

SERVICE REPAIR

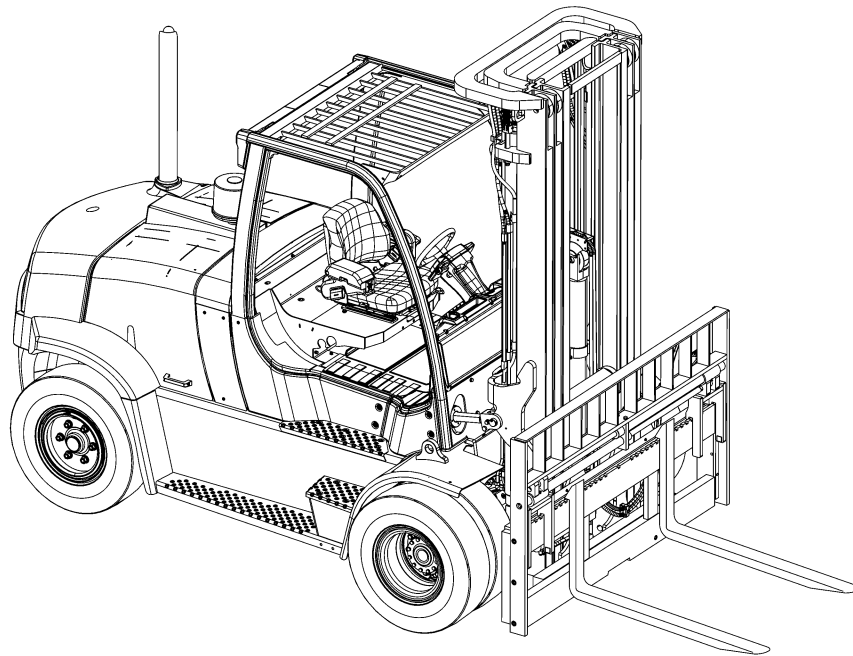
MANUAL

Hyster A299 (H170FT, H175FT36, F190FT) Forklift
Service Repair Manual

HYSTER

PERIODIC MAINTENANCE

H8.0FT, H8.0FT9, H9.0FT
(H170FT, H175FT36, H190FT) [A299]



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.

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This section is for the following models:

H8.0FT, H8.0FT9, H9.0FT (H170FT, H175FT36, H190FT) [A299]

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.



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.



CAUTION

Disposal of lubricants and fluids 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 of 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 recommendations for the time intervals are for eight 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 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 for the lift truck is on the Nameplate. It is also on the right side of the frame, under the floor plate.

HOW TO MOVE DISABLED LIFT TRUCK

How to Tow Lift Truck

WARNING

Use extra caution 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 towed on a slope.

If the engine cannot run, there is no power available for the hydraulic steering system and the service brakes. This condition can make the lift truck difficult to steer and stop. If the lift truck uses power from the engine to help apply the brakes, the application of the brakes will be more difficult. Poor traction can cause the disabled lift truck or towing vehicle to slide. A slope will also make the lift truck more difficult to stop.

Never lift and move a disabled lift truck unless the disabled lift truck **MUST** be moved and cannot be towed. A lift truck used to move a disabled lift truck **MUST** have a capacity rating equal to or greater than the weight of the disabled lift truck. The capacity of the lift truck used to move a disabled lift truck must have 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 load center of the forks. Be careful to not damage the underside of the lift truck.

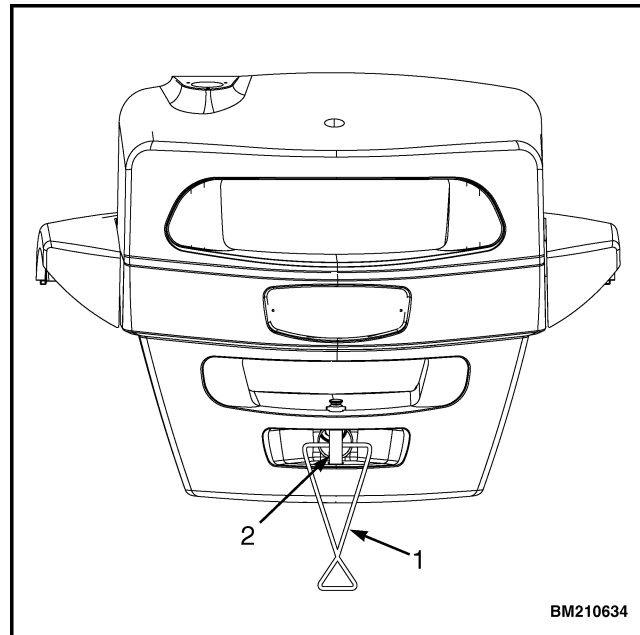
CAUTION

To prevent damage to the transmission during towing, lift the drive wheels off the ground or disconnect the drive shaft.

CAUTION

DO NOT try to start the engine by pushing or towing the lift truck. Damage to the hydraulic system can occur if engine is started by pushing or towing lift truck.

1. The towed lift truck must have an operator.
2. Tow truck slowly.
3. Using a lift truck or a lifting device that can be attached to the mast (I.E. come-a-long), raise carriage and forks approximately 30 cm (12 in.) from surface. Install chain around a mast crossmember and the carriage to prevent carriage and mast channels from moving.
4. If another 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. Install approximately 1/2 of a capacity load on forks of lift truck that is being used to tow disabled lift truck. This 1/2 capacity load will increase traction of lift truck. Keep load as low as possible.
5. Use a towing link made of steel that fastens to tow pins in counterweights of both lift trucks. Slowly and carefully remove the slack out of the towing link. See Figure 1.



