

**SERVICE REPAIR**

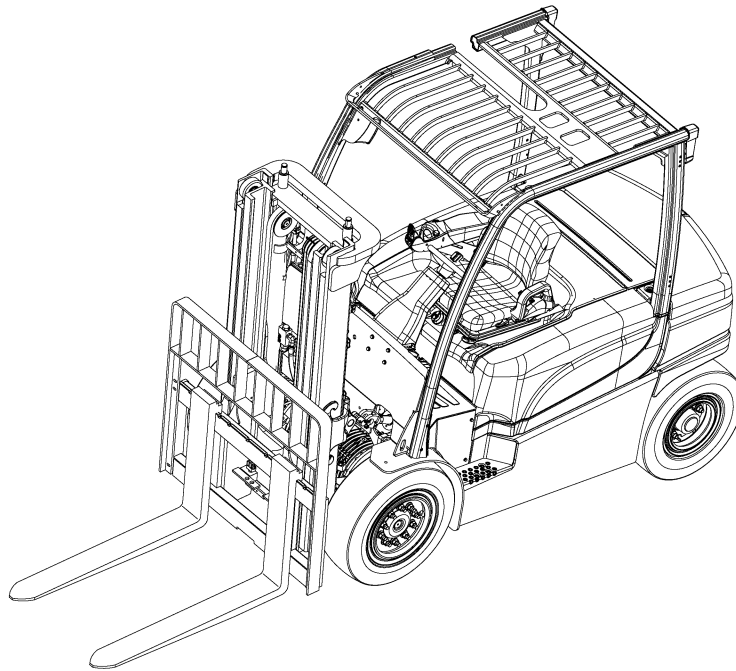
**MANUAL**

Hyster A970 (J80XN, J90XN, J100XN, J100XLN,  
J110XN, J120XN) Forklift

***HYSTER***

# PERIODIC MAINTENANCE

J80-120XN, J100XNL [A970]



# ***HYSTER***

# SAFETY PRECAUTIONS

## MAINTENANCE AND REPAIR

- The Service Manuals are updated on a regular basis, but may not reflect recent design changes to the product. Updated technical service information may be available from your local authorized Hyster® dealer. Service Manuals provide general guidelines for maintenance and service and are intended for use by trained and experienced technicians. Failure to properly maintain equipment or to follow instructions contained in the Service Manual could result in damage to the products, personal injury, property damage or death.
- 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.

## TABLE OF CONTENTS

General .....	1
Serial Number Data .....	2
Discharging the Capacitors .....	2
How to Move Disabled Lift Truck .....	3
How to Tow Lift Truck .....	3
How to Put Lift Truck on Blocks .....	4
How to Raise Drive Tires .....	4
How to Raise Steering Tires .....	4
How to Clean a Lift Truck .....	5
Maintenance Schedule .....	6
Maintenance Procedures Every 8 Hours or Daily .....	12
How to Make Checks With Key or Keyless Switch OFF .....	12
Tires and Wheels .....	12
Forks .....	12
General .....	12
Inspect .....	12
Inspection of Mast, Carriage, Header Hoses, Lift Chains, and Attachments .....	14
Safety Labels .....	15
Steering Column Adjustments .....	15
Tilt Adjust Feature .....	15
Tilt Memory Feature .....	15
Telescopic Feature .....	15
Operator Restraint System .....	16
Emergency Locking Retractor (ELR) .....	16
Seat Adjustments .....	16
Seat Position Adjustment (Standard Seat) .....	16
Seat Position Adjustment (Swivel Seat) .....	16
Seat Adjustment for Operator Weight .....	17
Battery Restraint System .....	19
Hood Latch and Hood Release Handle .....	20
Manual Hydraulics .....	20
E-Hydraulics .....	21
Battery .....	22
Hydraulic System .....	22
How to Make Checks With Key or Keyless Switch ON .....	26
Horn, Lights, and Backup Alarm .....	26
Motion Alarm .....	26
Steering System .....	26
Service Brakes .....	27
Automatic Parking Brake .....	27
Hydraulic Control Levers and Pedals .....	27
Direction and Speed Control Pedals .....	27
Lift System Operation .....	28
Oil Leaks .....	28
Maintenance Procedures Every 500 Hours or Three Months .....	28
Forks .....	28
Remove .....	28
Inspect .....	30
Install .....	30
Adjustment .....	30

**Thanks very much for your reading,  
Want to get more information,  
Please click here, Then get the complete  
manual**

**JustClickHere** 

**NOTE:**

**If there is no response to click on the link above,  
please download the PDF document first, and then  
click on it.**

**Have any questions please write to me:  
[admin@servicemanualperfect.com](mailto:admin@servicemanualperfect.com)**

**TABLE OF CONTENTS (Continued)**

Header Hose Checks .....	31
Mast Lubrication .....	32
Brake Fluid Check .....	34
Master Cylinder Oil Check .....	34
Bleeding the Brake System .....	36
Operator Presence System Check .....	38
Drive Axle Unit Assembly, Gear Oil Level Check .....	38
Drive Axle Unit Assembly, Wet Brake Oil Level Check .....	38
Tilt Cylinder Rod End Pins .....	40
Lift Chains .....	41
Wear Check .....	41
Lift Chain Lubrication .....	42
Fork Pins and Guides .....	42
Check Upper and Lower Bearings, Integral Sideshift Carriage .....	42
Check Lower Mounting Hook, Integral Sideshift Carriage .....	42
Hydraulic Tank Breather, Check .....	44
Electrical Inspection .....	45
Line Contactor .....	45
Steering Axle .....	46
King Pins and Tie Rods, Lubricate .....	46
Other Lubrication .....	46
Hydraulic Control Levers .....	46
Cab Heater .....	46
Maintenance Procedures Every 2000 Hours or Yearly .....	47
Hydraulic System .....	47
Hydraulic Filter Element, Replace .....	47
Hydraulic Tank Breather, Change .....	49
Service Brakes .....	49
Master Cylinder Oil, Change .....	49
Forks .....	50
Integral Sideshift Carriage, Replace Upper and Lower Bearings .....	50
Lift Chains .....	50
Steer Wheel Bearings, Lubricate .....	50
Wheel Bearings .....	50
Steer Wheels, Lubrication .....	50
Maintenance Procedures Every 4000 Hours or Two Years .....	52
Hydraulic Oil Change .....	52
Steering Direction Sensor Inspection .....	54
Fixed Steering Column .....	54
Telescopic Steering Column .....	55
Telescopic Steering Column Lubrication .....	56
Drive Axle Unit Assembly, Gear Oil Change .....	57
Drive Axle Unit Assembly, Wet Brake Oil Change .....	57
Battery Maintenance .....	59
How to Charge Battery .....	59
Rapid Charge .....	60
How to Change Batteries .....	61
General .....	61
Remove the Battery .....	62
Manual Hydraulics .....	62

## TABLE OF CONTENTS (Continued)

E-Hydraulics .....	64
Install the Battery .....	64
Lift and Tilt System Leak Check .....	68
Lift Cylinder Leak Check .....	68
Tilt Cylinder Leak Check .....	68
Safety Procedures When Working Near Mast .....	69
WHEN WORKING NEAR THE MAST ALWAYS: .....	69
Lift Chain Adjustments .....	71
Welding Repairs .....	72
Overhead Guard Changes .....	73
Wheels and Tires .....	73
General .....	73
Pneumatic Tires Repair .....	73
Remove Wheels From Lift Truck .....	73
Remove Tire From Wheel .....	74
Remove Tire From Two-Piece Wheel .....	75
Remove Tire From Three- and Four-Piece Wheels .....	76
Install Wheel in Tire .....	77
Install Two-Piece Wheel in Tire .....	78
Install Three- or Four-Piece Wheel in Tire .....	79
Add Air to Pneumatic Tires With Tube .....	80
Wheels, Install .....	80
Solid Rubber Tires on Pneumatic Wheels, Change .....	80
Remove Tire From Wheel .....	81
Install Tire on Wheel .....	82
Wheels, Install .....	84
Dual Drive Wheels, Install .....	84

This section is for the following models:

(J80-120XN, J100XNL) [A970]

**"THE  
QUALITY  
KEEPERS"**

**HYSTER  
APPROVED  
PARTS**



## General



### WARNING

**DO NOT** make repairs or adjustments unless you have both authorization and training. Repairs and adjustments that are not correct can make a dangerous operating condition.

