

SERVICE REPAIR

MANUAL

Hyster E007 (H8.00XL H9.00XL H10.00XL H12.00XL
Europe) Forklift

HYSTER

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INTRODUCTION

GENERAL

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 recommended time intervals are for eight hours of operation per day. Shorten the recommended time intervals in the MAINTENANCE SCHEDULE for the following conditions:

- a. If the lift truck is used more than eight hours per day.
- b. If the lift truck must work in dirty operating conditions.

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 give 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.

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.

HOW TO MOVE A DISABLED LIFT TRUCK

NOTE: If there is no air pressure in the brake system, the parking brake must be manually released. To manually release the parking brake, use the release bolt at each air chamber to compress the spring that applies the brake. Tighten the release bolt (or nut) until the brake is released.

H8.00–12.00XL (H165–280XL) models: the release bolt, washer and nut are in a receptacle on the side of the air chamber. Make sure the release bolt is engaged in the piston before the nut is tightened.

H13.00–16.00XL (H300–360XL) models: the release bolt is permanently installed in the piston .

WARNING

Use extra care when towing a lift truck if there is a problem with any of the following:

- a. Brakes do not operate correctly.
- b. Steering does not operate correctly.
- c. Tires are damaged.
- d. Traction conditions are bad.
- e. The lift truck must be towed on a steep grade.

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. 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 the load center of the forks. Be careful not to damage the under side of the lift truck.

How to Tow the Lift Truck

1. The towed lift truck must have an operator.

2. Tow the lift truck slowly.
3. Raise the carriage and forks approximately 30 cm (12 inches) from the surface. Install a chain to prevent the carriage and mast channels from moving.
4. If another lift truck is used to tow the disabled lift truck, that lift truck must have a weight equal or greater than the weight of the disabled lift truck. 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. Travel with the load as low as possible.
5. Use a towing link made of steel that attaches to the tow pins in the counterweights of both lift trucks.

HOW TO PUT A LIFT TRUCK ON BLOCKS

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 and transmission, and the 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 that the lift truck can not fall backward.
- b. Before removing the counterweight, put blocks under the mast assembly so that the lift truck can not 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. Put a steel plate on top of the block.

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

How to Raise the Drive Tires (See FIGURE 1.)

1. Put blocks on each side (front and back) of the steering tires to prevent movement of the lift truck.
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. Make sure the blocks are under the frame and not the hydraulic or fuel tanks.
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. See the nameplate.

How to Raise the Steering Tires (See FIGURE 1.)

1. Apply the parking brake. Put blocks on both sides (front and back) of the drive tires to prevent movement of the lift truck.
2. Use a hydraulic jack to raise the steering tires. Put the jack under the steering axle or frame to raise the lift truck. 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 blocks under the frame and counterweight to support the lift truck. Make sure the blocks are under the frame and not the hydraulic or fuel tanks.

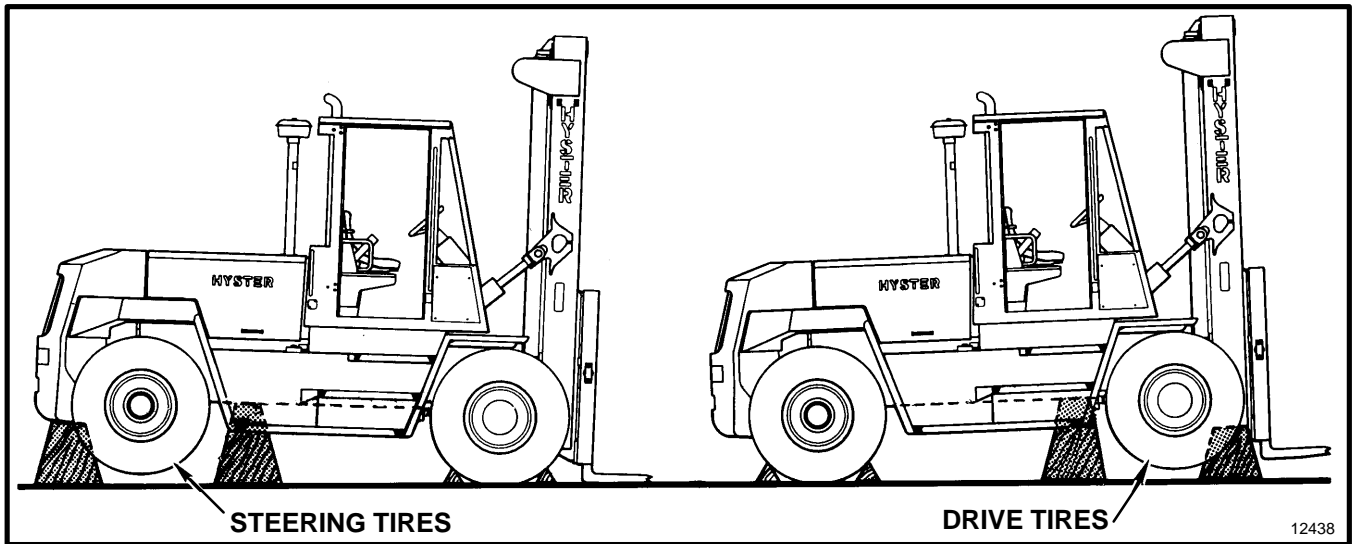


FIGURE 1. PUT A LIFT TRUCK ON BLOCKS

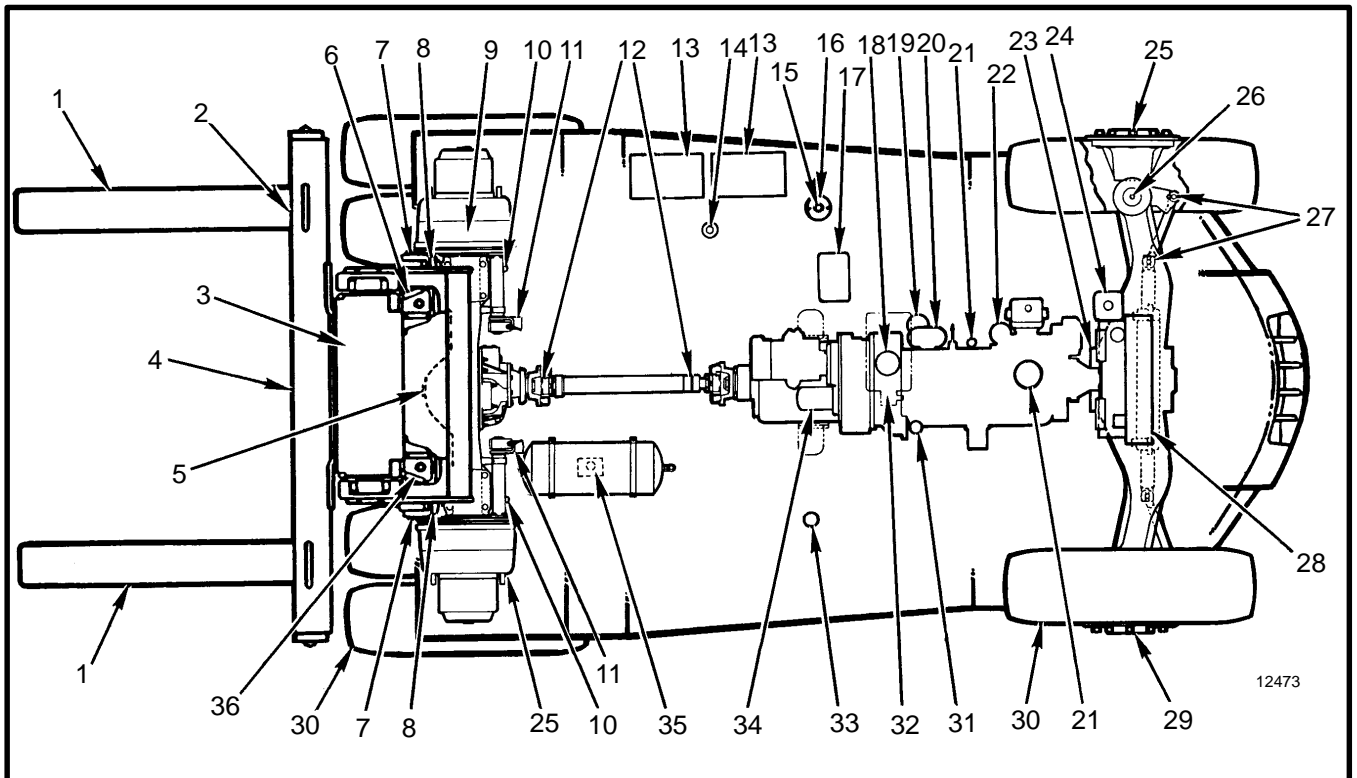


FIGURE 2. MAINTENANCE POINTS (DIESEL ENGINE SHOWN)

TABLE 1. MAINTENANCE SCHEDULE (Item Numbers Reference FIGURE 2.)

