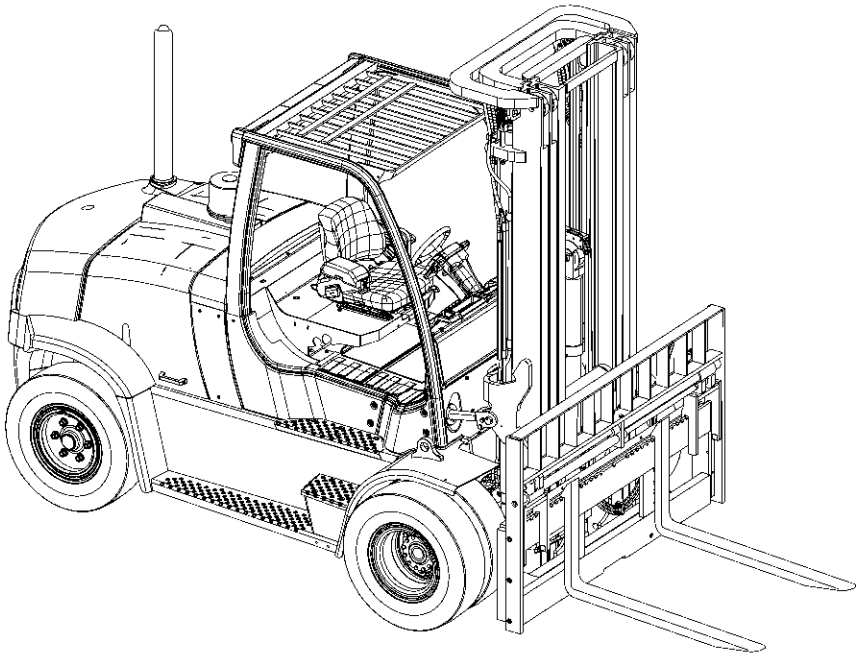
Yale®

Maintenance

PERIODIC MAINTENANCE

GLP/GDP170VX, GLP/GDP175VX36, GLP/GDP190VX [D909]



PART NO. 550229999

8000 YRM 2296

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 Yale® 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 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 **YALE ® 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, if present) are on orange background. The CAUTION symbol (and word, if present) are on yellow background.

WARNING

Installing improper electrical accessories or installing an electrical accessory incorrectly can increase the risk of equipment damage, personal injury and fire. DO NOT install electrical accessories to the truck unless you have been trained and authorized to do so. Personnel installing the electrical accessories must document the changes made to the truck. DO NOT install accessories which affect the truck's compliance with standard EN 1175:2020.

WARNING

California Proposition 65 - Operating, servicing and maintaining a powered industrial truck can expose you to chemicals including engine exhaust, carbon monoxide, phthalates, and lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov.

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Yale

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 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 **Yale** 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 **Yale** lift trucks to help users who perform 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.

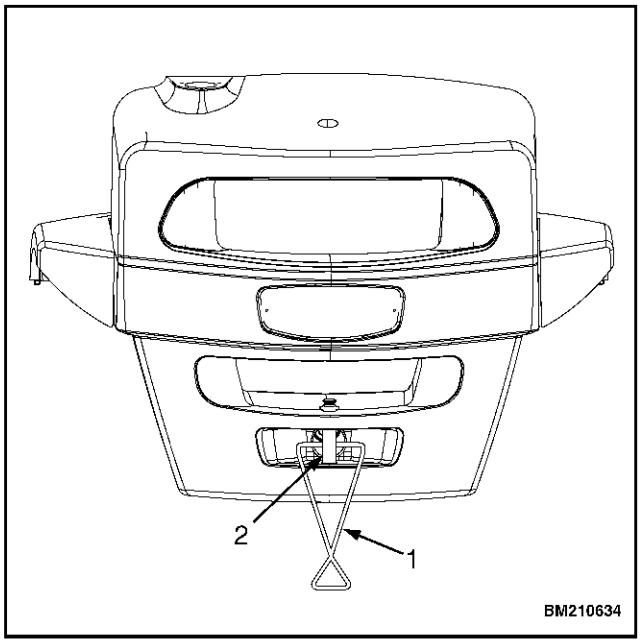
CAUTION

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

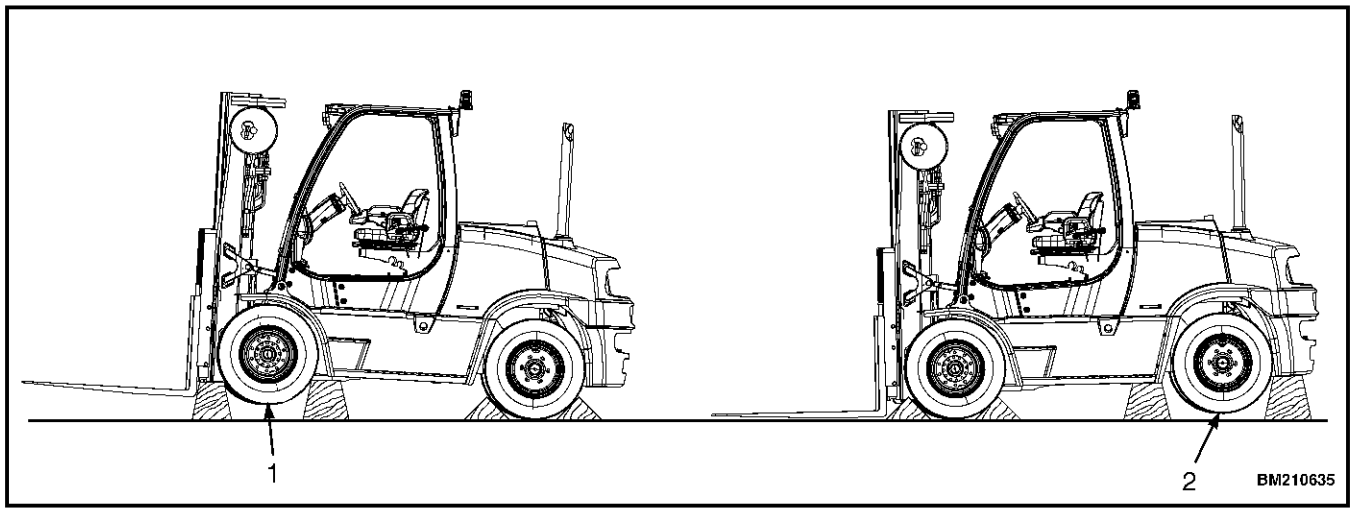
These lift trucks are equipped with cowl lifting eyes. The cowl lifting eyes are to be used to lift the front of the lift truck only. Lifting more than the front of the lift truck with the cowl lifting eyes will damage the cowl section.

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. See Figure 2.



1. DRIVE TIRES
2. STEERING TIRES

Figure 2. Put Lift Truck on Blocks

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.

Safety Procedures When Working Near Mast

The following procedures must be used when inspecting or working near the mast. Additional precautions and procedures can be required when repairing or removing the mast. See the correct Service Manual section for the specific mast being repaired.

⚠ WARNING

Mast parts are heavy and can move. Distances between parts are small. Serious injury or death can result if part of the body is hit by parts of the mast or the carriage.

- **Never put any part of the body into or under the mast or carriage unless all parts of the mast are completely lowered or a safety chain is installed. Also make sure that the power is off and the key is removed. Put a DO NOT OPERATE tag in the operator's compartment.**
- **Be careful of the forks. When the mast is raised, the forks can be at a height to cause an injury.**
- **DO NOT climb on the mast or lift truck at any time. Use a ladder or personnel lift to work on the mast.**
- **DO NOT use blocks to support the mast weldments nor to restrain their movement.**
- **Mast repairs require disassembly and removal of parts and can require removal of the mast or carriage. Follow the repair procedures in the correct Service Manual for the mast.**

NOTE: If there is no power to lower the mast on lift trucks equipped with Electronic Hydraulic System, there is an emergency load lowering valve located on the hoist/lower valve section of the main control valve. See the **Operating Manual** for the procedures to lower a load using the emergency load lowering valve.

1. Lower mast and carriage completely. Push lift/lower control lever forward and make sure there is no movement in the mast. Make sure all parts of the mast that move are fully lowered.

OR

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

   a. Put mast in vertical position.

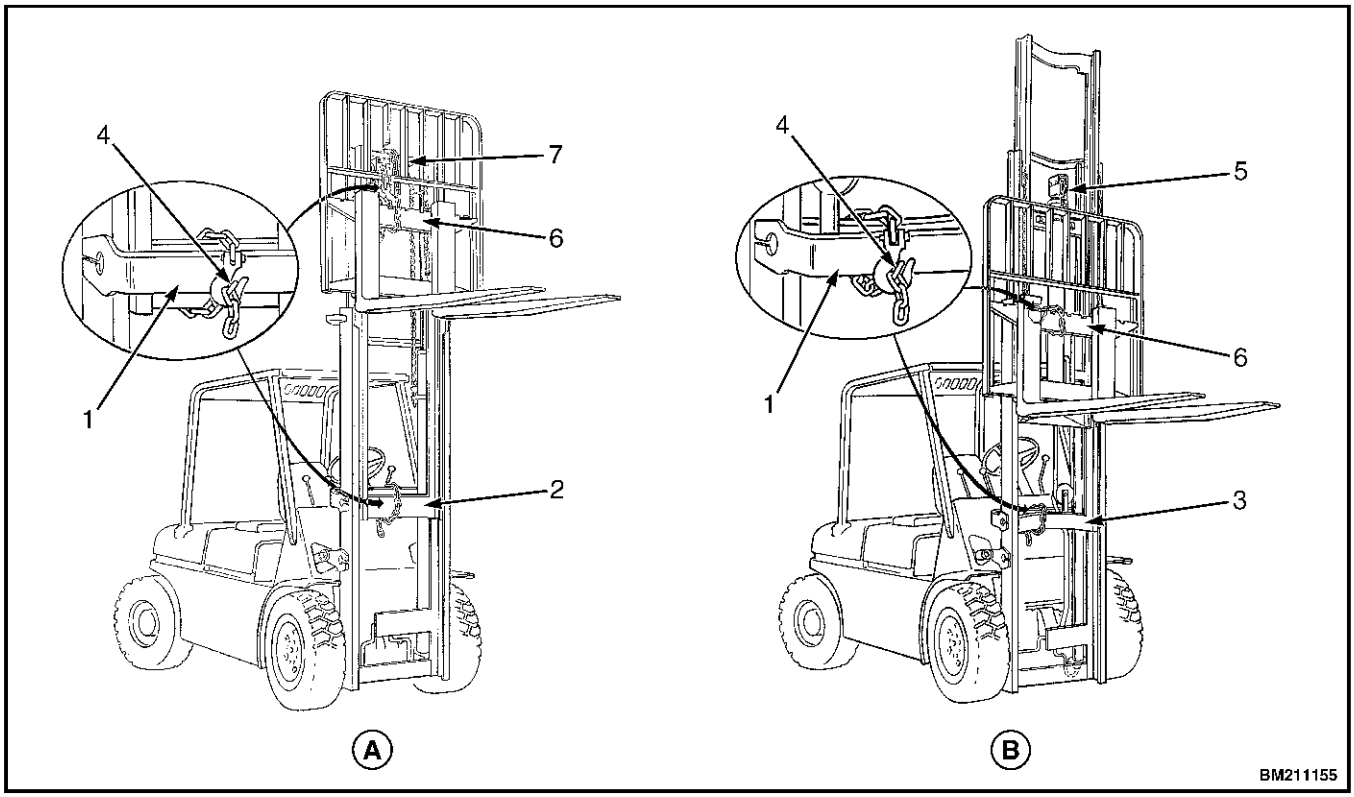
   b. Raise mast to align bottom crossmember of weldment that moves in outer weldment with a crossmember on outer weldment. On the two-stage and free-lift mast, the moving part is the inner weldment. On the three-stage mast, it is the intermediate weldment. See Figure 3.

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

   d. Lower the mast until there is tension in the safety chain and the free-lift cylinder (free-lift, three-stage, and four-stage masts only) is completely retracted. If running, stop engine. Apply parking brake. Install a **DO NOT REMOVE** tag on the safety chain(s).

   e. Install another safety chain (3/8-in. minimum) between the top or bottom crossmember of the carriage and a crossmember on the outer weldment.

3. Apply parking brake. After lowering or restraining the mast, shut off power and remove key. Put a **DO NOT OPERATE** tag in the operator's compartment.



A. TWO-STAGE LFL MAST

1. OUTER MAST
2. INNER MAST
3. INTERMEDIATE MAST
4. HOOK

B. THREE-STAGE FFL MAST

5. FREE-LIFT CYLINDER
6. CARRIAGE BAR
7. CROSSMEMBER

Figure 3. Two-Stage, Free-Lift, and Three-Stage Masts

Maintenance Schedule

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.

NOTE: See Figure 4 and Figure 5 for location of item numbers in Maintenance Schedule.

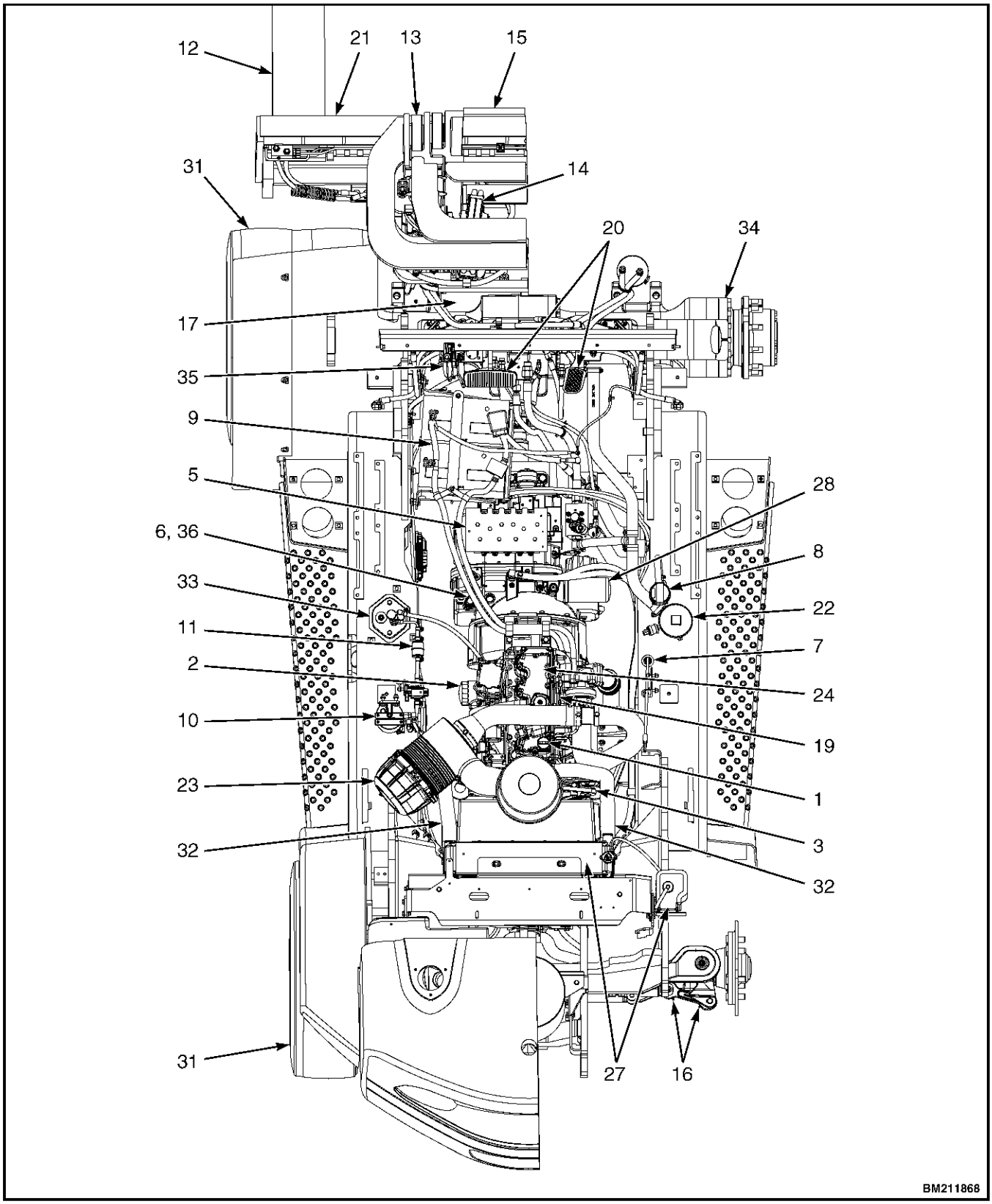


Figure 4. Maintenance and Lubrication Points, Kubota 3.8L Non-Compliant, 82kW Diesel Engine

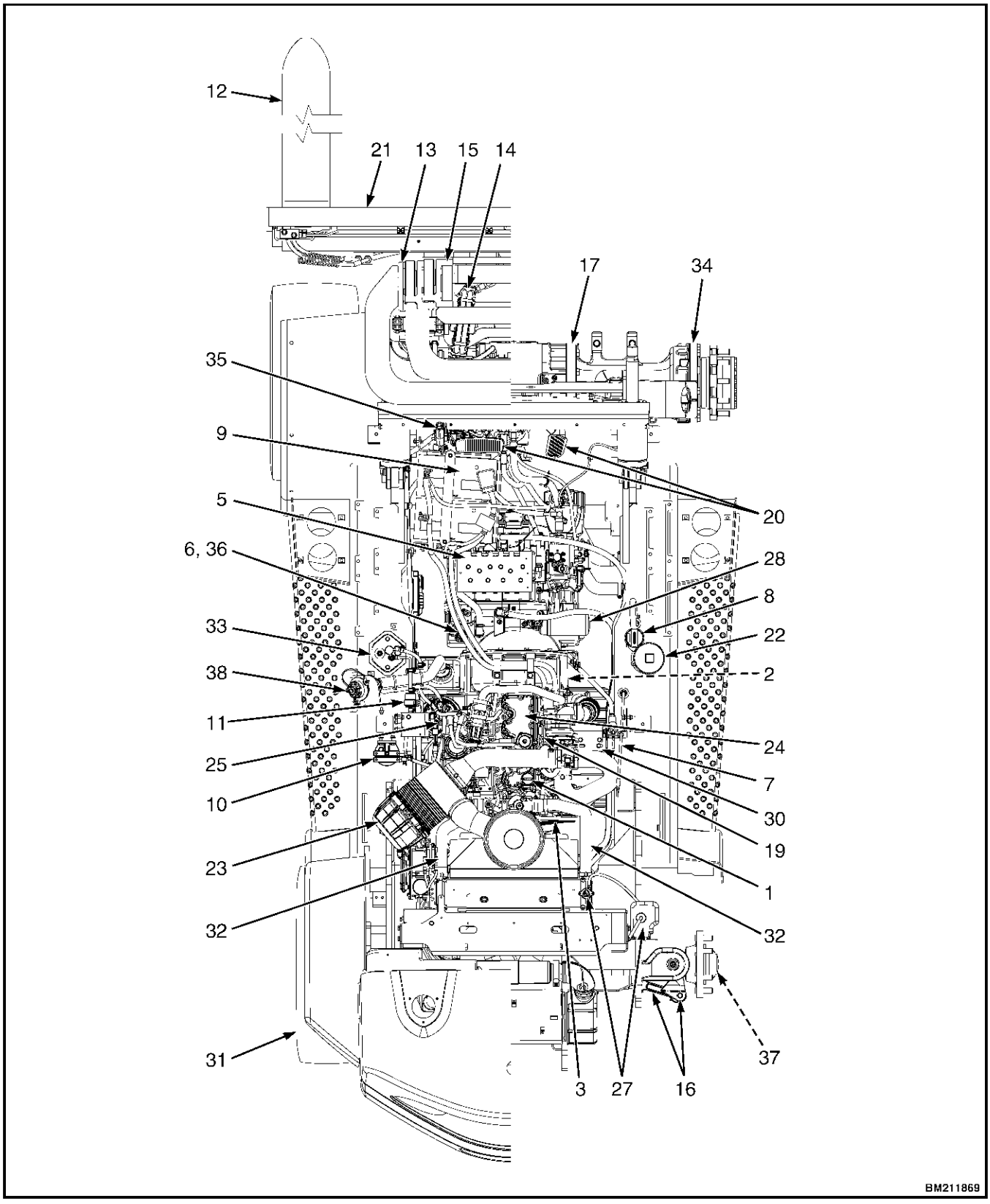


Figure 5. Maintenance and Lubrication Points, Kubota 3.8L, Tier 4/Stage V 55kW and 82kW Diesel Engine

Table 1. Maintenance Schedule

Item No.	Item	8 hr/ 1 day	500 hr/ 6 mo	1000 hr/ 6 mo	2000 hr/ 1 yr	4000 hr/ 2 yr	Procedure or Quantity	Specification
31	Tires and Wheels	X					Check Condition	See Nameplate
	Safety Labels	X					Replace as Necessary	See **Parts Manual**
13, 14, 15, 21	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**	
	Check for Leaks - Fuel, Oil, Water	X					Check for Leaks See **NOTE 1**.	
	Hydraulic Hoses	X					Check Condition	See **Parts Manual**
	Ground Static Strap (If Equipped)	X					Check Condition and Replace if Necessary.	
32	Coolant Hoses	X					Check Condition	See **Parts Manual**
33	Fuel Tank (Kubota Diesel Engine)	CIL					74.8 liter (19.7 gal)	See Table 2 See **NOTE 17**
	Horn, Lights, Alarms, Fuses, and Relays	X					Check Operation	
34	Service Brakes	X					Check Operation	
35	Parking Brake	X	X				Check Operation Adjust as Necessary	Must hold a full capacity load on a 15% grade.
	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	500 hr/ 6 mo	1000 hr/ 6 mo	2000 hr/ 1 yr	4000 hr/ 2 yr	Procedure or Quantity	Specification
5	Transmission	X					Check Operation Check for leaks	Chevron - Chevron 1000THF Deere and Company - HYGard Fluid J20C Mobile Oil Company - Mobilfluid 424 Shell Oil Company - Donax TD
36	Transmission Oil		X	C			24 liter (25.4 qt)	Chevron - Chevron 1000THF Deere and Company - HYGard Fluid J20C Mobile Oil Company - Mobilfluid 424 Shell Oil Company - Donax TD
28	Transmission Oil Filter			C			1 Filter See **NOTE 4**.	See **Parts Manual**
6	Transmission Oil Breather		X				Check Breather 1 Breather	See **Parts Manual**
5	Transmission				X		Perform Automatic Clutch Calibration	See **Calibration Procedures** 8000YRM1134 for Calibration Procedures
7	Hydraulic Oil	X	X			C	71.7 liter (75.8 qt) See **NOTE 2**, **NOTE 3**, **NOTE 13**, and **NOTE 18**.	ISO - VG 46 Hydraulic Oil Shell - Tellus Oil 46 Shell - Tellus Premium 46 Texaco - Rando HD 46 Exxon - Nuto H 46 Mobil - DTE 25 -15°C (5°F) and Above
22	Hydraulic Oil Filter				C		1 Filter. See **NOTE 13**.	See **Parts Manual**
8	Hydraulic Tank Breather		X		C		Inspect and Replace as Required See **NOTE 5**.	See **Parts Manual**
9	Battery and Cable Terminals		X				Clean	
X=Check C=Change L=Lubricate CIL=Check Indicator Light during operation								

Table 1. Maintenance Schedule (Continued)