**DO NOT** operate a lift truck that needs repairs. Report the need for repairs immediately. If repair is necessary, put a **DO NOT OPERATE** tag in the operator's area. Remove the key from the key switch or cover the keyless switch if lift truck is equipped with one. Disconnect the battery connector.

**DO NOT** work under a raised carriage. Lower the carriage or use a chain to prevent the carriage and the inner or intermediate weldments from lowering when doing maintenance. Make sure that the moving parts are attached to parts that cannot move.



### CAUTION

**Disposal of lubricants and fluids must meet local environmental regulations.**



### CAUTION

**Disposal of batteries must meet local environmental regulations.**

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

The Maintenance Schedule has time intervals for inspection, lubrication, and maintenance for your lift truck. The service intervals are provided in both

operating hours recorded on the lift truck hourmeter, and in calendar time. Use the interval that occurs first.

The recommendation for the time intervals are for 8 hours of operation per day. The time intervals must be decreased from the recommendations in the Maintenance Schedule for the following conditions:

- The lift truck is used more than eight hours per day.
- The lift truck must work in dirty operating conditions.
- Poor ground conditions.
- Intensive usage at high performance levels or other abnormal conditions will require more frequent servicing.

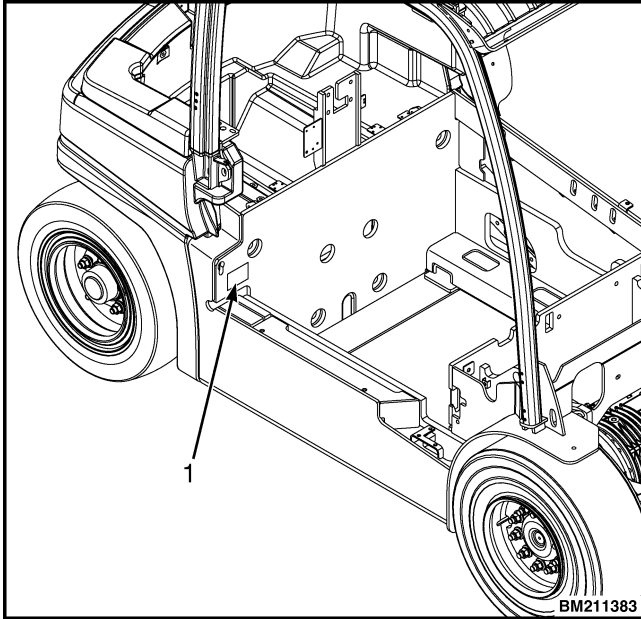
Your dealer for Hyster lift trucks will advise you on the maintenance time intervals based on their survey of the application.

Your dealer for Hyster lift trucks has the equipment and trained service personnel to do a complete program of inspection, lubrication, and maintenance. A regular program of inspection, lubrication, and maintenance will help your lift truck provide more efficient performance and operate for a longer period of time.

Some users have service personnel and equipment to do the inspection, lubrication, and maintenance shown in the Maintenance Schedule. Service Manuals are available from your dealer for Hyster lift trucks to help users who do their own maintenance.

## SERIAL NUMBER DATA

The serial number code for the lift truck is on the Nameplate and stamped into the front face of rear bulkhead. See Figure 1.



1. SERIAL NUMBER

*Figure 1. Stamped Serial Number*

## DISCHARGING THE CAPACITORS

### WARNING

**DO NOT** make repairs or adjustments unless you have been properly trained and authorized to do so. Improper repairs and adjustments 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, attach a **DO NOT OPERATE** tag on the steering wheel and disconnect the battery.

Disconnect the battery and allow the capacitors to discharge before opening any compartment covers or inspecting or repairing the electrical system. **DO NOT** place tools on top of the battery.

If a tool causes a short circuit, the high current flow from the battery can cause personal injury or property damage.

Some checks and adjustments are performed with the battery connected. **DO NOT** connect the battery until the procedure instructs you to do so. Never wear any metallic items on your fingers, arms, or neck. Metal items can accidentally make an electrical connection and cause injury.

Before performing any tests or adjustments, block the lift truck to prevent unexpected movement.

The capacitor in the transistor controller(s) can hold an electrical charge for about 10 seconds after the battery is disconnected. To prevent an electrical shock and personal injury, discharge the capacitor(s) before inspecting or repairing any component in the drive unit compartment. Make certain that the battery has been disconnected.

**DO NOT** short across the motor controller terminals with a screwdriver or jumper wire.

Make certain the Emergency Disconnect Switch has not been activated. This will isolate the controller and prevent the capacitors from discharging properly. The proper way to disconnect the battery is by separating the battery connectors.

1. Ensure the capacitors are discharged by performing Step 2 through Step 6 below.
2. Turn the key or keyless switch to the **OFF** position.
3. Disconnect the battery by separating the connectors.
4. Block drive wheels to prevent lift truck from moving.
5. Make sure the Emergency Disconnect Switch **HAS NOT** been activated. If the Emergency Disconnect Switch is activated, rotate the switch to the right until it pops up.
6. Press horn button. Wait 30 seconds to be sure capacitors are fully discharged.

## HOW TO MOVE DISABLED LIFT TRUCK

### How to Tow Lift Truck



#### WARNING

Use extra care when towing a lift truck if any of the following conditions exist:

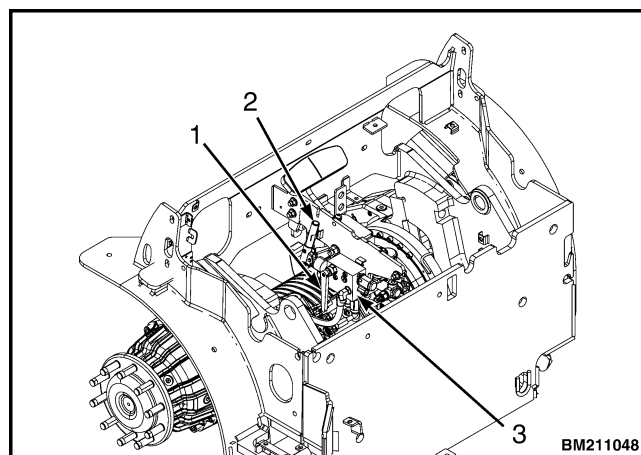
- Brakes DO NOT operate correctly.
- Steering does not operate correctly.
- Tires are damaged.
- Traction conditions are bad.
- The lift truck must be moved on a steep grade.

If the hydraulic pump motor, which includes the steering control functions, does not operate, steering control of the lift truck can be slow. DO NOT tow the lift truck if there is no power. 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 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. Put the weight center of the disabled lift truck on the load center of the forks. DO NOT damage the underside of the lift truck.

1. The towed lift truck must have an operator.
2. Raise the carriage and forks approximately 300 mm (12 in.) from the surface. Install a chain to prevent the carriage and mast channels from moving.

3. Tow with another lift truck of *equal* or *greater* capacity than the disabled lift truck. Install a load of approximately half-capacity on the forks of the lift truck that is being used to tow the disabled lift truck. The half-capacity load will increase the traction of the lift truck. Keep the load as low as possible.
4. Use a towing link made of steel that fastens to the tow pins in the counterweights of both lift trucks.
5. Remove the floor mat and floor plates. Swing the Automatic Park Brake valve handle up to close the Automatic Park Brake valve. Pump the handle on the hand pump 15 times. The Automatic Park Brake actuator releases, disengaging the Automatic Park Brake. See Figure 2.
6. Tow the lift truck slowly.



1. AUTOMATIC PARKING BRAKE VALVE HANDLE
2. HAND PUMP
3. AUTOMATIC PARKING BRAKE VALVE

**Figure 2. Automatic Park Brake Release**

## HOW TO PUT LIFT TRUCK ON BLOCKS

### How to Raise Drive Tires

**⚠ WARNING**

The lift truck must be put on blocks for some types of maintenance and repair. The removal of the following assemblies will cause large changes in the center of gravity: mast, drive axle, battery, or counterweight. When the lift truck is put on blocks, put additional blocks in the following positions to maintain stability:

- a. Before removing the mast and drive axle, put blocks under the counterweight so the lift truck cannot fall backward.
- b. Before removing the counterweight, put blocks under the mast assembly so the lift truck cannot fall forward.