1. STEEL TOW LINK
2. TOW PIN

Figure 1. Towing the Lift Truck

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, engine, transmission, and counterweight. When the lift truck is put on blocks, put additional blocks in the following positions to maintain stability:

- Before removing the mast and drive axle, put blocks under the counterweight so the lift truck cannot fall backward.
- 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 any blocks used to support the lift truck are solid, one-piece units.



CAUTION

These lift trucks are equipped with cowl lifting eyes. The cowl lifting eyes are to be used to lift the front of the lift truck only. Lifting more than the front of the lift truck with the cowl lifting eyes will damage the cowl section.

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

How to Raise Steering Tires

NOTE: Some lift trucks are equipped with lifting eyes for the purpose of lifting the entire lift truck. If the lift truck is equipped with this type of lifting eyes, the lift truck can be lifted and blocks installed.

1. Apply parking brake. Put blocks on both sides (front and back) of drive tires to prevent movement of lift truck. See Figure 2.
2. Use hydraulic jack to raise steering tires. Make sure jack has a capacity of at least 2/3 of total weight of lift truck as shown on the nameplate.
3. Put jack under steering axle or frame to raise lift truck. Put blocks under frame to support lift truck.

HOW TO CLEAN A LIFT TRUCK



WARNING

Engine, exhaust system components and other components are hot to the touch. Be sure lift truck components are cool before starting inspection and cleaning, or personal injury may occur.



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.



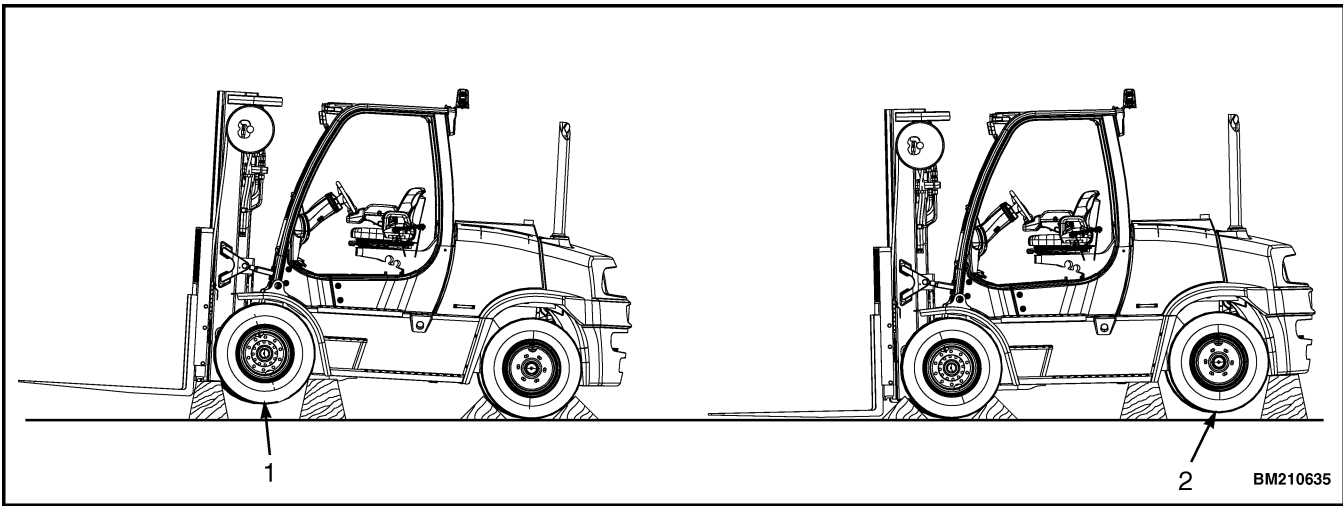
CAUTION

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 overspray 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 this **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 this **Service Manual** for proper cleaning procedures.
10. After cleaning, immediately start and run the lift truck to dry out components.



1. DRIVE TIRES

2. STEERING TIRES

Figure 2. Put Lift Truck on Blocks

Maintenance Schedule

NOTE: The 500-hour/6-months and 1000-hour/6-months maintenance services are performed either at the specified hours or at 6 months, whichever comes first.

