling under the base arms at the mast to raise the load wheels. Another lift truck can also be used to raise the base arms. Make sure that the crane and sling or other lifting device has a capacity of at least 2/3 of the total weight of the lift truck as shown on the nameplate.

3. Raise the base arms only enough to suspend the wheels. Install blocks under the base arms at the rear of the wheels near the truck frame to support the lift truck.



1. DRIVE AND CASTER WHEELS
2. LOAD WHEELS

Figure 5. How to Put Lift Truck on Blocks

How to Raise the Drive Tire End

Refer to the precautions at the beginning of the How to Put Lift Truck on Blocks instructions in this section before attempting to raise the lift truck.

1. Put blocks on each side (front and back) of the load wheels to prevent movement of the lift truck. See Figure 5.
2. Use a low-clearance, hydraulic jack under the rear of the frame to raise the drive/steer tire and caster wheels. Another lift truck can also be used to raise the lift truck. Make sure that the jack or other lifting device has a capacity of at least 2/3 of the total weight of the lift truck as shown on the nameplate.
3. Raise the lift truck only enough to suspend the drive/steer tire and the caster wheels. Install blocks under the rear of the frame to support the lift truck.

How to Raise the Entire Lift Truck

Refer to the precautions at the beginning of the How to Put Lift Truck on Blocks instructions in this section before attempting to raise the lift truck.

WARNING

The mast MUST BE REMOVED to raise the frame above 150 mm (6 in.).

1. Remove the mast from the lift truck. Refer to **Mast**, **Repair** 4000 SRM 1195.
2. Turn the key switch to the **OFF** position and disconnect the battery from the lift truck at the battery connector.

WARNING

The battery is heavy. Use appropriate lifting equipment to avoid personal injury.

3. Remove the battery from the lift truck.

WARNING

The truck must be kept level while raising.

4. Raise the lift truck and position solid, one-piece hardwood blocks or an approved lift truck frame stand under the frame. The truck must be kept level while raising. Frequently reposition jack stands or blocks under the frame while raising as a safety precaution in case of equipment failure. **DO NOT** raise any point of the frame 50 mm (2 in.) more than any other point of the frame.

MANUAL LOWERING VALVE

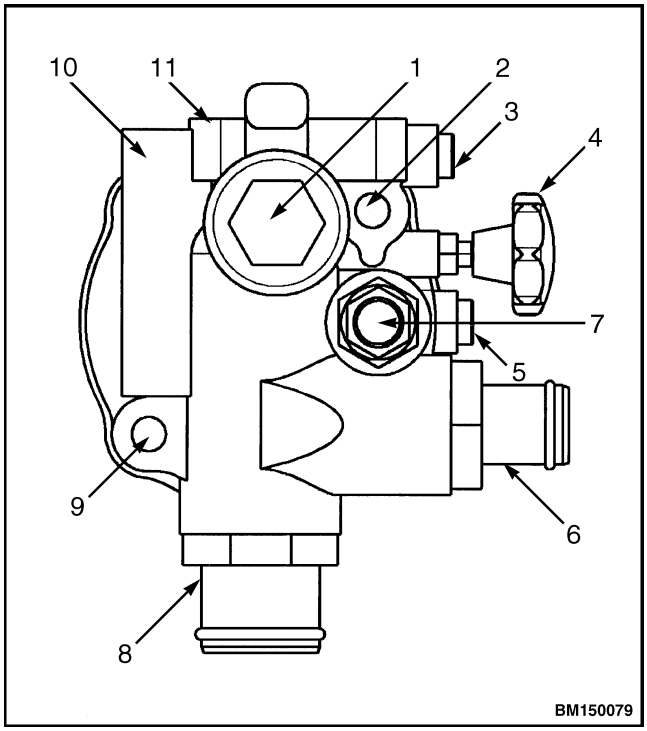
N30-35ZDR and N35-40-45ZR

WARNING

Allow no on under or near the lift mechanism or load during the manual lowering procedure.

Always verify that there are no obstructions beneath the lift mechanism or load before attempting to lower the mast manually.

The manual lowering valve is located on the main lift pump manifold beside the hydraulic tank. The manual lowering valve can be opened by turning the valve knob counterclockwise to relieve pressure from the hydraulic system. This can be used to manually lower the mast in case of malfunction or to relieve pressure from the system before servicing the hydraulics. If the mast leaks down during operation, lower the mast and check that the knob is completely closed (turn clockwise). Always close the manual lowering valve after use. See Figure 6.