The surface must be solid, even, and level when the lift truck is put on blocks. Make sure that any blocks used to support the lift truck are solid, one-piece units.

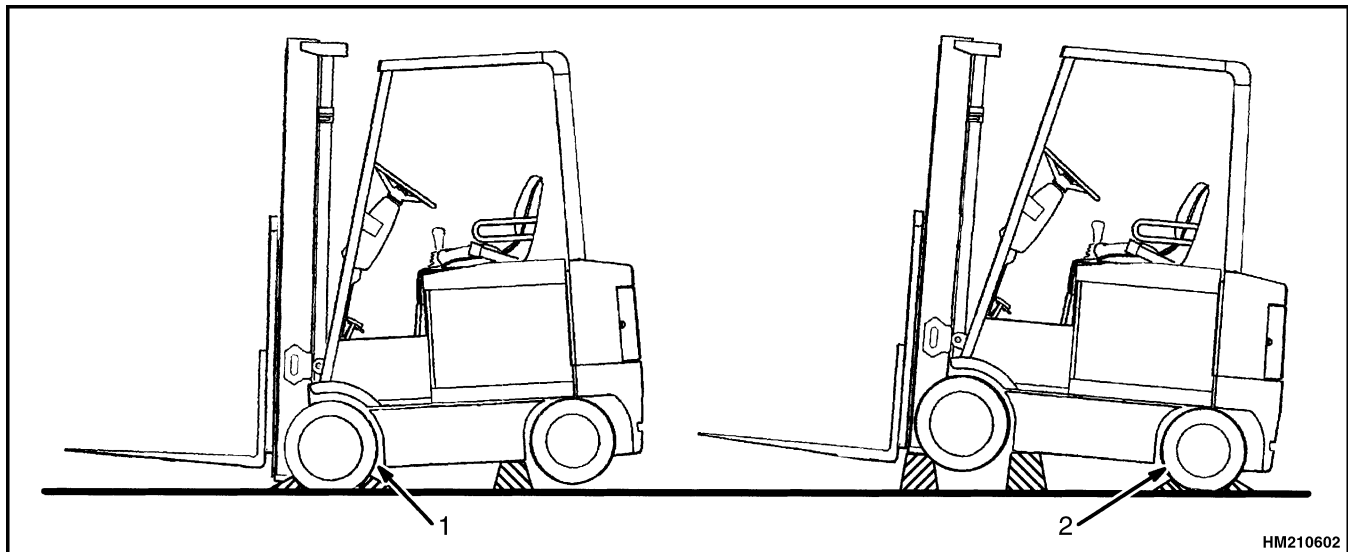
**NOTE:** Some lift trucks have lifting eyes. These lift points can be used to raise the lift truck so that blocks can be installed.

1. Put blocks on each side (front and back) of the steering tires to prevent movement of the lift truck. See Figure 3.

2. Put the mast in a vertical position. Put a block under each outer mast channel.
3. Tilt the mast fully forward until the drive tires are raised from the surface.
4. Put additional blocks under the frame behind the drive tires.
5. If the hydraulic system will not operate, use a hydraulic jack under the side of the frame near the front. Make sure that the jack has a capacity equal to at least half the weight of the lift truck as shown on the Nameplate.

### How to Raise Steering Tires

1. Make sure the Automatic Park Brake is applied before putting blocks on both sides (front and back) of the drive tires to prevent movement of the lift truck. See Figure 3.
2. Use a hydraulic jack to raise the steering tires. Make sure that the jack has a capacity of at least 2/3 of the total weight of the lift truck as shown on the Nameplate.
3. Put the jack under the steering axle or frame to raise the lift truck. Put blocks under the frame to support the lift truck.



1. DRIVE TIRES

2. STEERING TIRES

**Figure 3. Put Lift Trucks on Blocks**

## HOW TO CLEAN A LIFT TRUCK



### WARNING

Compressed air can move particles so that they cause injury to the user or to other personnel. Make sure that the path of the compressed air is away from all personnel. Wear protective goggles or a face shield to prevent injury to the eyes.



### CAUTION

Units may be washed with a non-heated pressure washer. Steam cleaning is not recommended in most instances, as condensation may form in electrical components causing damage or erratic behavior.

**NOTE:** Lift trucks used in paper applications may need cleaning beyond what is described here. Please refer to Paper Application section in the applicable Operating Manual and to available Service Gram/Bulletin for more detail.

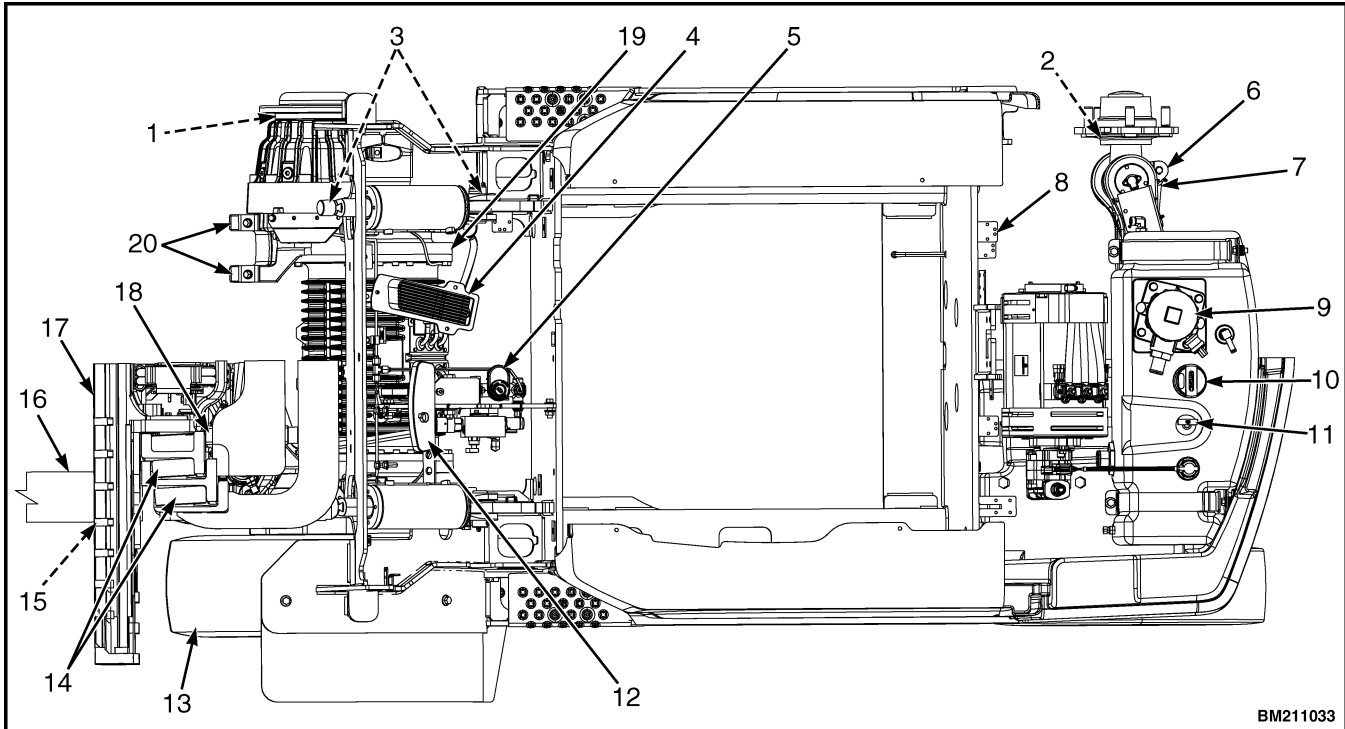
If it becomes necessary to clean the fork lift, follow the guidelines listed below.