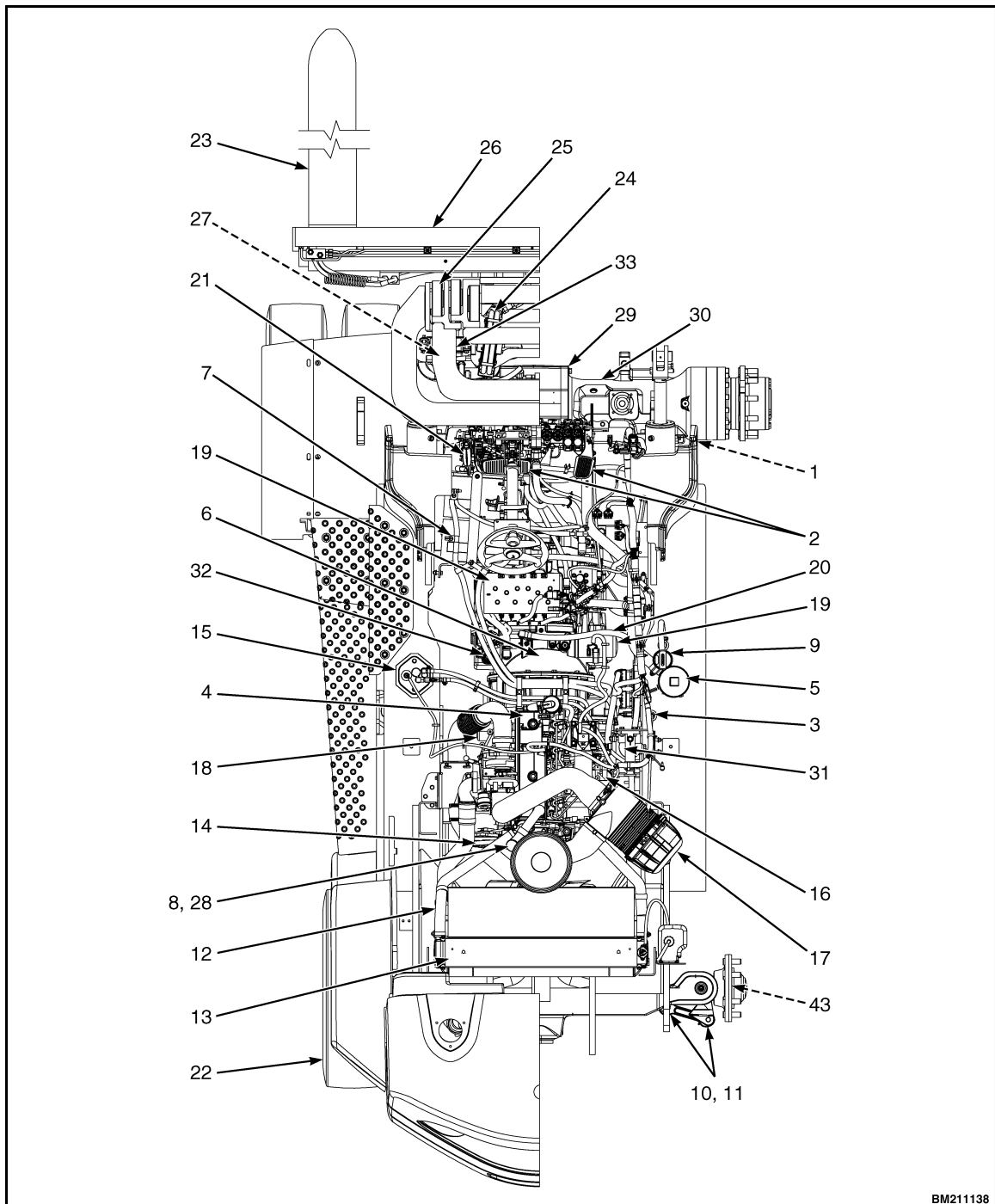
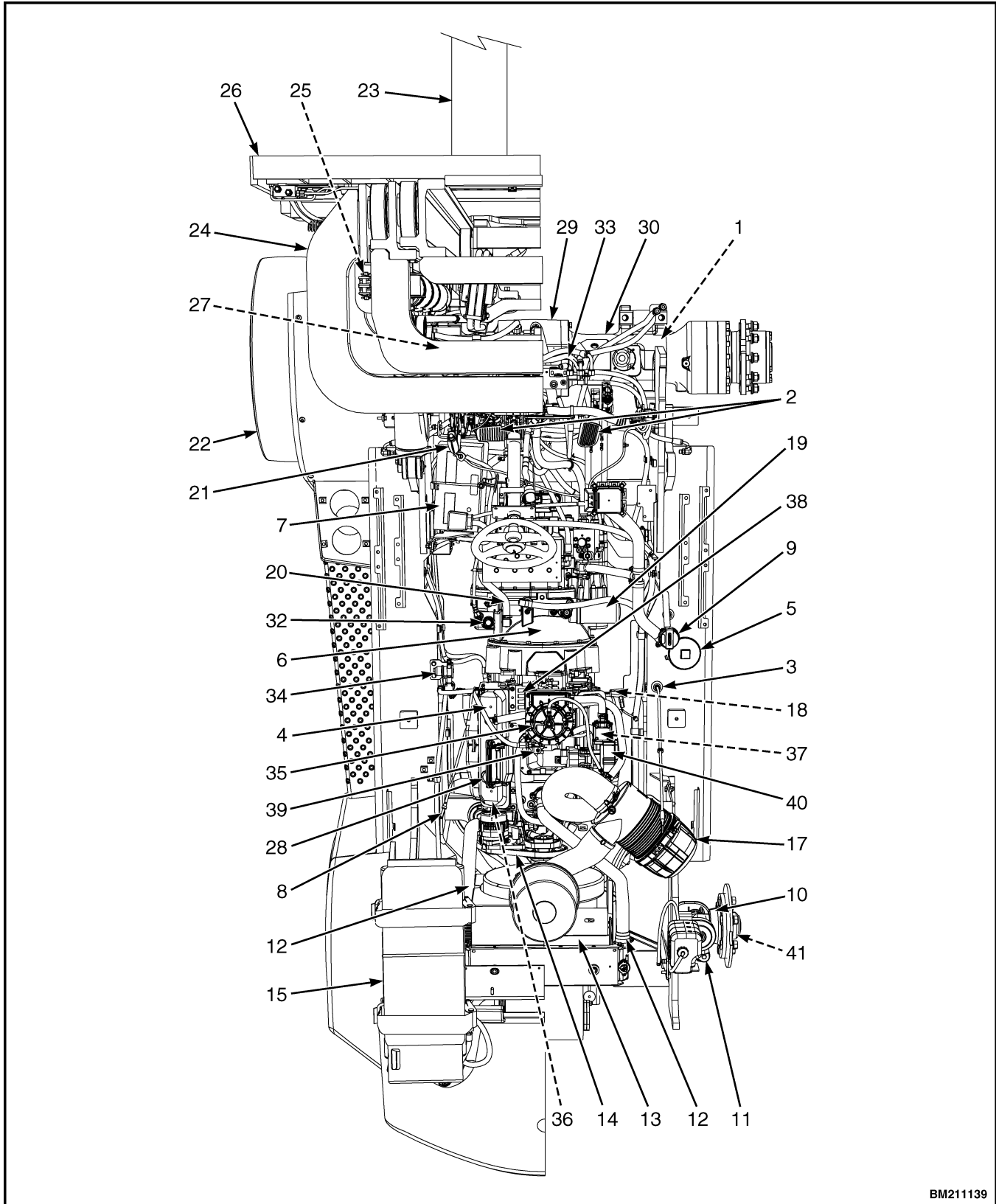