1. LOWERING CONTROL VALVE
2. UPPER MOUNTING HOLE
3. M2 TEST PORT
4. MANUAL LOWERING VALVE KNOB
5. M1 TEST PORT
6. RETURN FITTING
7. RELIEF VALVE
8. SUPPLY FITTING
9. LOWER MOUNTING HOLE
10. OVERRUN CHECK VALVE
11. PRESSURE FLANGE

Figure 6. Pump (Valve Manifold)

N30ZDRS and N35-40ZRS

WARNING

Allow no on under or near the lift mechanism or load during the manual lowering procedure.

Always verify that there are no obstructions beneath the lift mechanism or load before attempting to lower the mast manually.

Manual lowering is accomplished by pushing in the manual lowering valve knob and turning it counterclockwise 180° until the knob pops back out. See Figure 7. This will open the valve and the mast will begin lowering at a controlled rate. Push the load holding check valve knob in and turn it clockwise 180° until it pops back out to close. See Figure 7.

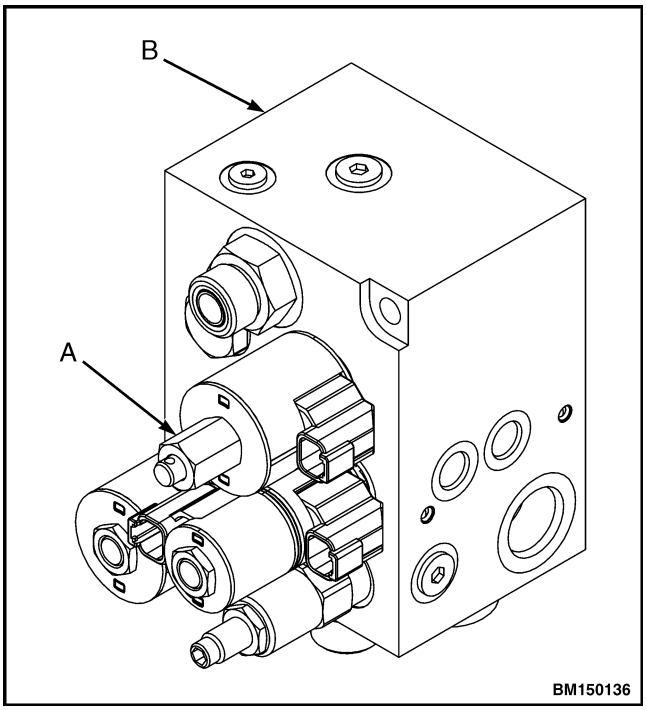


Figure 7. Main Control Valve

Legend for Figure 7

A. MANUAL LOWERING VALVE KNOB
B. MAIN CONTROL VALVE BODY

Transporting

WARNING

Maintain a safe distance from the edge of docks, ramps, platforms, and other similar working surfaces. Watch the "tailswing." Remember, when traveling in the forward direction, and the steering wheel is turned to move the lift truck away from the edge of the dock, the rear will swing toward the edge. This can cause the lift truck to fall off the dock.

If the lift truck falls off the dock, DO NOT jump off! Hold firmly to the steering wheel, brace your feet, and lean forward and away from the point of impact.

Before the lift truck is transported, check the selected route to make sure there is adequate clearance for the lift truck as loaded on the transport vehicle (bridges, overpasses, power lines, and natural barriers). In some cases, removal of the mast can be required.

If a trailer is the method of transportation, use blocks in front and back of the trailer tires to prevent movement of the trailer when the lift truck is loaded and unloaded. If a loading ramp is used, make sure that the ramp is the proper design and capacity.

Use approved lifting eyes to lift the truck. If the lift truck is not equipped with approved lifting eyes, **DO NOT** lift the truck by attaching a lifting device to any other part of the lift truck for the purposes of loading or unloading.

LOADING

If components attached to the lift truck must be removed for transport, refer to the section(s) for those components for proper handling procedures.

The operator must never leave a lift truck in a condition so it can cause damage or injury. When parking the lift truck, do the following operations:

1. After the lift truck has been loaded, apply the parking brake.
2. If the mast is mounted on the lift truck, fully lower the forks or carriage. If the lift truck is furnished with a tilt mechanism, tilt the forks forward until the tips of the forks touch the ground.
3. Turn the key switch to the **OFF** position to stop the engine.