1. Assure truck components are cool before starting the cleaning procedure.
2. Disconnect the battery. If an electric truck, remove the traction battery.
3. Remove accumulated debris using a compressed air line and nozzle.
4. Lightly spray a non-corrosive cleaning agent onto the areas to be cleaned. This will help loosen grime, so close contact direct spraying will not be necessary.
5. Be sure to avoid directing the spray into electrical panel compartment. Ensure over-spray does not come in contact with electrical components; **DO NOT** spray water directly at electrical components, wiring connectors or electrical enclosures. Even sealed connectors may allow water egress under pressure or if connector is damaged.
6. Avoid spraying in areas containing electrical components such as:
  - Floor Plates
  - Battery Compartment
  - Dash/cowl assembly
  - Armrests with electrical components
7. Clean the battery compartment by using a clean cloth to wash the battery with water. Dry with compressed air. Care should be taken to keep moisture at a minimum as some units have a traction or hydraulic motor directly below the battery compartment.
8. **DO NOT** pressure wash the battery. **DO NOT** use hot water. For cleaning traction batteries, refer to the Battery section of the **Service Manual**.
9. **DO NOT** pressure wash lift chains, sheaves or load rollers in the mast assembly. Refer to the Chains, Sheaves and Load Rollers maintenance section in the **Service Manual** for proper cleaning procedures.
10. After cleaning, immediately run the lift truck to dry out components.

## Maintenance Schedule

The Maintenance Schedule has time intervals for inspection, lubrication, and maintenance for your lift truck. The service intervals are provided in both operating hours recorded on the lift truck hourmeter, and in calendar time. The recommendation is to use the interval that comes first. The approximate locations of the items indicated in the Maintenance Schedule are shown in Figure 4.

The Maintenance Schedule has the maximum service intervals for usage under normal conditions. Inspect and lubricate more frequently if the lift truck operates in dirty, dusty, wet, or difficult conditions.



BM211033

Figure 4. Maintenance Points

Table 1. Maintenance Schedule

Item No.	Item	8 hr/ Daily	500 hr/ 3 mo	2000 hr/ 1 yr	4000 hr/ 2 yr	Procedure or Quantity	Specification
13	Tires	X				Check condition.	
	Automatic Parking Brake	X CIL				Check operation.	Must hold capacity load on a 15% grade [a slope that increases 1.5 meters in 10 meters (1.5 feet increase in 10 feet)].
1	Service Brakes	X CIL				Check operation.	See <b>Parts Manual</b> .
5	Brake Fluid Master Cylinder Oil	CIL	X	C		0.18 liter (0.4 pt) .	Dexron® III Transmission Fluid
18	Lift Chains	X				Check condition/ lube if necessary. See <b>NOTE 3</b> .	SAE 30W engine oil.
19	Drive Unit Assembly/Wet Brake	X				Check for Leaks.	
16	Forks	X	X	X		Check condition/ replace if necessary.	
	Paper Application Truck Components Drip Shield	X				Check Condition. Clean as Required. Replace as Required. See <b>NOTE 9</b> .	
4	Direction and Speed Control Pedals	X				Check operation. Lubricate as necessary.	Use multipurpose grease. See <b>NOTE 1</b> .
11	Hydraulic Oil Standard Truck (Total Capacity)	X			C	57 liter (60 qt) . See <b>NOTE 8</b> .	0 to 48°C (32 to 118°F) Hydraulic Oil ISO VG46.
11	Hydraulic Oil Cooler/Freezer Truck (Total Capacity)	X		C		57 liter (60 qt) <b>NOTE 8</b>	-29 to 48°C (-20 to 118°F) Hydraulic Oil ISO VG 32 - VI ≥ 140 (High Viscosity Index Oil per ISO 11158 L-HV).
X=Check C=Change L=Lubricate CIL=Check Indicator Light during operation							

Table 1. Maintenance Schedule (Continued)

Item No.	Item	8 hr/ Daily	500 hr/ 3 mo	2000 hr/ 1 yr	4000 hr/ 2 yr	Procedure or Quantity	Specification
11	Hydraulic Oil Sub-zero Construction (Total Capacity)	X		C		57 liter (60 qt) <b>NOTE 8</b>	-40 to 22°C (-40 to 71.6°F) Hydraulic Oil MIL- H-5606A
	Horn, Lights, and Alarm	X				Check operation.	
	Oil Leaks	X				Check for leaks.	
	Safety Labels	X				Replace as necessary.	See <b>Parts Manual</b> .
	Battery and Battery Restraint System	X				Check condition.	See <b>NOTE 4</b> and <b>NOTE 12</b> .
	Hood Latch and Release Handle	X, L				Lubricate as Necessary. Check operation.	See <b>NOTE 11</b> .
	Manual Control Lever Release Latch	X,L				Lubricate as Necessary. Check operation.	See <b>NOTE 11</b> .
	Steering Column Tilt Memory Lever	X				Lubricate as Necessary. Check operation.	Use multipurpose grease. See <b>NOTE 1</b> .
	Operator Restraint System	X CIL				Check condition.	
	Lift System Operation Check	X				Check operation.	
	Operator Presence System Check		X			Check operation.	
20	Pivots (Mast)	X	L			2 fittings, lubricate as required.	Use multipurpose grease. See <b>NOTE 1</b> .
14	Mast Sliding Surfaces	X	L			Lubricate as required. See <b>NOTE 5</b> .	Use multipurpose grease. See <b>NOTE 1</b> .
17	Integral Sideshift Carriage	X	L			2 fittings. See <b>NOTE 5</b> .	Use multipurpose grease. See <b>NOTE 1</b> .
	Header Hoses, Hose Fittings and Clamps	X	X			Inspect for kinked, flattened, stiff, or charred hoses.	Replace if necessary.
	Hydraulic Control Levers and Pedals	X				Check operation.	
	Steering System	X				Check operation.	

X=Check C=Change L=Lubricate CIL=Check Indicator Light during operation



Table 1. Maintenance Schedule (Continued)

Item No.	Item	8 hr/ Daily	500 hr/ 3 mo	2000 hr/ 1 yr	4000 hr/ 2 yr	Procedure or Quantity	Specification
19	Drive Axle Unit Assembly Gear Oil		X			Check oil level. 2.6 liter (2.7 qt) per chamber.	Use gear oil. John Deere JDM J20C
3	Tilt Cylinder Rod End Pins	X	L				Use multipurpose grease. See NOTE 1.
12	Brake Pedal Linkage and Shafts		L			Lubricate linkage and shafts. See NOTE 2.	Use multipurpose grease. See NOTE 1 and NOTE 11.
18	Lift Chains		L			Check stretch and lubricate. See NOTE 2 and NOTE 3.	30W Engine Oil
18	Lift Chains	X	X			Check adjustment and length. See NOTE 2.	
15	Fork Pins and Guides	X	L			Lubricate as necessary. See NOTE 2.	Use multipurpose grease. See NOTE 1.
10	Hydraulic Tank Breather		X	C		Clean or Replace. See NOTE 2.	See Parts Manual.
17	Integral Sideshift Carriage (Upper/Lower Bearings)		X			Check wear. 4 bearings. See NOTE 5.	2.5 mm (0.098 in.) minimum thickness.
17	Integral Sideshift Carriage Lower Mounting Hooks		X			Check for Wear and Clearance. See NOTE 2.	0.76 mm (0.03 in.) minimum wear limit.
8	Contactors		X			Check condition.	See Parts Manual. See NOTE 12.
6	Steering King Pins		L			4 fittings, lubricate as required. See NOTE 2.	Use multipurpose grease. See NOTE 1.
7	Steering Tie Rods		L			4 fittings, lubricate as required. See NOTE 2.	Use multipurpose grease. See NOTE 1.
X=Check C=Change L=Lubricate CIL=Check Indicator Light during operation							

Table 1. Maintenance Schedule (Continued)

Item No.	Item	8 hr/ Daily	500 hr/ 3 mo	2000 hr/ 1 yr	4000 hr/ 2 yr	Procedure or Quantity	Specification
	Hinges, Levers, Linkage, Pedals, Seat Rails, and Latches		L			Lubricate as required. See <b>NOTE 2</b> .	Use multipurpose grease. See <b>NOTE 1</b> and <b>NOTE 13</b> .
	Hydraulic Control Levers		L			Lubricate as required.	Use silicone lubricant spray. Hyster P/N 328388.
	Heater- Air Filter		C			Replace air filters. Quantity of 2.	See <b>Parts Manual</b> .
	Heater- Heater Element		X			Clean heater element.	Use compressed air.
	Heater- Operating Condition		X			Check operation and heater condition.	
17	Integral Side-Shift Carriage (Upper/Lower Bearings)			C		Replace bearings/ 4 bearings.	2.5 mm (0.098 in.) minimum thickness. See <b>Parts Manual</b> .
2	Steer Wheel Bearings			L		Check grease.	Use multipurpose grease. See <b>NOTE 1</b> .
9	Hydraulic Oil Filter			C		1 filter. See <b>NOTE 2</b> and <b>NOTE 8</b> .	See <b>Parts Manual</b> .
19	Drive Axle Unit Assembly Gear Oil				C	Change oil. 2.6 liter (2.7 qt) total both chambers.	Use gear oil John Deere JDM J20C.
18	Lift Chains			L		Remove lift chains to clean and lubricate.	30W engine oil.
	Steering Position Sensor				X	Check sensor assembly and column gear teeth.	Replace sensor or column gear as required.
	Telescopic Steering Column				L	Lubricate.	Use manual steering gear grease. See <b>NOTE 6</b> .