Item No.	Item	8 hr/ 1 day	500 hr/ 6 mo	1000 hr/ 6 mo	2000 hr/ 1 yr	4000 hr/ 2 yr	Procedure or Quantity	Specification
1	Engine Oil (Kubota 3.8L Compliant Diesel Engine)	X CIL	C				13.2 liter (13.9 qt) See **NOTE 4** and **NOTE 5**.	See Table 2
1	Engine Oil (Kubota 3.8L Non-Compliant Diesel Engine)	X CIL	C See **NOTE 20**				13.2 liter (13.9 qt) See **NOTE 4** and **NOTE 5**.	See Table 2
2	Engine Oil Filter		C Every 6 mo See **NOTE 20**				1 Filter See **NOTE 4** and **NOTE 5**	See **Parts Manual**
23	Air Filter	X CIL			C		1 Filter See **NOTE 5**, **NOTE 6**, and **NOTE 10**.	See **Parts Manual**
	Engine Oil Pressure (Kubota 3.8L Diesel Engine)	CIL					Check Oil Pressure	49 kPa (7 psi) Minimum
3	Drive Belt Kubota 3.8L Diesel Engines		X				Check for Wear and Damage. Adjust or Replace See **NOTE 5**.	See **Parts Manual**
	Engine Idle Speed (Kubota 3.8L Diesel Engines) **Hot Engine**		X				Coolant Temperature Greater than 15°C (59°F)	800 ±25 rpm
	Engine Governed Speed (Kubota 3.8L Diesel Engine) (No Load)		X					2400 ±25 rpm
24	Valve Adjustment (Kubota 3.8L Diesel Engine)			X			Adjust as Required	Intake 0.23 to 0.27 mm (0.009 to 0.011 in.) Cold Exhaust 0.23 to 0.27 mm (0.009 to 0.011 in.) Cold
10	Fuel Water Separator Filter (Kubota 3.8L Diesel Engine)	CIL	C				1 Filter Drain Water from filter as Required	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	500 hr/ 6 mo	1000 hr/ 6 mo	2000 hr/ 1 yr	4000 hr/ 2 yr	Procedure or Quantity	Specification
11	In Line Fuel Strainer (Kubota 3.8L Diesel Engine)			C			1 Filter	See **Parts Manual**
25	Crankcase Breather Filter (Kubota 3.8L Compliant Diesel Engines Only)			C			1 Filter See **NOTE 15**.	See **Parts Manual**
19	Fuel Injectors (Kubota 3.8L Diesel Engine)				X		Check and Replace, if Required 4 Injectors	
27	Cooling System (Kubota 3.8L Diesel Engine)	X CIL			C		11.0 liter (11.6 qt) (Total System Capacity)	See **NOTE 11**
	Clean Debris From Radiator Core		X				See **NOTE 5**.	
	Heater - Air Filter		C				Replace Air Filters. Quantity of 2.	See **Parts Manual**
	Heater - Operating Condition		X				Check operation and heater condition.	
12	Forks	X	X		X		Check Condition	
12	Fork Latches		L				Lubricate as Necessary	Multipurpose Grease See **NOTE 7.**
	Lift System, Operate	X					Check Operation	
13	Mast Sliding Surfaces and Load Roller Surfaces		L				Lubricate As Required See **NOTE 8**.	Multipurpose Grease See **NOTE 7**.
14	Header Hoses		X				Check Condition	
15	Lift Chains	X					Check Lubrication See **NOTE 9**.	Engine Oil SAE 30W
15	Lift Chains		L	L, X			Check for Wear Lubricate as Required	Engine Oil SAE 30W
21	Mast Pivots		L				2 Fittings	Multipurpose Grease See **NOTE 7**.
21	Mast	X	L	X			Lubricate as Required (2 fittings for Upper Bearings) and (4 Lower Bearing Strips)	Multipurpose Grease See **NOTE 7.**

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

Table 1. Maintenance Schedule (Continued)

Item No.	Item	8 hr/ 1 day	500 hr/ 6 mo	1000 hr/ 6 mo	2000 hr/ 1 yr	4000 hr/ 2 yr	Procedure or Quantity	Specification
	Integral Sideshift Carriage Sliding Surfaces (Upper and Lower Bearings)							
	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**
16	Steering Axle Spindle Bearings			L			4 Fittings	Multipurpose Grease See **NOTE 7.**
16	Steering Axle Tie Rods		L				4 Fittings	Multipurpose Grease See **NOTE 7.**
37	Wheel Bearings Steer Wheels				L		Check Grease	Multipurpose Grease See **NOTE 7.**
20	Pedals, Levers, Seat Rails, Cables, Hinges, Linkages, and Rod End Pins			L			Lubricate as Necessary	Use Silicone Spray Yale Part No. 504236201
35	Parking Brake			L			Lubricate as Necessary	Use Silicone Spray (Yale Part Number 504236201)
35	Parking Brake Adjustment		X				Adjust as Necessary.	Must Hold a Full Capacity Load on a 15% Grade.
X=Check C=Change L=Lubricate CIL=Check Indicator Light during operation								

Table 1. Maintenance Schedule (Continued)

Item No.	Item	8 hr/ 1 day	500 hr/ 6 mo	1000 hr/ 6 mo	2000 hr/ 1 yr	4000 hr/ 2 yr	Procedure or Quantity	Specification
17	Differential and Drive Axle Oil (Wet Brake)			C			Change Oil Left/ Right Chambers 18 liter (19 qt) Center Chamber 4.6 liter (4.9 qt)	Left/ Right Chambers Chevron - Chevron 1000THF Deere and Company - HYGard Fluid J20C Mobile Oil Company - Mobilfluid 424 Shell Oil Company - Donax TD Center Chamber SAE J2360 Gear Oil
17	Differential and Drive Axle (Wet Brake)	X	X				Check for Leaks	
	Inspect Engine Electrical System, Connectors			X				
	Inspect Engine Fuel Lines, and Fittings				X			
	Check Air Induction System for Leaks				X			
	Check Manifold for Vacuum Leaks				X			
	Check Injectors and Rails for Leaks				X			
	Inspect Exhaust Manifolds and Piping for Leaks				X			
	Inspect Muffler Inlet and Outlet				X			
	Inspect Catalyst Inlet and Outlet (Kubota 3.8L Compliant Diesel Engines)				X			
	Oxygen Sensor (Kubota 3.8L Compliant Diesel Engines)	CIL			X		Replace as Necessary 2 Sensors	See **Parts Manual**
30	Diesel Particulate Filter (DPF)				X		Service Filter.	
X=Check C=Change L=Lubricate CIL=Check Indicator Light during operation								

Table 1. Maintenance Schedule (Continued)

Item No.	Item	8 hr/ 1 day	500 hr/ 6 mo	1000 hr/ 6 mo	2000 hr/ 1 yr	4000 hr/ 2 yr	Procedure or Quantity	Specification
	(Kubota 3.8L Compliant Diesel Engines)				See **NOTE 1 2** and **NOTE 1 9**		Pressure Check DPF Pipes and Hoses.	
38	Diesel Exhaust Fluid (DEF) (Kubota 3.8L Compliant Diesel Engines)	X					Check Levels	32.5% Urea AUS 32 ISO 22241 **Tank Capacity** 20 liter (21.1 qt) **Useable Fluid** 15 liter (15.9 qt) See Table 3
	Diesel Exhaust Fluid Filter (DEF) Injector Tip			X See **NOTE 1 5**			Replace as Required	See **Parts Manual**
	Diesel Exhaust Fluid Filter (DEF) Pump Filter				C See **NOTE 1 4**		Replace	See **Parts Manual**
	Diesel Exhaust Fluid Filter (DEF) Tank Filter					C See **NOTE 1 6**	Replace	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 Yale 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 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: Use Ethylene Glycol Boron-free Antifreeze. Purchase a pre-diluted 50/50 solution; or mix 50% concentrate with 50% distilled or deionized water.

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

Table 1. Maintenance Schedule (Continued)

Item No.	Item	8 hr/ 1 day	500 hr/ 6 mo	1000 hr/ 6 mo	2000 hr/ 1 yr	4000 hr/ 2 yr	Procedure or Quantity	Specification
NOTE 12: Service Diesel Particulate Filter (DPF) every 3000 hours. See Yale dealer. Use hourly interval only.								
NOTE 13: Hydraulic oil sampling and analysis is a recommended practice. See **Hydraulic Cleanliness Procedures** 1900YRM1620 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 14: Replace after 3000 hours. Use hour interval only.								
NOTE 15: Check after 1500 hours. Use hour interval only.								
NOTE 16: Replace filter at 8000 hours. Use hour interval only.								
NOTE 17: See **Capacities And Specifications** 8000YRM2297 for diesel fuel cleanliness requirements before filling lift truck tank with diesel fuel.								
NOTE 18: Check and clean hydraulic oil strainer screen, every time hydraulic oil is changed.								
NOTE 19: For Kubota 3.8L, Stage V, 55kW and 82kW compliant diesel engines, equipped with a DPF, remove the ash content every 6000 hours or when ash meter on DPF display indicates a full DPF. Whichever occurs first.								
NOTE 20: For Kubota 3.8L non-compliant engines, change engine oil and oil filter at 250 hours or 6 months.								
X=Check C=Change L=Lubricate CIL=Check Indicator Light during operation								

Table 2. Diesel Fuel and Lube Chart

Engine Oil Specification by Diesel Fuel Type				
	Diesel Fuel Type			
Engine	WWFC Diesel Category 1 500ppm<Sulfur<5000ppm	WWFC Diesel Category 2 15ppm<Sulfur<500ppm	WWFC Diesel Category 4 ASTM D975 No. 2 D S15 Sulfur<15ppm	Engine Oil Viscosity based on ambient temperature
Kubota 3.8L w/DPF & SCR	NA	NA	API CJ-4	-15°C (5°F) and above 15W-40 or 5W-40 -25°C (-13°F) 10W-30 or 5W-40 Below -25°C (-13°F) 5W-30 or 5W-40
Kubota 3.8L w/DOC	NA	NA	API CJ-4	
Kubota 3.8L Non-Certified Emissions	API CF	API CF or Better	API CF or Better	

Table 3. Diesel Exhaust Fluid (DEF) Tank

DEF Condition	Value on Display	Volume in tank
Total Capacity	100%	20 liter (21 qt)
"Full line"	100%	17 liter (18 qt)
"half line"	50%	11.5 liter (12 qt)
"Low DEF Warning"	10%	7 liter (7.5 qt)
Engine Derate, stops using DEF	0%	5.5 liter (6 qt)
Limp home mode	0%	5 liter (5 qt)
NOTE: The reserve volume of 5 liter (5 qt) in the tank is required for cooling flow through the DEF system.		

Store DEF at a temperature between
10 to 40°C (50 to 104°F). Higher temperatures within
this range reduce shelf lift as shown in Table 4.

Table 4. DEF Storage

Storage Temperature	Shelf Life
10 to 20°C (50 to 68°F)	24 Months
20 to 30°C (68 to 86°F)	18 Months
35°C (95°F)	12 Months
40°C (104°F)	3 Months

Maintenance Procedures Every 8 Hours or Daily

HOW TO MAKE CHECKS WITH ENGINE STOPPED

WARNING

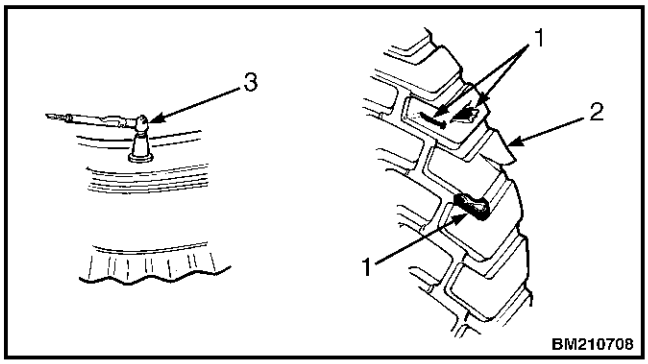
DO NOT operate a lift truck that needs repairs. Report the need for repairs immediately. If repair is necessary, put a DO NOT OPERATE tag in the operator's area. If the lift truck is equipped with a key switch, remove the key from the key switch.

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

Put the lift truck on a level surface. Lower the 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 (see Figure 6). Check for bent or damaged rims. Check for loose or missing hardware. Remove any wire, strapping, or other material wrapped around the axle.



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

Figure 6. 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 the lift truck. See the **Parts Manual, Model Description** section in the **Operating Manual** or **Frame** 0100YRM1948 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.

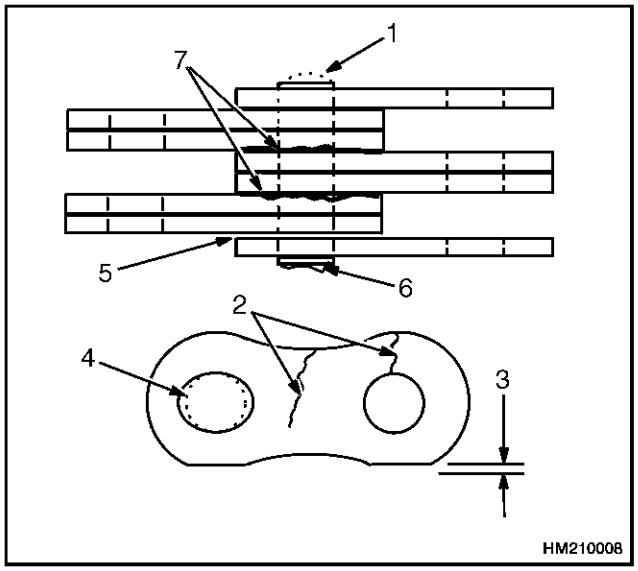
1. Inspect the welds on the mast, cylinders, and carriage for cracks. Make sure that the capscrews and nuts are tight.
2. Inspect the channels for wear in the areas where the rollers travel. Inspect the rollers for wear or damage.
3. Inspect the load backrest extension for cracks and damage.
4. If the lift truck is equipped with an integral sideshift 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 the lift chains for cracks or broken links, and worn or turned pins. See Figure 7.

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.**

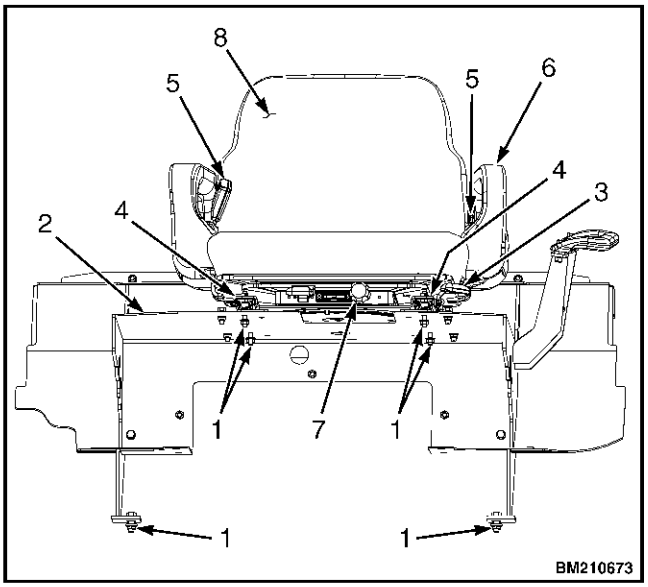


1. WORN PIN
2. CRACKS
3. EDGE WEAR
4. HOLE WEAR
5. LOOSE LEAVES
6. TURNED PIN
7. CORROSION

Figure 7. Lift Chain Check

Operator Restraint System

The seat, seat belt, seat rails, hip restraint, and seat plate are all part of the operator restraint system. See Figure 8. Each item must be checked to make sure it is fastened correctly, functions correctly, and is in good condition.



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 8. Seat, Seat Rail, Seat Plate, and Seat Belt Check

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 8.

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

NOTE: Swivel seat is an optional feature on lift trucks covered in this **Service Manual**.

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 as easier exit of the truck.
- The neutral position is shown in Figure 9.

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. See Figure 9.

Seat Adjustment for Operator Weight

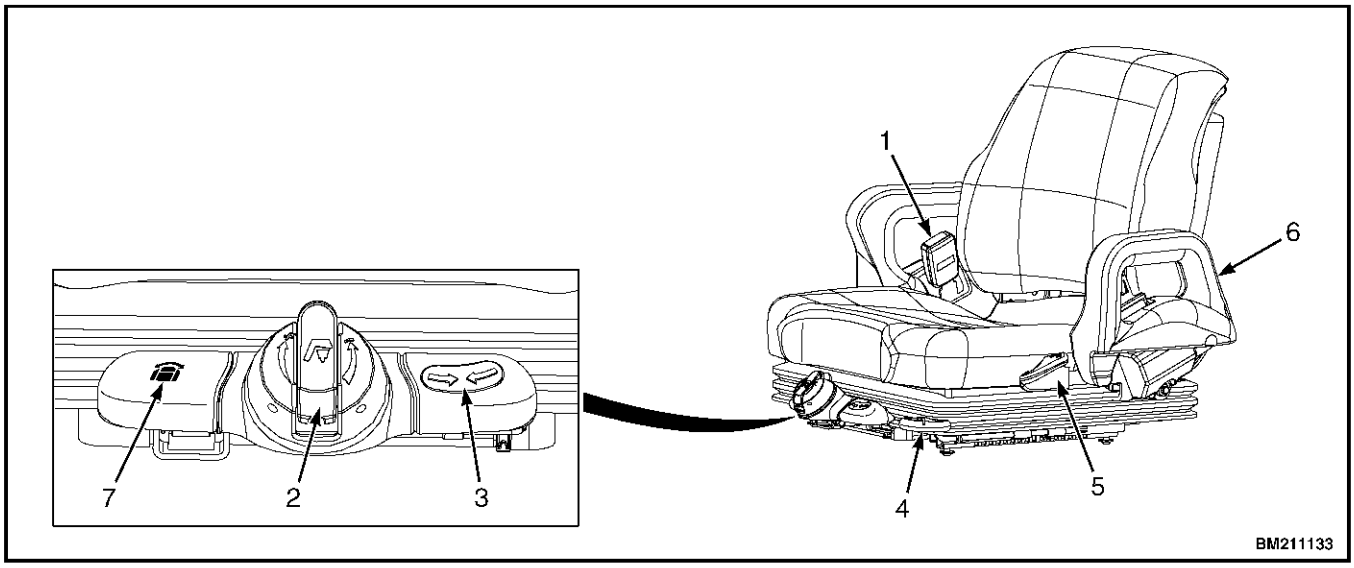
CAUTION

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.



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

Figure 9. Seat Adjustment

Adjust Seat - Internal Suspension

NOTE: Swivel seat is an optional feature on lift trucks covered in this **Service Manual**.

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 as easier exit of the truck.
- The neutral position is shown in Figure 9.

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 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.

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 (see Figure 8). The seat rails must be correctly fastened to the seat plate and the seat plate must be fastened to the frame.

Engine Compartment

Check for the presence of any combustible material such as paper, leaves, etc. Remove any combustible materials.

Fuel, Oil, and Coolant Leaks, Check

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 report the leak to maintenance for repair. Leaks often indicate a need for repair of damaged or worn components. Fuel leaks MUST be repaired **IMMEDIATELY.**

Check the fuel system for leaks and the condition of parts. To add fuel to the lift truck, see the section **How To Add Fuel To The Lift Truck** in the **Operating Manual** for procedures.

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 Hoses

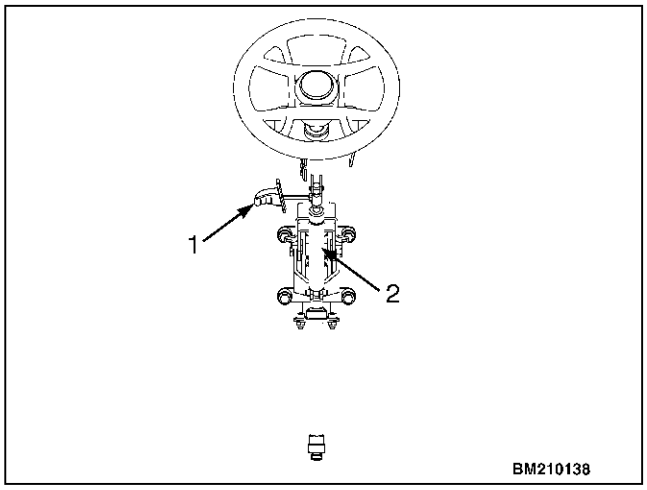
Check the condition of the hydraulic hoses for serviceability by inspecting for cracks or other obvious damage. Check to insure that the hydraulic hoses are not leaking. If any hose is leaking, report it to maintenance for repair.

Coolant Hoses

Check the condition of the coolant hoses for serviceability by inspecting for cracks or other obvious damage. Check to insure that the coolant hoses are not leaking. If any hose is leaking, report it to maintenance for repair.

Steering Column Gas Cylinder

Make sure the gas cylinder for the steering column operates correctly. The cylinder must NOT allow the column to move unless the tilt lever is released. See Figure 10.



1. TILT LEVER 2. GAS CYLINDER

Figure 10. Steering Column Gas Cylinder and Tilt Lever

Transmission

Check the transmission for leaks and damaged or loose components. Heavy-duty or high temperature operations can require more frequent checks. See Figure 12. Check the condition of the transmission hoses for serviceability by inspecting for cracks or other obvious damage. Check to insure that the transmission hoses are not leaking. If any hose is leaking, report it to maintenance for repair.

Hydraulic System Oil

WARNING

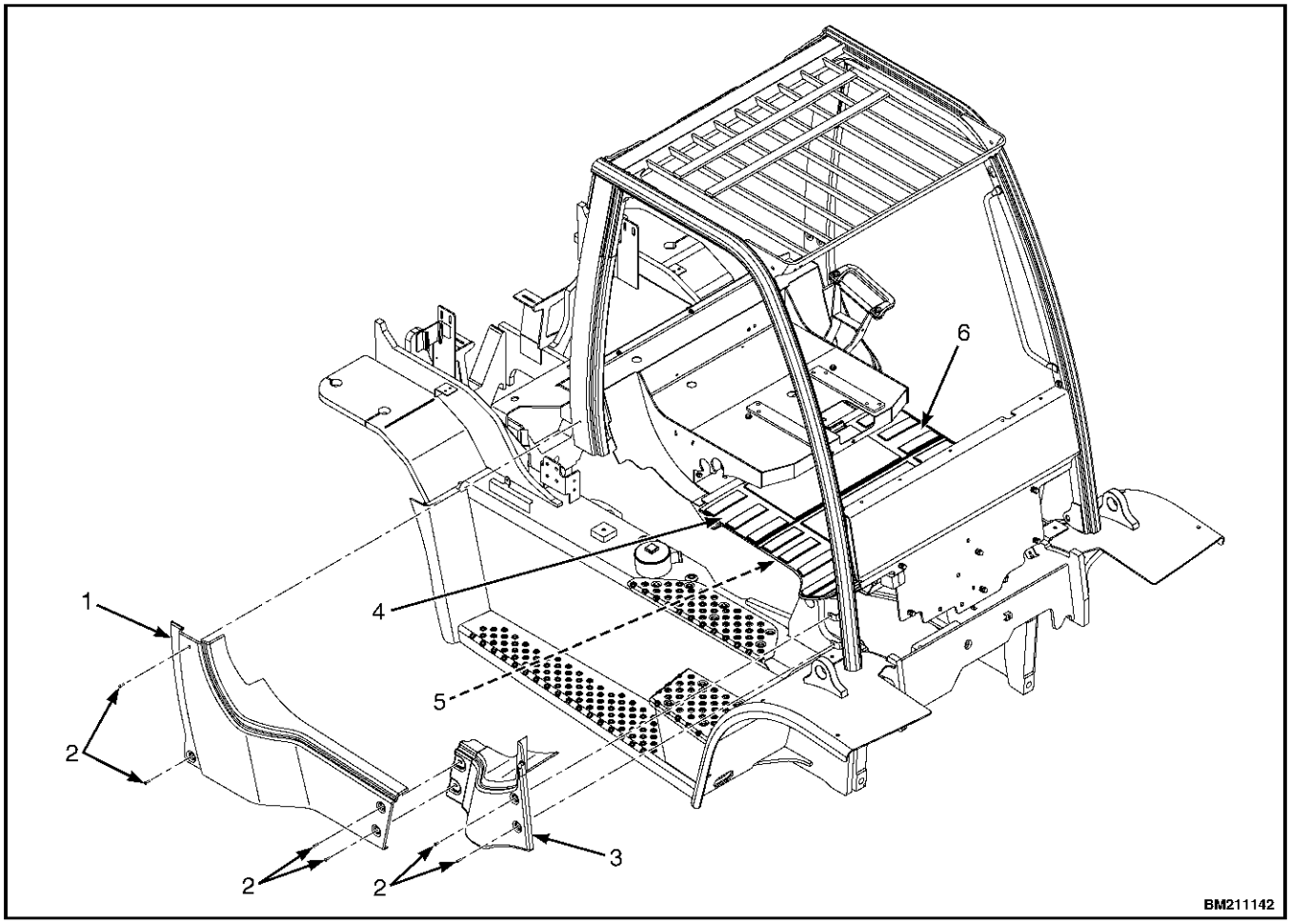
At operating temperature, the hydraulic oil is HOT. DO NOT permit the hot oil to touch the skin and cause a burn.