4. Check that all switches and accessories are turned off.

5. Put blocks in front and back of the lift truck tires to prevent any movement of the lift truck. Make sure the blocks are attached to the transport surface.

WARNING

The straps or chains used to attach the lift truck to the transporter must be directly attached to the lift truck frame or to a component (drive axle, tow pin) that is solidly attached to the frame. DO NOT attach the straps or chains to the mast or any attachment.

CAUTION

Make sure that any straps or chains used to attach the lift truck to the transporter do not contact any tubes, hoses, hydraulic cylinders, or other parts of the lift truck that are easily damaged.

6. If the lift truck is transported in severe weather or any other condition that can damage the lift truck, cover the lift truck. Make sure the tarp or protective material is designed for the application and is securely attached.

UNLOADING

If components attached to the lift truck must be removed for transport, refer to the section(s) for those components for proper handling procedures.

1. If used, remove any covering.

2. Make sure the park brake is applied.

3. Disconnect the straps or chains.

4. Remove the wheel blocks.

5. Check that all switches and accessories are turned off.

6. Unload the lift truck.

Preparation for Use

CAUTION

Transporting trucks in the horizontal position may cause some looseness in the mast chains, hoses, and other components. Always check for loose or shifted components before raising the mast. Raise the mast very slowly after standing the truck up, to ensure all hoses and chains are properly seated in their respective sheaves and anchor points. Raise the mast up and down a few times to ensure the hoses and chains are working and adjusted properly. If the truck is equipped with displacement main or free-lift cylinders, the cylinders should be bled. See Lift Cylinders 4000 SRM 481.

After being transported or stored, the lift truck must be prepared for proper operation. All problems must be corrected before use of the lift truck. See the proper section for component repair procedures.

PREPARATION AFTER SHIPMENT

1. Complete the unloading procedures.

2. Inspect the lift truck for damage and missing components.

3. Follow the steps in the section Maintenance Procedures Every 8 Hours or Daily.

PREPARATION AFTER STORAGE

1. Remove all tape, covers, and preservation materials.

2. Check the lift truck for damaged or missing components. Repair damage and/or replace missing components.

NOTE: If the lift truck has been stored longer than 1 year, all lubricants and fluids must be drained and replaced. Refer to Maintenance Schedule.

3. Clean battery cables. Check the battery voltage. If the voltage is less than nominal, charge the battery. Connect the cables to battery and tighten.

4. Follow the steps in the section Maintenance Procedures Every 8 Hours or Daily.

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.

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. Disconnect the battery on electric lift trucks and put a tag or lock on the battery connector.**
- **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 require disassembly and removal of parts and can require removal of the mast or carriage. Follow the repair procedures in the correct Service Manual section for the mast.**

WHEN WORKING NEAR THE MAST, ALWAYS:

1. Lower the mast and carriage completely. Press the lower button on the control handle. If the lowering controls do not operate correctly, slowly open the lowering control valve to relieve pressure from the hydraulic system. and make sure there is no movement in the mast. Make sure that all parts of the mast that move are fully lowered.

   OR

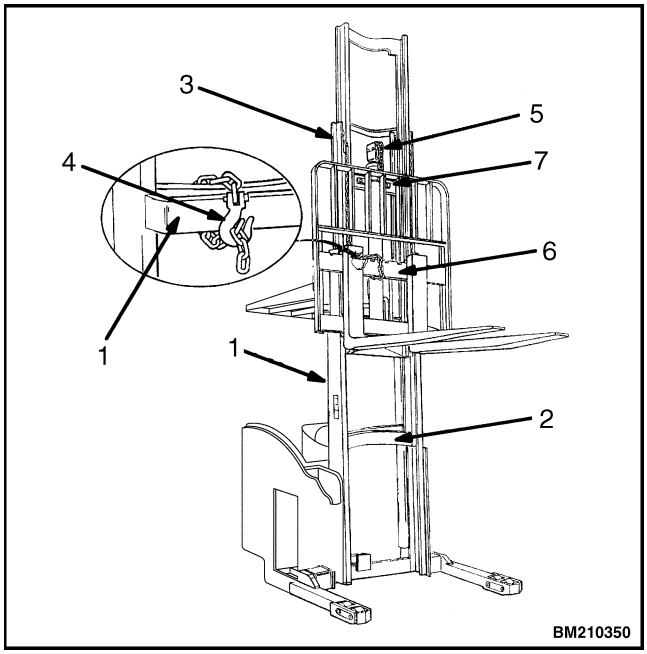
2. If parts of the mast must be in raised position, install a safety chain to restrain the moving parts of the mast. Connect moving parts to a part that does not move. Follow these procedures:

   a. Raise the mast to align the bottom crossmember of the weldment that moves in the outer weldment with a crossmember on the outer weldment (1). See Figure 8.