X=Check C=Change L=Lubricate CIL=Check Indicator Light during operation

Table 1. Maintenance Schedule (Continued)

Item No.	Item	8 hr/ Daily	500 hr/ 3 mo	2000 hr/ 1 yr	4000 hr/ 2 yr	Procedure or Quantity	Specification
	Automatic Parking Brake Cable Barrel		L				
	Automatic Parking Brake Cable	X				Check condition. Replace as necessary.	See NOTE 7.
	Automatic Parking Brake Actuator and Levers					Replace actuator and levers.	See NOTE 7.
	Mast and Carriage with Paper Roll Clamp				X	Inspect. NOTE 10	Dye Penetrant.

**NOTE 1:** Multipurpose grease with 2 to 4% Molybdenum Disulfide.

**NOTE 2:** Recommended service intervals are based on a normal application in a clean environment. Applications involving contaminated environments such as high levels of air borne debris (dust and waste paper); chemical or abrasive compounds; poor ground conditions; intensive usage at high performance levels; or other abnormal conditions will require more frequent servicing. At your request your dealer will advise you of the appropriate service intervals based on an application survey.

**NOTE 3:** Lubricate if dry or at first sign of visible surface rust

**NOTE 4:** Equalization charge is required approximately each month.

**NOTE 5:** Maximize life of surface by lubricating every 250 hours for first 1000 hours.

**NOTE 6:** Multipurpose lithium base grease.

**NOTE 7:** Replace at 10,000 hours. See **Transaxle** 1300SRM1539 for procedures.

**NOTE 8:** Hydraulic oil sampling and analysis is a recommended practice. See **Hydraulic Cleanliness Procedures** 1900SRM1620 for oil cleanliness and water content guidelines. For lift trucks operating in heavy duty applications or highly contaminated environments, take oil samples every 500 hours. Normal Operating conditions may allow for less frequent oil sampling. Oil sampling should be done just prior to all oil and filter changes.

**NOTE 9:** Vehicles used in paper application require regular inspection and cleaning to minimize risk of fire. This should be done at least once every 8 hours or more frequently depending upon operating environment. Use compressed air and steam clean as necessary.

**NOTE 10:** Inspect after an impact likely to cause damage. In large diameter paper-roll production applications, inspect at first 4000 hours with subsequent inspection at 2000-hour intervals. At your request your **Hyster** dealer will advise you of the appropriate service intervals based on an application survey.

**NOTE 11:** Lubricate with anti-seize grease compound for lift trucks equipped with Outdoor Protection/Wash-down Package.

**NOTE 12:** Spray electrical connections with rust inhibitor-ignition sealer, after components are properly tightened, for lift trucks equipped with Outdoor Protection/Wash-down Package.

**NOTE 13:** Coat all brake linkage pivot points, exposed brake cables, pivot shafts, and bushings with anti-seize lubricant for lift trucks equipped with Outdoor Protection/Wash-down Package.

X=Check C=Change L=Lubricate CIL=Check Indicator Light during operation

## Maintenance Procedures Every 8 Hours or Daily

### **WARNING**

**DO NOT** operate a lift truck that needs repairs. Report the need for repairs immediately. If repair is necessary, put a **DO NOT OPERATE** tag in the operator's area. Remove the key from the key switch or cover the keyless switch.

Inspect the lift truck after every eight hours or daily before use. Put the lift truck on a level surface. Lower the carriage and forks and turn the key or keyless switch to the **OFF** position. Apply the Automatic Parking Brake (APB). Remove the floor mat and floor plate 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. Make the additional checks as described in the following paragraphs of How to Make Checks With Key or Keyless Switch OFF and How to Make Checks With Key or Keyless Switch ON.

### **HOW TO MAKE CHECKS WITH KEY OR KEYLESS SWITCH OFF**

#### **Tires and Wheels**

Inspect the tires for wire, rocks, glass, pieces of metal, holes, cuts and other damage. Remove any object that will cause damage. Check for loose or missing hardware. Remove any wire strapping or other material that is wrapped around the axle. See Figure 5.

#### **Forks**

##### **General**

**NOTE:** Forks must be removed and installed by trained personnel.

The identification of a fork describes how the fork is connected to the carriage. These lift trucks have hook forks.

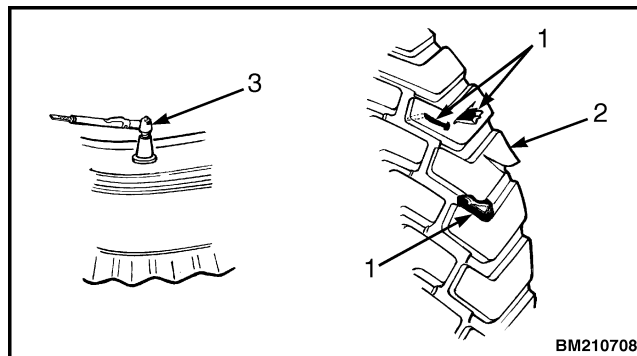
#### *Inspect*

### **WARNING**

**DO NOT** try to correct fork tip alignment by bending the forks or adding shims. Replace bent forks.

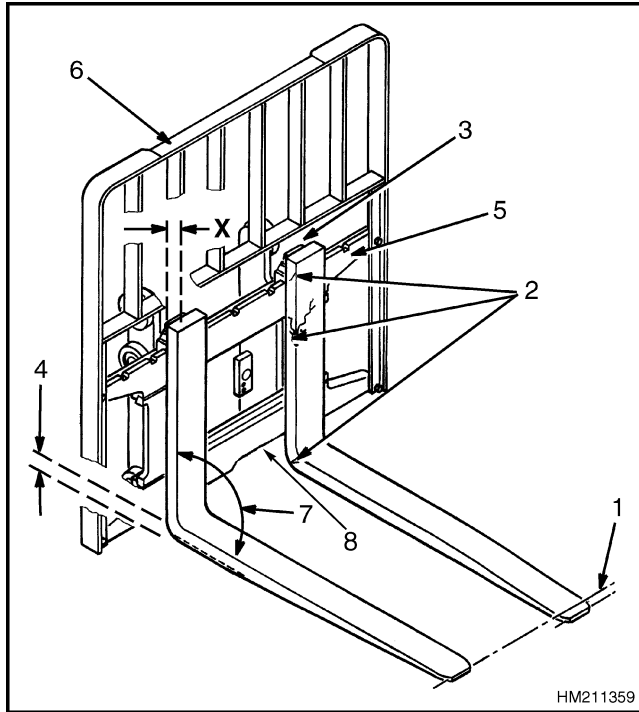
**Never repair damaged forks by heating or welding. Forks are made of special steel using special procedures. Replace damaged forks. Forks are to be replaced only in sets and not individually.**

1. Inspect the forks for cracks and wear. Check that the fork tips are aligned as shown in Figure 6.
2. Check that the bottom of the fork is not worn (item 4 in Figure 6).
3. Replace any damaged or broken parts that are used to keep the forks locked in position. See Figure 7.