Figure 3. Maintenance and Lubrication Points, Cummins QSB 3.3L Diesel Engine



BM211139

Figure 4. Maintenance and Lubrication Points, GM 5.7L LPG Engine

Table 1. Maintenance Schedule

Item No.	Item	8 hr/ 1 day	250 hr/ 6 mo	500 hr/ 6 mo	1000 hr/ 6 mo	2000 hr/ 1 yr	4000 hr/ 2 yr	Procedure or Quantity	Specification
22	Tires and Wheels	X						Check Condition	See Nameplate
	Safety Labels	X						Replace as Necessary	See Parts Manual
24, 25, 26, 33	Mast, Carriage, Header Hoses, Lift Chains, and Attachment	X						Check Condition and Lubrication	See Parts Manual
	Seat Belt, Hip Restraints, and Seat Rails	X						Check Condition and Operation	
	Engine Compartment	X						Remove Combustible Materials See NOTE 5 and NOTE 13.	
	Check for Leaks - Fuel, Oil, Water	X						Check for Leaks See NOTE 1 and NOTE 13.	
	Hydraulic Hoses	X						Check Condition See NOTE 13.	See Parts Manual
12	Coolant Hoses	X						Check Condition See NOTE 13.	See Parts Manual
15	Fuel Tank (Diesel)	CIL						74.8 liter (19.7 gal)	Diesel No. 2
15	Fuel Tank (LPG)	CIL						38.8 liter (10.3 gal) 54.3 liter (14.1 gal)	LPG - HD 5
	Horn, Lights, Alarms, Fuses, and Relays	X						Check Operation	
1	Service Brakes	X						Check Operation	
21	Parking Brake	X						Check Operation	
	Steering Controls and Steering Column Gas Cylinder	X						Check Condition and Operation	

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

Table 1. Maintenance Schedule (Continued)

Item No.	Item	8 hr/ 1 day	250 hr/ 6 mo	500 hr/ 6 mo	1000 hr/ 6 mo	2000 hr/ 1 yr	4000 hr/ 2 yr	Procedure or Quantity	Specification
20	Transmission Hoses	X						Check for Leaks Check condition See NOTE 13.	John Deere JDM J20C
6	Transmission	X						Check Operation Check for leaks See NOTE 13.	
32	Transmission Oil			X	C			24 liter (25.4 qt) See NOTE 13.	John Deere JDM J20C
19	Transmission Oil Filter				C			1 Filter See NOTE 4 and NOTE 13.	See Parts Manual
6	Transmission					X		Perform Automatic Clutch Calibration	See Calibration Procedures 8000SRM1134 for Calibration Procedures
32	Transmission Oil Breather			X				Check Breather 1 Breather See NOTE 13.	See Parts Manual
3	Hydraulic Oil	X		X			C	71.7 liter (75.8 qt) See NOTE 2, NOTE 3NOTE 13, and NOTE 14.	ISO VG 46 Hydraulic Oil -15°C (5°F) and Above
5	Hydraulic Oil Filter					C		1 Filter See NOTE 13 and NOTE 14.	See Parts Manual
9	Hydraulic Tank Breather			X		C		Inspect and Replace as Required See NOTE 5 and NOTE 13.	See Parts Manual
7	Battery and Cable Terminals			X				Clean See NOTE 13.	

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

Table 1. Maintenance Schedule (Continued)

Item No.	Item	8 hr/ 1 day	250 hr/ 6 mo	500 hr/ 6 mo	1000 hr/ 6 mo	2000 hr/ 1 yr	4000 hr/ 2 yr	Procedure or Quantity	Specification
8, 28	Engine Oil Fill/ Dipstick (Cummins QSB 3.3L Diesel)	X CIL		C				7.5 liter (8 qt) See NOTE 4, NOTE 5, and See NOTE 13.	0°C (32°F) and below SAE 0W-30 -25 to 20°C (-13 to 68°F) SAE 5W-30 -20 to 20°C (-4 to 68°F) SAE 10W-30 -15°C (5°F) and above SAE 5W-40 or 15W-40 API CH-4 or CI-4
8, 28	Engine Oil Fill/ Dipstick (GM 5.7L LPG Engine)	X CIL	C					5.2 liter (5.5 qt) See NOTE 4, NOTE 5, and NOTE 13.	-7°C (20°F) and below SAE 5W-20 16°C (60°F) and below SAE 5W-30 -18°C (0°F) and above SAE 10W-30 API SM ILSAC: GF4
18	Engine Oil Filter (GM 5.7L LPG Engine)		C					1 Filter See NOTE 4, NOTE 5 and NOTE 13.	See Parts Manual
18	Engine Oil Filter (Cummins Engine)			C				1 Filter See NOTE 4, NOTE 5 and NOTE 13	See Parts Manual
17	Air Filter	X CIL				C		1 Filter See NOTE 5, NOTE 6, NOTE 10, and NOTE 13.	See Parts Manual
	Engine Oil Pressure (Cummins QSB 3.3L Diesel Engine)	CIL						Check Oil Pressure See NOTE 13.	49 kPa (7 psi) Minimum

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

Table 1. Maintenance Schedule (Continued)