ITEM NO.	ITEM	8 Hr./ Daily	150 Hr./ 2 mo.	350 Hr./ 2 mo.	1000 Hr./ 6 mo.	2000 Hr./ 1 yr.	PROCEDURE OR QUANTITY	SPECIFICATION
30	TIRES TIRE PRESSURE	X X					Check Condition See Nameplate	See Parts Manual
1	FORKS	X		X			Check Condition	
3	MAST, CARRIAGE, ATTACHMENT	X					Check Condition and Operation	
6	LIFT CHAINS	X	X, L X	 X			Check Condition and Lubrication Check Adjustment Check Length	Engine Oil
	SAFETY LABELS	X					Replace If Necessary	See Parts Manual
	SAFETY BELT AND SEAT RAILS	X					Check Condition	
	CHECK FOR LEAKS— FUEL, OIL, COOLANT	X					Check for leaks	
33	FUEL TANK (Diesel) LPG (Option)	X					120 litre (31.7 gal) (2) 43.5 lb LPG tanks	Diesel No. 2 LPG — HD-5
24	COOLING SYSTEM	X				C	26.0 litre (27.5 qt)	50% water with 50% Ethylene Glycol
28	RADIATOR HOSES	X					Check Condition	See Parts Manual
23	DRIVE BELTS	X		X			Check Condition Check Tension	See Parts Manual
19	PRIMARY FUEL FILTER	X			C		Drain Water	See Parts Manual
13	BATTERY ELECTROLYTE LEVEL	X X					Clean Check Level	See Parts Manual 2 Batteries
15	HYDRAULIC SYSTEM H8.00–12.00XL (H165–280XL) H13.00–16.00XL (H300–360XL)	X				C	113 litre (31.7 gallons) 142 litre (37.5 gallons)	–18°C (0°F) and Above SAE 10W API CC or CC/SE/SF/ SG
18	PRE-CLEANER FOR ENGINE AIR FILTER	X					Clean	See Parts Manual
32	AIR FILTER, ENGINE AND AIR COMPRESSOR		X				Clean or Replace (See NOTE 3)	See Parts Manual
21 22	ENGINE OIL AND FILTER Perkins Diesel	X		C			15.1 litre (16.0 qt) 1 Filter See NOTES 1 & 2	greater than –18°C (0°F) SAE 10W–30 API SE/ SG See Parts Manual
21 22	ENGINE OIL AND FILTER GM V–8	X		C			10 litre (9.5 qt) 1 Filter See NOTES 1 & 2	API SE/SF greater than –18°C (0°F) SAE 10W–30 See Parts Manual

X= Check C=Change L=Lubricate

NOTE 1: Change filters after first 100 hours of operation on a new lift truck.

NOTE 2: Change engine oil and filters every 400 hours.

NOTE 3: Very dirty conditions will require a daily clean and check.

ITEM NO.	ITEM	8 Hr./ Daily	150 Hr./ 2 mo.	350 Hr./ 2 mo.	1000 Hr./ 6 mo.	2000 Hr./ 1 yr.	PROCEDURE OR QUANTITY	SPECIFICATION
17	WINDSHIELD WASHER FLUID	X					Check Level	
	HORN, GAUGES, LIGHTS, ALARMS, AND MIRRORS	X					Check Operation	
31	TRANSMISSION OIL HYSTER T-50	X			C		28 litre (29 qt)	Hyster Part No. 336830 Hyster Part No. 336831 Hyster Part No. 336832
	STEERING	X					Check Operation	
9	BRAKES, SERVICE AND PARKING	X				X	Check Operation Check Condition	
35	AIR TANK		X				Drain Moisture	
12	DRIVE SHAFT		L				3 Fittings	Multi-Purpose Grease See NOTE 4
27	STEERING AXLE TIE RODS		L				4 Fittings	See NOTE 4 Multi-Purpose Grease
26	LOWER SPINDLE BEARINGS		L				2 Fittings	Multi-Purpose Grease
10	SHAFT FOR BRAKE ACTUATORS		L				2 Fittings	Multi-Purpose Grease See NOTE 4
5	DRIVE AXLE AND DIFFERENTIAL H8.00-12.00XL (H165-280 XL) H13.00-16.00XL (H300-360XL)		X			C	23.7 litre (25.0 qt) 24.6 litre (26 qt)	SAE 85W-140
14	HYDRAULIC TANK BREATHER		X				1 Clean as Necessary	See Parts Manual
	AIR FILTER, HEATER		X				1 Clean (See NOTE 3)	See Parts Manual
25	WHEEL NUTS DRIVE WHEELS STEER WHEELS		X X				Check Torque Check Torque	640 to 680 Nm (470 to 500 lb _f ft)
11	BRAKE ACTUATOR ARMS			X			2 Check Adjustment	
8 36 4 2 7	MAST PIVOTS SLIDING SURFACES SIDE SHIFT CARRIAGE FORK GUIDES TILT CYLINDER PIVOT PINS CHAIN ANCHORS (Top of Mast)			L L L L L			2 Fittings As Necessary 4 Fittings As necessary 4 Fittings 2	See NOTE 4 Multi-Purpose Grease Multi-Purpose Grease Multi-Purpose Grease Engine Oil Multi-Purpose Grease Multi-Purpose Grease
	PEDALS, LEVERS, LINKAGES, CABLES, HINGES, SEAT RAILS			L			As Necessary	Engine Oil
X= Check C=Change L=Lubricate		NOTE 3: Very dirty conditions will require a daily clean and check. NOTE 4: Multi-purpose grease with 2-4% molybdenum disulfide.						

ITEM NO.	ITEM	8 Hr./ Daily	150 Hr./ 2 mo.	350 Hr./ 2 mo.	1000 Hr./ 6 mo.	2000 Hr./ 1 yr.	PROCEDURE OR QUANTITY	SPECIFICATION
	ENGINE SPEED (DIESEL) IDLE SPEED GOVERNED SPEED			X X			Adjust as Necessary	725 to 775 rpm 2660 to 2760 rpm
	ENGINE SPEED (GM V-8) IDLE SPEED GOVERNED SPEED			X X			Adjust as Necessary	725 to 750 rpm 2700 to 2800 rpm
	TIMING, INJECTION PUMP				X		Adjust as Required	23° BTDC Static
	TIMING, GM V-8 SPARK PLUGS				X X		Adjust as Required (8) Replace as Necessary	6° to 8° BTDC Gap = 0.89 mm (0.35 in) See Parts Manuals
	VALVE ADJUSTMENT (DIESEL) INLET (Cold) EXHAUST (Cold) GM V-8 (NO VALVE ADJUSTMENT)				X		Adjust as Required	0.20 mm (0.008 in) 0.45 mm (0.018 in)
	SPARK PLUGS (GM V-8)				C		8	0.89 mm (0.35 in) See Parts Manual
20	FINAL FUEL FILTERS (DIESEL)				C		2	See Parts Manual
	FUEL FILTER (LPG)				C			See Parts Manual
34	TRANSMISSION OIL FILTER				C		1 (See NOTE 1)	See Parts Manual
16	HYDRAULIC SYSTEM OIL FILTER					C	1 (See NOTE 1)	See Parts Manual
29	HUB BEARINGS, STEER WHEELS					C	As Necessary	Multi-Purpose Grease See NOTE 4
X= Check C=Change L=Lubricate		NOTE 1: Change filters after first 100 hours of operation on a new lift truck. NOTE 4: Multi-purpose grease with 2-4% molybdenum disulfide.						

**MAINTENANCE SCHEDULE, EMPTY CONTAINER ATTACHMENT
(Item Numbers Reference FIGURE 3.)**

ITEM NO.	ITEM	150 Hr./ 2 mo.	350 Hr./ 2 mo.	2000 Hr./ 1 yr.	PROCEDURE OR QUANTITY	SPECIFICATION
1	SIDE-SHIFT ROLLERS		L		8 Fittings	Multi-Purpose Grease ⁴
2	SIDE-SHIFT CYLINDER PINS		L		2 Fittings	Multi-Purpose Grease ⁴
3	LOCK PINS		L		2 Fittings	Multi-Purpose Grease ⁴
4	BEARING BLOCKS		X, L		As Necessary	Multi-Purpose Grease ⁴
5	ACCUMULATORS		X		Drain Moisture	
6	LOCK PIN CYLINDERS			L	Lubricate Internally	See Service Manual
X= Check C=Change L=Lubricate		NOTE 4: Multi-purpose grease with 2-4% molybdenum disulfide.				