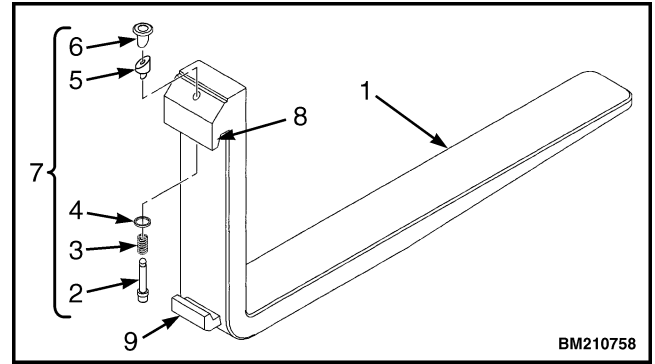
1. CHECK FOR DAMAGE AND REMOVE NAILS, GLASS, METAL, AND OTHER OBJECTS FROM TREAD
2. CHECK EDGES FOR WEAR
3. CHECK TIRE PRESSURE

**Figure 5. Tires Check**



1. TIP ALIGNMENT (MUST BE WITHIN 3% OF FORK LENGTH)
2. CRACKS
3. LATCH
4. HEEL OF FORK (MUST BE 90% OF DIMENSION X)
5. CARRIAGE
6. LOAD BACKREST EXTENSION
7. MAXIMUM ANGLE 93°
8. FORK REMOVAL NOTCH

**Figure 6. Forks Check**



1. FORK
2. LOCK PIN
3. SPRING
4. WASHER
5. WEDGE
6. KNOB
7. LOCK PIN ASSEMBLY
8. TOP FORK HOOK
9. LOWER FORK HOOK

**Figure 7. Fork Lock Pin Assembly**

## Inspection of Mast, Carriage, Header Hoses, Lift Chains, and Attachments

### WARNING

Lower the lift mechanism completely. Never allow any person under a raised carriage. DO NOT put any part of your body in or through the lift mechanism unless all parts of the mast are completely lowered and the lift truck traction motor is OFF.

1. Inspect the welds on the mast, cylinders, and carriage for cracks. Make sure that the cap-screws and nuts are tight.
2. Inspect the channels for wear in the areas where the rollers travel. Inspect the rollers for wear or damage.
3. Inspect the load backrest extension for cracks and damage.
4. If the lift truck is equipped with a sideshift carriage or attachment, inspect the parts for cracks and wear. Make sure the parts that fasten the sideshift carriage or attachment to the carriage are in good condition.

### WARNING

Always wear the proper protective equipment including eye protection and petroleum-resistant gloves when handling hydraulic oil. Thoroughly wash oil from exposed areas of skin as soon as possible.

### WARNING

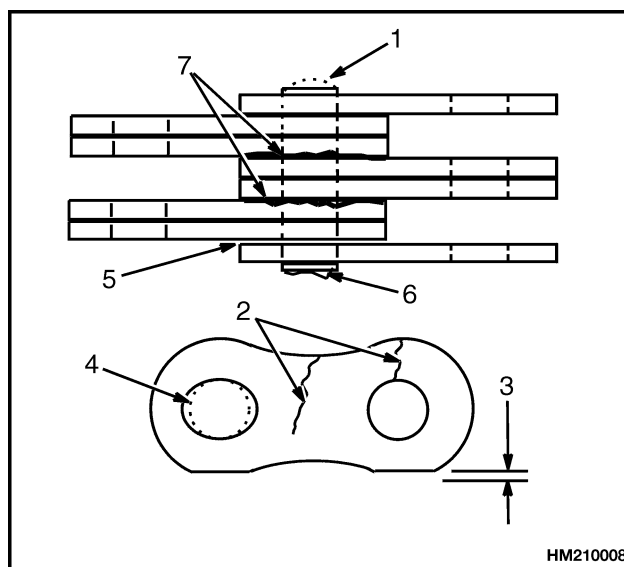
Never check for leaks by putting hands on hydraulic lines or components under pressure. Hydraulic oil under pressure can be injected into the skin.

5. Visually inspect hoses/fittings for hydraulic leaks; hose covers for cuts, cracks, or exposed reinforcement; defective/broken clamping devices or sheaves; and proper tracking during operation. Adjust/repair/replace hose/components as necessary.

6. Check that lift chains are correctly lubricated. Use SAE 30W engine oil to lubricate lift chains.
7. Inspect the lift chains for cracks or broken links and worn or turned pins. Lift chains must be replaced as a set. See Figure 8.

**NOTE:** Chain anchor pins MUST be replaced anytime chains are replaced.

8. Inspect the chain anchors and pins for cracks and damage.
9. Make sure the lift chains are adjusted so that they have equal tension. **Adjustments or replacement of the lift chains must be done by authorized personnel.**



1. WORN PIN
2. CRACKS
3. EDGE WEAR (MAXIMUM 5% OF NEW)
4. HOLE WEAR
5. LOOSE LEAVES
6. DAMAGED PIN
7. CORROSION

**Figure 8. Lift Chains Check**

## Safety Labels



### WARNING

Safety labels are installed on the lift truck to provide 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 service manual section **Frame 0100SRM1342** for the correct locations of the safety labels.

## Steering Column Adjustments

Make sure the steering column adjustment features are functioning properly. If lift truck is equipped with the optional telescoping steering column, make sure the tilt memory and telescoping features are operating correctly. The tilt memory lever must **NOT** allow the column to move unless the tilt memory lever is released. See Figure 9.

### Tilt Adjust Feature

The column tilt angle should be locked in position whenever the tilt position lever is released. Use multipurpose grease as shown in the Maintenance Schedule and lubricate the lever and pivots as needed.

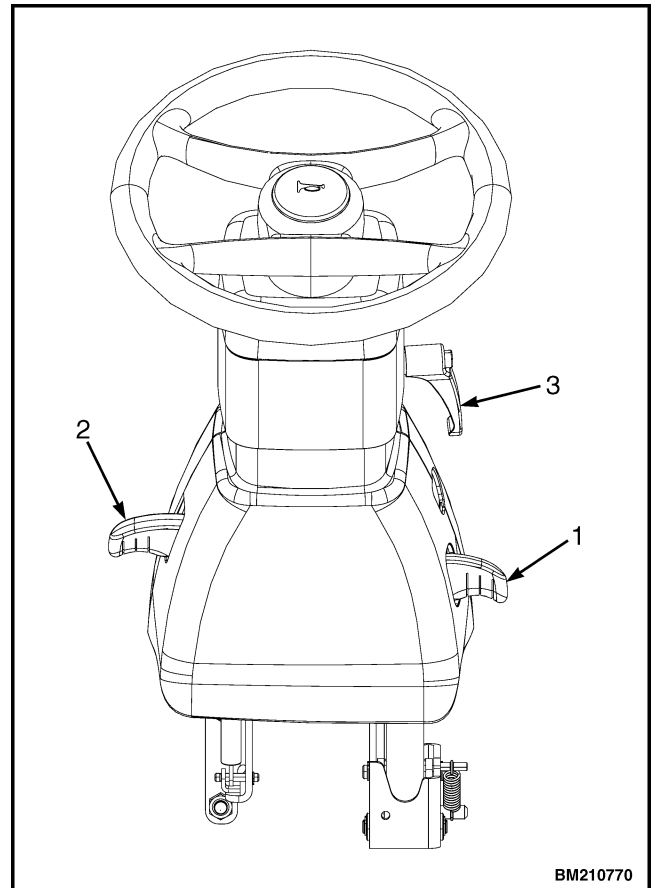
### Tilt Memory Feature

After the tilt memory lever is released, tilt the column down until the column locks into position. The column should remain locked in place and **NOT** move. Use multipurpose grease as shown in the Maintenance Schedule and lubricate the lever and pivots as needed.

### Telescopic Feature

**NOTE:** DO NOT use multipurpose grease to lubricate the sliding surfaces of the telescopic column.

When the telescopic column locking handle is tightened to 6 N·m (53 lbf in), the steering wheel should remain locked in place. Use multipurpose grease as shown in the Maintenance Schedule and lubricate the lever and pivots as needed.