Item No.	Item	8 hr/ 1 day	250 hr/ 6 mo	500 hr/ 6 mo	1000 hr/ 6 mo	2000 hr/ 1 yr	4000 hr/ 2 yr	Procedure or Quantity	Specification
	Engine Oil Pressure GM 5.7L LPG Engine	CIL						Check Oil Pressure See NOTE 13.	42 to 208 kPa (6.1 to 30.2 psi) @ 2000 rpm
14	Drive Belt GM 5.7L LPG Engine			X				Check for Wear and Damage. No Adjustment Needed. See NOTE 5 and NOTE 13.	
14	Drive Belt Cummins QSB 3.3L Diesel Engine			X				Check for Wear and Damage. Adjust or Replace See NOTE 5 and NOTE 13.	See Parts Manual
	Engine Idle Speed (Cummins QSB 3.3L Diesel Engine) Cold Engine			X				Coolant Temperature Less than 30°C (86°F)	1000 ±25 rpm
	Engine Idle Speed (Cummins QSB 3.3L Diesel Engine) Hot Engine			X				Coolant Temperature Greater than 30°C (86°F)	800 ±25 rpm
	Engine Idle Speed (GM 5.7L LPG Engine)			X					750 ±25 rpm
	Engine Governed Speed (Cummins QSB 3.3L Diesel Engine) (No Load)			X					2430 ±50 rpm
	Engine Governed Speed (GM 5.7L LPG Engine) (No Load)			X					2400 ±25 rpm
4	Valve Adjustment (Cummins QSB 3.3L Diesel Engine)					X		Adjust as Required See NOTE 11 and NOTE 13.	0.35 mm (0.014 in.) Cold Exhaust 0.50 mm (0.02 in.) Cold
X=Check C=Change L=Lubricate CIL=Check Indicator Light during operation									

Table 1. Maintenance Schedule (Continued)

Item No.	Item	8 hr/ 1 day	250 hr/ 6 mo	500 hr/ 6 mo	1000 hr/ 6 mo	2000 hr/ 1 yr	4000 hr/ 2 yr	Procedure or Quantity	Specification
4	Valve Adjustment (GM 5.7L LPG Engine)							Not Adjustable	
31	Fuel Water Separator Filter (Cummins QSB 3.3L Diesel Engine)	CIL		C				1 Filter Drain Water from filter as Required	See Parts Manual
16	Final Fuel Filter (Cummins QSB 3.3L Diesel Engine)			C				1 Filter	See Parts Manual
34	LPG Fuel Filter (GM 5.7L LPG Engine)				C			1 Filter	See Parts Manual
13	Cooling System (Cummins QSB 3.3L Diesel Engine)	X CIL				C		10.65 liter (11.25 qt) See NOTE 13.	See NOTE 12
13	Cooling System (GM 5.7L LPG Engine)	X CIL				C		15.9 liter (16.8 qt) See NOTE 13.	See NOTE 12
35	LPG Converter (GM 5.7L LPG Engine)			X				Drain Tar. See NOTE 5	
	Clean Debris From Radiator Core			X				See NOTE 5 and NOTE 13.	
23	Forks	X		X		X		Check Condition	
	Fork Latches			L				Lubricate as Necessary	Multipurpose Grease See NOTE 7.
	Lift System, Operate	X						Check Operation	
24	Mast Sliding Surfaces and Load Roller Surfaces			L				Lubricate As Required See NOTE 8.	Multipurpose Grease See NOTE 7.
33	Header Hoses			X				Check Condition	

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

Table 1. Maintenance Schedule (Continued)

Item No.	Item	8 hr/ 1 day	250 hr/ 6 mo	500 hr/ 6 mo	1000 hr/ 6 mo	2000 hr/ 1 yr	4000 hr/ 2 yr	Procedure or Quantity	Specification
25	Lift Chains	X						Check Condition/ Lube if Necessary See NOTE 9 .	Engine Oil SAE 30W
25	Lift Chains			L	L, X			Check for Wear Lubricate as Required	Engine Oil SAE 30W
	Mast Pivots			L				2 Fittings	Multipurpose Grease See NOTE 7 .
	Mast Integral Sideshift Carriage Sliding Surfaces (Upper and Lower Bearings)	X		L	X			Lubricate as Required (2 fittings for Upper Bearings) and (4 Lower Bearing Strips) Check Bearing Strips for Wear	Multipurpose Grease See NOTE 7 . 2.5 mm (0.10 in.) Minimum Thickness
	Mast Fork Positioner	X		L	X			Lubricate as Required 2 Fittings	Multipurpose Grease See NOTE 7 .
	Mast Fork Positioner Cylinder Rod Anchors	X		L	X			Lubricate as Required 2 Anchors	Multipurpose Grease See NOTE 7 .
	Mast Fork Positioner Socket Head Mounting Capscrews			X				Check Torque 6 Capscrews	145 N•m (110 lbf ft)
	Tilt Cylinder Ends			L				4 Fittings	Multipurpose Grease See NOTE 7 .
	Brake Actuation Valve Rod End Pin			L					Engine Oil SAE J2362
	Brake System Accumulator					C			See Parts Manual

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

Table 1. Maintenance Schedule (Continued)