   b. Use a 3/8-in. minimum safety chain with a hook (4) to fasten the crossmembers together so that the movable member cannot lower. Put the hook on the back side of the mast. Make sure the hook is completely engaged with a link in the chain. Make sure the safety chain does not touch lift chains or chain sheaves, tubes, hoses, fittings, or other parts on the mast.

   c. Lower the mast until there is tension in the safety chain, and the free-lift cylinder (5) is completely retracted. Install a **DO NOT REMOVE** tag on the safety chain(s).

   d. Install another safety chain (3/8 in. minimum) around the safety chain already installed as a secondary safety precaution. Hook the chain as tight as possible by hand.



1. OUTER MAST
2. INNER MAST
3. INTERMEDIATE MAST
4. HOOK
5. FREE-LIFT CYLINDER
6. CROSSMEMBER
7. CROSSMEMBER

Figure 8. Safety Chains

3. 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. Disconnect the battery and put a tag or lock on the battery connector.

Maintenance Schedule

NOTE: Certain components on the truck require an initial inspection earlier than the prescribed maintenance schedule to preserve the original manufacturer's warranties. Perform the 3 month 500 hour inspection at 150 to 250 hours after the initial installation of the truck and then follow the scheduled inspections as listed in the maintenance schedule (see the notes after Table 1).

The Maintenance Schedule is divided into three time intervals which call for particular maintenance procedures to be performed. The intervals are 1 Day or 8 Hours, 3 Months or 500 Hours, and 1 Year or 2000 Hours for normal operations (whichever comes first). **Normal** operation is considered one 8-hour shift per day, in a relatively clean environment, on an improved surface. Operating a lift truck for more than eight hours per day is considered **Heavy** operation and requires the 3-month checks to be performed at **350** hours. Lift trucks operating in freezer environments or dirty conditions are considered **Severe** operation and require the 3-month checks to be performed at **200** hours. For an approximate location of the items listed in Table 1, see Figure 9.