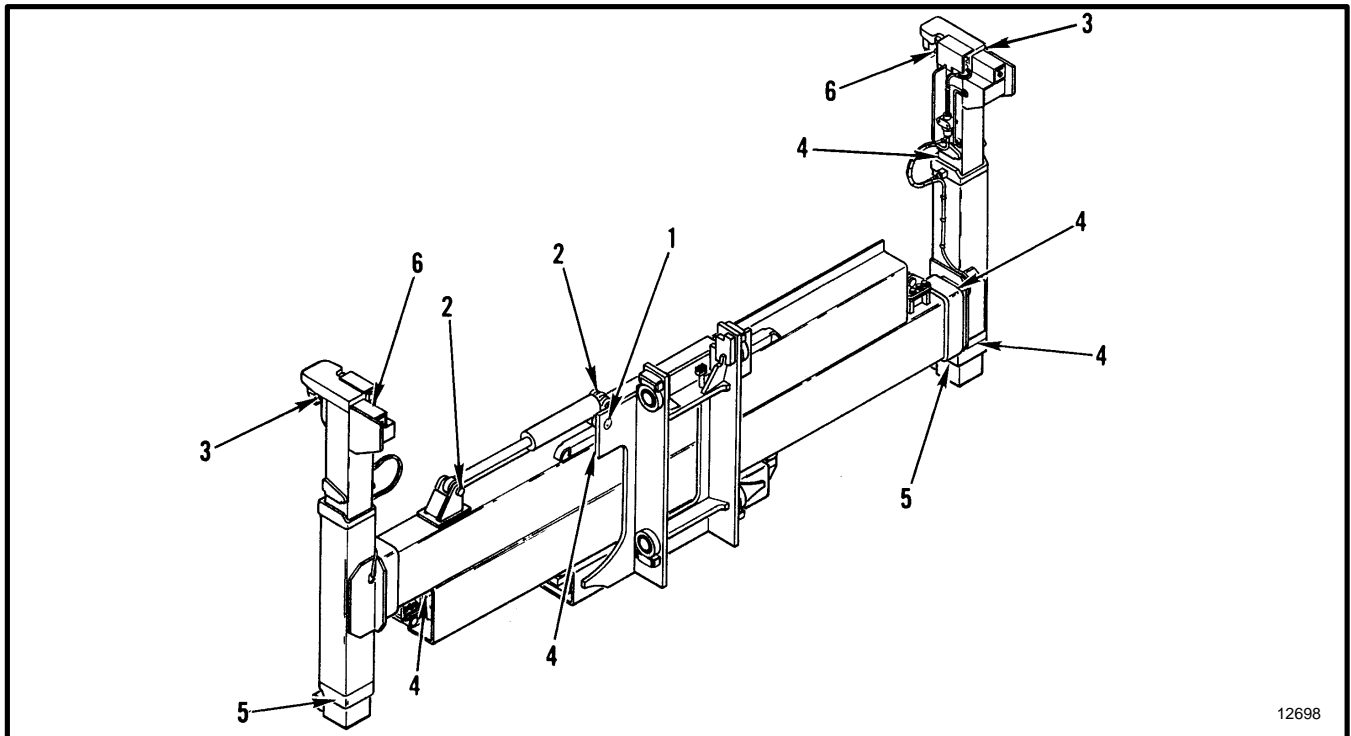


FIGURE 3. MAINTENANCE POINTS, EMPTY CONTAINER ATTACHMENT

MAINTENANCE PROCEDURES

EVERY 8 HOURS OR DAILY

HOW TO MAKE THE CHECKS WITH THE ENGINE STOPPED

Put the lift truck on a level surface. Lower the carriage and forks, stop the engine and apply the parking brake. Open the hood and check for leaks and conditions that are not normal. Clean any oil or fuel spills. Make sure that lint, dust, paper and other materials are removed from the engine compartment.

Tires and Wheels (See FIGURE 4.)

⚠ WARNING

Air pressure in tires can cause tire and wheel parts to explode. The explosion of wheel parts can cause serious injury or death.

Remove all of the air from the tires before the tires are removed from the lift truck.

If the air pressure is less than 80% of the correct pressure, the tire must be removed before air is added. Put the tire in a safety cage when adding air

pressure to the tire. Follow the procedures under ADD AIR TO THE TIRES.

When air is added to the tires, a remote air chuck must be used so that the person adding air can stand to the side and not in front of the tire.

Keep the tires at the correct air pressure. (See the Nameplate.) Check the air pressure with a gauge when the tires are cold. If it is necessary to add air to a tire that is warm, check one of the other tires on the same axle and add air to the tire that has low pressure so that the air pressures are equal. The air pressure of warm tires must always be equal to or greater than air pressures specified for cold tires.

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 that is wrapped around the axle.

Make sure the wheel nuts are tight. Tighten the wheel nuts in a cross pattern (see FIGURE 37.) to the correct

torque value shown in the MAINTENANCE SCHEDULE.

NOTE: Whenever a wheel is removed, it will be necessary to lubricate the wheel nuts and studs. (See FIGURE 37.) Put two drops of engine oil (or other lubricant) between the flange and body of the wheel nut. Also put two drops of oil on the threads of the studs.

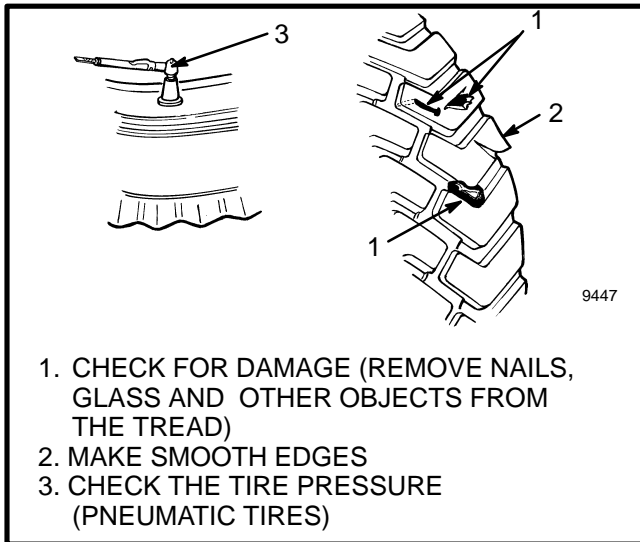


FIGURE 4. CHECK THE TIRES

CAUTION

When the wheels have been installed check all wheel nuts after 2 to 5 hours of operation. Tighten the nuts in a cross pattern to the correct torque value shown in the MAINTENANCE SCHEDULE table. When the nuts stay tight after eight hours, the interval for checking the torque can be extended to 150 hours.

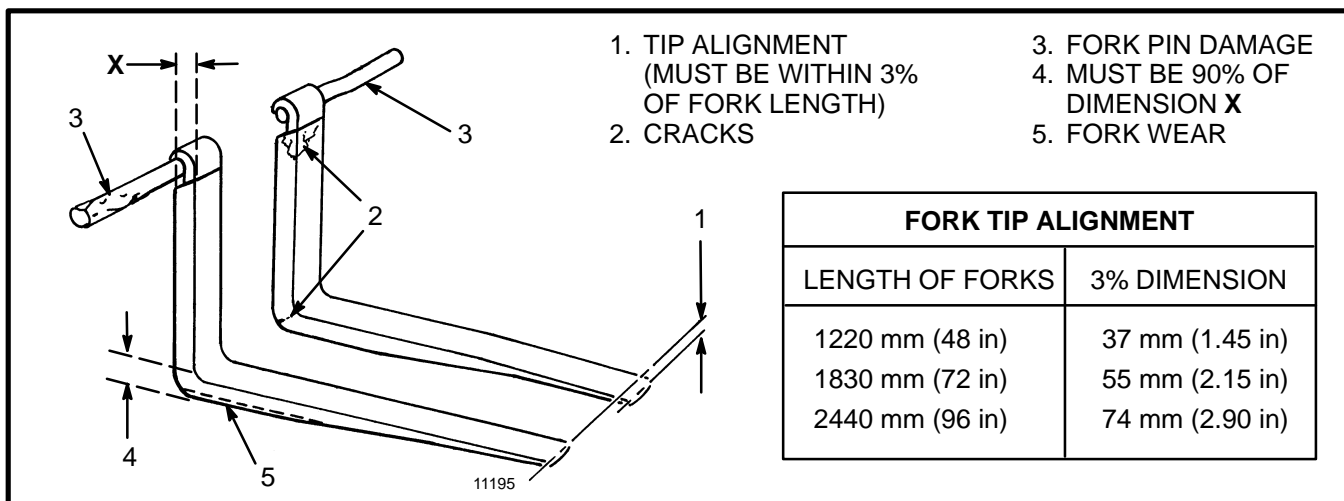


FIGURE 5. CHECK THE FORKS

Forks

The identification of a fork is determined by how it is connected to the carriage. These lift trucks have pin forks. Pin forks are fastened to the carriage with large fork pins.

Forks, Adjustment

A lock pin for each fork fits into the top carriage bar and a slot in the fork. These lock pins hold the fork in position. Adjust the forks as far apart as possible for maximum support of the load. Make sure the lock pin is engaged in the carriage bar and the fork. The fork must be locked into position after the adjustment is made.

Forks, Removal

WARNING

Do not try to move a fork without a lifting device. The forks can weigh up to 370 kg (800 lb) each.

Put the lift truck on a level surface and lower the forks. Tilt the mast so that the forks have stability. Remove the retainers for the fork pins and push the pins from the carriage. Move the lift truck away from the forks.

Forks, Installation

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

Inspection of Forks, Mast and Lift Chains (See FIGURE 5. and FIGURE 6.)

⚠ WARNING

Never work under a raised carriage or forks. Lower the carriage or use blocks and chains on the mast weldments and carriage so that they can not move. Make sure the moving parts are attached to a part that does not move.

Do not try to correct fork tip alignment by bending the forks or adding shims. Replace damaged forks.

Never repair damaged forks by heating or welding. Forks are made of special steel using special procedures. Replace damaged forks.