CAUTION

DO NOT permit dirt to enter the hydraulic system when the oil level is checked or the filter is changed. Damage to the lift truck and hydraulic system can occur if dirt enters the hydraulic system.

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

After the engine has stopped, wait one minute before checking the oil level. Remove four screws and right side rear cover for access to hydraulic dipstick. See Figure 11.

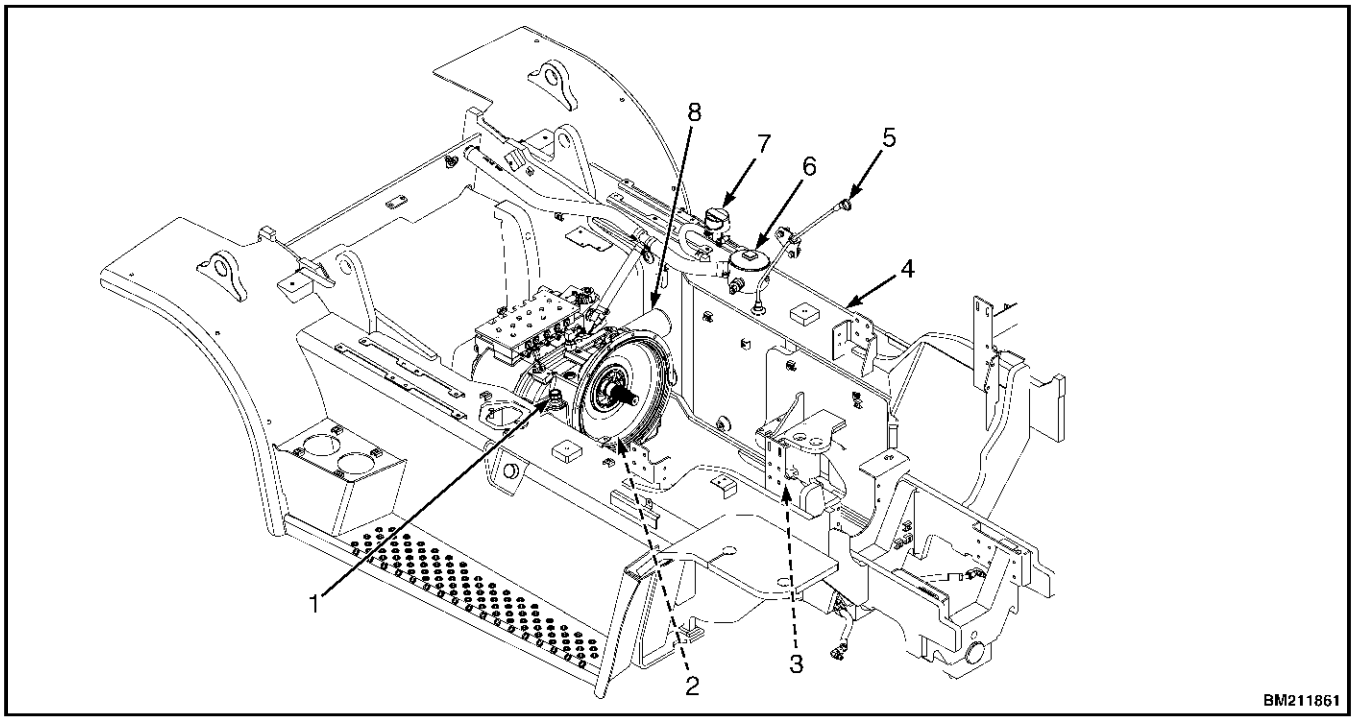


NOTE: RIGHT SIDE SHOWN.

1. RIGHT SIDE REAR COVER
2. SCREWS
3. RIGHT SIDE FRONT COVER
4. REAR FLOOR PLATE
5. FRONT FLOOR PLATE (NOT SHOWN)
6. FLOORMAT

Figure 11. Side Cover Removal

Keep the hydraulic oil at the correct level as indicated on the dipstick (see Figure 12). Use the correct oil as shown in the Maintenance Schedule. Check the hydraulic system for leaks and damaged or loose components. Heavy-duty or high temperature operations can require more frequent checks.



1. TRANSMISSION OIL BREATHER/DIPSTICK
2. TRANSMISSION OIL DRAIN PLUG
3. HYDRAULIC OIL DRAIN PLUG
4. HYDRAULIC TANK
5. HYDRAULIC OIL DIPSTICK
6. HYDRAULIC OIL FILTER
7. HYDRAULIC TANK BREATHER
8. TRANSMISSION OIL FILTER

Figure 12. Transmission and Hydraulic Oil Checks

After hydraulic oil level check is completed, install right side rear cover using four screws. See Figure 11.

Engine Oil

WARNING

At operating temperature, the engine oil is HOT. DO NOT permit the hot oil to touch the skin and cause a burn.

CAUTION

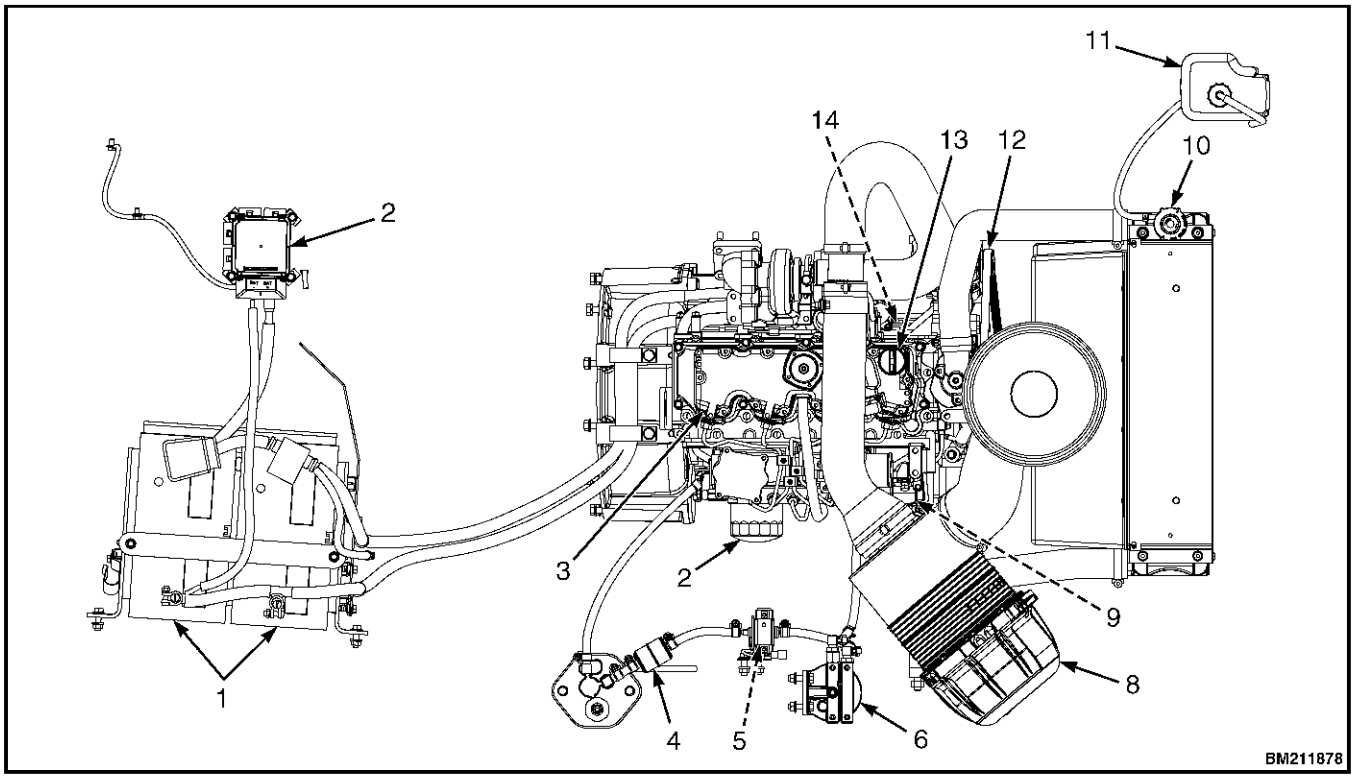
DO NOT permit dirt to enter the engine when the oil level is checked or the filter is changed. Damage to the engine can occur if dirt enters the engine.

Never operate the engine without oil. The operation of the engine without oil will damage the engine.

After engine has stopped, wait one minute before checking the oil level. Keep oil at the correct level as indicated on the dipstick. Use the correct oil as shown in the Maintenance Schedule.

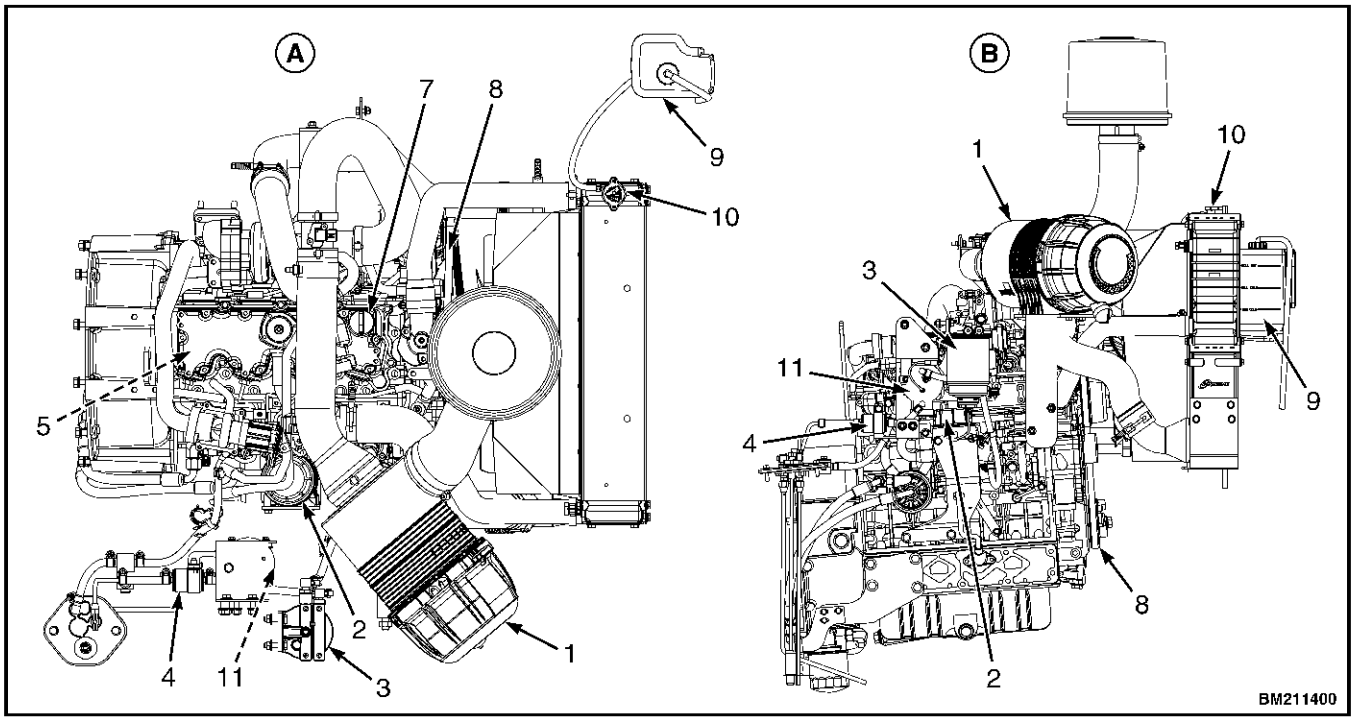
See Figure 13 for lift trucks equipped with Kubota 3.8L, 82kW non-emissions compliant diesel engine.

See Figure 14 for lift trucks equipped with Kubota 3.8L emissions compliant diesel engine.



1. BATTERY
2. POWER DISTRIBUTION MODULE (PDM)
3. INJECTOR
4. IN-LINE STRAINER
5. FUEL PUMP
6. WATER SEPARATOR
7. ENGINE OIL FILTER
8. AIR FILTER
9. INJECTION PUMP
10. RADIATOR CAP
11. AUXILIARY COOLANT RESERVOIR
12. DRIVE BELT
13. ENGINE OIL CAP
14. ENGINE OIL DIPSTICK

Figure 13. Engine Maintenance Points, Kubota 3.8L, 82kW Non-Compliant Diesel Engine



A. TOP VIEW

1. AIR FILTER
2. CRANKCASE BREATHER
3. FUEL/ WATER SEPARATOR FILTER
4. IN LINE FUEL STRAINER
5. FUEL INJECTORS
6. ENGINE OIL DIPSTICK (NOT SHOWN)

B. LEFT SIDE VIEW

7. ENGINE OIL CAP
8. DRIVE BELT
9. AUXILIARY COOLANT RESERVOIR
10. RADIATOR CAP
11. FUEL INJECTION PUMP

Figure 14. Engine Maintenance Points, Kubota 3.8L Emissions Compliant (55kW and 82kW) Diesel Engines

Forks

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

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 the alignment of the fork tips 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. If either fork is damaged, replace the forks as a set.

1. Inspect forks for cracks and wear. Check that fork tips are aligned as shown in Figure 15. Check that bottom fork is not worn (item A, Figure 15).

CAUTION

Remove fork latch pins if adding a fork positioner attachment. Damage to forks and other carriage components can occur if fork latch pins are not removed prior to using attachment.

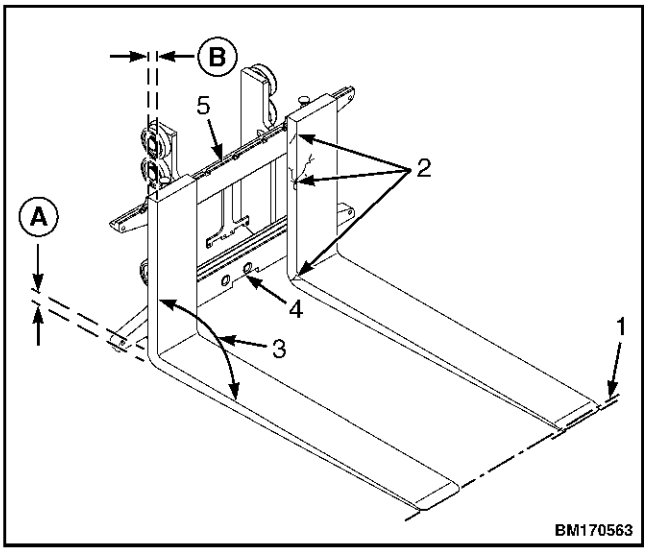
2. Replace any damaged or broken parts that are used to keep forks locked in position. See Figure 18.

3. Inspect fork wear. Ensure heel wear is not more than 10% of original thickness. If fork wear is more than 10%, fork must be replaced or rerated. Perform fork wear inspection using a BOL256N1 caliper ruler Yale P/N 550088603 as follows. See Figure 16.

   a. Determine the normal thickness of the "N" of the fork using the scale or ruler portion of the caliper ruler. Measurement has to be done on the fork shank using the caliper ruler.

   b. Position the caliper at the end of the heel internal radius (item A, Figure 15) with the opening corresponding to the measured thickness of the fork shank in Step a above. (e.g. for N 1.75 use N 1.75 opening). This is typically the section of the fork where wear is the greatest. Note that the opening distance has been reduced by 10% from the nominal thickness.

   c. If the fork enters the opening, it is mandatory to replace it. DANGER OF BREAKING. Furthermore, a 10% reduction in fork blade thickness results in 20% reduction in operating capacity.



Fork Tip Alignment	
Length of Forks	**3% Dimension**
1200 mm (47 in.)	36 mm (1.42 in.)
1500 mm (59 in.)	45 mm (1.77 in.)
1800 mm (71 in.)	54 mm (2.13 in.)
2100 mm (83 in.)	63 mm (2.48 in.)
2400 mm (94 in.)	72 mm (2.83 in.)

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

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

Figure 15. Forks Check

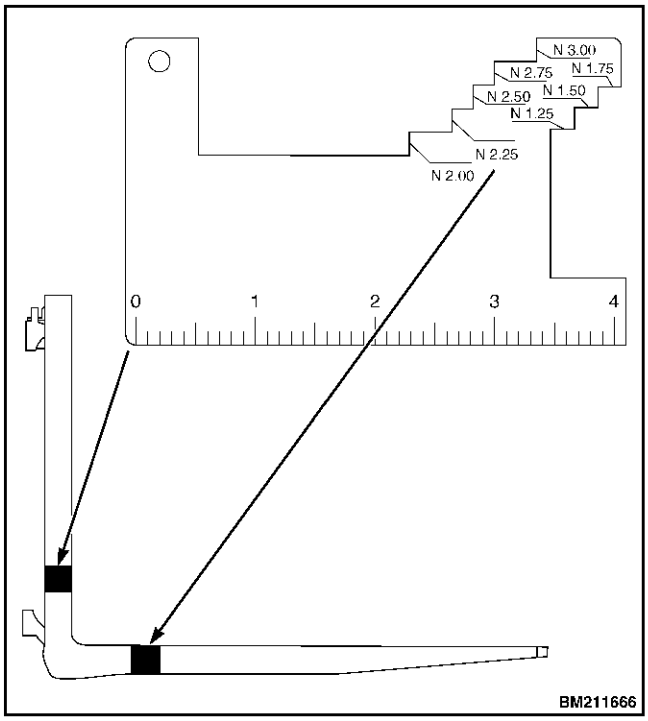


Figure 16. Fork Wear Check

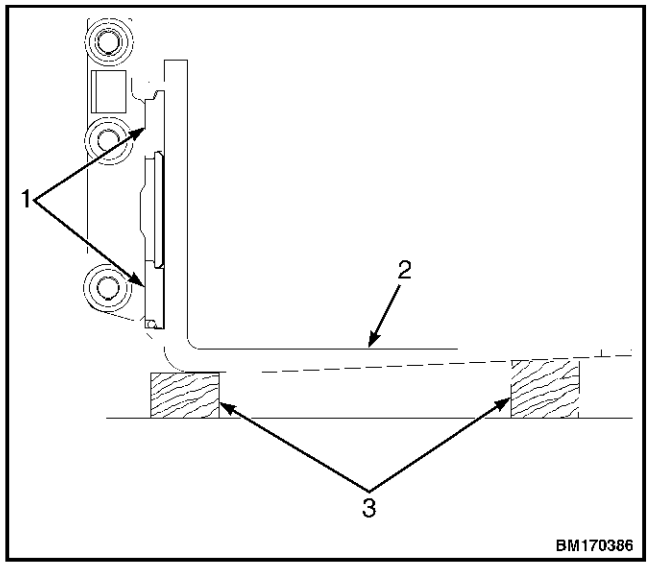
Remove

WARNING

DO NOT try to move a fork without a lifting device. Each hook fork for these lift trucks can weigh 181 to 272 kg (400 to 600 lb).

NOTE: Forks are to be replaced only in sets and not individually.

A fork can be removed from the carriage for replacement of the fork or other maintenance. Lift the lock pin and slide a hook fork to the fork removal notch on the carriage. See Figure 17 and Figure 15. Lower the fork onto blocks so that the bottom hook of the fork moves through the fork removal notch. See Figure 15. Lower the carriage further so that the top hook of the fork is disengaged from the top carriage bar. Move the carriage away from the fork, or use a lifting device to move the fork away from the carriage.



1. CARRIAGE BARS
2. HOOK FORK
3. BLOCKS

Figure 17. Hook Fork Removal

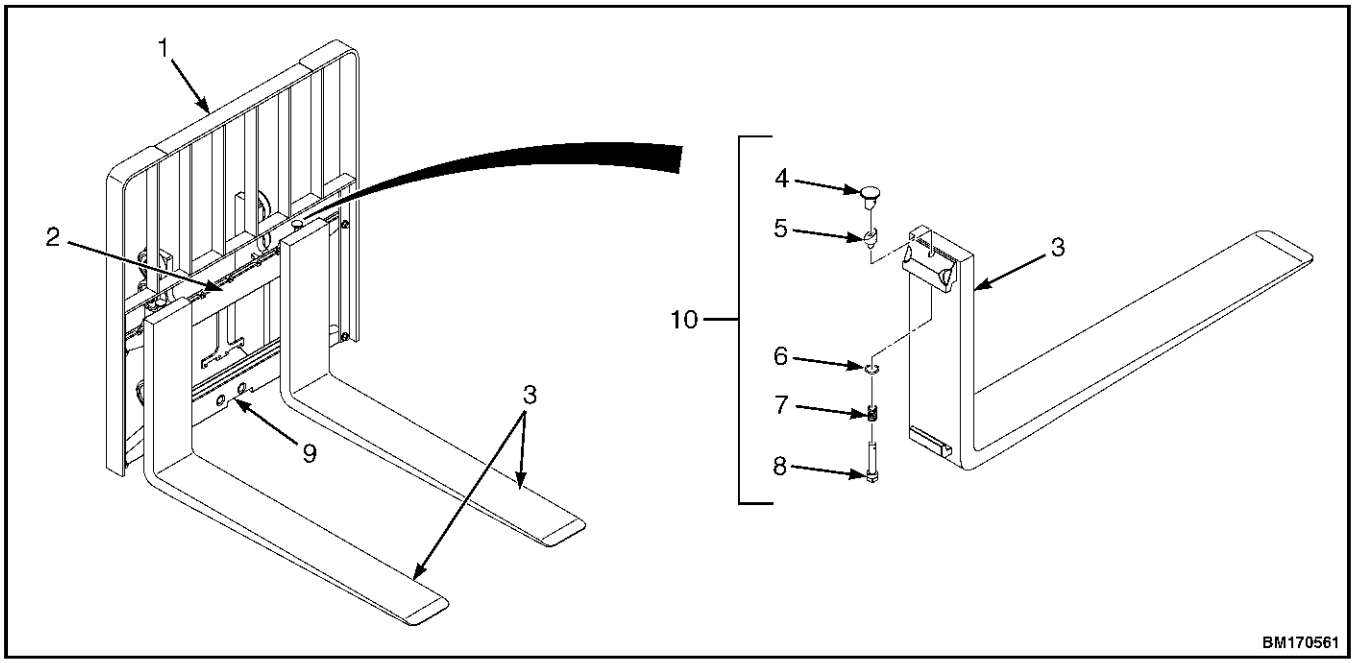
Install

Move the fork and carriage so that the top hook on the fork can engage the upper carriage bar. Raise the carriage to move the lower hook through the fork removal notch. Slide the fork on the carriage so that both upper and lower hooks engage the carriage. Engage the lock pin with a notch in the upper carriage bar. See Figure 18.