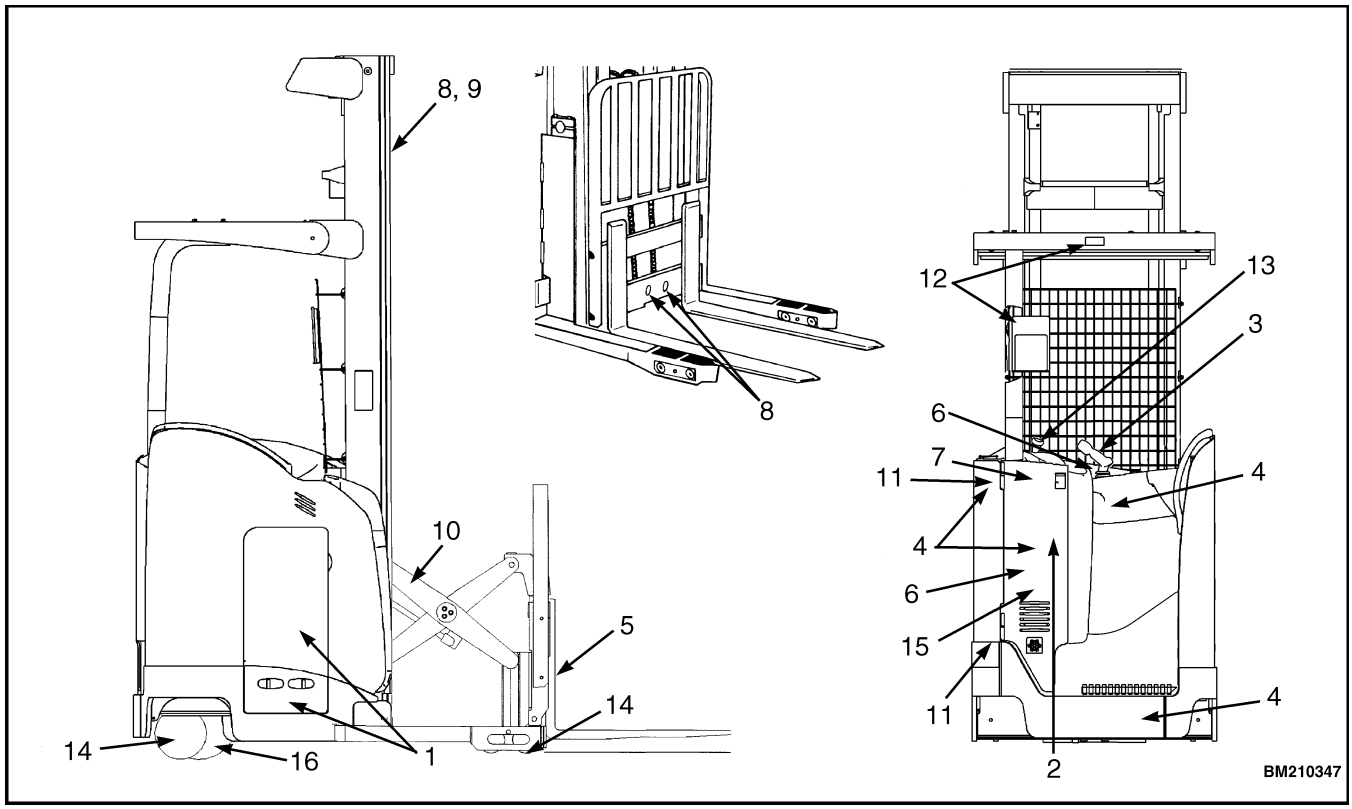


Figure 9. Maintenance Points

Table 1. Maintenance Schedule

Item No.	Item	1 day/ 8 hr	3 mo/ 500 hr	1 yr/ 2000 hr	Procedure or Quantity	Specification
1	Battery	X, C[1]			Check for Full Charge	Charge or Change Out
	Fluid Level	X			Check	Distilled Water
	Restraint Panels	X			Check Condition	Repair as Necessary
	Power Disconnect	X			Check Operation	Repair as Necessary
2	Brake	X			Check Operation	Repair as Necessary
				X	Hold on Grade Test	Capacity Load on 10% Slope
3	Control Handle	X			Check Operation	Repair as Necessary
4	Electrical Circuits	X			Check Operation	Repair as Necessary
	Contactors			X	Check Condition	Repair as Necessary
5	Forks	X			Check for Damage	
	Guides and Locks	X	L		As Required	Multipurpose Grease[2]
	Sideshift Wear Bearings		X		Check Wear	Replace as Necessary
6	Dash Display, Horn, Lights, Fuses	X			Check Operation	Repair as Necessary
X=Check C=Change L=Lubricate						

Table 1. Maintenance Schedule (Continued)

Item No.	Item	1 day/ 8 hr	3 mo/ 500 hr	1 yr/ 2000 hr	Procedure or Quantity	Specification
7	Hydraulic System	X			Visually Inspect for Leaks	Repair as Necessary
		X			Check for Proper Operation	Repair as Necessary
	Hydraulic Oil		X		Check Level	See Table 3
				C	Change Oil (Standard Operation)	ISO VG 46 Antiwear
				C	Change Oil (Freezer Applications)	Exxon Univis® HVI 26
	Breather Cap		X		Inspect	Replace as Necessary
	Hydraulic Oil Filter		C[5]	C	Replace	See **Parts Manual**
	Hydraulic Oil Strainer		X		Inspect	Replace as Necessary
	Hydraulic Hoses, Fittings, and Clamps		X		Inspect for Visible Damage and Defects	Adjust, Repair, or Replace as Necessary
			X		Inspect for Kinked, Flattened, Stiff, or Charred Hoses	Replace as Necessary
8	Lift Chains	X			Inspect for Visible Damage	Check Operation
			X		Check Stretch	Replace as Necessary
			L		Lubricate as Required	SAE 20 or 30 Engine Oil
X=Check C=Change L=Lubricate						

Table 1. Maintenance Schedule (Continued)