1. Inspect the welds on the mast and carriage for cracks. Make sure that the nuts and bolts 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 forks for cracks and wear. Check that the fork tips are aligned (item 1, FIGURE 5.). Check that the bottom of the fork is not worn (item 8, FIGURE 5.).

4. Replace any damaged or broken parts that are used to keep the forks locked in position.

5. Check that the lift chains are correctly lubricated. Use engine oil to lubricate the chains.

6. If the lift truck is equipped with a side-shift carriage or attachment, inspect the parts for cracks and wear. Make sure the parts that fasten the side-shift carriage or attachment to the carriage are in good condition.

7. Inspect the lift chains for cracks or broken links and pins. (See FIGURE 6.)

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. If the lift chains need repair or adjustment, it must be done by authorized personnel. See the section, **THE TWO-STAGE MAST, 4000 SRM 445**, for adjustment procedures.

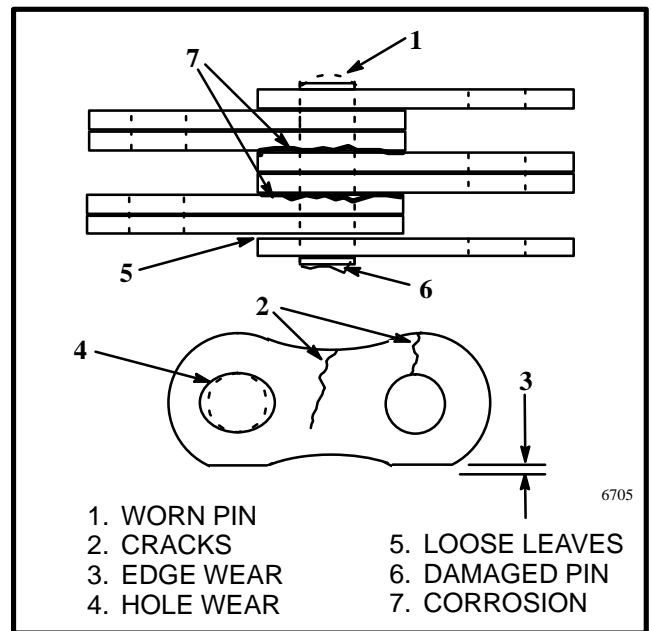


FIGURE 6. CHECK THE LIFT CHAINS

SAFETY LABELS

⚠ WARNING

Safety labels are installed on the lift truck to give information about operation and 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 **FRAME** section of the **SERVICE MANUAL** for the correct location of the safety labels.

If new labels must be installed, use the following procedure:

⚠ WARNING

Cleaning solvents can be flammable and toxic, and can cause skin irritation. When using cleaning solvents, always follow the recommendations of the manufacturer.

- Make sure the surface is dry and has no oil or grease. Do not use solvent on new paint. Clean the surface of old paint with a cleaning solvent.
- Remove the paper from the back of the label. Do not touch the adhesive surface.
- Carefully hold the label in the correct position above the surface. The label cannot be moved after it touches the surface. Put the label on the

surface. Make sure that all air is removed from under the label and the corners and edges are tight.

Operator Restraint System (See FIGURE 7.)

The seat belt, hip restraint brackets, seat and mounting are all 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.

The seat belt must latch securely. Make sure the seat belt extends and retracts smoothly and is not damaged nor torn.

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.

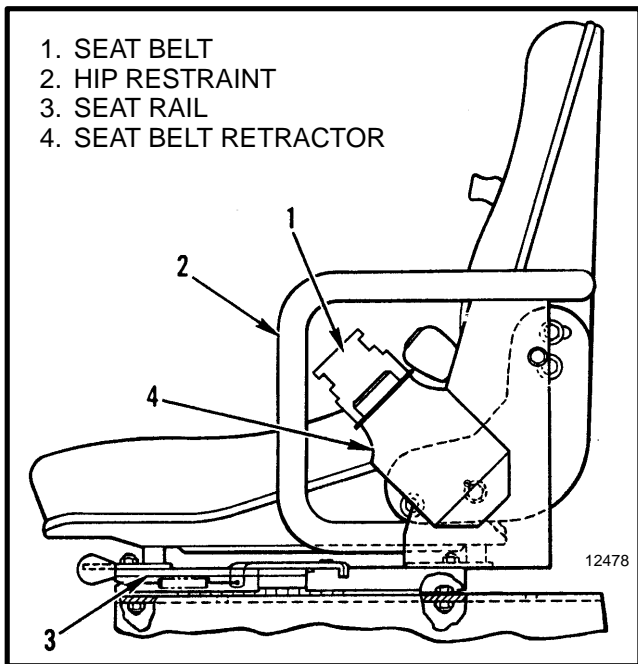


FIGURE 7. CHECK THE SEAT

Steering Column Latch

Make sure the latch for the steering column operates correctly. The latch must NOT allow the column to move unless the latch is released.

Drive Belts

Check the drive belts for wear or damage.

Cooling System (See FIGURE 8.)

⚠ WARNING

DO NOT remove the radiator cap when the engine is hot. When the pressure cap is removed from the radiator, the pressure is released from the system. If the system is hot, the steam and boiling coolant can cause burns.

Make sure the coolant level is between the “FULL” and the “ADD” mark on the auxiliary coolant reservoir. The coolant will expand as it is heated and the level in the auxiliary coolant reservoir will increase. Add coolant to the auxiliary reservoir if additional coolant is needed.

Check the radiator fins. Clean the radiator with compressed air or water as needed.

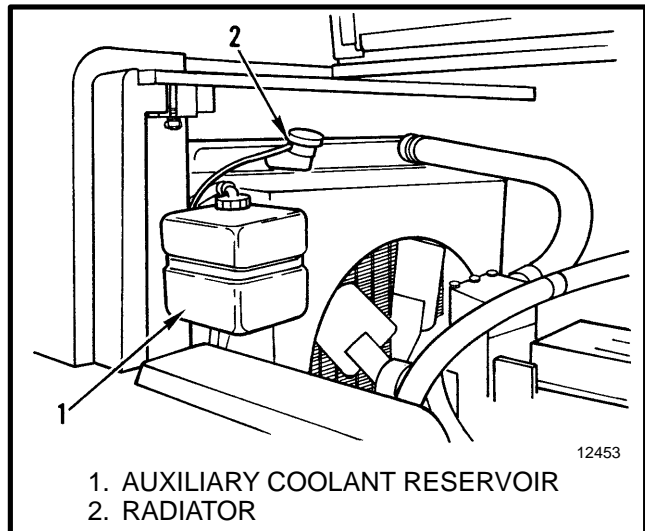


FIGURE 8. AUXILIARY COOLANT RESERVOIR

Check For Fuel, Oil Or Coolant Leaks

⚠ WARNING

All fuels are very flammable and can burn or cause an explosion. Do not use an open flame to check the fuel level or to check for leaks in the fuel system. If there is a leak in the fuel system, extra care must be used during the repair. Do not operate the lift truck until a leak is repaired.

Make a visual check for leaks on and under the lift truck. If possible, find and repair the leak at the source. Leaks often indicate a need for repair of damaged or worn components. Leaks in an LPG fuel system are usually not visible unless ice is visible. There is however, usually a strong odor. Fuel leaks MUST be repaired NOW.

Check the fuel system for leaks and the condition of parts. Also check the condition of the radiator or heater hoses that are not leaking. Soft or cracked hoses need to be replaced before a major leak occurs.

Hydraulic System (See FIGURE 9.)

⚠ WARNING

At operating temperature the hydraulic oil is **HOT**. Do not permit the oil to touch the skin and cause a burn.

⚠ CAUTION

Do not permit dirt to enter the hydraulic system when the oil level is checked or the filter is changed.

Never operate the hydraulic pump without oil in the hydraulic system. The operation of the hydraulic pump without oil will damage the pump.

Check the hydraulic oil level when the oil is at operating temperature, the carriage is lowered and the engine is stopped. Add hydraulic oil only as needed. If more hydraulic oil is added than the "FULL" level, the hydraulic oil will leak from the breather during operation.

Check the hydraulic system for leaks and damaged or loose components.

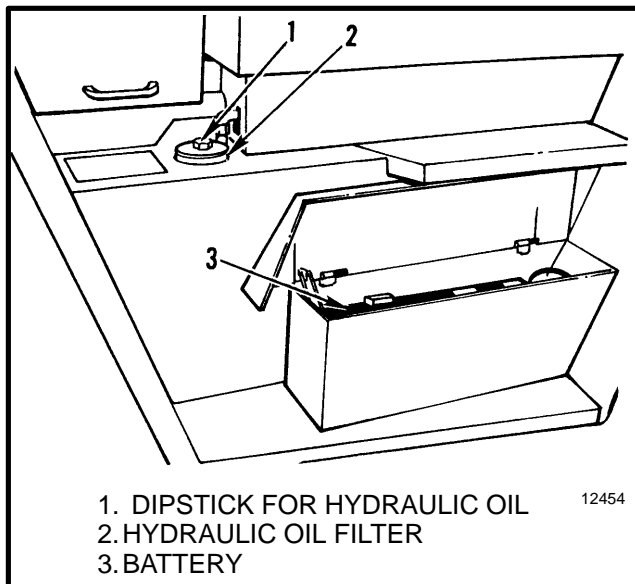


FIGURE 9. MAINTENANCE POINTS

Engine Oil (See FIGURE 10.)