Adjust

NOTE: During the adjustment of the forks, the heel of the forks should not be touching the ground.

The forks are connected to the carriage by hooks and lock pins. See Figure 17 and Figure 18. The lock pins are installed through the top fork hooks and fit into slots in the top carriage bar. If pin does not remain engaged in carriage slot, replace with new pin. Adjust the forks as far apart as possible for maximum support of the load. Hook forks will slide along the carriage bars to adjust for the load to be lifted. Raise the lock pin in each fork to slide the fork on the carriage bar. Make sure the lock pin is engaged in the carriage bar to lock the fork in position after the width adjustment is made.



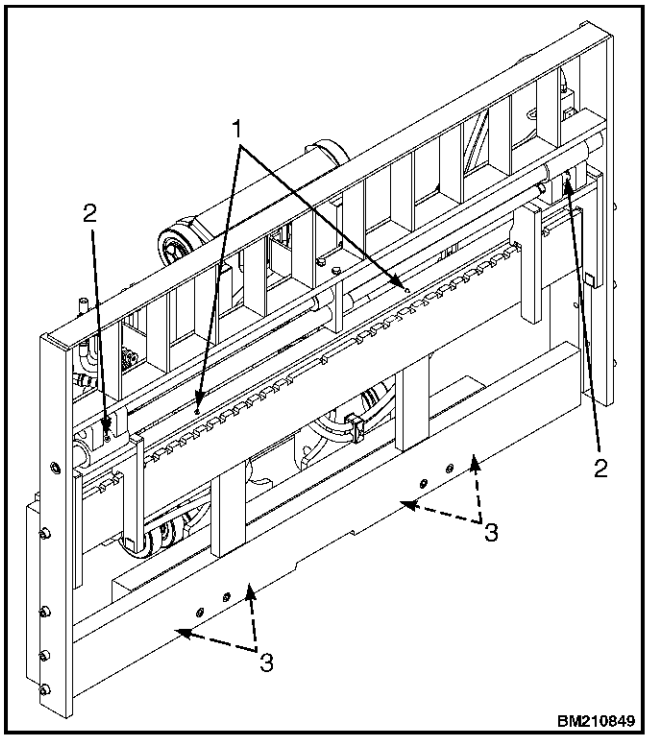
1. LOAD BACKREST
2. CARRIAGE
3. FORKS
4. KNOB
5. WEDGE
6. WASHER
7. SPRING
8. PIN
9. FORK REMOVAL NOTCH
10. PIN ASSEMBLY

Figure 18. Fork Lock Pin Assembly and Carriage

Integral Sideshift Carriage

Check for cracks, wear, and damage. If damaged, see **Mast Repair (S/N A613, A614, A643, A644, A683, A684)** 4000YRM1956 for repair procedures. If necessary, lubricate sliding surfaces (upper bearings) at grease fittings and lower bearing strips with multipurpose grease shown in the Maintenance Schedule. See Figure 19.

If lift truck is equipped with a fork positioner, lubricate fork positioner carrier at grease fittings and the fork cylinder rod anchors with multipurpose grease shown in the Maintenance Schedule. See Figure 19.



1. UPPER BEARINGS GREASE FITTING
2. GREASE FITTINGS FOR FORK POSITIONER CARRIER AND FORK CYLINDER ROD ANCHORS
3. LOWER BEARING STRIPS

Figure 19. Integral Sideshift Carriage Maintenance Points

HOW TO MAKE CHECKS WITH ENGINE RUNNING

WARNING

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

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

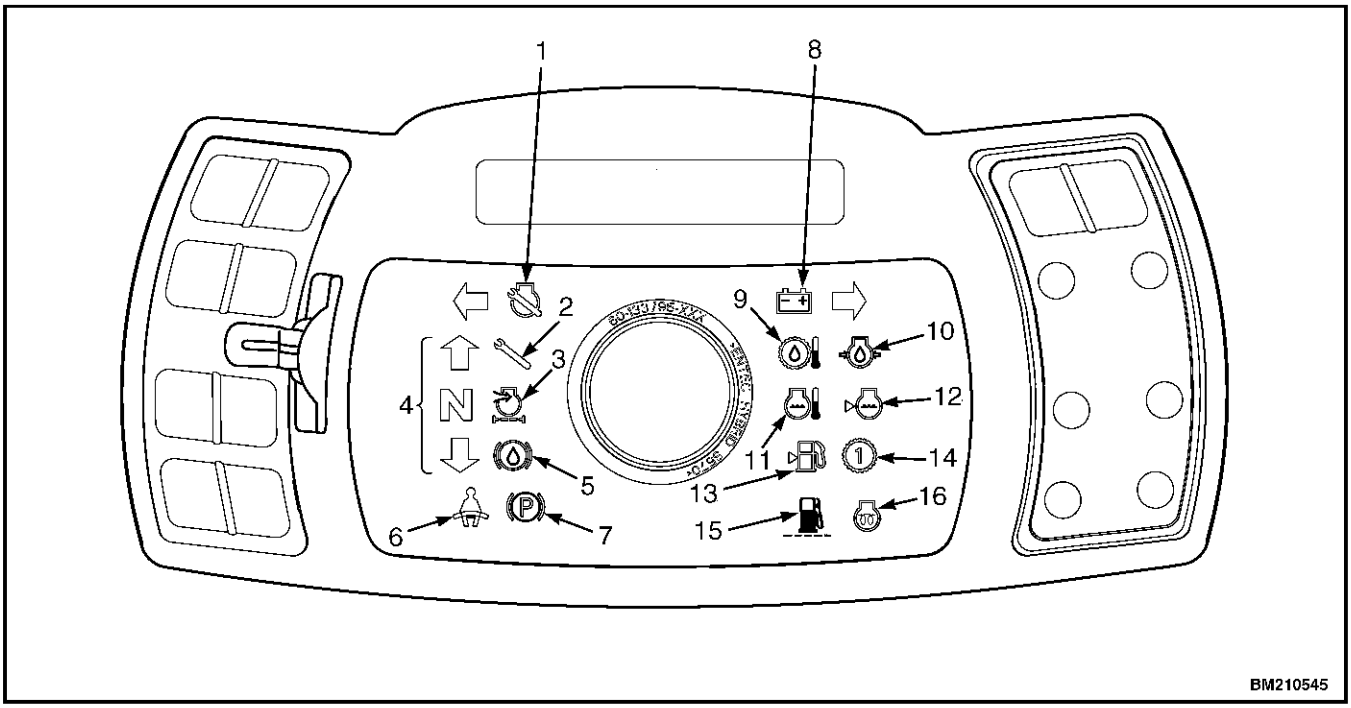
WARNING

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 checks of the operation. 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**. Make the checks carefully.

Indicator Lights, Horn, Fuses, and Relays

If lift truck is equipped with a key switch, turn key to **ON** position. If lift truck is equipped with a Power **ON/OFF** button, press button to turn system power on. Check all indicator lights for correct operation as described in the **Operating Manual**. All warning and indicator lights will light up for two seconds (start check) when system power is turned **ON**. See Figure 20. Check the operation of the horn. Start the engine by turning the key switch to the **Start** position, if truck is equipped with a key switch, or press the engine start button, if lift truck is equipped with this button. If any indicator lights do not operate correctly, check the fuses. The fuses are located in the Power Distribution Module (PDM), which is located under the floor plates mounted on the right side of lift truck frame. See Figure 21.



Item	Warning and Indicator Light
1	Warning Light, Engine Malfunction Light
2	Warning Light, System Malfunction Light
3	Indicator Light, Air Filter Restriction
4	Indicators Light, Direction and Transmission
5	Warning Light, Low Accumulator Pressure Indicator
6	Warning Light, Fasten Seat Belt Malfunction Indicator
7	Warning Light, Parking Brake Malfunction Indicator
8	Warning Light, Alternator Malfunction Indicator
9	Warning Light, Transmission Oil Temperature Malfunction Indicator
10	Warning Light, Engine Oil Pressure Malfunction Indicator
11	Warning Light, Engine Coolant Temperature Malfunction Indicator
12	Warning Light, Coolant Level in Radiator Malfunction Indicator
13	Warning Light, Fuel Level Indicator
14	Indicator Light, 1st Gear Locking
15	Indicator Light, Water Separator (Diesel Only)
16	Indicator Light, Cold Start (Diesel Only)

Figure 20. Warning and Indicator Lights

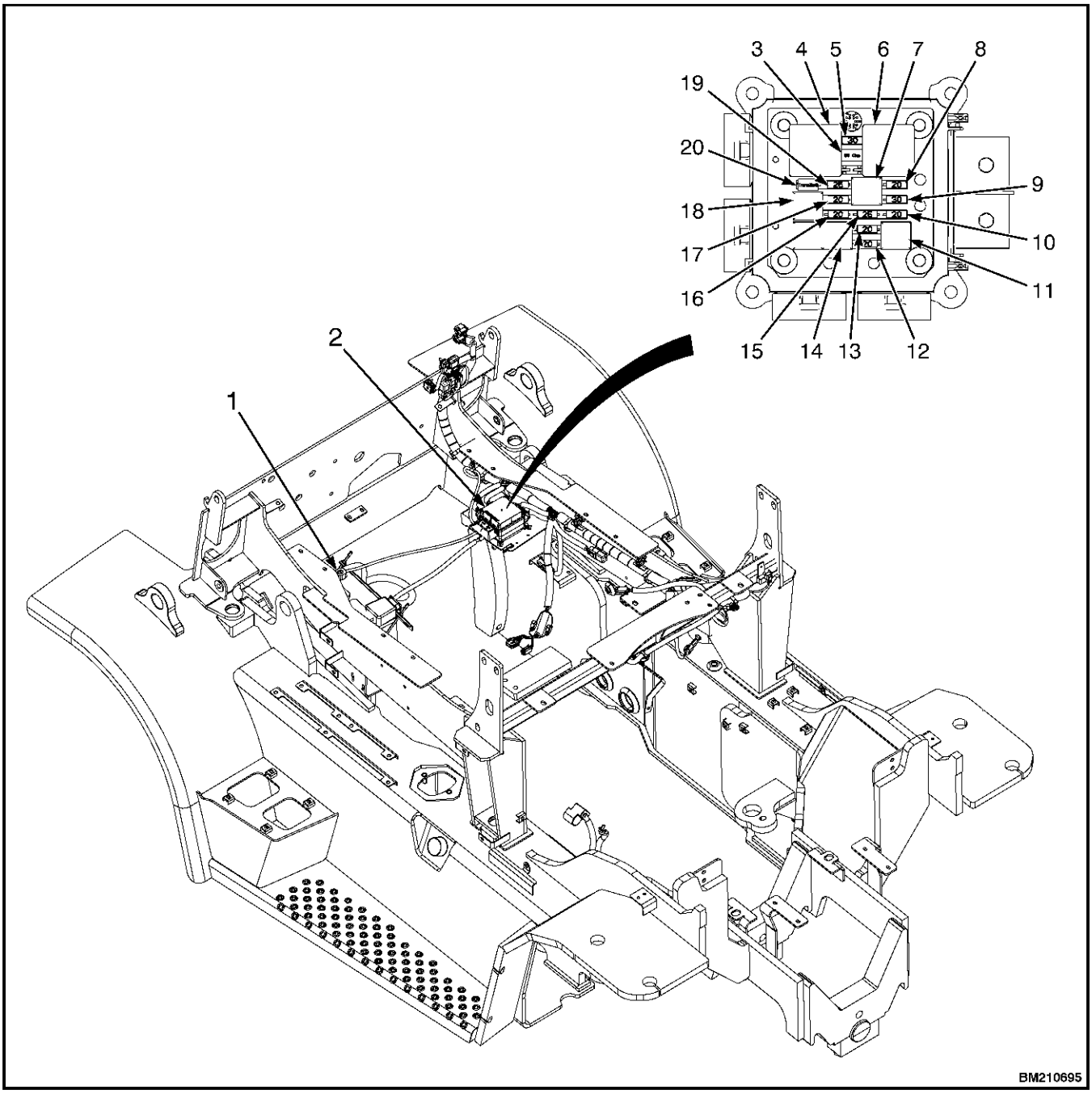


Figure 21. PDM Showing Fuses and Relays

Legend for Figure 21.

NOTE: FLOOR PLATES REMOVED FOR CLARITY.

1. BATTERY
2. POWER DISTRIBUTION MODULE (PDM)
3. RESISTOR (68 OHM)
4. START RELAY
5. STARTER (30 AMP FUSE)
6. IGNITION 3 RELAY
7. BACKUP RELAY
8. BACKUP (20 AMP FUSE)
9. IGNITION (30 AMP FUSE)
10. SPARE FUEL PUMP (20 AMP FUSE)
11. SPARE FUEL PUMP RELAY
12. BATTERY (20 AMP FUSE)
13. FRONT WORK LIGHT (20 AMP FUSE)
14. FRONT/REAR WORK LIGHT RELAYS
15. BATTERY (25 AMP FUSE)
16. REAR WORK LIGHT (20 AMP FUSE)
17. IGNITION 1 (20 AMP FUSE)
18. IGNITION RELAY
19. BATTERY (25 AMP FUSE)
20. SEMICONDUCTOR TRANSZORB

Service Brakes

Operation, Check

Check the operation of the service brakes. Push on the inching/brake pedal. The service brakes must be applied before the inching/brake pedal reaches the floor plate. The pedal must stop firmly and must not move slowly down after the brakes are applied. The service brakes must apply equally to both drive wheels. The service brakes must not pull the lift truck to either side of the direction of travel when they are applied. The service brakes are automatically adjusted when the lift truck is moving and the brakes are firmly applied. Full application of the inching/brake pedal applies the service brakes and puts the transmission in **NEUTRAL**.

Lift trucks with aFoot Directional Control pedal: When the inching/brake pedal is fully applied, a switch in the starting circuit is closed so that the engine can be started.

Accumulator Pressure

WARNING

DO NOT continue to operate the lift truck if the light and audible alarm are on during operation. Low accumulator pressure will prevent the service brakes from stopping the lift truck. Serious injury to personnel can result.

There is an indicator light on the Display Switch Cluster for the accumulator pressure. During normal operation, the red indicator light will illuminate when the key switch is turned to **ON**, if the truck is equipped with a key switch, or when the power **ON/OFF** button is pressed, and will stay illuminated until correct minimum hydraulic pressure of 7240 kPa (1050 psi) is obtained, at which time the light will go off.

If the light continues to stay on when the engine is running, and an audible alarm is sounding, the hydraulic pressure is too low. Move lift truck to level ground and/or apply the parking brake. Stop the engine and check the hydraulic oil. See Figure 12. DO NOT restart the engine until the low pressure condition has been corrected.

Parking Brake

There is an indicator icon on the display panel for the parking brake. This icon is illuminated as describe in the **Operating Manua1**. There is a sensor in the seat that actuates an audible alarm. If the operator leaves the seat, with system power **OFF**, without applying the parking brake, the alarm will sound for 10 seconds until the parking brake is applied or the operator sits back on the seat. If system power is **ON** or the engine is running, and the operator leaves the seat, without applying the parking brake, the alarm will sound continuously until parking brake is applied or the operator sits back on the seat. Make sure the service brakes operate correctly before checking the operation of the parking brake. Check the operation of the parking brake. The parking brake, when in good condition and correctly adjusted, will hold a lift truck with a full capacity load on a 15% grade [a slope that increases 1.5 meters in 10 meters (1.5 feet increase in 10 feet)]. If parking brake requires adjustment, notify service personnel.

Engine Oil Pressure

NOTE: The engine will enter shutdown mode after a warning buzzer sounds and a 30-second countdown, if engine oil pressure is less than, 49 kPa (7 psi) and lift truck is equipped with powertrain protection system. See the **Engine Shutdown** procedures in the **Operating Manual**.

There is an indicator light for the engine oil pressure on the Display Switch Cluster. During normal operation, the red indicator light will illuminate when the key switch is turned to **ON**, if the truck is equipped with a key switch, or when the power **ON/OFF** button is pressed, if the truck is equipped with a keyless option, and will stay illuminated until correct oil pressure is obtained, at which time the light will go off.

If the light continues to stay on when engine is running, the engine oil pressure is low. Stop the engine and check the oil level. DO NOT restart the engine until the low pressure condition has been corrected.

See Figure 13 for lift trucks equipped with a Kubota 3.8L non-emissions compliant diesel engine

See Figure 14 for lift trucks equipped with a Kubota 3.8L emissions compliant diesel engine

Cooling System

WARNING

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

NOTE: The engine will enter shutdown mode after a warning buzzer sounds and a 30-second countdown, if coolant temperature reaches 121°C (250°F) for Kubota 3.8L diesel engine, on lift trucks with powertrain protection system. See the **Engine Shutdown** procedures in the **Operating Manual**.

If lift truck is not equipped with powertrain protection system and coolant temperatures exceed the limits listed above, turn the engine **OFF** and check the coolant level in the auxiliary coolant reservoir. Add coolant, if necessary, as shown in the Maintenance Schedule.

There is an indicator light on the Display Switch Cluster for the coolant temperature. The red light is **ON** when the key switch is in the **START** position or the Power **ON/OFF** button is pressed, and must go **OFF** when the engine is running. If the light is **ON** when the engine is running, the coolant and engine are too hot. Stop the engine and check the coolant level in the auxiliary coolant reservoir.

Make sure the coolant level is between the **ADD** and **FULL** marks on the auxiliary coolant reservoir (see Figure 22). The coolant will expand as it is heated and the level in the auxiliary coolant reservoir will increase.

CAUTION

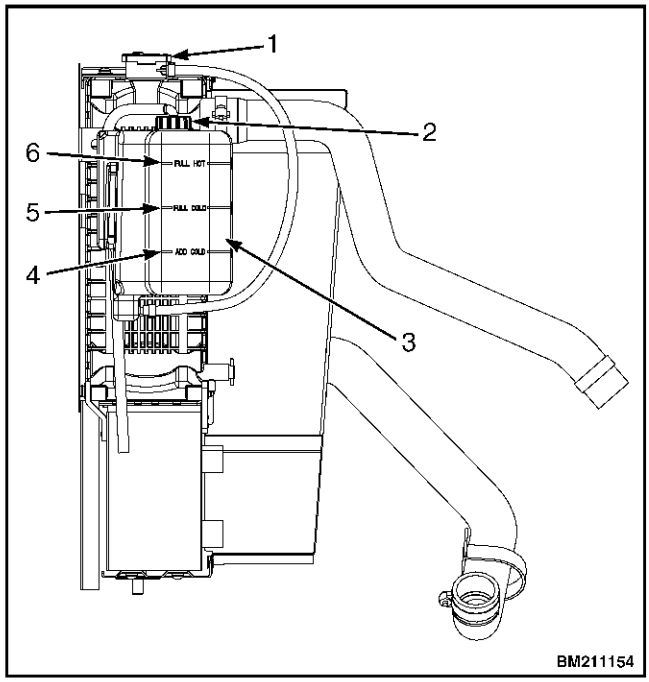
Additives may damage the cooling system. Before using additives, contact your local Yale dealer.

If coolant is added, See Maintenance Schedule for correct solution.

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.

Check the radiator fins. Clean the radiator with compressed air or water as needed. Check for and remove any debris on the radiator core. If the indicator light turns on again after restarting, shut down the lift truck and DO NOT operate the lift truck until the problem is corrected.



1. RADIATOR CAP
2. FILL CAP
3. AUXILIARY COOLANT RESERVOIR
4. **ADD** MARK
5. **FULL** COLD MARK
6. **FULL** HOT MARK

Figure 22. Auxiliary Coolant Reservoir

Steering System

WARNING

The lift truck has hydraulic power steering. The steering can be difficult if the engine is not running and cause injury to personnel.

Make sure the steering system operates smoothly and provides good steering control. Make sure the steering column can be adjusted and the gas cylinder function is correct.

Control Levers and Pedals

Check that the control levers for the transmission, mast, and attachment operate as described in the **Operating Manual**. Check that the pedals operate correctly as described in the **Operating Manual**.

Lift System, Operate

WARNING

When working on or near the mast, see Safety Procedures When Working Near Mast at the beginning of this manual.

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. Serious injury to personnel can result if lift mechanism is not lowered completely.

If the mast cannot be lowered, use chains on the mast weldments and carriage so that they cannot move. Make sure the moving parts are attached to a part that does not move.

DO NOT try to find hydraulic leaks by putting hands on pressurized hydraulic components. Hydraulic oil can be injected into the body by the pressure and cause serious injury to personnel.

Perform the following checks and inspections:

1. Check for leaks in the hydraulic system. Check the condition of the hydraulic hoses and tubes.

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

2. Slowly raise and lower the mast several times without a load. Raise the mast to its full height at least once. The mast components must raise and lower smoothly in the correct sequence. Hoses must track properly during operation.

3. The inner weldments and the carriage must lower completely.

4. Raise the mast 1 m (3 ft) with a capacity load. The inner weldments and the carriage must raise smoothly. Lower the mast. All moving components must lower smoothly.

5. Lower the load to approximately 0.3 m (1 ft). Tilt the mast forward and backward. The mast must tilt smoothly and both tilt cylinders must stop evenly.

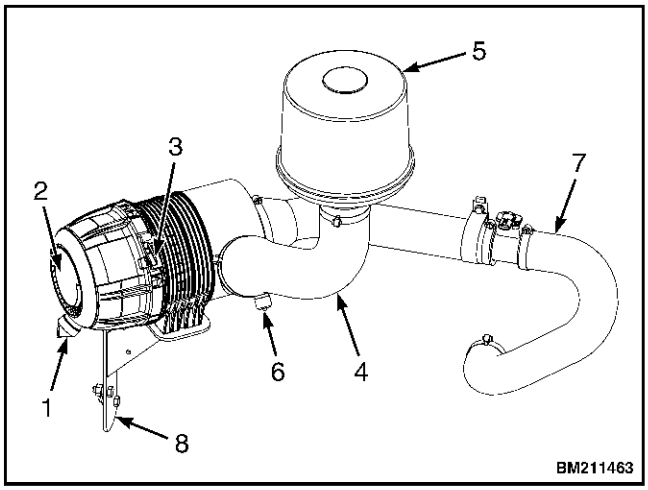
6. Check that the controls for the attachment operate the functions of the attachment. See the symbols by each of the controls. Make sure all of the hydraulic lines are connected correctly and do not leak.

Air Filter

The air filter canister should not be opened until an air filter element replacement is required. An air filter element replacement is required when one of the following occurs:

- The optional air flow restriction indicator light on the dash illuminates.
- If equipped, the manual air flow indicator is red.
- The specified number of hours has passed since the last filter element replacement.

DO NOT operate the lift truck until the air filter element has been replaced. See Figure 23.



1. DUST DISCHARGE VALVE
2. AIR FILTER COVER
3. AIR FILTER COVER LATCH
4. AIR INLET
5. PRECLEANER
6. AIR FILTER RESTRICTION SENSOR
7. AIR OUTLET
8. AIR FILTER MOUNTING BRACKET

Figure 23. Air Filter

Fuel/Water Separator Filter, Kubota Diesel Engines

This amber indicator light (see Figure 20) will illuminate if the sensor on the fuel/water separator filter indicates that water must be drained from the filter.