Item No.	Item	1 day/ 8 hr	3 mo/ 500 hr	1 yr/ 2000 hr	Procedure or Quantity	Specification
9	Mast	X			Inspect for Visible Damage	Check Operation
	Bleed Cylinders (Displacement Type Only)			X	Remove all air from cylinders using bleeder screws	See Cylinder Identification.
	Header Hoses, Fittings, and Clamps	X			Inspect for Visible Damage and Defects	Adjust, Repair, or Replace as Necessary
			X		Inspect for Kinked, Flattened, Stiff, or Charred Hoses	Replace as Necessary
	Sliding Surfaces		L[2]		As Required	Multipurpose Grease[2]
10	Reach Carriage Assembly	X			Inspect for Visible Damage	Check Operation
	Single Reach Scissor Arms		L		4 Lube Fittings	Multipurpose Grease[2]
	Double Reach Scissor Arms		L		8 Lube Fittings	Multipurpose Grease[2]
	Reach Cylinder Pivot Pins		L		4 Lube Fittings	Multipurpose Grease[2]
	Tilting Frame		L		2 Lube Fittings	Multipurpose Grease[2]
	Side Shift Carriage		L		4 Lube Fittings	Multipurpose Grease[2]
11	Frame	X			Visually Inspect	Repair as Necessary
	Overhead Guard	X			Visually Inspect	Replace as Necessary
	Door Hinges		L		Lightly Oil	SAE 20 or 30 Engine Oil
12	Safety Labels and Operating Manual	X			Replace if Necessary	See **Parts Manual**
13	Steering Operation	X			Check Operation	
X=Check C=Change L=Lubricate						

Table 1. Maintenance Schedule (Continued)

Item No.	Item	1 day/ 8 hr	3 mo/ 500 hr	1 yr/ 2000 hr	Procedure or Quantity	Specification
14	Caster and Load Wheels	X			Check Condition	
	Caster Wheel Assembly	X			Check Condition	
			L		Belleville Springs (If Equipped)	Brush With Antiseize Lubricant
			L		1 Lube Fitting	Multipurpose Grease[2]
			X		Check Adjustment Gap	Adjust With Shims
	Load Wheel Bolts		L		Check Condition/ Lube	Antiseize Lubricant
			L		Optional Grease Fittings	Multipurpose Grease[2]
15	Master Drive Unit	X			Check Operation	
	MDU Steering Gear		L		Apply to Gear	Multipurpose Grease[2]
	MDU Splines			L[7]	Apply to Internal Spline Shaft and External Motor Splines	Moly Paste (Hyster P/N 0339068)
	MDU Gearcase A265 and D470 (GK - 20)		X, C[3]		Level With Bottom of Check Hole	Gear Oil[6] 2.5 liter (2.6 qt)
	C264 (GK - 25)		X, C[3]		Level With Bottom of Check Hole	Gear Oil[6] 3.7 liter (3.9 qt)
16	Drive Wheel and Tire	X			Check Condition	
	Tire	X			Inspect for Damage	Smooth Edges/Remove Embedded Objects
	Axle Seal	X			Inspect for Leaks	Remove Wrapped Debris
	Wheel Lug Torque		X[4]		Tighten as Required	135 N•m (100 lbf ft)

[1]Equalization charge approximately each month, but not more than each week.

[2]Use Amsoil® GHD synthetic multipurpose grease (lithium complex) for standard, freezer, and cold storage configurations.
Use Mobilgrease® 28 synthetic extra-protection grease (clay) for arctic configurations.

[3]Change after 150 to 250 hours; no subsequent change for life of unit.

X=Check C=Change L=Lubricate

Table 1. Maintenance Schedule (Continued)

Item No.	Item	1 day/ 8 hr	3 mo/ 500 hr	1 yr/ 2000 hr	Procedure or Quantity	Specification
[4]Apply antiseize lubricant at installation and check every 2 to 5 hours until nuts stay tight for an entire 8-hour shift. Check tightness every 3 months or 500 hours thereafter.						
[5]Replace the filter element after the first 150 to 250 hours of service and every 2000 hours or yearly thereafter.						
[6]Use Hyster® P/N 2046459 conventional gear oil for normal operations. Use Hyster® P/N 2308302 synthetic gear oil for freezer applications.						
[7]Apply Dow Corning® Molykote G-N paste (or equivalent)(Hyster P/N 0339068) with a small brush to moderately coat internal MDU splines and external drive motor splines every 3000 hours.						
X=Check C=Change L=Lubricate						

Maintenance Procedures Every 8 Hours or Daily

WARNING

DO NOT operate a lift truck that needs repairs. If a repair is necessary, put a DO NOT OPERATE tag in the operator's area. Remove the key from the key switch.