Item No.	Item	8 hr/ 1 day	250 hr/ 6 mo	500 hr/ 6 mo	1000 hr/ 6 mo	2000 hr/ 1 yr	4000 hr/ 2 yr	Procedure or Quantity	Specification
10	Steering Axle Spindle Bearings				L			2 Fittings	Multipurpose Grease See NOTE 7.
11	Steering Axle Tie Rods			L				4 Fittings	Multipurpose Grease See NOTE 7.
41	Wheel Bearings Steer Wheels					L		Check Grease	Multipurpose Grease See NOTE 7.
2	Pedals, Levers, Seat Rails, Cables, Hinges, Linkages, and Rod End Pins				L			Lubricate as Necessary	Use Silicone Spray Hyster Part No. 328388
21	Parking Brake Adjustment			X				Adjust as Necessary	Must Hold a Full Capacity Load on a 15% Grade.
21	Parking Brake				L			Lubricate as Necessary	Use Silicone Spray (Hyster Part Number 328388)
30	Wet Brake Drive Axle Housing Arm Oil (Left Chamber)				C			Change Oil 9 liter (9.5 qt)	John Deere JDM J20C
27	Wet Brake Drive Axle Housing Arm Oil (Right Chamber)				C			Change Oil 9 liter (9.5 qt)	John Deere JDM J20C
29	Wet Brake Center Section Oil			X	C			Change Oil 4.6 liter (4.9 qt)	SAE 80W-90
36	Spark Plugs (GM 5.7L LPG Engine)				C			8 Plugs See NOTE 13.	See Parts Manual For Plug Type Spark Plug Gap 0.89 mm (0.035 in.)
37	PCV Valve (GM 5.7L LPG Engine)				X			Inspect and Replace if Necessary See NOTE 13.	See Parts Manual
37	PCV Valve (GM 5.7L LPG Engine)					C		Replace See NOTE 13.	See Parts Manual

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

Table 1. Maintenance Schedule (Continued)

Item No.	Item	8 hr/ 1 day	250 hr/ 6 mo	500 hr/ 6 mo	1000 hr/ 6 mo	2000 hr/ 1 yr	4000 hr/ 2 yr	Procedure or Quantity	Specification
38	Ignition System, Distributor Cap, Rotor, and Spark Plug Wires (GM 5.7L LPG Engine)					C		Replace See NOTE 13.	See Parts Manual
39	Inspect Lock-Off for Leaks and Ensure Lock-Off Closing (GM 5.7L LPG Engine)					X			
40	Test and Inspect Electronic Pressure Regulator/Fuel Mixer (GM 5.7L LPG Engine)					X			
	Inspect Engine Electrical System, Connectors				X			See NOTE 13.	
	Inspect Engine Fuel Lines, and Fittings					X		See NOTE 13.	
	Check Air Induction System for Leaks					X			
	Check Manifold for Vacuum Leaks					X			
	Check Injectors and Rails for Leaks					X		See NOTE 13.	
	Inspect Exhaust Manifolds and Piping for Leaks					X			
	Inspect Muffler Inlet and Outlet					X			

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

Table 1. Maintenance Schedule (Continued)

Item No.	Item	8 hr/ 1 day	250 hr/ 6 mo	500 hr/ 6 mo	1000 hr/ 6 mo	2000 hr/ 1 yr	4000 hr/ 2 yr	Procedure or Quantity	Specification
	Inspect Catalyst Inlet and Outlet (GM 5.7L LPG Engine)					X			
	Oxygen Sensor (GM 5.7L LPG Engine)	CIL				X		Replace as Necessary	See Parts Manual
NOTE 1: Check fuel system for leaks prior to any service or maintenance activity.									
NOTE 2: Heavy-duty or high-temperature operations require more frequent checks.									
NOTE 3: Heavy-duty or contaminated applications will require hydraulic oil change at 2000 hours.									
NOTE 4: Change engine oil and filter after first 100 hours of operation. Change transmission oil filter after first 500 hours of operation.									
NOTE 5: 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 6: In dirty or dusty environments, replace at 1000 hours or as needed.									
NOTE 7: Multipurpose grease with 2 to 4% Molybdenum Disulfide.									
NOTE 8: Lubricate mast every three months if units has less than 1000 hours.									
NOTE 9: Lubricate if dry or at first sign of visible surface rust.									
NOTE 10: Do not open the air filter canister except to change the air filter element. See Maintenance Procedures Every 2000 Hours or Annually to change air filter element.									
NOTE 11: Initial valve adjustment is at 250 hours or 3 months. Subsequent adjustments must be performed at 2000-hour/2-year intervals, whichever comes first.									
NOTE 12: Use Ethylene Glycol Boron-free Antifreeze. Purchase a pre-diluted 50/50 solution; or mix 50% concentrate with 50% distilled or deionized water.									
NOTE 13: Turn lift truck engine OFF, prior to performing maintenance or checks in engine compartment.									
NOTE 14: 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.									
X=Check C=Change L=Lubricate CIL=Check Indicator Light during operation									

Maintenance Procedures Every 8 Hours or Daily

HOW TO MAKE CHECKS WITH ENGINE STOPPED

WARNING

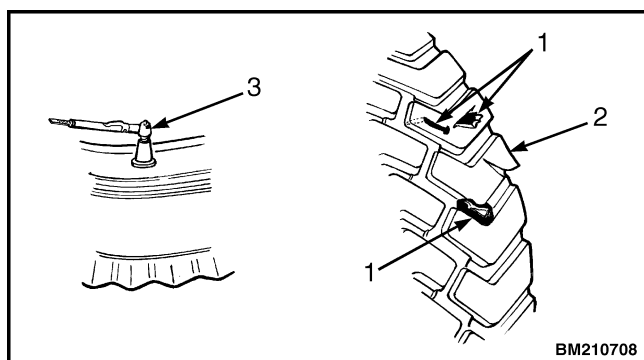
DO NOT operate a lift truck that needs repairs. Report the need for repairs immediately. If repair is necessary, put a DO NOT OPERATE tag in the operator's area. If the lift truck is equipped with a key switch, remove the key from the key switch.

If a lift truck that needs repairs is operated, damage to lift truck and injury to personnel can occur.

Put lift truck on a level surface. Lower carriage and forks, stop the engine, and apply the parking brake. Open both hood door assemblies and check for leaks and conditions that are not normal. Clean any oil or fuel spills. Ensure all surfaces are free of oils, lubricants, fuel, and organic dust or fibers (paper, wood, cotton, agricultural grass/grain, etc.).