After the engine has stopped, wait one minute before checking the oil level. Keep the oil at the correct level as

indicated on the dipstick. Use the correct oil as shown in the MAINTENANCE SCHEDULE.

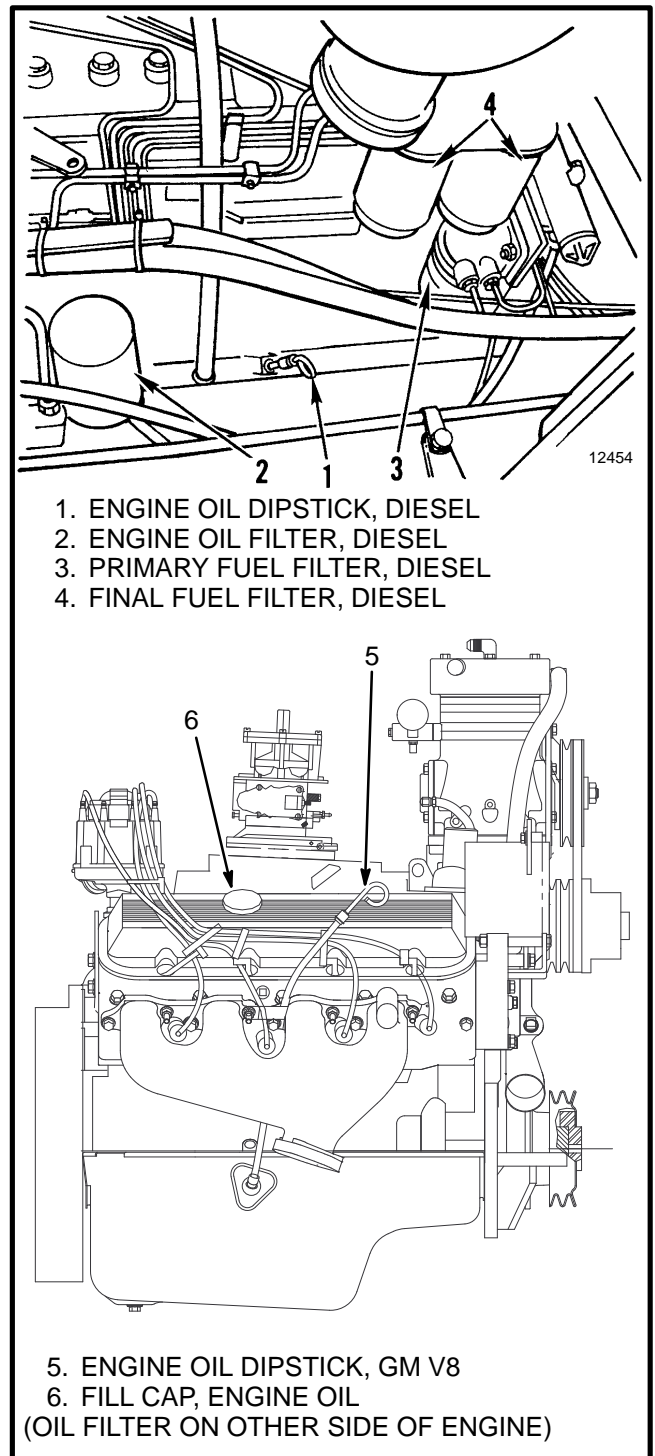


FIGURE 10. ENGINE MAINTENANCE

Fuel System

⚠ WARNING

All fuels are very flammable and can burn or cause an explosion. Do not use an open flame to check the

fuel level or to check for leaks in the fuel system. If there is a leak in the fuel system, extra care must be used during the repair. Do not operate the lift truck until a leak is repaired.

Check the fuel system for leaks and the condition of the parts. When fuel is added to the lift truck, see the section, **How To Add Fuel To The Lift Truck** procedures in the **OPERATING MANUAL**.

Primary Fuel Filter (See FIGURE 10.)

Drain the water from the primary fuel filter.

1. Open the valve on the bottom of the filter canister. Drain some fuel (and any water) into a cup until clean fuel flows from the filter.

2. Close the valve.

Battery (See FIGURE 9.)

⚠ WARNING

The acid in the electrolyte can cause injury. If the electrolyte is spilled, use water to flush the area. Use a solution of sodium bicarbonate (soda) to make the acid neutral. Acid in the eyes must be flushed with water immediately. Wear eye protection.

Batteries generate explosive fumes. Keep the vents in the caps clean. Keep sparks or open flame away from the battery area. Do not make sparks from the battery connections. Disconnect the battery ground cable when doing maintenance.

⚠ CAUTION

Disposal of batteries must meet local environmental regulations.

Keep the battery and cable terminals clean. Check the electrolyte level (unless a maintenance-free battery). Keep the electrolyte level above the separators and plates. Use distilled water. Do not fill the battery more than to the bottom of the internal filler neck.

If the battery becomes discharged and requires a booster battery to start the engine, follow these procedures carefully when connecting the jumper cables:

- Always connect the positive jumper cable to the positive terminal of the discharged battery and the negative jumper cable to the negative terminal.

- Always connect the jumper cable that is the ground cable last.
- Always connect the jumper cables to the discharged battery before connecting them to the booster battery.

Pre-Cleaner for Air Filter (See FIGURE 11.)

Clean the pre-cleaner for the air filter as necessary. Remove the cover for the pre-cleaner, then remove the dirt from the bowl. Install the bowl and cover.

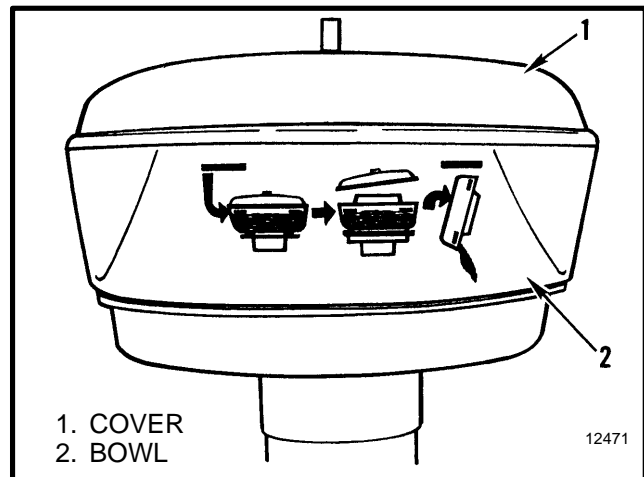


FIGURE 11. PRE-CLEANER FOR THE AIR FILTER

Air Filter (See FIGURE 24.)

Clean or replace the air filter as necessary. Use compressed air to clean the filter element. Air pressure must be less than 210 kPa (30 psi). Apply the air from the inside to the outside of the element.

To inspect the element, put a bright light inside and look for holes or other damage. If the element is damaged, replace it with a new element. Clean the inside of the canister when changing filters.

HOW TO MAKE THE CHECKS WITH THE ENGINE RUNNING

⚠ WARNING

FASTEN YOUR SEAT BELT! The seat belt is installed to help the operator stay on the truck if the lift truck tips over. IT CAN ONLY HELP IF IT IS FASTENED.

Make sure that the area around the lift truck is clear before starting the engine or making any operational

checks. Be careful when making the checks. If the lift truck is stationary during a check, apply the parking brake and put the transmission in **NEUTRAL**. Proceed carefully.

Gauges, Lights, Horn and Fuses,

Start the engine. Check that the gauges and lights for

correct operation as described in the **OPERATING MANUAL**. Check the operation of the horn.

The fuses are under the instrument panel on the left side. (See FIGURE 12.)