Inspect the lift truck every 8 hours or daily before use. Put the lift truck on a level surface. Lower the carriage and forks, and turn the key switch to the **OFF** position. If repair is required, put a tag in the operator's area that indicates the lift truck cannot be operated. **DO NOT** operate a lift truck until the problems are corrected.

CHECKS WITH KEY SWITCH TURNED OFF

Make the following checks:
- Electrolyte and specific gravity of the battery
- Make sure the battery is clean and the correct size and weight for the lift truck
- Check that the battery restraint plates are in place
- Leaks in the hydraulic system
- Condition of the wheels and tires
- Condition of the forks, carriage, mast, and overhead guard

Battery

WARNING

DO NOT put tools on the battery.

The acid in the electrolyte can cause injury. If the electrolyte is spilled, use water to flush the area. Make the acid neutral with a solution of sodium bicarbonate (soda). Acid in the eyes must be flushed with water continuously for 15 minutes then seek medical attention.

Batteries generate explosive fumes. Keep the vents in the caps clean. Keep sparks or open flames away from the battery area. DO NOT make a spark from the battery connections. Disconnect the battery when doing maintenance.

The battery must fit the battery compartment so the battery restraint panels will operate correctly. Use spacers to prevent the battery from moving more than 13.0 mm (0.5 in.) in any direction.

CAUTION

Disposal of batteries must meet local environmental regulations.

Make sure the battery weight is within the maximum and minimum weight shown on the nameplate.

Keep the battery case, top cover, and the area for the battery clean and painted. Leakage and corrosion from the battery can cause a malfunction in the electric controls of the lift truck. Use a water and sodium bicarbonate solution (soda) to clean the battery and

the battery area. Keep the top of the battery clean, dry, and free of corrosion.

Make sure the battery is charged and has the correct voltage and ampere hour rating for the lift truck. See the nameplate.

Inspect the battery case, connector, and cables for damage, cracks, or breaks. Contact your local battery dealer to discuss repair options for the battery case. Check the level of the electrolyte daily on a minimum of one cell. The correct level is halfway between the top of the plates and the bottom of the fill hole. Add only distilled water.

Make certain the battery restraint panels are properly installed.

WARNING

Make sure the key switch is in the OFF position and the brake is set before connecting the battery.

If the lift truck was operated with a discharged battery, check the contactor for welded tips before a charged battery is connected.

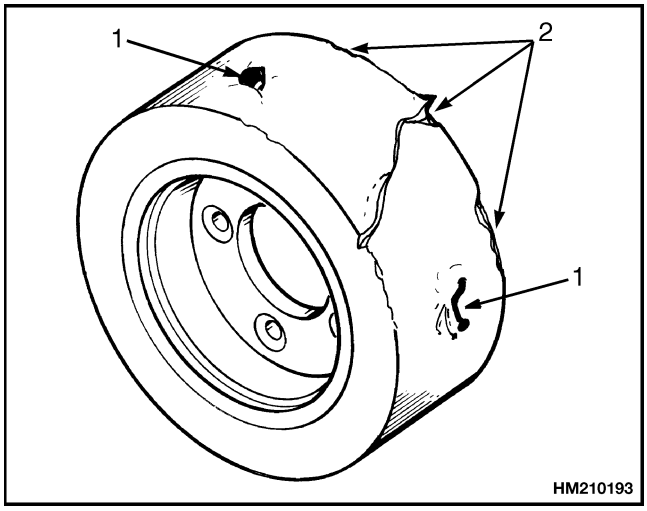
The battery should have an equalization charge each month, but not more than each week.

Tires and Wheels

WARNING

When the wheels have been installed, check all wheel nuts after 2 to 5 hours of operation. When the nuts stay tight after an 8-hour check, the interval for checking the torque can be extended to 500 hours. Refer to the Maintenance Schedule, Table 1 in this section.

Inspect the tires for embedded rocks, glass, wire, pieces of metal, holes, cuts, and other damage. See Figure 8. Remove any object that will cause damage. Check for loose or missing nuts and broken studs. Remove any wire strapping or other material that is wrapped around the axle to prevent damage to the axle seal. See Figure 10.



1. CHECK FOR DAMAGE. REMOVE NAILS, GLASS, METAL, AND OTHER OBJECTS.
2. MAKE EDGES SMOOTH

Figure 10. Check Tires

If the wheel and tire has recently been installed, check to ensure the lug nuts are properly tightened to 135 N•m (100 lbf ft). When installing, snug all the nuts, then tighten to half the torque value, then tighten to the full torque value. Tighten the nuts in a cross pattern to properly seat the wheel to the hub.