**NOTE:** OPTIONAL TELESCOPIC STEERING COLUMN SHOWN.

1. TILT POSITION LEVER
2. TILT MEMORY LEVER
3. TELESCOPIC COLUMN LOCKING HANDLE

**Figure 9. Steering Column Tilt Memory Lever**

## Operator Restraint System

There is an indicator icon on the display panel for the seat belt. The icon is ON as described in the **Operating Manual**. The indicator icon can help the operator remember to fasten the seat belt.

The seat belt, hip restraint brackets, and the seat and seat mounting components are the parts of the operator restraint system (see Figure 10). If the lift truck is equipped with manual hydraulic control levers, the control lever assembly and latch are also part of the operator restraint system. Each item must be checked to make sure it is attached securely, functions correctly and is in good condition.

Make sure the seat rails are not loose. The seat rails must lock securely in position, but move freely when unlocked. The seat rails must be securely attached to the mounting surface. See Figure 10.

## Emergency Locking Retractor (ELR)

When the ELR style seat belt is properly buckled across the operator, the belt will permit slight operator repositioning without activating the locking mechanism. If the truck tips over, travels off a dock, or comes to a sudden stop, the locking mechanism will be activated and hold the operator's lower torso in the seat. See Figure 10.

A seat belt that is damaged, worn, or does not operate properly will not provide protection when it is needed. The end of the belt must fasten correctly in the latch. The seat belt must be in good condition. Replace the seat belt if it is damaged or worn.

The following seat belt operation checks must be performed three times before replacing the seat belt assembly:

- With the hood closed and in the locked position, pull the seat belt slowly from the retractor assembly. Make sure the seat belt pulls

out and retracts smoothly. If the seat belt does not pull out of the retractor assembly the internal latch may be locked. Pull firmly on the seat belt and hold for a moment to remove slack from the belt in the retractor. Release the seat belt. Seat belt will retract and the internal latch will unlock. If the seat belt cannot be pulled from the retractor assembly or the belt will not retract, replace the seat belt assembly.

- With the hood closed and in the locked position, pull the seat belt with a sudden jerk. Make sure the seat belt will not pull from the retractor assembly. If the seat belt can be pulled from the retractor when it is pulled with a sudden jerk, replace the seat belt assembly.
- With the hood in the open position, make sure the seat belt will not pull from the retractor assembly. If the seat belt can be pulled from the retractor, with the hood in the open position, replace the seat belt assembly.

## Seat Adjustments

### Seat Position Adjustment (Standard Seat)

Fore and aft adjustment - it is recommended that the seat be adjusted so that the thigh is horizontal to the ground in order to achieve the best ergonomic position.

### Seat Position Adjustment (Swivel Seat)

- The seat swivels 12 degrees to the right to allow the operator a more ergonomic position when driving in reverse.
- The seat swivels 5 degrees to the left to allow easier exit of the truck.
- The neutral position is shown in Figure 11.



### Seat Adjustment for Operator Weight



#### CAUTION

A major cause for high Whole Body Vibration is caused by the operator not adjusting the seat to his/her weight.

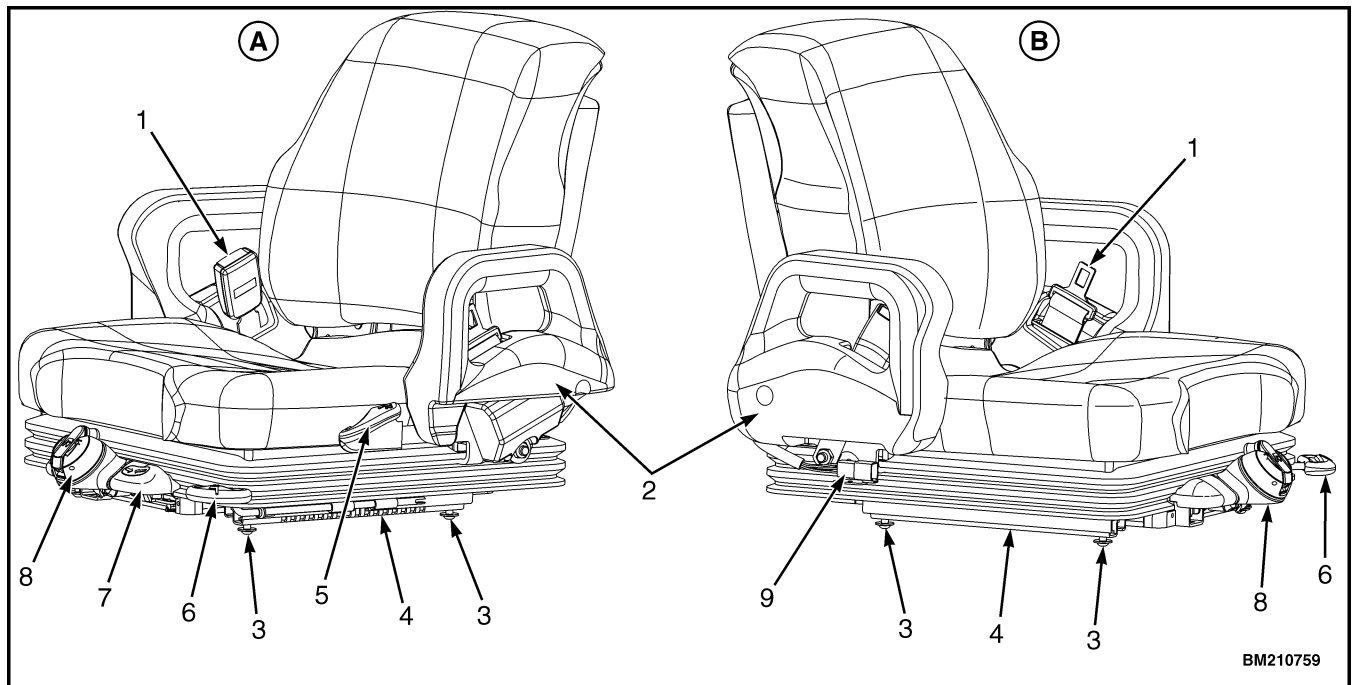
**NOTE:** It is important to adjust the weight setting for each operator.

**NOTE:** The seat is designed for a maximum weight of 135 kg (298 lb).

- The target is for the "ride indicator" to fall between the arrows when the operator sits upright on the seat with the feet positioned

on the pedals. This ensures that the operator is set at the midpoint of the 80 mm (3.5 in.) suspension. See Figure 11.

- The weight adjustment handle can be turned as shown to increase or decrease the weight resistance. Pull handle out before turning. As handle is turned the "stiffness" of the suspension can be felt to increase or decrease depending on which way the handle is turned.



**NOTE:** STANDARD SEAT SHOWN. AN OPTIONAL SWIVEL SEAT IS AVAILABLE. SWIVEL SEAT ARRANGEMENT IS THE SAME. HIP RESTRAINTS FOR LIFT TRUCKS WITH MANUAL HYDRAULIC SYSTEM SHOWN.