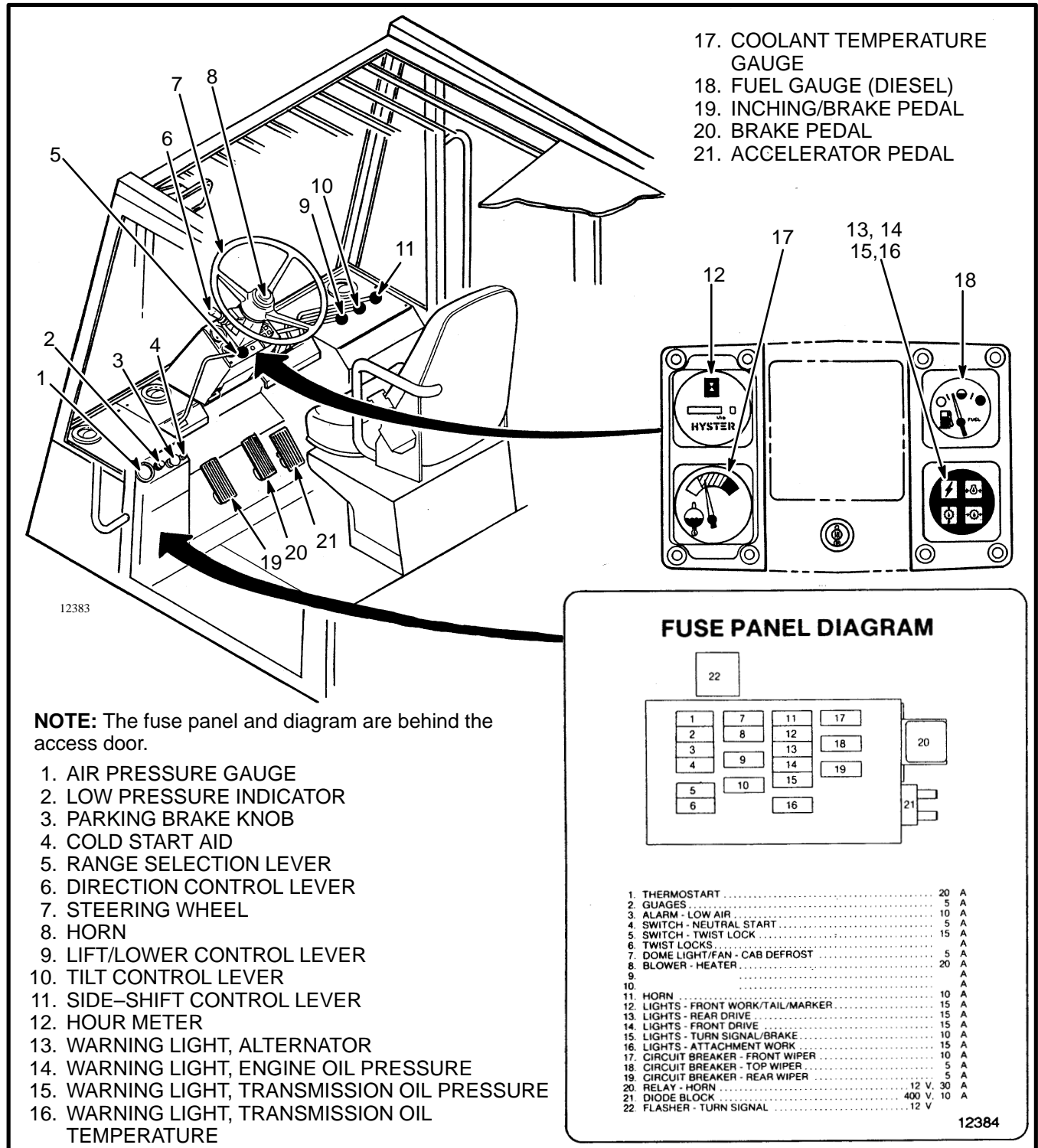


FIGURE 12. INSTRUMENTS AND CONTROLS

Control Levers and Pedals

Check that the control levers for the transmission, mast and attachment and the pedals operate as described in the **OPERATING MANUAL**.

Transmission Oil (See FIGURE 13.)

Apply the parking brake. Check the oil level in the powershift transmission when the engine is running at idle speed and, if equipped, the direction control lever is in the Neutral position. Use the correct oil as shown in the Maintenance Schedule. Keep the oil level at the "FULL" mark on the dipstick.

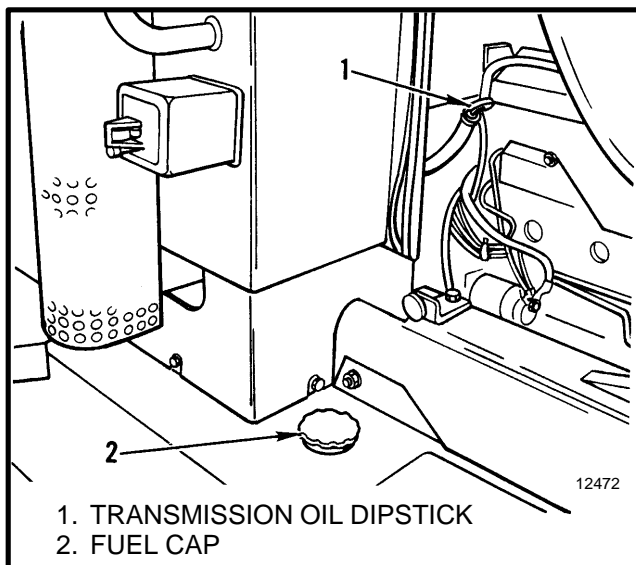


FIGURE 13. TRANSMISSION OIL

Lift System Operation

⚠ WARNING

Lower the lift mechanism completely. Never allow anyone 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.

⚠ WARNING

Before making any repairs, use blocks and chains on the mast weldments and carriage so that they can not move. Make sure the moving parts are attached to a part that does not move.

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

Do the following checks and inspections:

- a. Check for leaks in the hydraulic system. Check the condition of the hydraulic hoses and tubes.
- b. Slowly raise and lower the mast several times without a load. Raise the mast to its full extension height at least once. The mast components must raise and lower smoothly in the correct sequence.

NOTE: Some parts of the mast move at different speeds during raising and lowering.

- c. The inner weldment and the carriage must lower completely.
- d. Raise the mast one metre (three feet) with a capacity load. The inner weldment and the carriage must raise smoothly. Lower the mast. All moving components must lower smoothly.
- e. Lower the load to approximately 0.3 metre (one foot) from the floor. Tilt the mast forward and backward. The mast must tilt smoothly and both tilt cylinders must stop evenly.
- f. Check that the controls operate the functions of the attachment correctly. (See the symbols next to each of the controls.) Make sure all of the hydraulic lines are connected correctly and do not leak.

Brakes

Check that the service and parking brakes operate correctly. The service brakes must apply when the brake pedal is depressed. The parking brake must apply when the knob for the parking brake is pushed. The parking brake must release when the knob is pulled. On lift trucks with a Monotrol pedal, applying the parking brake puts the transmission in Neutral.

NOTE: Full application of the inching/brake pedal applies the service brakes and disengages the transmission.

Steering System

⚠ WARNING

The lift truck has hydraulic power steering. The steering can be difficult if the engine is not running.

Make sure the steering system operates smoothly and gives good steering control.

EVERY 150 HOURS OR MONTHLY

NOTE: Do these procedures in addition to the 8 hour checks.

LIFT CHAINS, LUBRICATION

Lubricate the lift chains with SAE 30 engine oil. The best procedure is to remove the chains from the lift truck and soak them in oil.

⚠ WARNING

Do not repair a worn or damaged lift chain. Replace a worn or damaged lift chain with a new chain. If a pair of lift chains is used in the mast, both lift chains must be replaced.

LIFT CHAIN ADJUSTMENTS (See FIGURE 14.)

When the lift chains are correctly adjusted:

- The tension will be the same on each chain of the chain set. Check tension by pushing on both chains at the same time.
- The chain length will be correct.
- The chains must travel freely through the complete cycle.

1. Put a load equal to 80 to 90% of the capacity load on the forks. Lower the forks as much as possible. Tilt the mast fully backward.

2. Check the amount that the bottom carriage roller extends below the inner channel of the mast. The carriage roller must not extend more than 1.3 in (34 mm) below the inner channel. If the adjustment is not correct, adjust the chain anchors. Make sure each anchor is adjusted the same amount.

3. Remove the load from the forks. Check the clearance of the carriage when the mast is fully extended. The carriage must not touch the top crossmember of the inner weldment. The chains are too tight if the carriage touches the crossmember. Put the mast in a vertical position and lower the carriage completely. If the forks do not just touch the surface the chains are too tight. If the chains are too tight adjust the chain anchors. Make sure each anchor is adjusted the same amount.

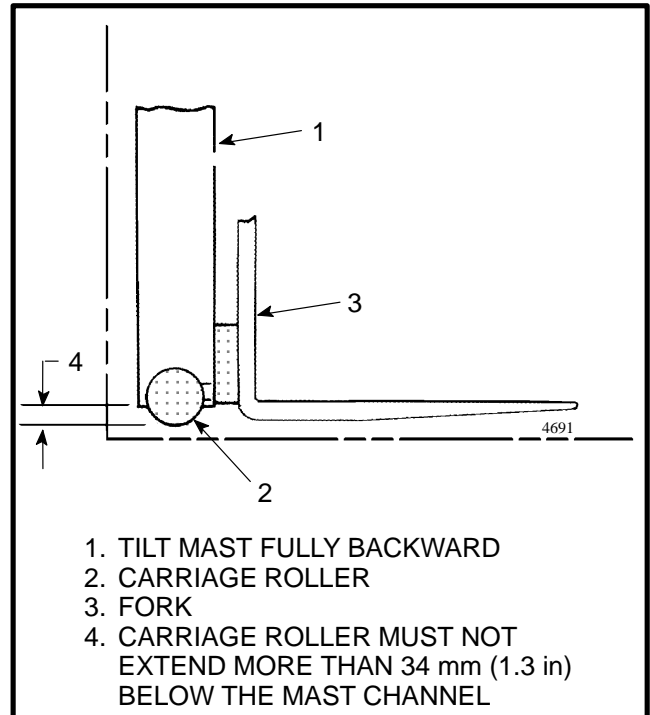


FIGURE 14. LIFT CHAIN ADJUSTMENTS

⚠ WARNING

Do not repair a worn lift chain. Replace a worn chain with a new chain. If a pair of chains is used in the mast, both chains must be replaced.