See Figure 13 for lift trucks equipped with a Kubota 3.8L 82kW non-compliant diesel engine

See Figure 14 for lift trucks equipped with a Kubota 3.8L diesel engine

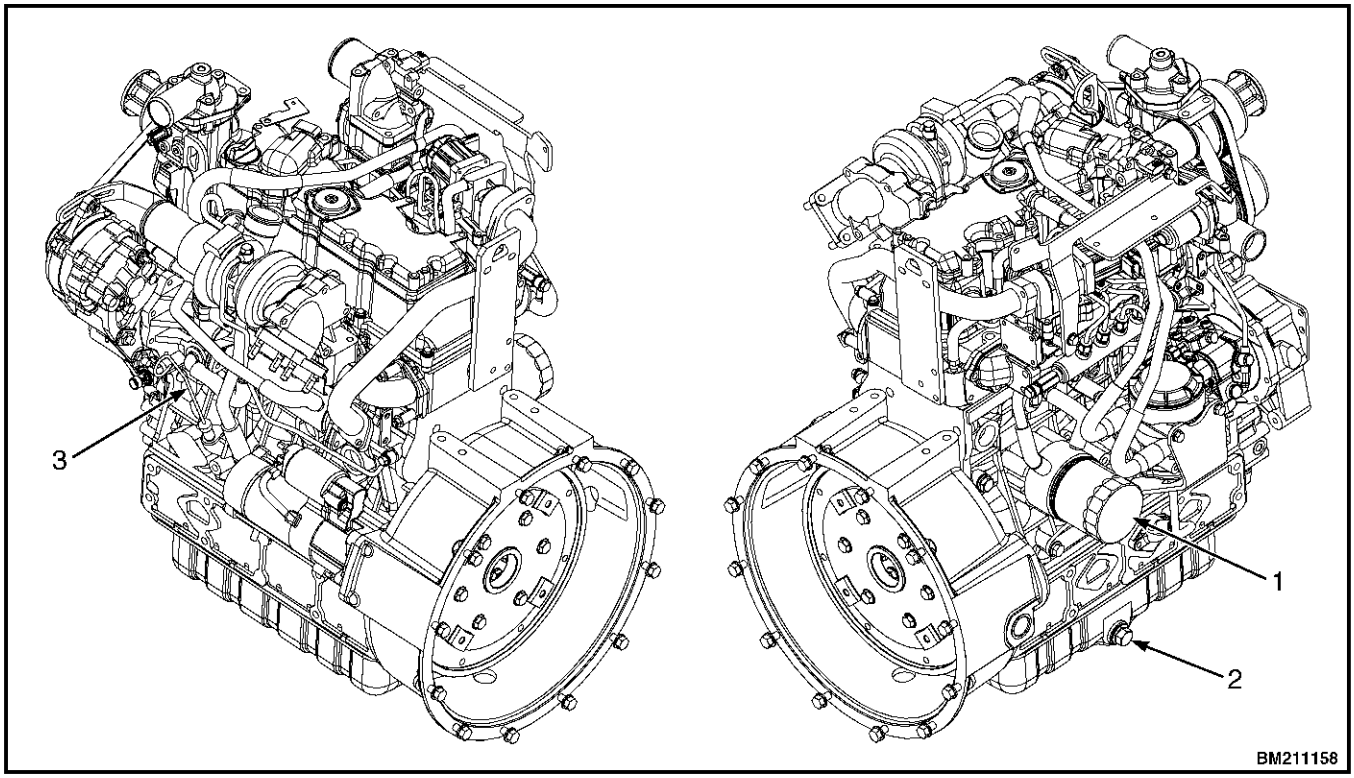
See the section Fuel/Water Separator Filter Replacement, Kubota 3.8L Diesel Engine for procedures to drain water and change the filter.

First Service After First 100 Hours of Operation

ENGINE OIL AND OIL FILTER

NOTE: Turn lift truck engine **OFF** before changing engine oil and filter.

1. Change engine oil and oil filter. Apply clean oil to gasket of new filter. Install new filter. Turn filter until gasket touches, then tighten ½ to 3/4 turn with your hand. Fill engine with oil specified in the Maintenance Schedule.
2. Check oil level in engine at the dipstick tube If necessary, add additional oil shown in the Maintenance Schedule. Start engine. Check area around oil filter for leaks. See Figure 24.



NOTE: ILLUSTRATION APPLIES TO BOTH KUBOTA 3.8L EMISSIONS COMPLIANT AND NON-COMPLIANT ENGINES.

A. LEFT SIDE
B. RIGHT SIDE

1. OIL FILTER
2. DRAIN PLUG
3. OIL DIPSTICK

Figure 24. Engine Oil and Filter Change, Kubota 3.8L Diesel Engine

Maintenance Procedures Every 500 Hours or 6 Months

NOTE: Perform the Maintenance Procedures Every 8 Hours or Daily prior to performing the procedures in this section.

HYDRAULIC SYSTEM OIL CHECK

WARNING

At operating temperature, the hydraulic oil is HOT. DO NOT permit the hot 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. Damage to the lift truck and hydraulic system can occur if dirt enters the hydraulic system.

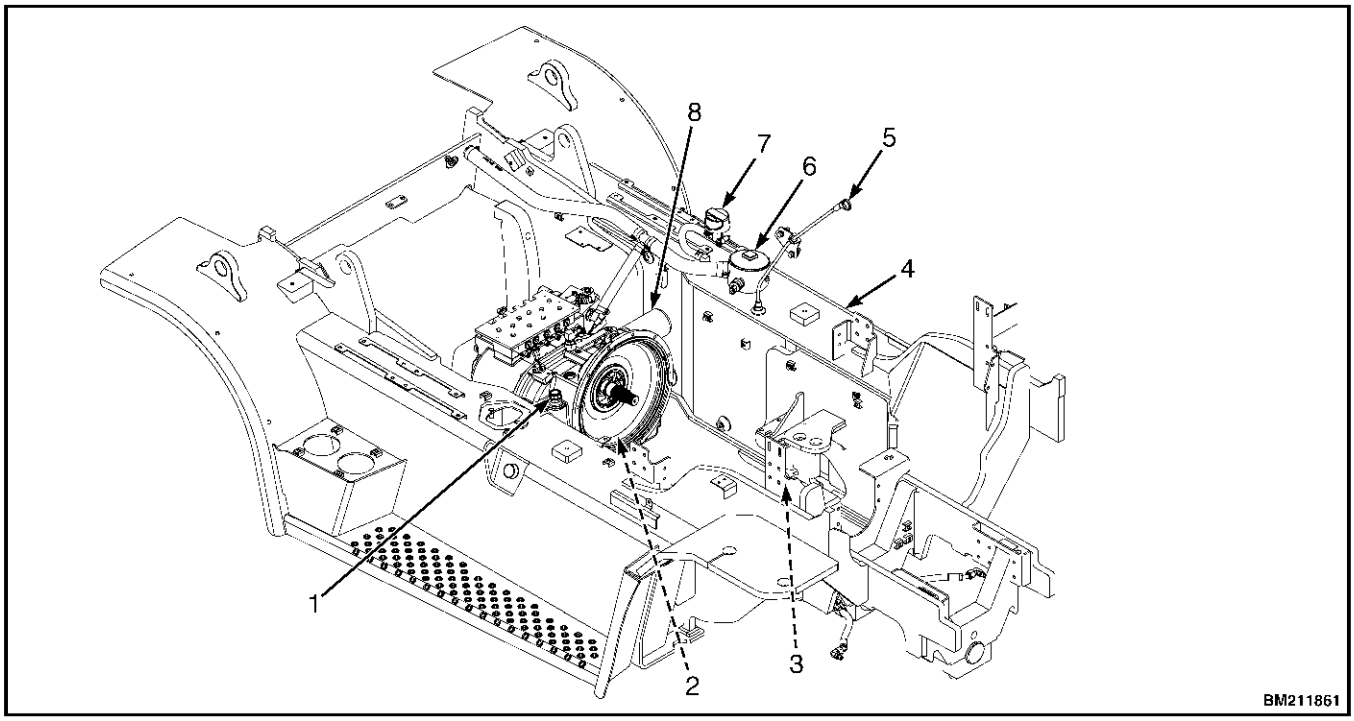
Never operate the hydraulic pump without oil in the hydraulic system. The operation of the hydraulic pump without oil will damage the pump.

CAUTION

Additives may damage the hydraulic system. Before using additives, contact your local Yale dealer.

Remove four screws and right side rear cover to access hydraulic oil filter. See Figure 26. Check the hydraulic oil level when the oil is at operating temperature and with the mast in a vertical position, the carriage lowered, and the engine stopped. See Figure 25. Add hydraulic oil only as needed. If hydraulic oil is above the **FULL** level, the hydraulic oil will leak from the breather during operation. The oil level indicated by the dipstick is most accurate when the oil temperature is 50°C (120°F).

When check is completed, install right side rear cover using four screws. See Figure 25.



1. TRANSMISSION OIL BREATHER/DIPSTICK
2. TRANSMISSION OIL DRAIN PLUG
3. HYDRAULIC OIL DRAIN PLUG
4. HYDRAULIC TANK
5. HYDRAULIC OIL DIPSTICK
6. HYDRAULIC OIL FILTER
7. HYDRAULIC TANK BREATHER
8. TRANSMISSION OIL FILTER

Figure 25. Transmission and Hydraulic Oil Checks

HYDRAULIC TANK BREATHER

Inspect

NOTE: When inspecting the breather, do not disassemble it. The breather element is a non serviceable part. If it is damaged, replace with a new breather element.

1. Remove four screws and right side rear cover to access hydraulic tank breather. See Figure 25 and Figure 26.

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.

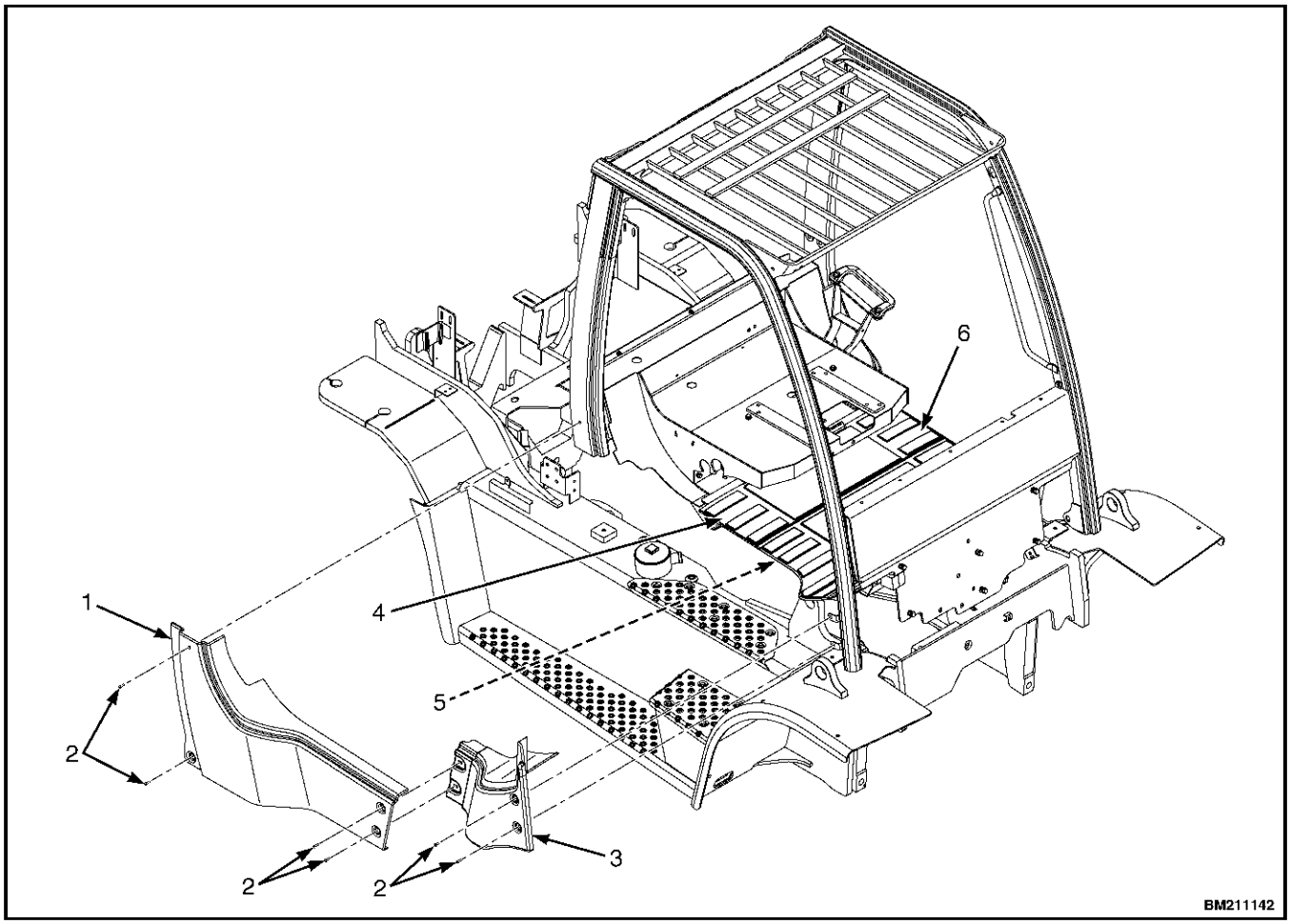
CAUTION

Direct air pressure on the filter element can cause damage. Direct air pressure away from filter element.

2. Using compressed air, remove any dirt and debris in the frame cavity around the breather. See Figure 26.

3. If necessary, unscrew and replace the breather if oil has accumulated in the cavity or on the breather, or if dirt has accumulated at the breather passages at the bottom of the breather.

4. If necessary, install new hydraulic tank breather and install right side rear cover using four screws. See Figure 25 and Figure 26.



NOTE: RIGHT SIDE SHOWN.

1. RIGHT SIDE REAR COVER
2. SCREW
3. RIGHT SIDE FRONT COVER
4. REAR FLOOR PLATE
5. FRONT FLOOR PLATE (NOT SHOWN)
6. FLOOR MAT

Figure 26. Side Cover Removal

BATTERY

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.

WARNING

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.

Disconnect the negative and positive terminals of the battery. Using a damp cloth, clean the case of the battery. If the terminals are corroded, clean the terminals with a wire brush. Connect the negative and positive cables to their respective terminals.

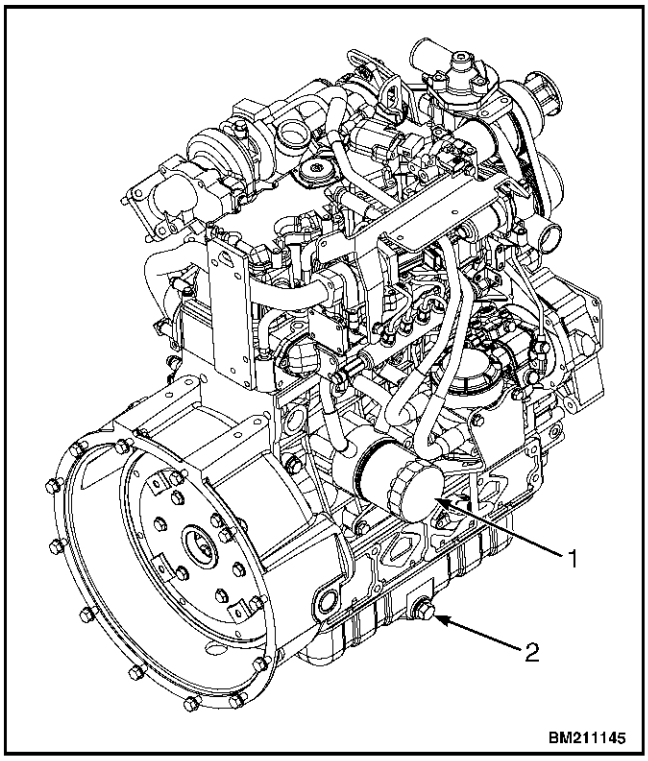
ENGINE OIL AND OIL FILTER

NOTE: For Kubota 3.8L non-certified emissions engine, change engine oil and filter at 250 hours or 6 months.

NOTE: Turn lift truck engine **OFF** before changing engine oil and filter.

1. Change engine oil and oil filter. Apply clean oil to gasket of new filter. Install new filter. Turn filter until gasket touches, then tighten ½ to 3/4 turn with your hand. Fill engine with oil specified in the Maintenance Schedule.

2. Check oil level in engine at the dipstick tube If necessary, add additional oil shown in the Maintenance Schedule. Start engine. Check area around oil filter for leaks. See Figure 27.



NOTE: ILLUSTRATION SHOWN REPRESENTS BOTH EMISSIONS CERTIFIED AND NON-EMISSIONS CERTIFIED KUBOTA 3.8L DIESEL ENGINES.

1. OIL FILTER
2. DRAIN PLUG

Figure 27. Engine Oil and Filter Change, Kubota 3.8L Diesel Engine

FUEL/WATER SEPARATOR FILTER REPLACEMENT, KUBOTA 3.8L DIESEL ENGINE

CAUTION

Disposal of lubricants and fluids must meet local environmental regulations.

Replace the fuel filter at specified intervals to prevent contaminants from adversely affecting the diesel fuel flow.

Remove

1. Stop engine and allow it to cool.

2. Disconnect fuel filter sensor connector from the fuel filter element.

3. Loosen outlet plug. See Figure 29.

CAUTION

Drain the water/fuel into a container and dispose in accordance with local environmental regulations.

4. Open the drain valve by turning the valve counterclockwise approximately 3 ½ turns until draining occurs. Drain until fuel filter element is empty.

5. Remove and discard fuel filter element.

Install

1. Clean the fuel filter head mounting surface and apply a small amount of diesel fuel to the gasket on the new fuel filter element. See Figure 28.

2. Before installing the filter element, fill the filter element with diesel fuel. This method will aid in bleeding the fuel system.

CAUTION

DO NOT overtighten the filter element. Overtightening the filter element may distort the threads.

3. Install the new fuel filter element until it contacts the fuel filter head mounting surface. Tighten one additional turn.

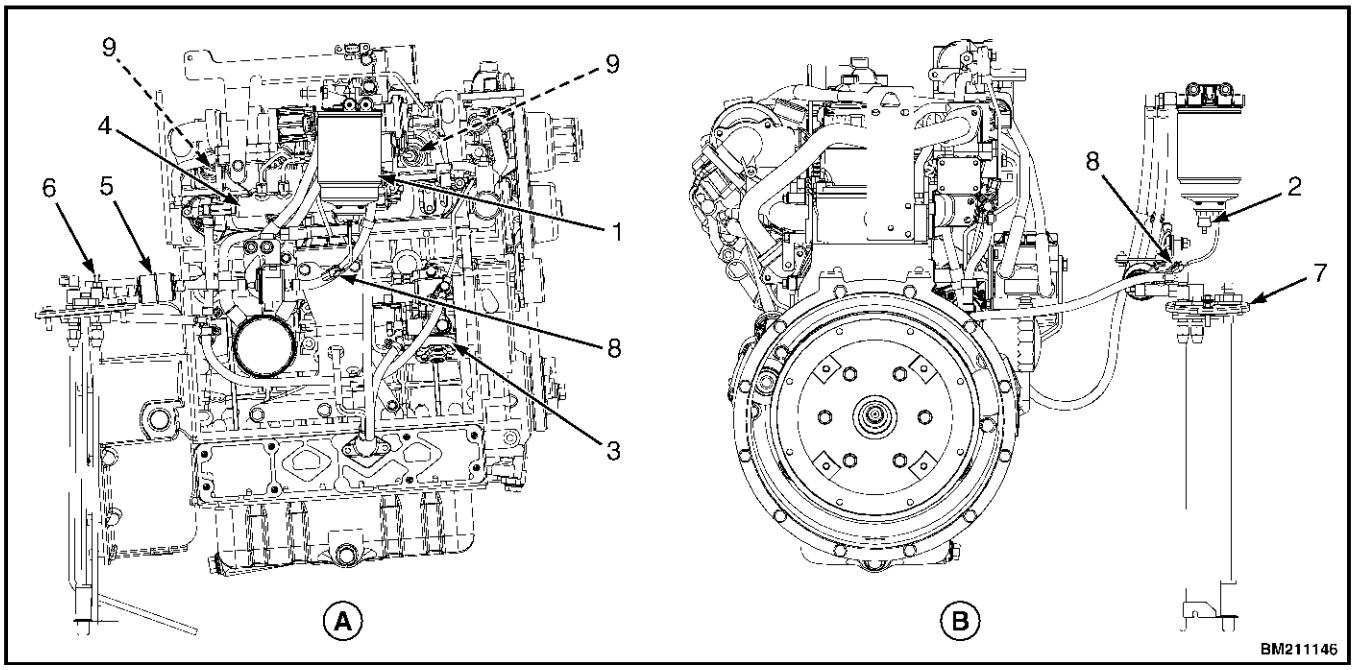
4. Tighten outlet plug. See Figure 29.

5. Connect the fuel filter sensor connector to fuel filter element. See Figure 28.

6. Open the fuel supply valve.

7. Prime the fuel system. See Priming The Fuel System, Kubota 3.8L Diesel Engine for procedures.

8. Check for fuel leaks.



NOTE: ILLUSTRATION SHOWN APPLIES TO BOTH EMISSIONS COMPLIANT AND NON-EMISSIONS COMPLIANT KUBOTA 3.8L DIESEL ENGINES.

A. LEFT SIDE VIEW

1. FUEL/WATER SEPARATOR FILTER
2. DRAIN VALVE
3. FUEL INJECTION PUMP
4. COMMON FUEL RAIL
5. IN-LINE FUEL STRAINER

B. FRONT VIEW

6. FUEL SUPPLY VALVE
7. FUEL SENDING UNIT
8. FUEL FILTER SENSOR CONNECTOR
9. FUEL INJECTOR

Figure 28. Kubota 3.8L Diesel Engine Fuel System

PRIMING THE FUEL SYSTEM, KUBOTA 3.8L DIESEL ENGINE

After fuel filter has been replaced, it is necessary to prime the fuel system before lift truck can be operated.

1. Loosen outlet plug located on top of fuel filter element. See Figure 29.

2. Rotate ignition key to **ON** position and allow electric fuel pump to cycle.

3. The electric fuel pump will run approximately 6 to 10 seconds. This process will need to be repeated for 60 to 90 seconds (6 to 12 cycles) or until fuel has been expelled from outlet plug.

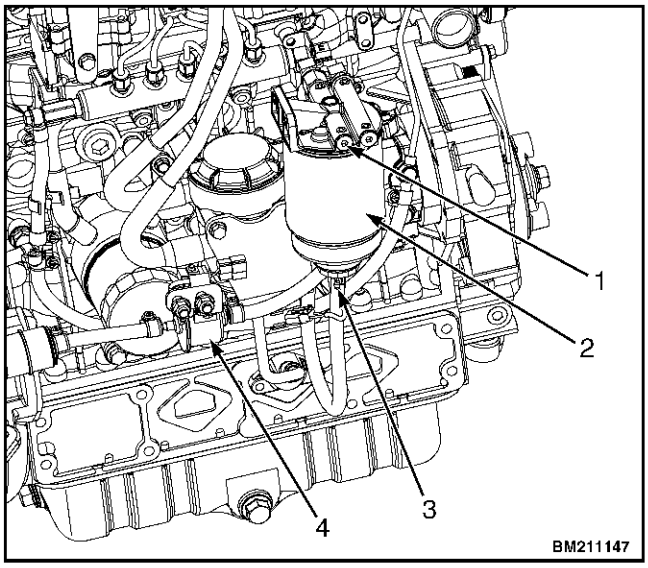
4. Tighten outlet plug at top of fuel filter element. See Figure 29.

5. Lift truck should now be ready to start.

CAUTION

Disposal of lubricants and fluids must meet local environmental regulations.