Tires and Wheels

Check the tires for damage. Check the tread and remove any objects that will cause damage. Check for bent or damaged rims. Check for loose or missing hardware. Remove any wire, strapping, or other material wrapped around the axle. See Figure 5.



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

Figure 5. Check the Tires

Safety Labels

WARNING

Safety labels are installed on the lift truck to provide information about operation and possible hazards. It is important that all safety labels are installed on the lift truck and can be read to avoid damage to lift truck and injury to personnel.

Check that all safety labels are installed in the correct location on lift truck. See the **Parts Manual, Model Description** section in the **Operating Manual** or the section **Frame 0100SRM1321** for the correct location of the safety labels. See the **Parts Manual** for the part numbers of the safety labels.

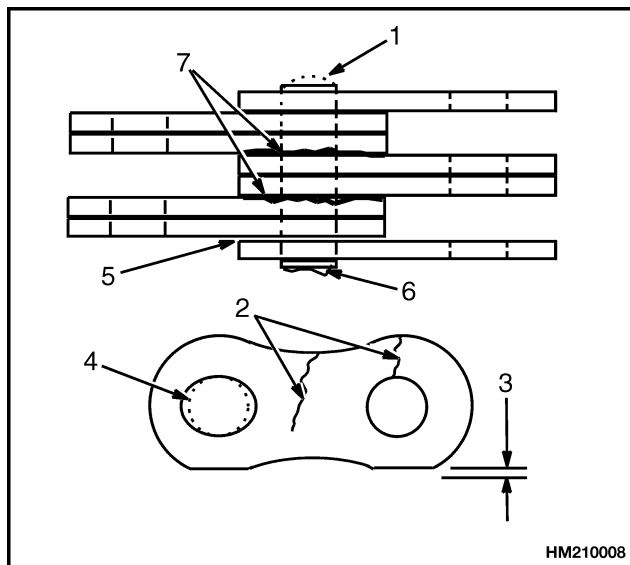
Mast, Carriage, Lift Chains, Header Hoses, and Attachment

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 engine is STOPPED.

1. Inspect the welds on the mast, cylinders, and carriage for cracks. Make sure that the cap-screws and nuts are tight.
2. Inspect channels for wear in areas where rollers travel. Inspect rollers for wear or damage.
3. Inspect load backrest extension for cracks and damage.
4. If lift truck is equipped with an integral side-shift carriage or attachment, inspect the parts for cracks and wear. Make sure the parts that fasten the integral sideshift carriage or attachment to the carriage are in good condition.
5. Visually inspect hoses/fittings for hydraulic leaks; hose cover for cuts, cracks, or exposed reinforcement; defective/broken clamping devices or sheaves; proper tracking during operation. Adjust/repair/replace hose/components as necessary.

6. Check that the lift chains are correctly lubricated. Use SAE 30W engine oil as necessary to lubricate the lift chains.
7. Inspect lift chains for cracks or broken links, and worn or turned pins. See Figure 6.
8. Inspect chain anchors and pins for cracks and damage.
9. Make sure 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
4. HOLE WEAR
5. LOOSE LEAVES
6. TURNED PIN
7. CORROSION

Figure 6. Lift Chain Check

Operator Restraint System

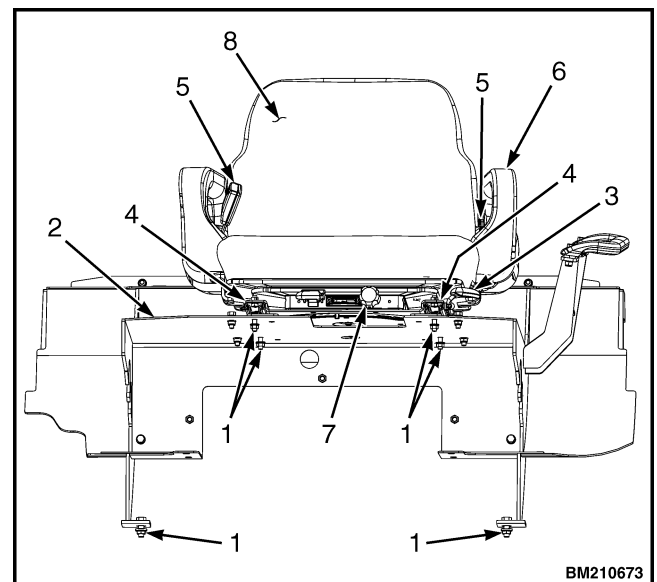
NOTE: The seat belt can be either black or red.

The seat, seat belt, seat rails, hip restraint, and seat plate are all part of the operator restraint system. Each item must be checked to make sure it is fastened correctly, functions correctly, and is in good condition. See Figure 7.

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, 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.

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 damage or wear is seen. See Figure 7.



NOTE: NON-SWIVEL SEAT SHOWN.

1. FLANGE NUT
2. SEAT PLATE
3. FORWARD/BACKWARD ADJUSTMENT
4. SEAT RAIL
5. SEAT BELT
6. HIP RESTRAINT
7. OPERATOR WEIGHT ADJUSTMENT
8. SEAT

Figure 7. Seat, Seat Rail, Seat Plate, and Seat Belt Check

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

- 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.
- 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.

Adjust Seat - Full Suspension

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 an easier exit of the truck.
- The neutral position is shown in Figure 8.

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 maximum weight of 135 kg (298 lb).

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

on the pedals. This ensures that the operator is set at the midpoint of the 80 mm (3.15 in.) suspension.

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

Adjust Seat - Internal Suspension

Seat Position Adjustment (Swivel Seat)

- The seat swivels 10.5 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 an easier exit of the truck.
- The neutral position is shown in Figure 8.