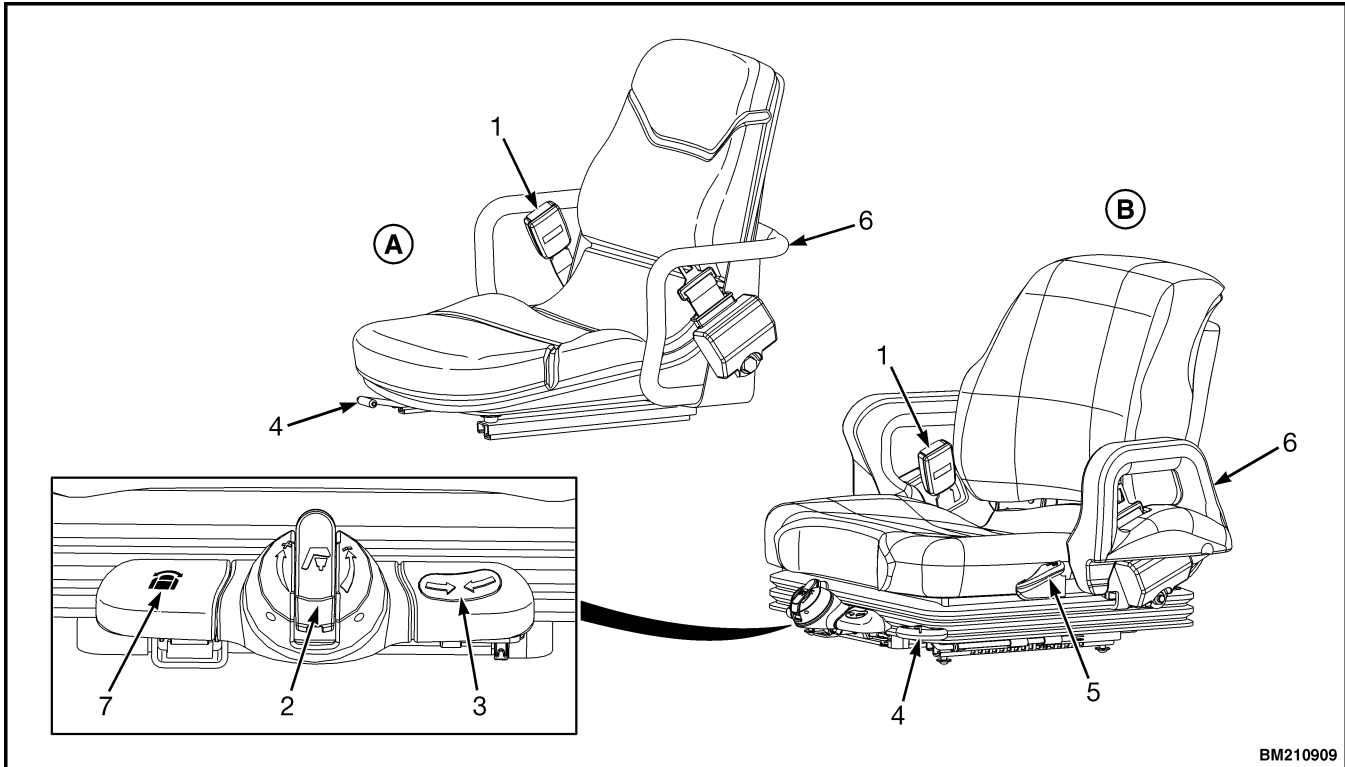
#### A. LEFT VIEW

- SEAT BELT
- HIP RESTRAINT BRACKET
- MOUNTING HARDWARE
- SEAT RAILS
- BACKREST ANGLE ADJUSTMENT LEVER

#### B. RIGHT VIEW

- FORWARD/BACKWARD ADJUSTMENT LEVER
- RIDE POSITION INDICATOR
- WEIGHT ADJUSTMENT KNOB
- SEAT HARNESS

**Figure 10. Seat Components and Operator Restraint System**



BM210909

**A. STANDARD, NON SUSPENSION SEAT**

- 1. SEAT BELT
- 2. WEIGHT ADJUSTMENT HANDLE
- 3. RIDE POSITION INDICATOR
- 4. FORWARD/BACKWARD ADJUSTMENT LEVER

**B. FULL SUSPENSION SEAT**

- 5. BACKREST ANGLE ADJUSTMENT LEVER
- 6. ARMREST
- 7. SWIVEL LATCH RELEASE LEVER

**Figure 11. Seat Adjustment (Full Suspension and Swivel Seats)**

## Battery Restraint System



### WARNING

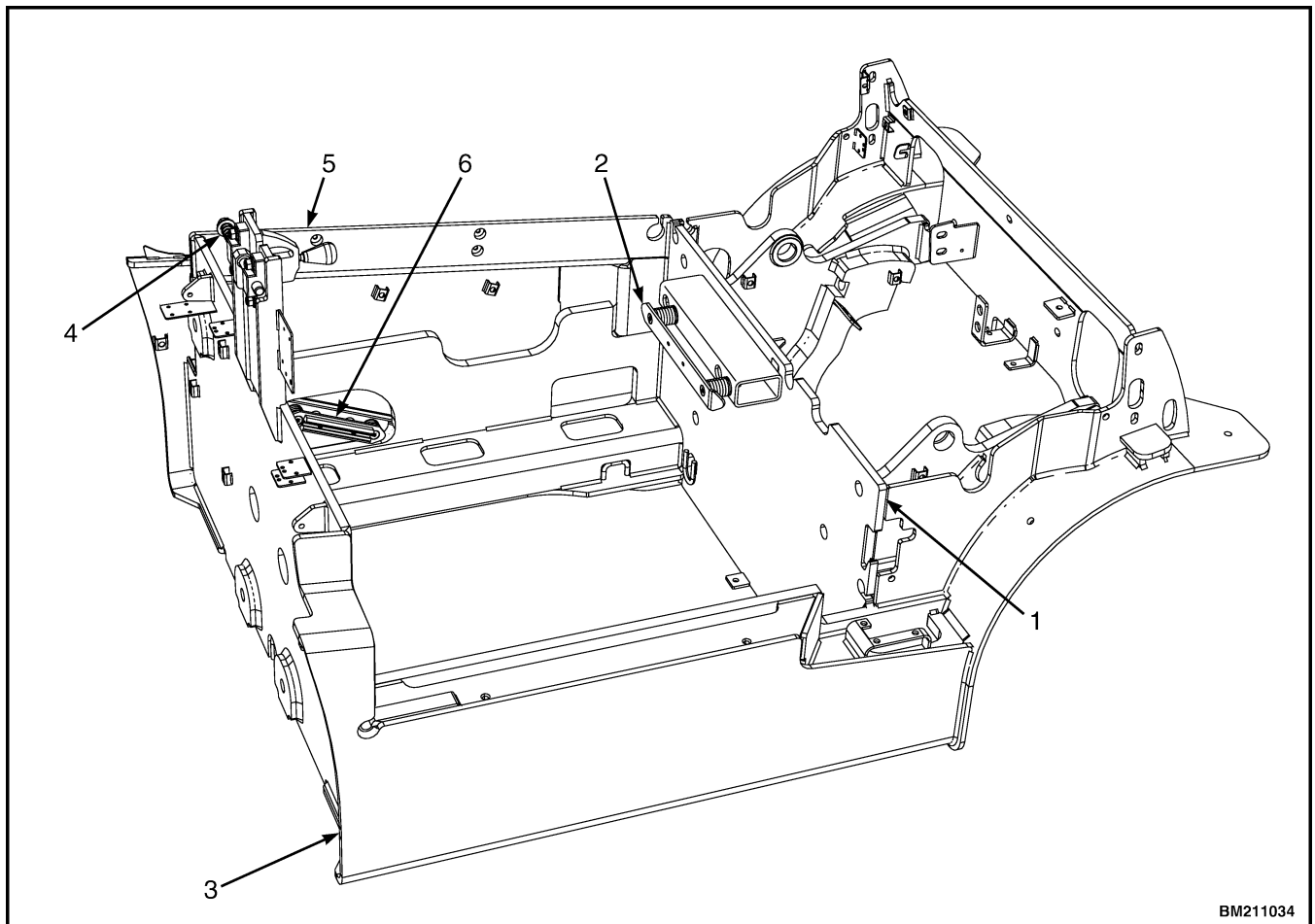
The hood latch mechanism and battery restraint system must operate correctly before a lift truck is operated.

The battery restraint system is made up of a front and side spacer plates, the battery retention pin and the right and left side battery covers that help prevent the battery from moving side-to-side. See Figure 12.

The front and side spacer plates are adjustable. The front spacer plate helps prevent the battery from moving forward and backward.

The side spacer plate helps prevent side-to-side movement of the battery. The retention pin helps to prevent the battery from falling out of the battery compartment if a tipover occurs.

The battery restraint system must function so that the operator restraint system can operate correctly. Operation of the battery restraint system requires that the maximum movement allowed for the battery is 13 mm (0.50 in.) in any horizontal direction. This will reduce the risk of operator injury in a truck tipover. Batteries for this series of lift trucks must all have the same length dimension to just fit the battery compartment width. For correct battery sizes, see the **Operating Manual**.



BM211034

- |                       |                      |
|-----------------------|----------------------|
| 1. FRONT BULKHEAD     | 4. RETENTION PIN     |
| 2. FRONT SPACER PLATE | 5. LH FRAME CHANNEL  |
| 3. RH FRAME CHANNEL   | 6. SIDE SPACER PLATE |

**Figure 12. Standard Battery Restraint System**