6. Wipe up any fuel that may have spilled and dispose of the fuel and rags in accordance with local directives.



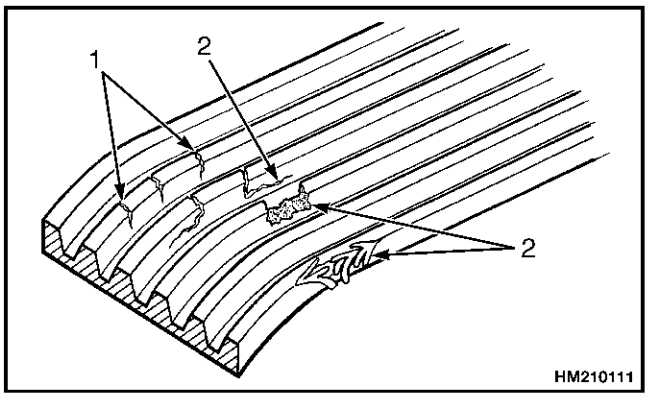
1. OUTLET PLUG
2. FUEL/WATER SEPARATOR FILTER
3. DRAIN VALVE
4. ELECTRIC FUEL PUMP

Figure 29. Electric Fuel Pump and Outlet Plug

DRIVE BELT

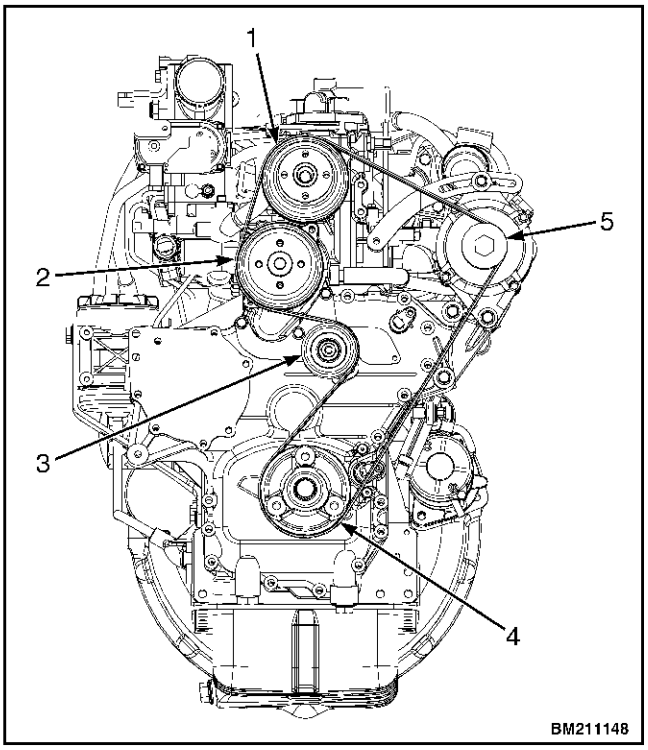
Fan and Alternator Drive Belt Inspection

Check drive belt for wear and damage. See Figure 30. A few small cracks that run across belt are acceptable. A belt with cracks that run the length of the belt or a belt with missing pieces is not acceptable. For drive belt arrangement, see Figure 31.



1. ACCEPTABLE CRACKS
2. NOT ACCEPTABLE CRACKS AND DAMAGE

Figure 30. Drive Belt Inspection



NOTE: NON-EMISSIONS COMPLIANT ENGINE SHOWN. DRIVE BELT ARRANGEMENT IS THE SAME FOR EMISSIONS COMPLIANT ENGINE.

1. COOLING FAN PULLEY
2. WATER PUMP PULLEY
3. IDLER PULLEY
4. CRANKSHAFT PULLEY
5. ALTERNATOR PULLEY

Figure 31. Engine Drive Belt Arrangement, Kubota 3.8L Diesel Engine

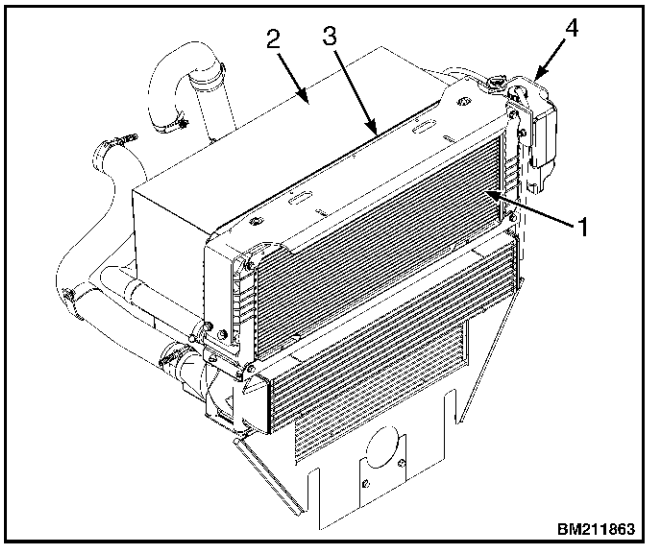
CLEAN DEBRIS FROM RADIATOR CORE

Check the radiator core for restrictions and remove material causing radiator core to be plugged or restricted. See Figure 32.

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.

Clean with compressed air, adjusted to a maximum output of 103 kPa (15 psi), and blow debris from core and fan shroud.



1. RADIATOR CORE
2. FAN SHROUD
3. RADIATOR MOUNTING BRACKET
4. COOLANT RESERVOIR

Figure 32. Clean Radiator Core

TRANSMISSION AND WET BRAKE AXLE OIL LEVEL CHECK

WARNING

At operating temperature, the transmission oil is HOT. DO NOT permit the hot oil to touch the skin and cause a burn.

CAUTION

DO NOT permit dirt to enter the transmission when the oil level is checked or the filter is changed and cause damage to the transmission.

NOTE: The transmission and wet brake drive axle housing arms share oil. By checking the transmission oil level and adding oil if necessary, the oil level in the wet brake drive axle housing arms is also checked and filled when oil is added.

1. The lift truck must be warmed up to at least 50°C (120°F) before checking the transmission oil level. Once lift truck has reached desired temperature, shut engine off and wait one minute before checking transmission oil level.

2. Remove the floor mat and front and rear floor plates for access to transmission. See Figure 26. If the transmission oil is low, add oil to transmission at the dipstick tube to the correct level as indicated on the dipstick. Use the correct oil as shown in the Maintenance Schedule. See Figure 33.

WARNING

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

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.

3. Check the transmission oil breather If breather is dirty or plugged up. Clean transmission oil breather with a grease cleaning solvent and use compressed air to dry. If transmission oil breather is worn or damaged, replace with new transmission oil breather. See **Parts Manual**. See Figure 25.

4. Start and run the engine for approximately one minutes after adding oil to allow oil to lubricate parts within the wet brake drive axle housing arms.

NOTE: Lift truck should be at least 50°C (120°F) when checking oil level.

5. Turn lift truck **OFF** and let it cool for one minute. Check oil level at the transmission dipstick and add additional oil at the transmission dipstick tube to properly fill the transmission. The correct oil and quantity needed is shown in the Maintenance Schedule.

6. When correct oil level has been reached, install front and rear floor plate and floor mat. See Figure 26.

WET BRAKE CENTER BODY OIL LEVEL CHECK

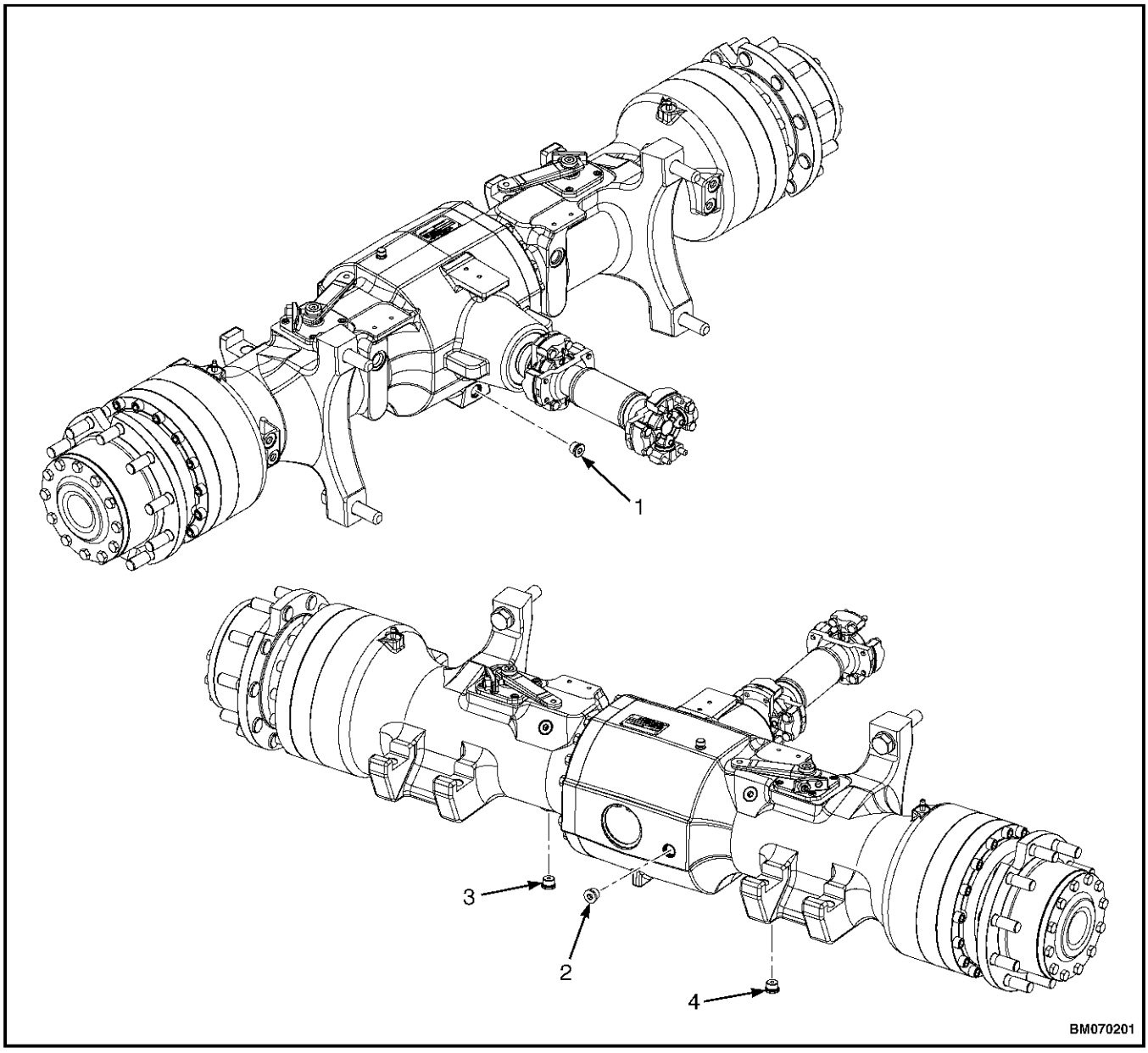
WARNING

At operating temperature, the center section oil is HOT. DO NOT permit the hot oil to touch the skin and cause a burn.

CAUTION

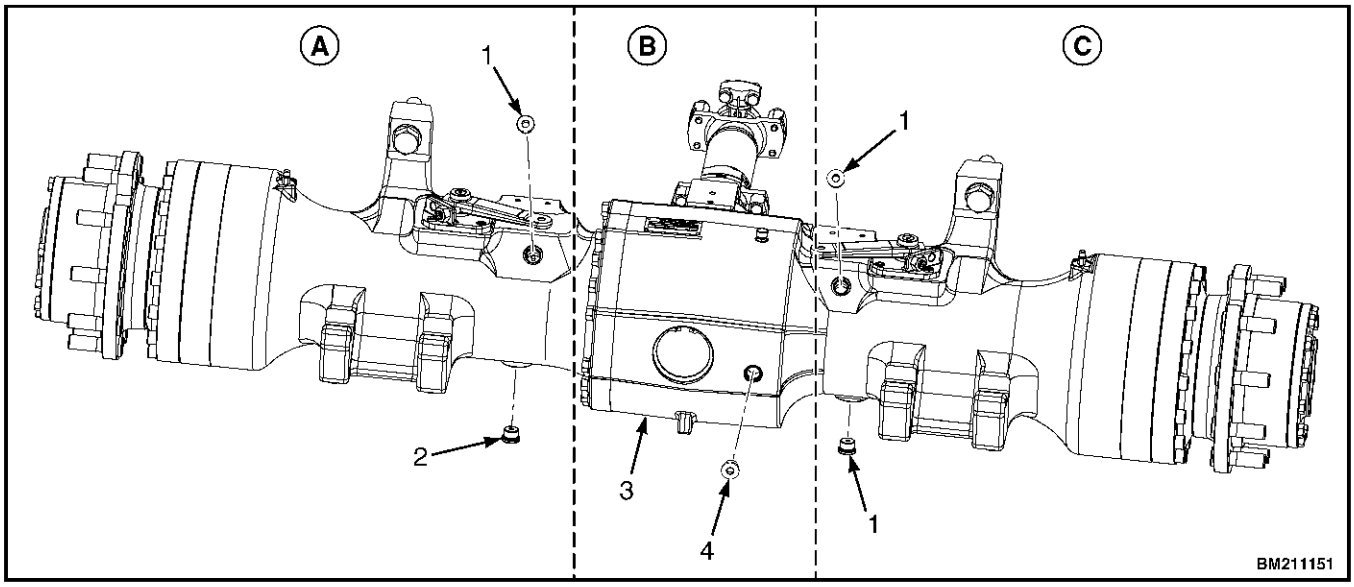
DO NOT permit dirt to enter the center body when the oil level is checked. Dirt will contaminate the oil and cause damage to the center body of the axle.

1. Remove center body fill plug. See Figure 33.
2. Visually check oil level. If necessary, add oil at the fill port until the oil fill/ level port has overflowed. The correct oil is shown in the Maintenance Schedule or in Figure 34.
3. Install center body fill plug and tighten to 30 to 50 N•m (22 to 37 lbf ft).



1. CENTER SECTION DRAIN PLUG
2. CENTER SECTION FILL/LEVEL PLUG
3. OIL DRAIN PLUG, RIGHT SIDE
4. OIL DRAIN PLUG, LEFT SIDE

Figure 33. Wet Brake Drive Axle Drain and Fill/Level Plug Location



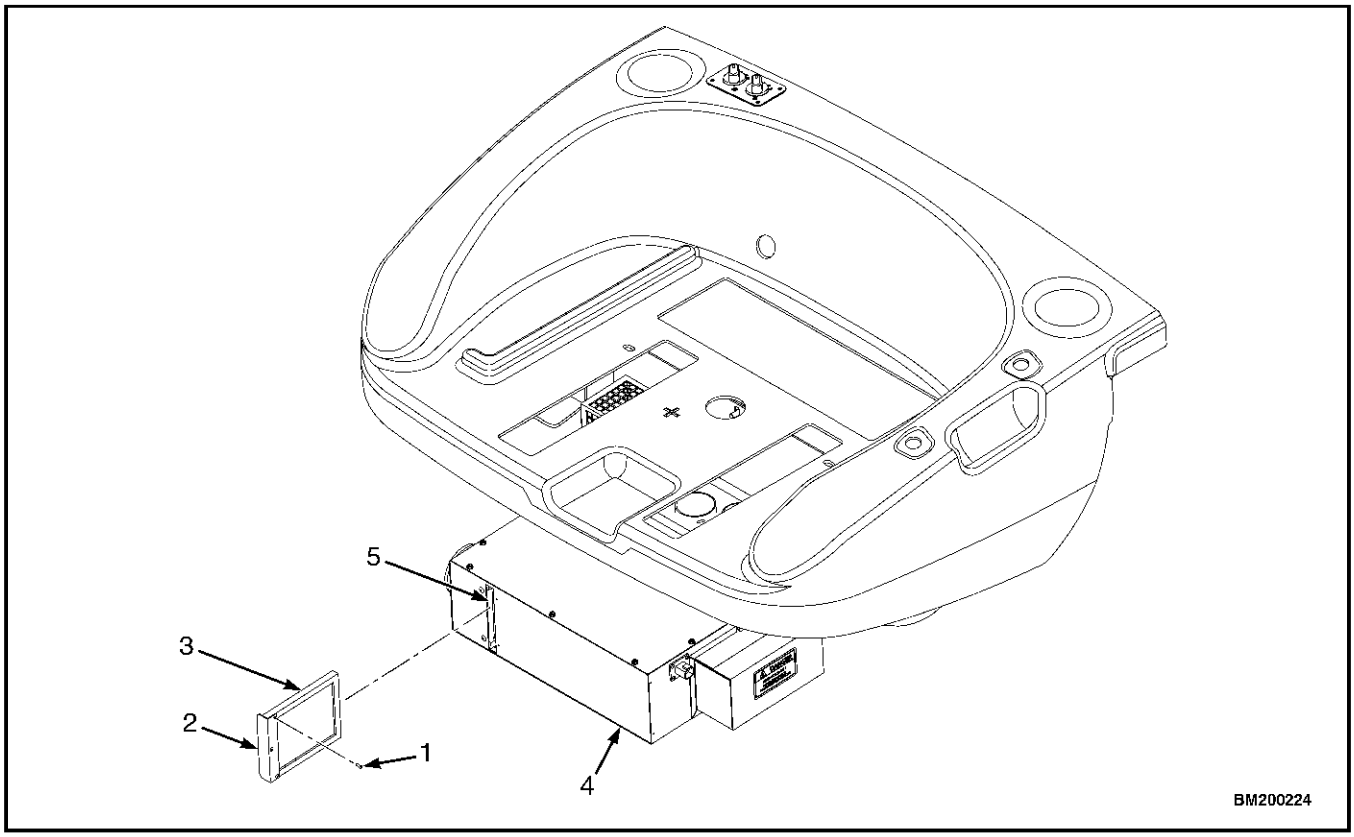
A. RIGHT DRIVE AXLE HOUSING ARM- USE JDM J20C
B. CENTER SECTION HOUSING - USE SAE J2360 GEAR OIL
C. LEFT DRIVE AXLE HOUSING ARM - USE JDM J20C

1. DRIVE AXLE HOUSING FILL PLUG
2. DRIVE AXLE HOUSING DRAIN PLUG
3. CENTER SECTION DRAIN PLUG (NOT SHOWN)
4. CENTER SECTION FILL/LEVEL PLUG

Figure 34. Oil Application Diagram

CAB HEATER AIR FILTER

1. Remove front and rear floor mat and fron floor plate.
2. Remove four flange bolts and rear floor plate.
3. Pull filter mounting bracket and remove heater filter from filter slot in heater unit. See Figure 35.
4. Remove three capscrews and heater filter from filter mounting bracket. See Figure 35.



1. CAPSCREWS
2. FILTER MOUNTING BRACKET
3. HEATER FILTER
4. HEATER UNIT
5. FILTER SLOT

Figure 35. Heater Filter

5. Install new heater filter to heater mounting brachet using three capscrews. See Figure 35.

6. Push heater mounting bracket into slot on heater unit. See Figure 35.

7. Install rear floor plate with four flange bolts.

8. Install front floor plate and front and rear floor mats.

FORKS, INSPECT

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 as a complete set.

1. Inspect the forks for cracks and wear. Check that the fork tips are aligned as shown in Figure 36. Check that the bottom of the fork is not worn (item A, Figure 36).

CAUTION

Remove fork latch pins if adding a fork positioner attachment. Damage to forks and other carnage components can occur if fork lat pins are not removed prior to using attachment.

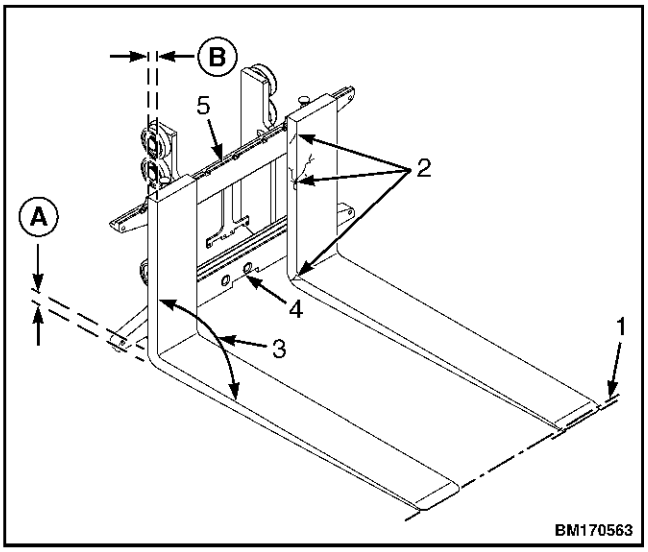
2. Replace any damaged or broken parts that are used to keep the forks locked in position.

3. Inspect fork wear. Ensure heel wear is not more than 10% of original thickness. If fork wear is more than 10%, fork must be replaced or rerated. Perform fork wear inspection using a BOL256N1 caliper ruler Yale P/N 550088603 as follows. See Figure 37.

a. Determine normal thickness of "N" of fork using scale or ruler portion of caliper ruler. Measurement has to be done on fork shank using caliper ruler.

b. Position caliper at end of heel internal radius (item A, Figure 36) with opening corresponding to measured thickness of fork shank in Step a above. (e.g. for N 1.75 use N 1.75 opening). This is typically the section of fork where wear is greatest. Note that opening distance has been reduced by 10% from nominal thickness.

c. If fork enters opening, it is mandatory to replace it. DANGER OF BREAKING. Furthermore, a 10% reduction in fork blade thickness results in 20% reduction in operating capacity.



Fork Tip Alignment	
Length of Forks	**3% Dimension**
1200 mm (47 in.)	36 mm (1.42 in.)
1500 mm (59 in.)	45 mm (1.77 in.)
1800 mm (71 in.)	54 mm (2.13 in.)
2100 mm (83 in.)	63 mm (2.48 in.)
2400 mm (94 in.)	72 mm (2.83 in.)

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

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

Figure 36. Forks Check

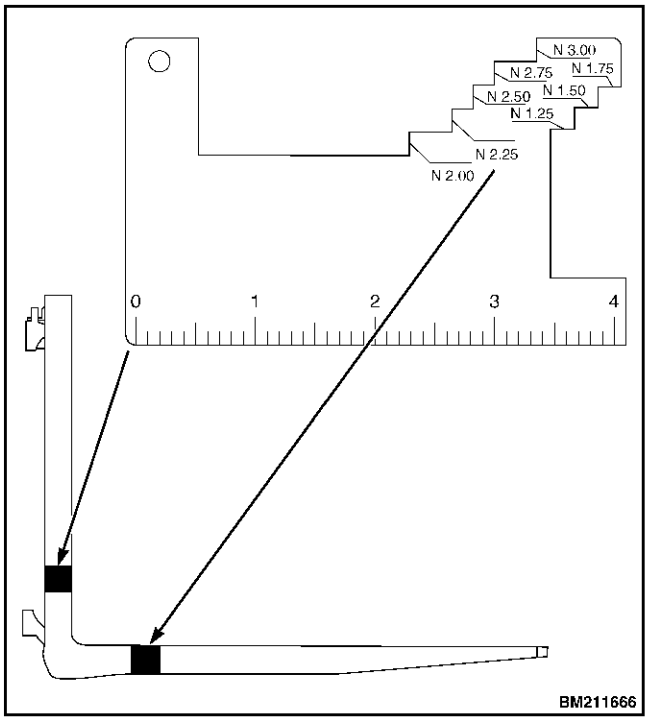


Figure 37. Fork Wear Check

MAST LUBRICATION

WARNING

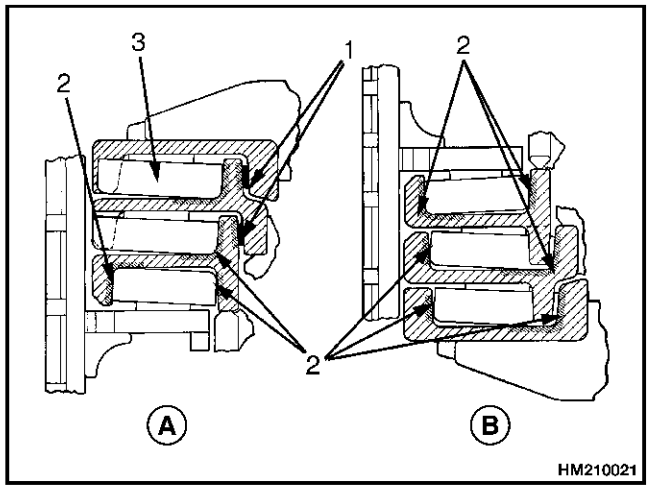
When working on or near the mast, see Safety Procedures When Working Near Mast in the beginning of this manual.