Seat Adjustment for Operator Weight



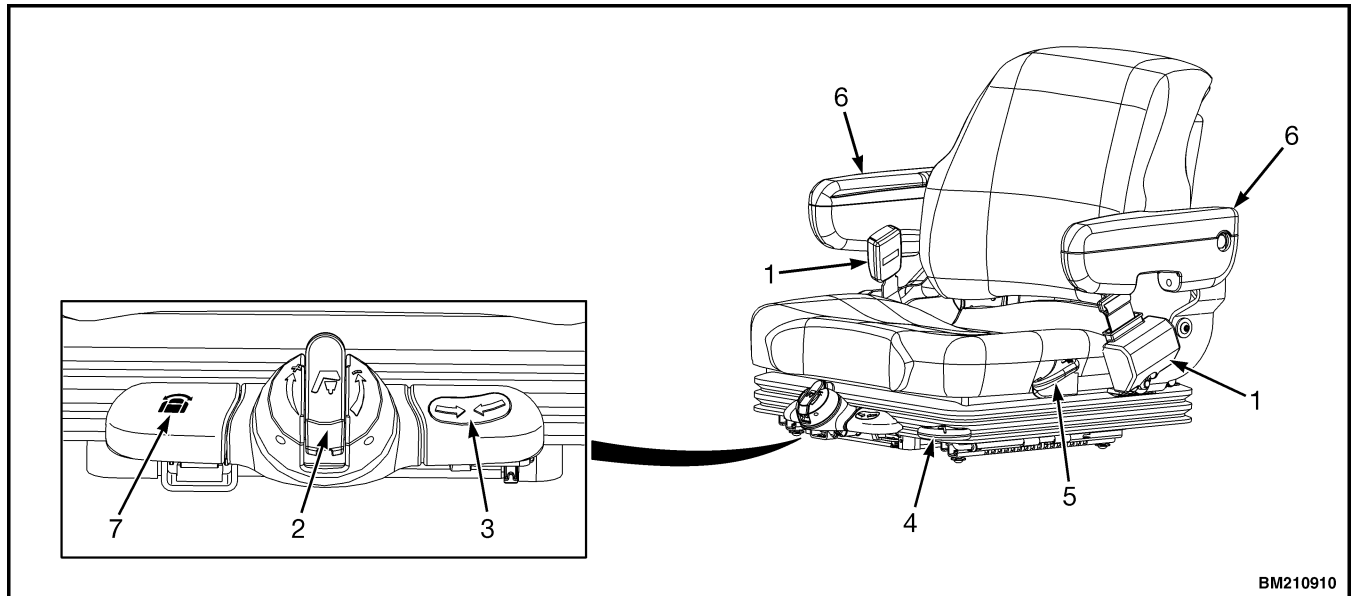
CAUTION

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 maximum weight of 135 kg (298 lb).

- The target is for the "ride indicator" to fall between the arrows when the operator sits upright in the seat with the feet positioned on the pedals. This ensures that the operator is set at the midpoint of the 40 mm (1.57 in.) suspension.
- The weight adjustment knob can be turned left or right to increase or decrease the weight resistance. As the weight adjustment knob is turned the "stiffness" of the suspension can be felt to increase or decrease on which way the weight adjustment knob is turned.



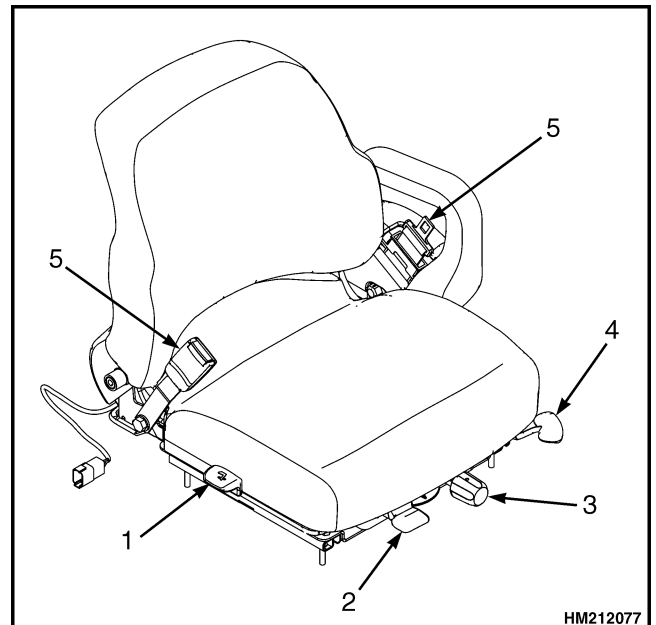
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- | | |
|--------------------------------------|------------------------------------|
| 1. SEAT BELT | 5. BACKREST ANGLE ADJUSTMENT LEVER |
| 2. WEIGHT ADJUSTMENT KNOB | 6. ARMREST |
| 3. RIDE POSITION INDICATOR | 7. SWIVEL LATCH RELEASE LEVER |
| 4. FORWARD/BACKWARD ADJUSTMENT LEVER | |

Figure 8. Seat Adjustment

Seat Plate and Seat Rails

Make sure the seat rails are not loose. The seat rails must lock tightly in position, but move freely when unlocked. The seat rails must be correctly fastened to the seat plate and the seat plate must be fastened to the frame. See Figure 7 and Figure 9.



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NOTE: SWIVEL SEAT IS AN OPTIONAL FEATURE.

- | |
|---|
| 1. FORWARD/BACKWARD ADJUSTMENT |
| 2. SWIVEL ADJUSTMENT |
| 3. OPERATOR WEIGHT ADJUSTMENT |
| 4. SEAT POSITION ADJUSTMENT (SEAT RAIL) |
| 5. SEAT BELT |

Figure 9. Swivel Seat Controls