Frame and Load Wheels

Inspect the frame for structural damage and loose/missing hardware. Make certain all covers are in place and secured before operating the lift truck. Inspect the load wheels. Loose or crooked load wheels may indicate bearing failure. If failure is suspected, raise the lift truck front end slightly (refer to How to Put Lift Truck on Blocks) and check that load wheels are secure on their axles and rotate smoothly. Repair or replace as necessary.

Safety Labels

WARNING

Safety labels are installed on the lift truck to give information about possible hazards. It is important that all safety labels are installed on the lift truck and can be read.

Check that all safety labels are installed in the correct locations on the lift truck. See the **Parts Manual** or the section **Frame** 100 SRM 1185 for the correct locations of the safety labels.

Overhead Guard

WARNING

DO NOT operate the lift truck without the overhead guard correctly fastened to the lift truck. DO NOT make changes to the overhead guard by welding. Changes that are made by welding or by drilling holes can reduce the strength of the overhead guard.

DO NOT weld mounts for lights or accessories to the leg of the overhead guard. The strength of the overhead guard components can be compromised by welding or heating.

Make sure the capscrew that holds the vertical support post that supports the overhead guard is in the correct position and is tight. The overhead guard and support post reinforce one another to provide protection to the operator.

Make certain the overhead guard is in place and securely attached to the mast. Make certain that the operator's guard is installed between the mast and the operator's compartment.

Forks Check

WARNING

Never repair damaged forks by heating or welding. Forks are made of tempered steel using special procedures and can be weakened by heating or welding. Always replace damaged forks as a pair.

Inspect the forks for cracks and wear. Check the alignment of the fork tips. The difference in height of the fork tips must be less than 3% of the length of the forks. See Table 2.

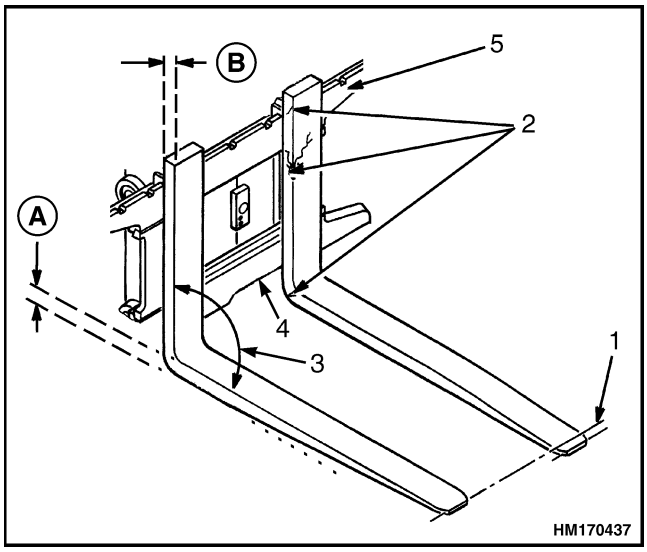
Table 2. Fork Tip Alignment

Fork Tip Alignment Specifications			
Standard Fork Lengths		Maximum Fork Tip Difference$_1$	
mm	(inch)	mm	(inch)
914	(36)	27.00	(1.08)
1067	(42)	32.00	(1.26)
1219	(48)	37.00	(1.44)

Table 2. Fork Tip Alignment (Continued)

Fork Tip Alignment Specifications			
Standard Fork Lengths		Maximum Fork Tip Difference$_1$	
mm	(inch)	mm	(inch)
1372	(54)	41.00	(1.62)
1524	(60)	46.00	(1.80)
1829	(72)	55.00	(2.16)
$_1$Difference of alignment between fork tips must be no more than 3% of the total fork length.			

Some applications may require closer alignment. If the forks do not meet specification, both forks must be replaced. Check that the bottom of each fork is not excessively worn. Check for smooth and proper operation of the fork lock pins. Repair or replace any damaged or broken fork lock pins or components and lubricate as necessary. See Figure 11.



A. HEEL OF FORK (MIN. 90% OF DIMENSION B)
B. ORIGINAL FORK THICKNESS

1. TIP ALIGNMENT (WITHIN 3% OF FORK LENGTH)
2. CRACKS
3. MAXIMUM ANGLE 93°
4. FORK REMOVAL NOTCH
5. CARRIAGE

Figure 11. Fork Check