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

1. Lubricate sliding surfaces and load roller surfaces along full length of channels as shown in Figure 38.

NOTE: When lubricating the mast mounting/pivot pins, the load must be removed from the normal contact surface to allow grease to properly lubricate the normal contact surfaces of the mast bushings.

2. Raise carriage about 61 mm (2 ft), and tilt mast fully back. Place blocks under the outer mast channels to within 13 mm (0.5 in.) of the channels. See Figure 39.



A. UPPER LOAD ROLLERS
B. LOWER LOAD ROLLERS

1. LUBRICATE STRIP BEARING SURFACES
2. LUBRICATE LOAD ROLLER SURFACES
3. LOAD ROLLER

Figure 38. Mast Lubrication

3. Tilt mast fully forward. See Figure 39.

4. Lubricate mast pivot bushings at grease fittings on outer mast. Use multipurpose grease shown in the Maintenance Schedule. See Figure 40.

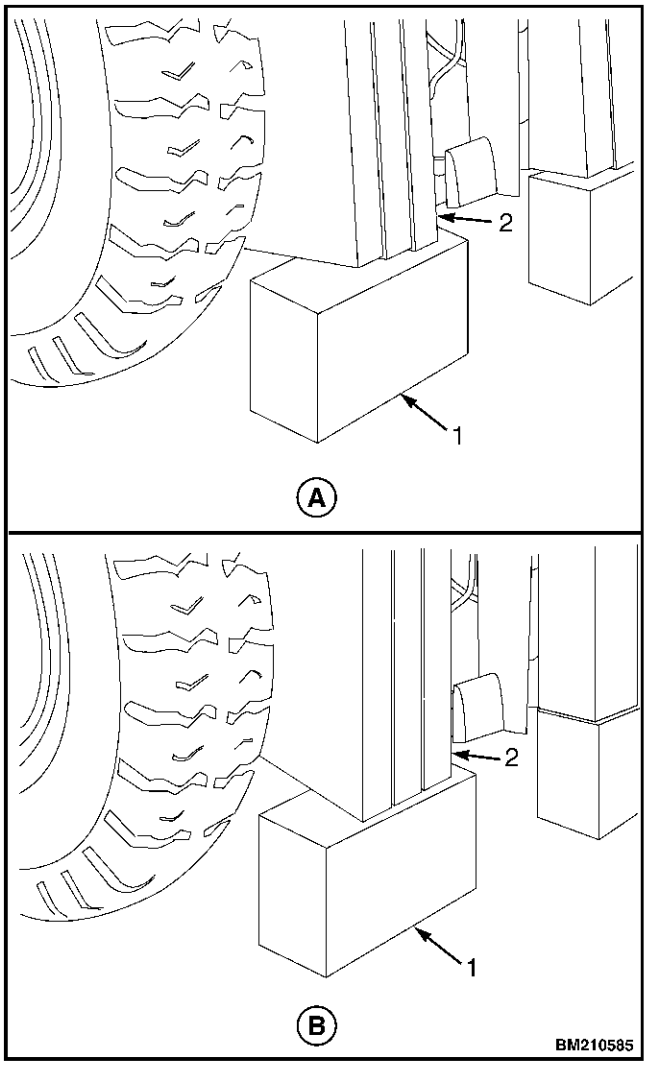
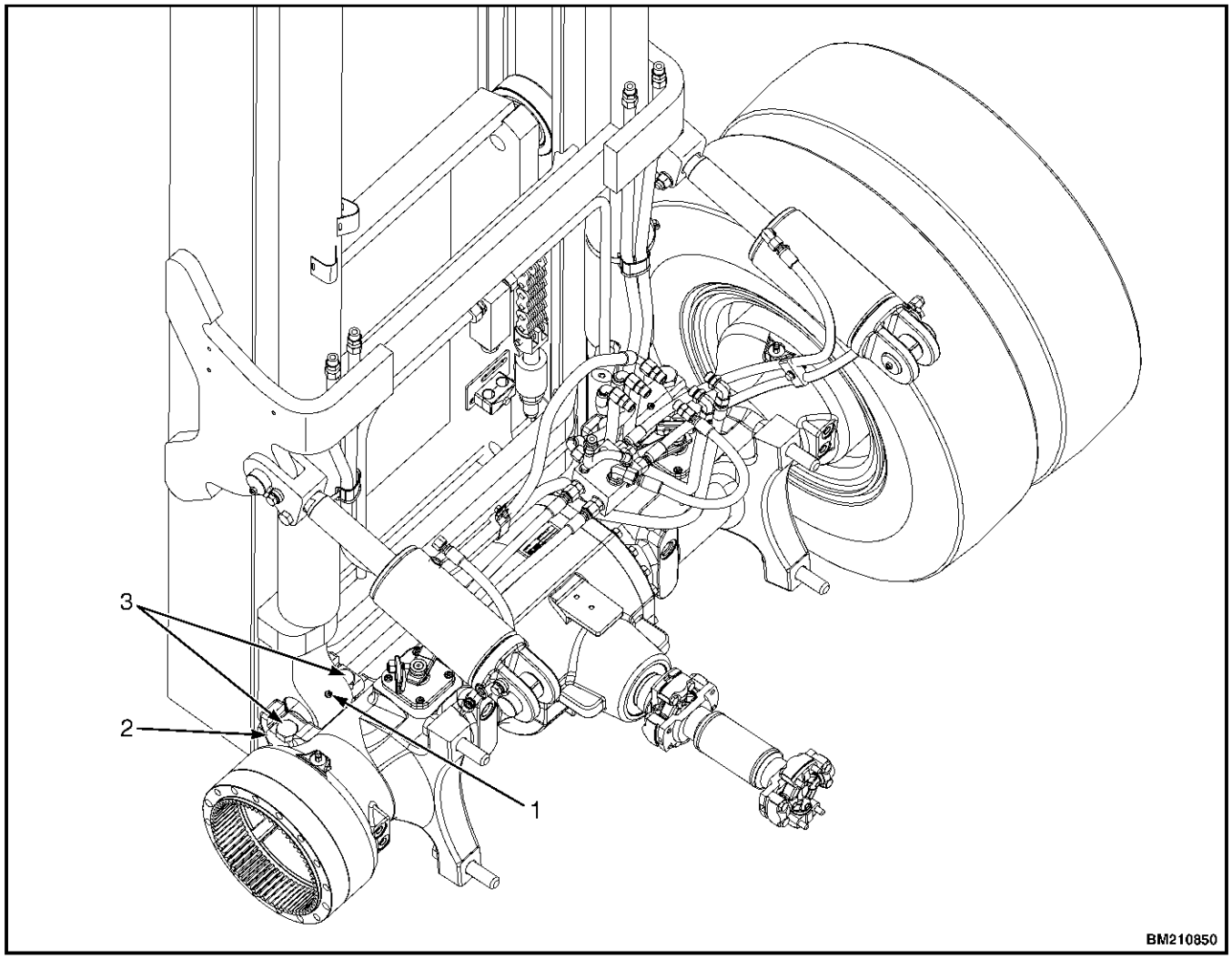


Figure 39. Blocking the Mast

Legend for Figure 39.

A. MAST TILTED FULLY BACK
B. MAST TILTED FORWARD

1. BLOCK
2. MAST



NOTE: TIRE AND WHEEL REMOVED FOR CLARITY

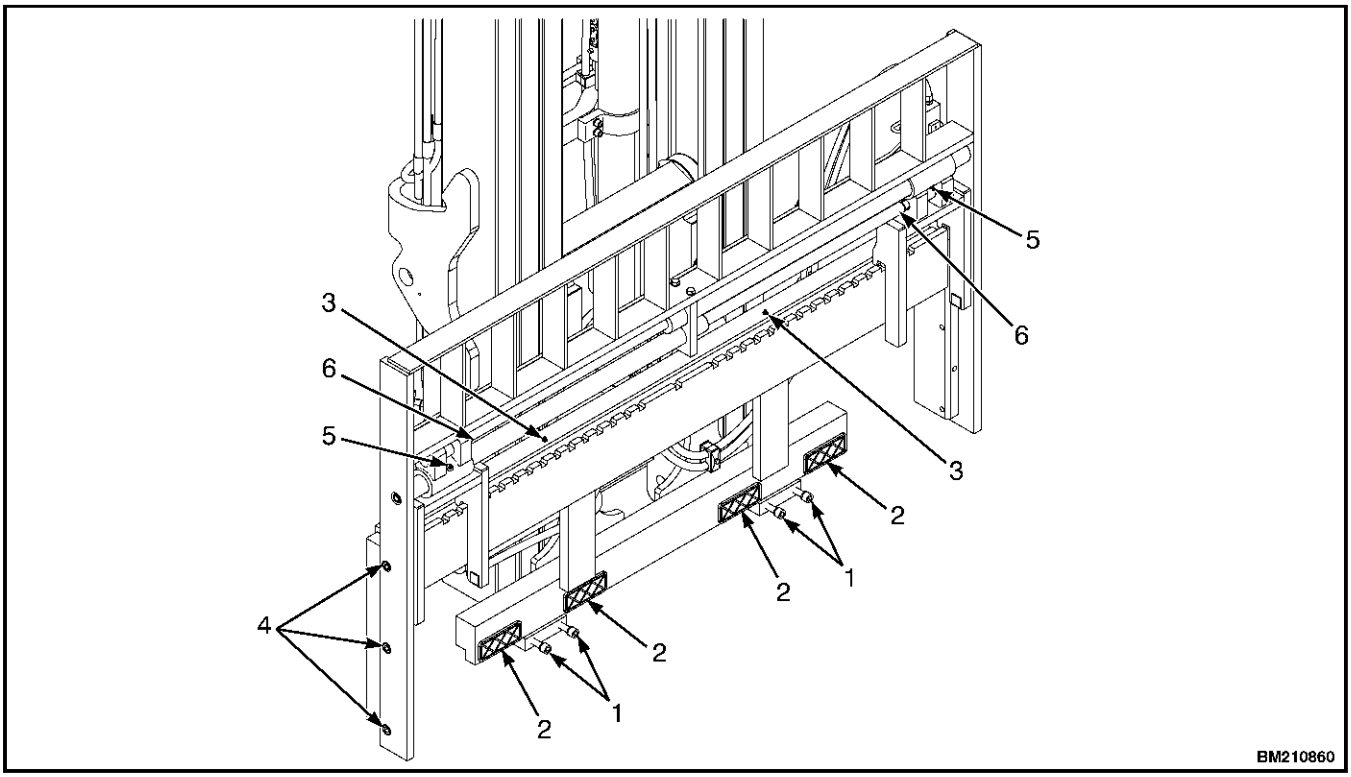
1. GREASE FITTING
2. MAST PIVOT PIN
3. MOUNTING CAPSCREWS

Figure 40. Pivot Pin Lubrication

5. Tilt mast fully back. Remove the blocks from under the channels.

6. If a integral sideshift carriage is installed, lubricate sliding surfaces (upper bearings) at grease fittings and lower bearing strips with multipurpose grease shown in the Maintenance Schedule. See Figure 41.

7. If lift truck is equipped with a fork positioner, lubricate fork positioner carrier at grease fittings and the fork cylinder rod anchors with multipurpose grease shown in the Maintenance Schedule. See Figure 41.



NOTE: LOWER BAR ON INTEGRAL SIDESHIFT CARRIAGE OMITTED TO SHOW LOWER BEARING STRIPS.

1. INTEGRAL SIDESHIFT CARRIAGE MOUNTING CAPSCREWS
2. LOWER BEARING STRIPS
3. LUBE FITTING FOR UPPER BEARINGS
4. FORK POSITIONER SOCKET HEAD MOUNTING CAPSCREWS
5. FORK POSITIONER CARRIER LUBE FITTINGS
6. FORK POSITIONER CYLINDER ROD ANCHORS

Figure 41. Integral Sideshift Carriage With Fork Positioners, Lubrication Points

8. Check the torque for the fork positioner socket head mounting capscrews, if lift truck is equipped with a fork positioner. The torque values for these capscrews are 145 N•m (110 lbf ft).

HEADER HOSE CHECKS

NOTE: Also inspect header hoses every 8 hours or daily.

Inspect for kinked, crushed, flattened, or twisted hoses; hard, stiff, or charred hoses. Inspect hose fittings and for hose slippage and proper hose tensioning. Adjust/repair/replace hose/components as necessary.

LIFT CHAIN LUBRICATION

NOTE: The 500 hour/6 months lift chain lubrication should not be performed in combination with the 1000 hour/6 months lift chain lubrication. Lubricate lift chains at the interval that occurs first.

1. Disconnect and remove lift chains from mast. See **Mast Repair (S/N A613, A614, A643, A644, A683, A684)** 4000YRM1956 for procedures.

WARNING

Cleaning solvents may be flammable and toxic and can cause severe skin irritation. When using commercial cleaning solvents, always comply with solvent manufacturer's recommended safety precautions.

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.

2. Clean the lift chains by soaking in solvent for 30 minutes to remove all dirt and grease. Hang lift chains up and remove solvent using compressed air.

WARNING

Never replace only the worn section of a chain. Replace the complete chain. Never replace only one chain of a chain pair. Replace both chains. Damage to the lift truck and serious injury can occur if lift chains are not replaced correctly.

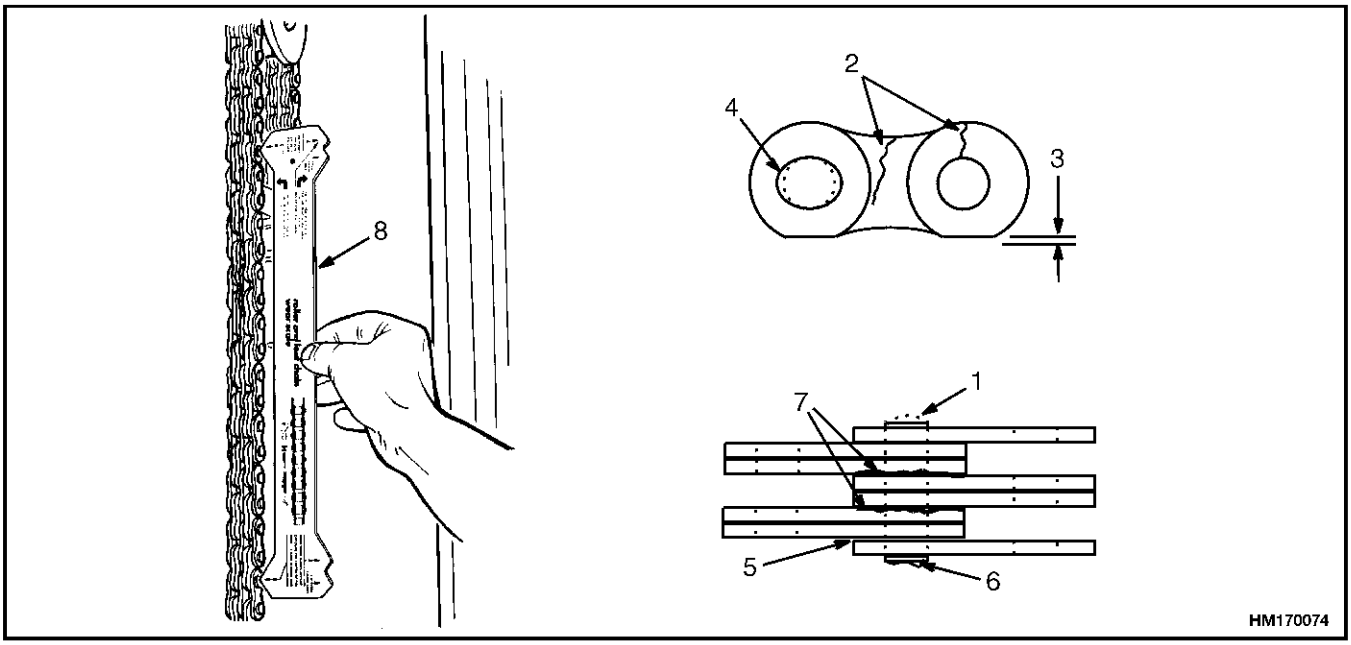
NOTE: The chains must be inspected in the area of chain that passes over the chain sheave during the first portion of a lift. These links will show maximum wear.

3. Inspect the lift chains for wear and damage. A lift chain becomes longer when it is worn. If a chain is 3% longer than a new lift chain, the lift chain must be replaced.

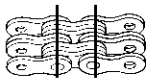
4. If a chain scale is available, check lift chains as shown in Figure 42. If a chain scale is not available measure 20 links of chain. Measure from the center of a pin to the center of another pin 20 pitches away. Compare the length with the chart in Figure 42. Replace chain if the length of 20 links of the worn section is more than the maximum wear limit.

5. Lubricate lift chains by soaking them in SAE 30W engine oil for 30 minutes. Hang chains over a drip pan for one hour to remove excess oil.

6. After excess oil has drained from lift chains, install lift chains onto mast. See **Mast Repair (S/N A613, A614, A643, A644, A683, A684)** 4000YRM1956 for procedures.



NOTE: THE INSTRUCTIONS FOR MEASURING CHAIN WEAR ARE SHOWN ON THE CHAIN WEAR SCALE.

Pitch 	Total length of 20 links (pitch) of new chain	Wear Limit The maximum length of 20 links
12.7 mm (0.5 in.)	254.0 mm (10.0 in.)	261.6 mm (10.3 in.)
15.9 mm (0.6 in.)	317.5 mm (12.5 in.)	327.0 mm (12.9 in.)
19.1 mm (0.8 in.)	381.0 mm (15.0 in.)	392.4 mm (15.4 in.)
25.4 mm (1.0 in.)	508.0 mm (20.0 in.)	523.3 mm (20.6 in.)

1. WORN PIN
2. CRACKS
3. EDGE WEAR
4. HOLE WEAR
5. LOOSE LEAVES
6. DAMAGED PIN
7. RUST
8. CHAIN WEAR SCALE

Figure 42. Lift Chains Check

TILT CYLINDER LUBRICATION

1. Remove six screws from the right side front and rear side covers for access to rear tilt cylinder lube fittings. See **Frame** 0100YRM2293 for procedures.

2. Lubricate tilt cylinder ends. Use multipurpose grease shown in the Maintenance Schedule. There are two lube fittings on the frame end and two on the mast end. See Figure 43.

3. Install right side front and rear side covers using six screws. See **Frame** 0100YRM2293 for procedures.

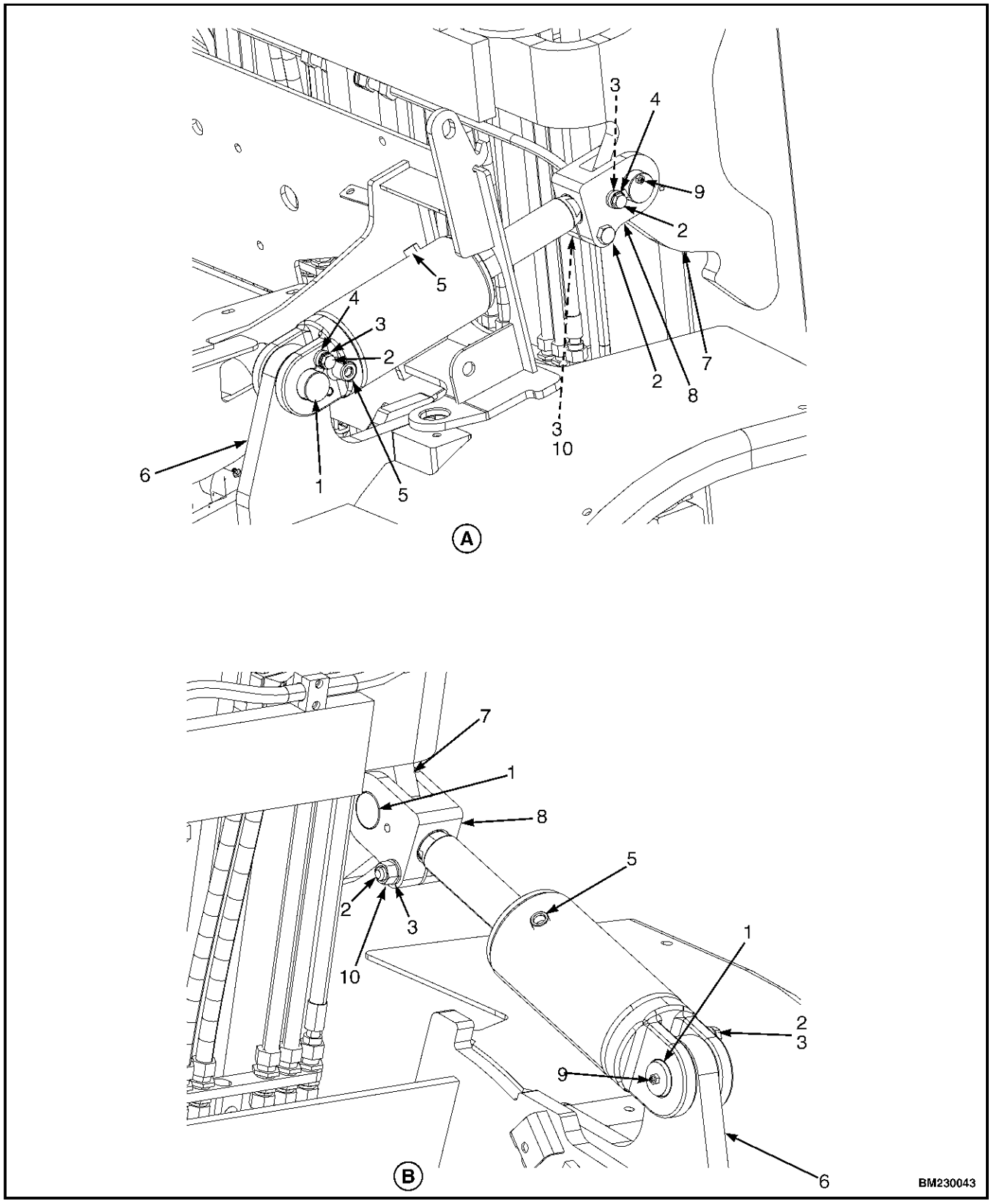


Figure 43. Tilt Cylinder Lubrication

Legend for Figure 43.