NOTE: When the chain adjustments are complete, make sure that the threads on the nuts of the chain anchors are completely engaged. Make sure that all of the adjustment is not removed from the chain anchors. The chain anchors must be able to move in their sockets.

AIR TANKS

Operate the drain valve to check its operation and to drain moisture from the air tank. The drain valves are installed at the bottom of the air tanks.

DRIVE SHAFT

Lubricate the three fittings on the transmission drive shaft with multi-purpose grease.

STEERING AXLE (See FIGURE 15.)

Lubricate the grease fittings on the tie rods and the lower spindle bearings with multi-purpose grease.

WHEEL NUTS

Check the torque of the wheel nuts. Tighten the nuts to 640 to 680 N.m (470 to 500 lbf ft) in the sequence shown in FIGURE 37.

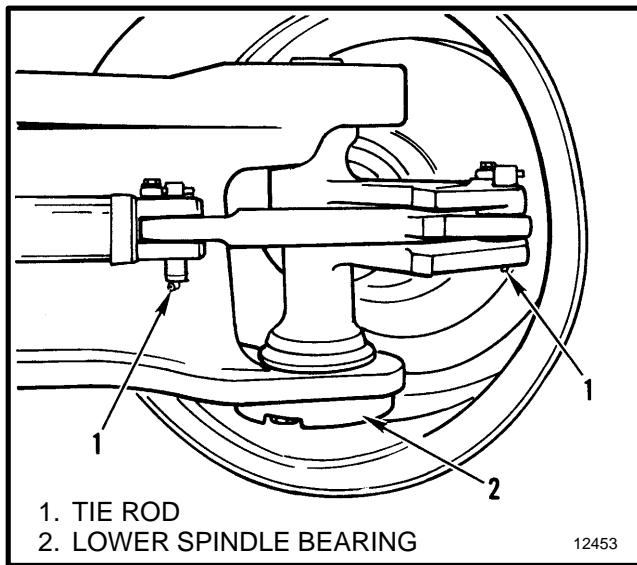


FIGURE 15. STEERING AXLE

SHAFTS FOR BRAKE ACTUATORS

Lubricate the grease fitting on the shafts for the brake actuator arms.

DRIVE AXLE AND DIFFERENTIAL

The drive axle and differential use the same oil supply. The oil level in the drive axle is correct when the oil is even with the plug in the planetary cover. Be sure to check both planetary covers and the differential when checking the oil level. Make sure the “level line” on the planetary cover is parallel to the floor.

The oil level in the differential is correct when the oil is even with the plug in the front of the housing. Add the correct oil as specified in the MAINTENANCE SCHEDULE.

HYDRAULIC TANK BREATHER (See FIGURE 2.)

Remove the hydraulic tank breather from behind the right-hand cover and clean it in solvent. Dry the breather with compressed air and install it.

AIR FILTER, HEATER

Remove the four screws and the air intake cover at the right side of the cab. Remove the spring and air filter. Clean the filter with soap and water or compressed air. Replace the filter if it is damaged.

EVERY 350 HOURS OR TWO MONTHS

NOTE: Do these procedures in addition to the 150 hour checks.

ENGINE OIL AND FILTER (See FIGURE 9.)

NOTE: Change the oil filter for the engine after the first 100 hours on new lift trucks.

CAUTION

Never run the engine without oil.

Change the filter at the same time engine oil is changed. Use the correct oil according to the specifications. Install a new filter. Apply clean oil to the gasket of the new filter. Turn the filter until the gasket touches, then tighten $\frac{1}{2}$ to $\frac{3}{4}$ turn with your hand. Start the engine. Check for leaks.

CAUTION

Long term exposure to used engine oil can cause skin irritation or cancer. Wash with detergent and water.

BRAKE ACTUATOR ARMS

Check the adjustment of the brake actuator arms as described in the section, **BRAKE SYSTEM, 1800 SRM 441.**

DRIVE BELTS (See FIGURE 16. and FIGURE 17.)

Check the drive belts for wear and damage. When a pair of drive belts are used, they must be replaced as a pair.

When a pair of drive belts are used, adjust the tension for the tightest belt.

A gauge is available that will indicate the tension in the drive belt. Fit the gauge at the center of the longest length of the drive belt and measure the tension. See FIGURE 16. The correct tension is approximately 355 N (80 lbf).

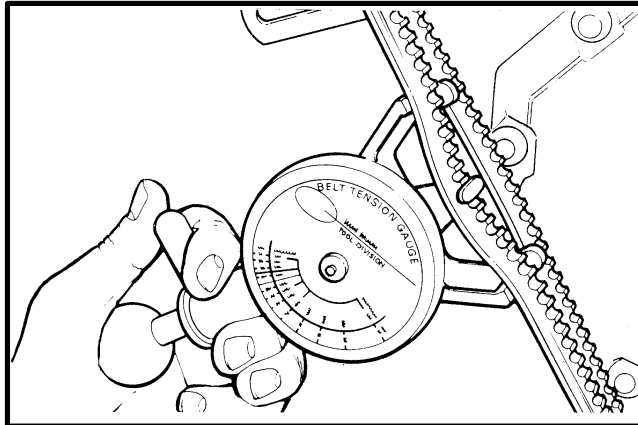


FIGURE 16. GAUGE TO CHECK DRIVE BELT TENSION

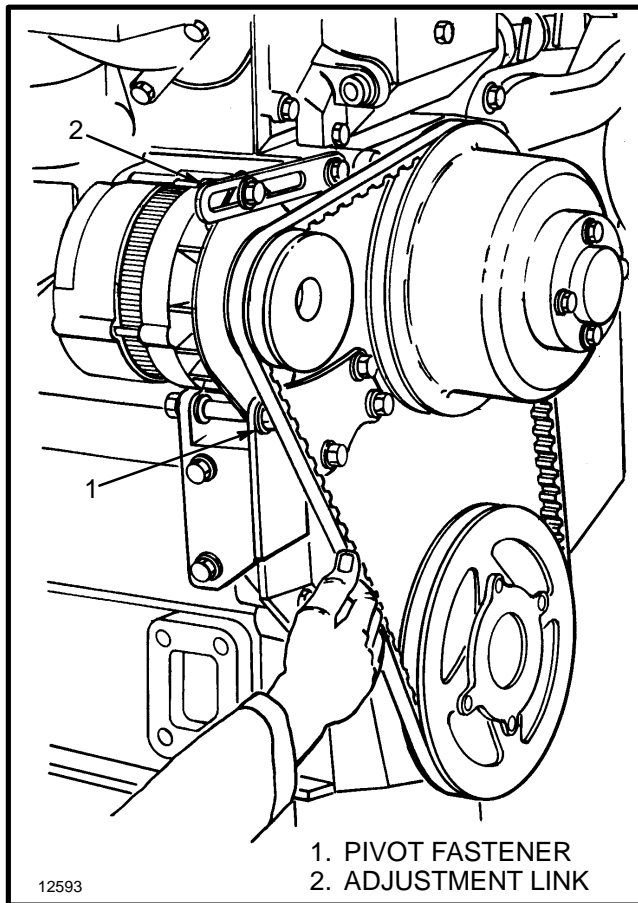


FIGURE 17. CHECK AND ADJUST DRIVE BELT TENSION (DIESEL)

The tension can also be checked by pushing on the drive belt as shown in FIGURE 17. Push on the drive belt with approximately 10 kg (20 lb) force between the alternator and crankshaft pulleys. When the tension is correct, the drive belt will move approximately 13 mm (0.5 in).

Loosen the capscrew on the alternator mount to adjust the tension of the drive belts.

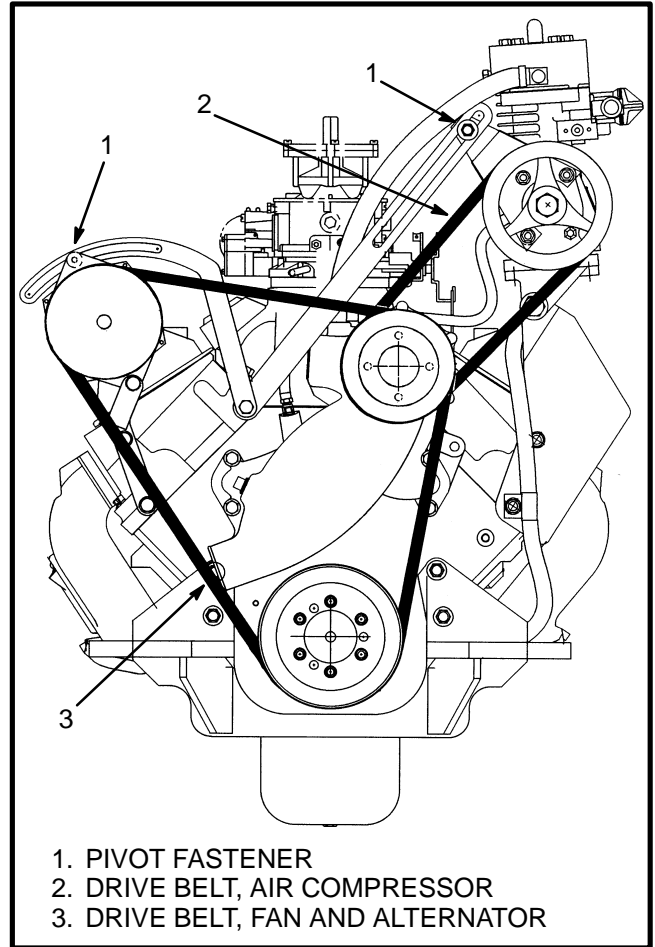


FIGURE 18. CHECK AND ADJUST DRIVE BELT TENSION (GM V-8)

MAST (See FIGURE 19.)

⚠ WARNING

Lower the lift mechanism completely. Never allow anyone 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.

Before making any repairs, use blocks and chains on the mast weldments and carriage so that they can not move. Make sure the moving parts are attached to a part that does not move.

1. Lubricate the sliding surfaces for the bearing blocks along the full length of the channels as shown in FIGURE 19. Apply lubricant only to the indicated surfaces.

NOTE: The load rollers and sheaves have sealed bearings and do not need additional lubrication.

2. Lubricate the pivot pins for the mast at the grease fittings on the pivot pins. Use multi-purpose grease.

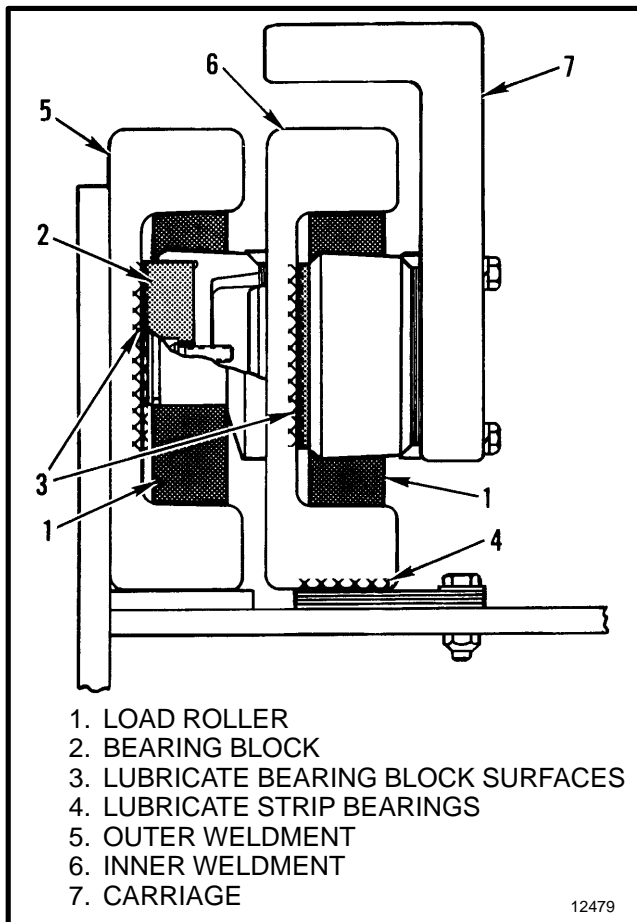


FIGURE 19. LUBRICATE THE MAST

3. Lubricate the pivot pins for the tilt cylinders. There is a grease fitting on each pivot pin. Use multi-purpose grease.

4. If a side-shift carriage is installed, lubricate the fittings and the sliding surfaces with multi-purpose grease.

EMPTY CONTAINER ATTACHMENT (See FIGURE 3.)

1. Lubricate the grease fittings for the side-shift rollers and the anchor pins for the side-shift cylinder. Lubricate the grease fittings for the lock pins. These fittings are located at the top of the end beams.

2. Lubricate the sliding surfaces for all of the bearing blocks.

3. Remove the drain plugs at the bottom of both end beams to drain moisture from the accumulators.

GENERAL LUBRICATION

Inspect all hinges, pins, linkages, cables, pedals and levers for wear and damage. Lubricate these parts as necessary with engine oil.

FORKS, CHECK FOR WEAR AND DAMAGE (See FIGURE 5.)

⚠ WARNING

Never repair damaged forks. Do not heat, weld, or bend the forks. Forks are made of special steel using special methods. Replace damaged forks.

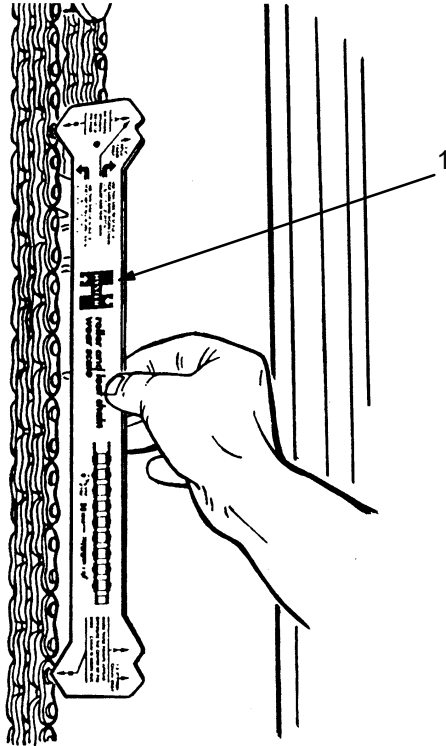
1. Check the heel and attachment points of the forks with a penetrant or magnetic particle inspection.

2. Measure the thickness of the forks at a vertical section where there is no wear. This is dimension X. Now measure the thickness at the heel (5) of the fork. If the thickness is not more than 90% of dimension X, replace the fork.

LIFT CHAINS, CHECK FOR WEAR (See FIGURE 20.)

If a section of chain is 3% longer than a similar section of new chain, the chain is worn and must be replaced. Measure the chain for wear where it moves over the sheaves. If a chain scale is available, check the lift chains as shown in FIGURE 20. If a chain scale is not available, measure 20 links of chain. Measure from the center of a pin to the center of another pin 20 pitches away. Compare the length with the chart in FIGURE 20. Replace the chain if the length of 20 links of the worn section is more than the WEAR LIMIT.

Pitch		TOTAL LENGTH OF 20 LINKS (PITCH) OF NEW CHAIN		WEAR LIMIT – MAXIMUM LENGTH OF 20 LINKS	
Inch	mm	Inch	mm	Inch	mm
1.25	31.8	25.0	635	25.8	654
1.50	38.1	30.0	762	30.9	785
1.75	44.5	35.0	889	36.1	915



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NOTE: The instructions for measuring chain wear are shown on the Chain Wear Scale.

1. CHAIN WEAR SCALE

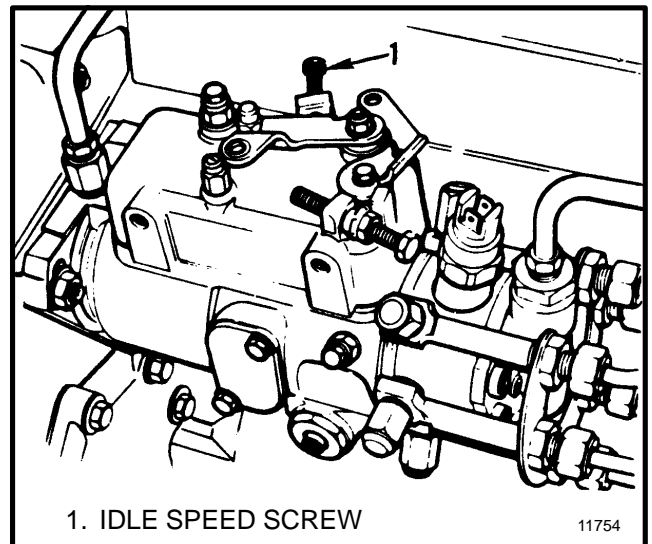
FIGURE 20. CHECK THE LIFT CHAINS

FUEL SYSTEM

With the engine at normal operating temperature, adjust engine speed as follows:

Idle Speed (See FIGURE 21.)

Loosen the locknut and turn the idle speed screw until the idle speed is within the specifications shown in the MAINTENANCE SCHEDULE. Tighten the locknut.



1. IDLE SPEED SCREW

11754

FIGURE 21. FUEL INJECTION PUMP

Governor Speed (Diesel) (See FIGURE 22.)

1. Adjust the idle speed to 725 to 775 rpm.
2. Disconnect the throttle cable (6) at the throttle lever (9) on the fuel injection pump. Push the throttle or Monotrol pedal (1) until it stops against the floor plate (2). Hold the pedal in this position with a rod.
3. Connect the end of the throttle cable (6) to the rod end (8) on the throttle lever (9). Make sure the end of the cable is connected securely with the rod end, but the cable is not tight. Tighten the jam nut (7) to hold the cable to the rod end.
4. Adjust the cable housing at the bracket on the engine (4) to obtain full throttle at the engine. Tighten the jam nuts (5) on the cable housing.
5. Remove the rod from holding the pedal in the open position. If necessary, adjust the pedal stop (3) so that there is approximately 3 mm (0.13 in) free pedal when the engine is at idle speed.
6. On units with a Monotrol pedal, move the pedal from Forward to Reverse and Reverse to Forward several times. The pedal must shift to the opposite direction before the throttle opens.