A. OUTER VIEW
B. INNER VIEW

1. TILT PIN
2. CAPSCREW
3. WASHER
4. ANCHOR PIN
5. CYLINDER HOSE PORT
6. FRAME END MOUNT
7. MAST END MOUNT
8. ROD END
9. LUBE FITTING
10. HEX NUT

BRAKE ACTUATION VALVE ROD END PIN

1. Remove floor mat and floor plate for access to the brake actuation valve rod end pin.

2. Lubricate the brake actuation valve rod end pin. Use lubrication shown in the Maintenance Schedule. See Figure 44.

3. Install floor plate and floor mat.

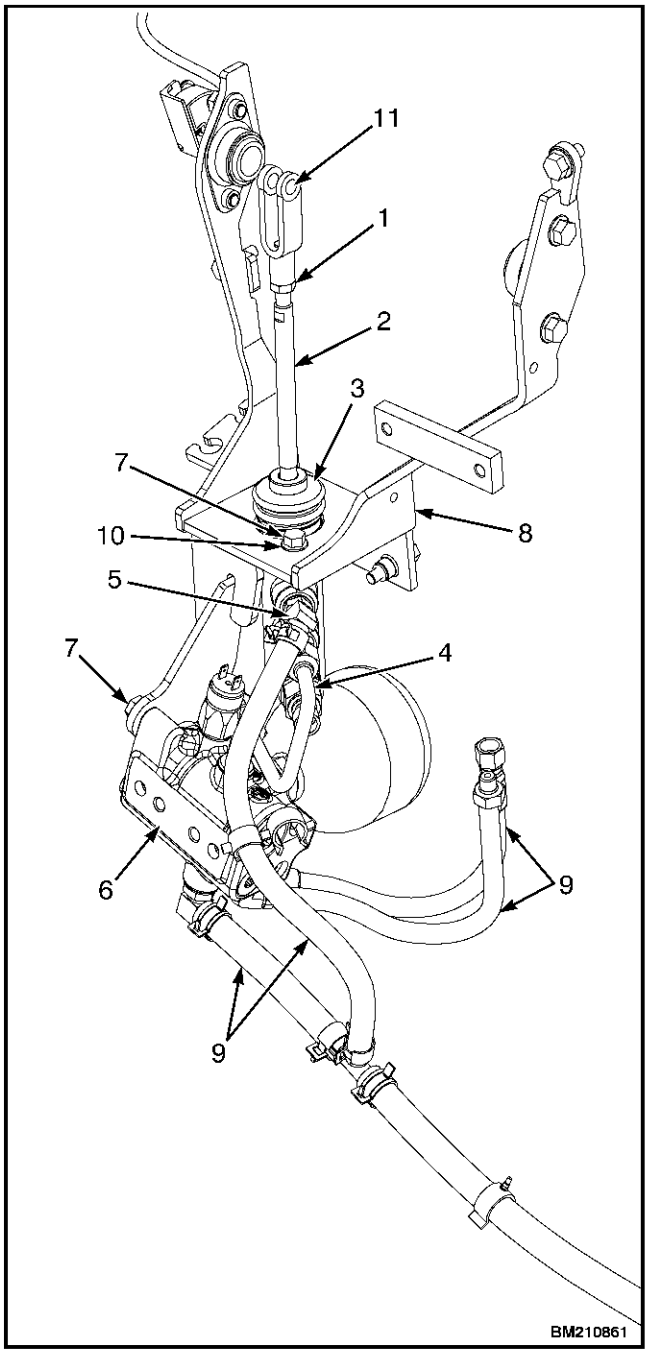


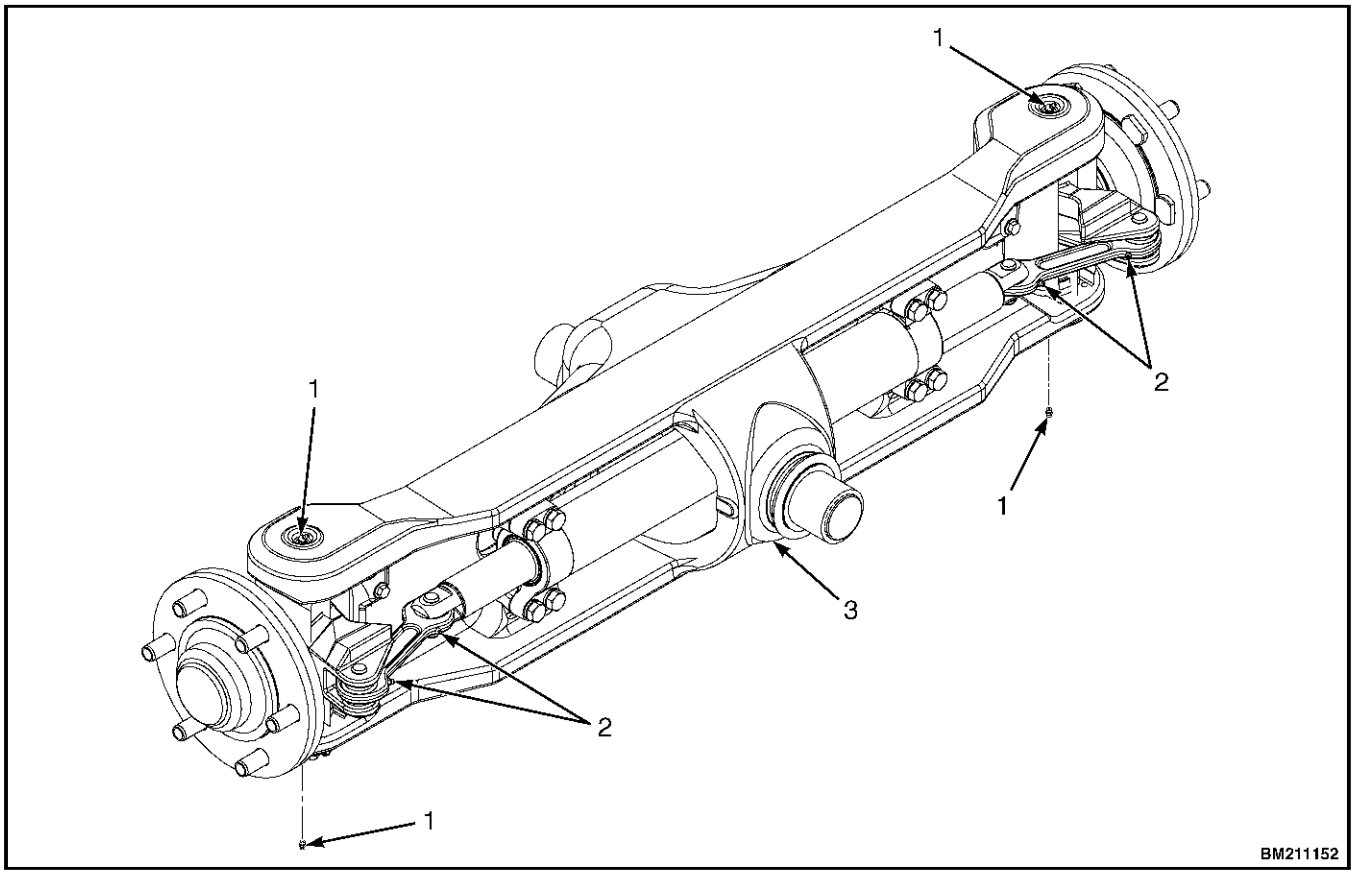
Figure 44. Brake Actuation Valve Rod End Pin Lubrication

Legend for Figure 44.

1. NUT
2. PUSH ROD
3. BOOT
4. TUBE ASSEMBLY
5. MODULATING BRAKE VALVE
6. ACCUMULATOR CHARGE VALVE
7. CAPSCREW
8. BRAKE BRACKET
9. HYDRAULIC LINE
10. WASHER
11. BRAKE ACTUATION VALVE ROD END PIN

TIE ROD LUBRICATION

Lubricate the tie rods. Use multipurpose shown in the Maintenance Schedule. There are two lubrication fittings on each tie rod. See Figure 45.



1. SPINDLE BEARINGS LUBE FITTINGS
2. TIE RODS LUBE FITTINGS
3. STEERING AXLE

Figure 45. Tie Rod Lubrication

LOW IDLE SPEED CHECK

Check the low idle speed to ensure it is within the range shown in the Maintenance Schedule. If the low idle speed needs to be adjusted, see **Diagnostic Troubleshooting Manual** 9000YRM1112 for adjustment procedures.

PARKING BRAKE ADJUSTMENT

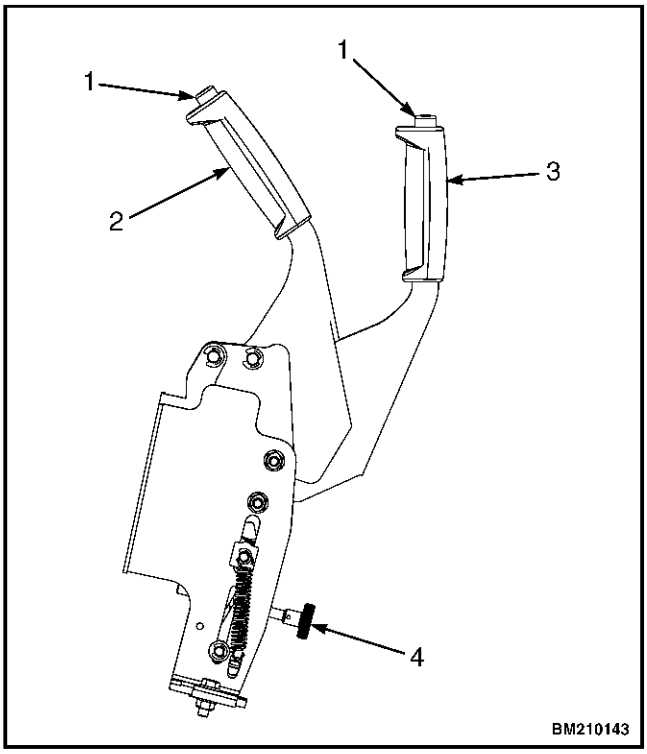
Make sure the service brakes are adjusted before the parking brake is adjusted.

Lift trucks with a Foot Directional Control pedal: A switch energizes the seat warning circuit when hand lever is released. This switch puts the transmission in **NEUTRAL** by de-energizing the direction solenoid. There is also a switch on the left side of bracket. This switch prevents engine from starting unless parking brake is applied.

NOTE: Make sure parking brake is released before making adjustment.

To adjust the parking brake, do the following:

Turn the adjustment knob to raise the equalized link and tighten the parking brake cables. Do not tighten the adjustment so that the brake is applied when the lever is released. The lever for the parking brake has a lock. See Figure 46. Use your thumb or finger to release the lock on the lever when the parking brake is released.



1. LOCK BUTTON RELEASE
2. OFF POSITION
3. ON POSITION
4. ADJUSTMENT KNOB

Figure 46. Parking Brake

Maintenance Procedures Every 1000 Hours or 6 Months

NOTE: Perform the Maintenance Procedures Every 8 Hours or Daily and Maintenance Procedures Every 500 Hours or 6 Months prior to performing the procedures in this section.

LIFT CHAIN LUBRICATION AND WEAR CHECK

WARNING

Cleaning solvents may be flammable and toxic and can cause severe skin irritation. When using commercial cleaning solvents, always comply with solvent manufacturer's recommended safety precautions.

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.

1. Disconnect and remove lift chains from mast. See service manual **Mast Repair (S/N A613, A614, A643, A644, A683, A684)** 4000YRM1956 for procedures.

2. Clean the lift chains by soaking in solvent for 30 minutes to remove all dirt and grease. Hang lift chains up and remove solvent using compressed air.

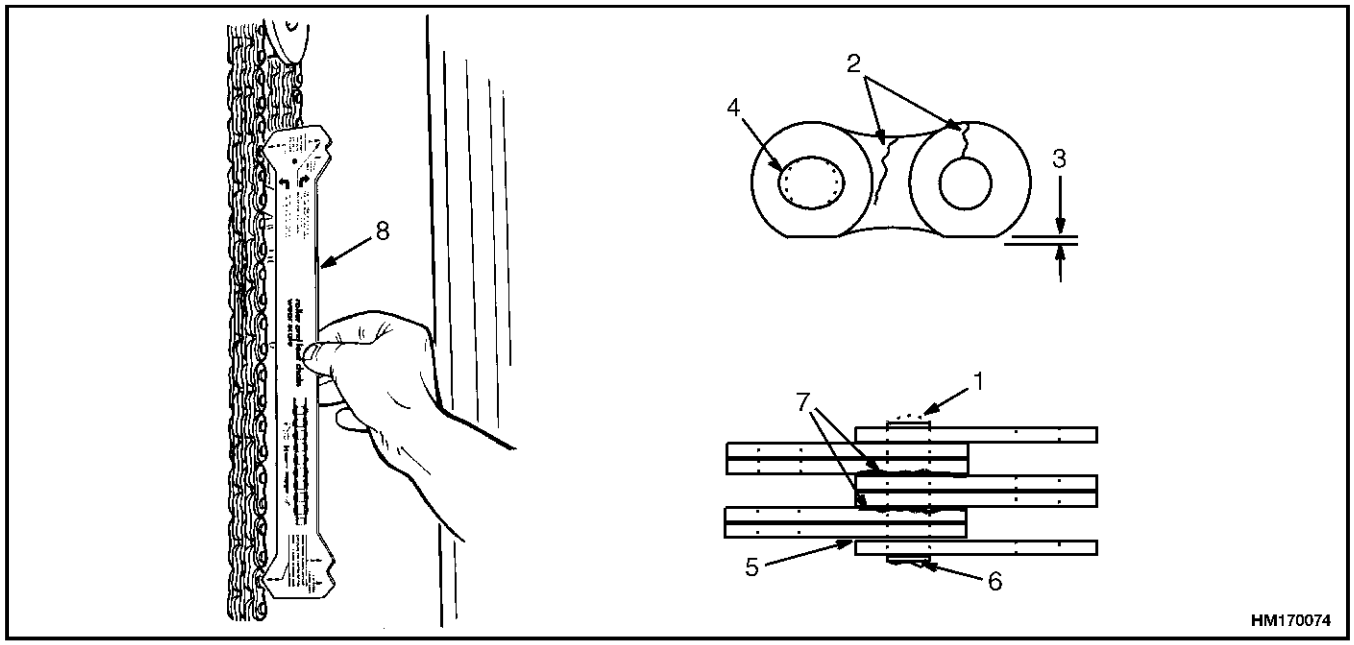
WARNING

NEVER replace only the worn section of a chain. Replace the complete chain. NEVER replace only one chain of a chain pair. Replace both chains. Damage to the lift truck and serious injury can occur if lift chains are not replaced correctly.

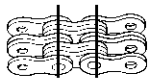
NOTE: The chains must be inspected in the area of chain that passes over the chain sheave during the first portion of a lift. These links will show maximum wear.

3. Inspect lift chains for wear and damage. A lift chain becomes longer when it is worn. If a chain is 3% longer than a new lift chain, the lift chain must be replaced.

4. If a chain scale is available, check lift chains as shown in Figure 47. 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 47. Replace chain if the length of 20 links of the worn section is more than the maximum wear limit.



NOTE: THE INSTRUCTIONS FOR MEASURING CHAIN WEAR ARE SHOWN ON THE CHAIN WEAR SCALE.

Pitch 	Total Length of 20 Links (Pitch) of New Chain	Wear Limit The Maximum Length of 20 Links
12.7 mm (0.5 in.)	254.0 mm (10.0 in.)	261.6 mm (10.3 in.)
15.9 mm (0.6 in.)	317.5 mm (12.5 in.)	327.0 mm (12.9 in.)
19.1 mm (0.8 in.)	381.0 mm (15.0 in.)	392.4 mm (15.4 in.)
25.4 mm (1.0 in.)	508.0 mm (20.0 in.)	523.3 mm (20.6 in.)

1. WORN PIN
2. CRACKS
3. EDGE WEAR
4. HOLE WEAR
5. LOOSE LEAVES
6. DAMAGED PIN
7. RUST
8. CHAIN WEAR SCALE

Figure 47. Lift Chains Check

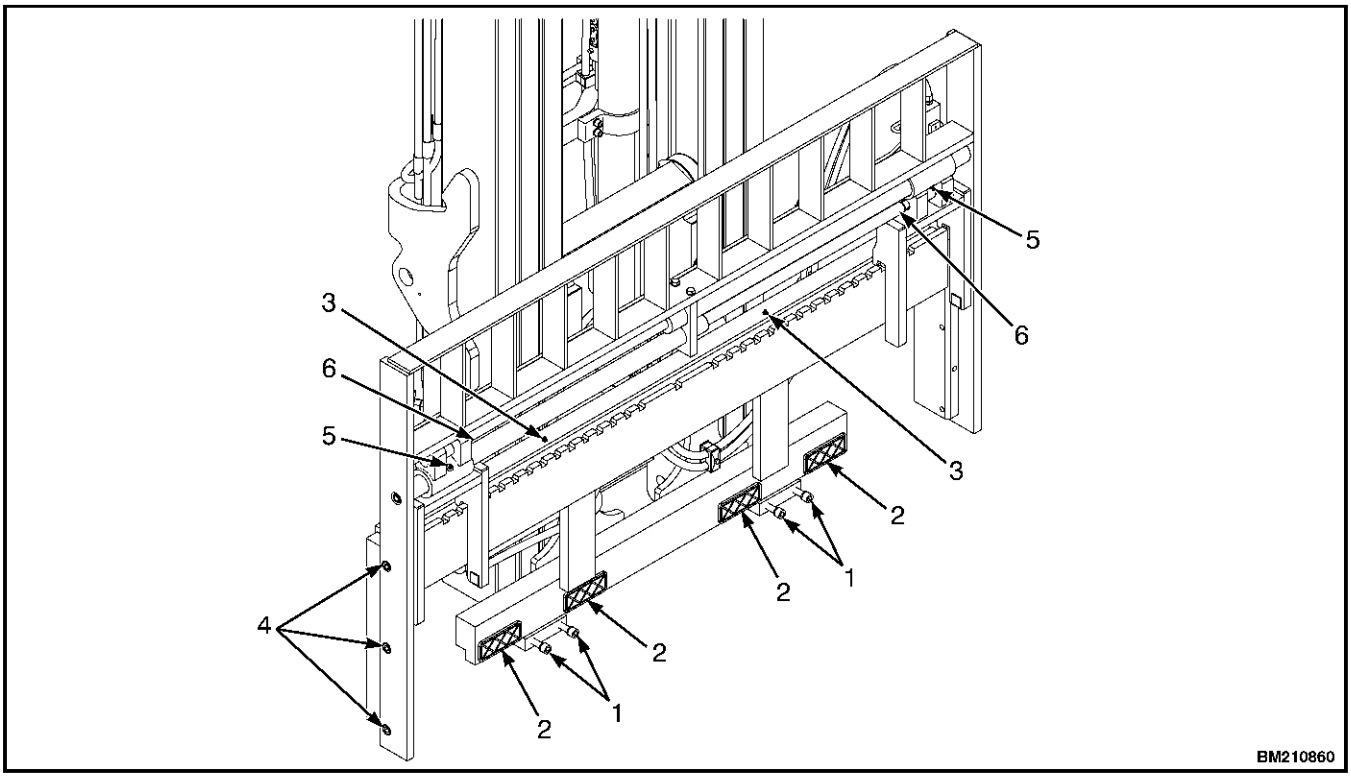
5. Lubricate lift chains by soaking them in SAE 30W engine oil for 30 minutes. Hang chains over a drip pan for one hour to remove excess oil.

6. After excess oil has drained from lift chains, install lift chains onto mast. See service manual **Mast Repair (S/N A613, A614, A643, A644, A683, A684)** 4000YRM1956 for procedures.

INTEGRAL SIDESHIFT CARRIAGE, CHECK SLIDING SURFACES

1. Check lower bearing strips for wear. See **Mast Repair (S/N A613, A614, A643, A644, A683, A684)** 4000YRM1956 for procedures. See Figure 48.

2. Check the integral sideshift carriage sliding surfaces to ensure there is enough grease for proper operation. If more grease is necessary, lubricate sliding surfaces (upper bearings) at lube fittings and lower bearing strips with multipurpose grease shown in the Maintenance Schedule. See Figure 48.



NOTE: LOWER BAR ON INTEGRAL SIDESHIFT CARRIAGE OMITTED TO SHOW LOWER BEARING STRIPS.

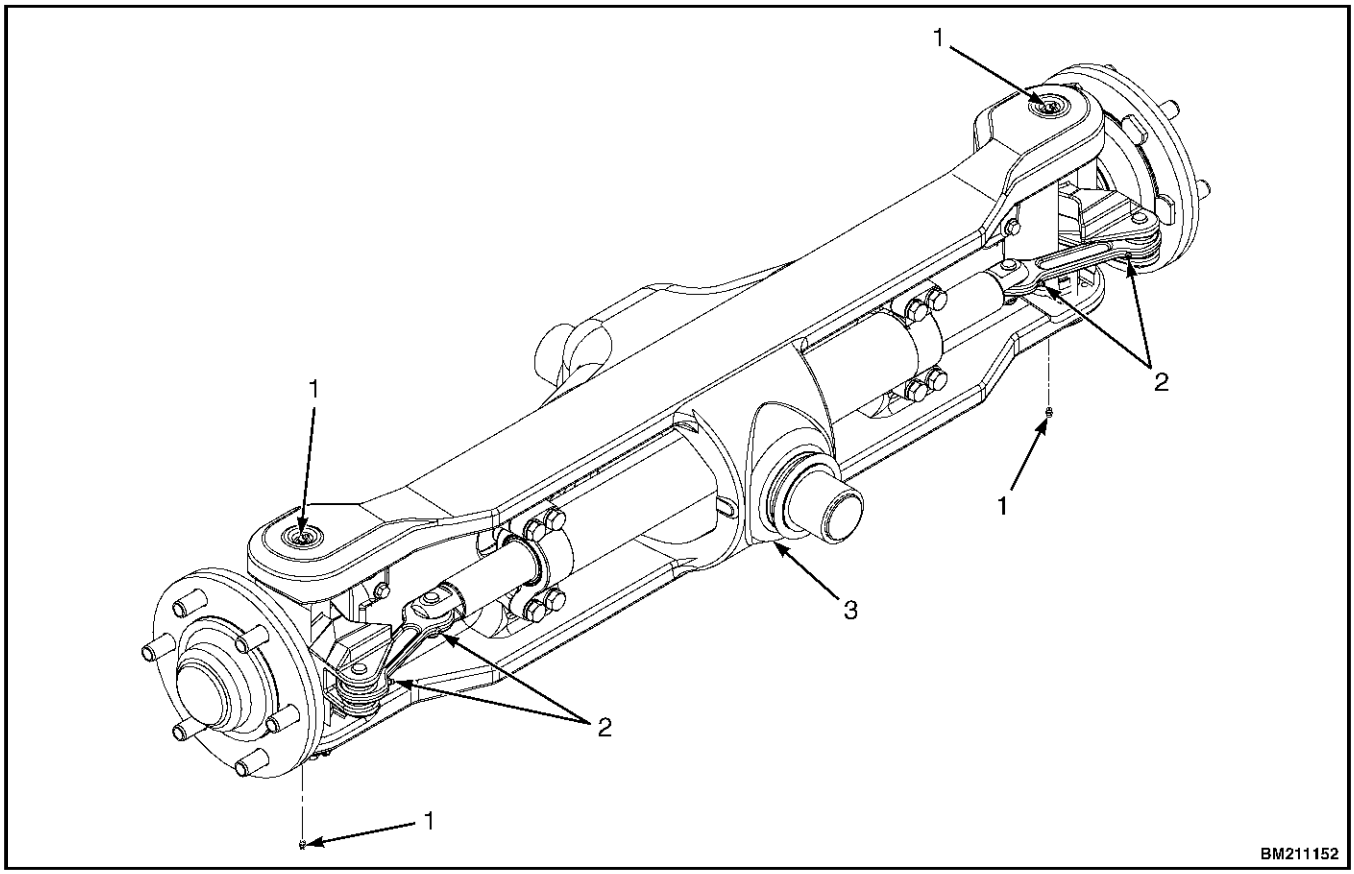
1. INTEGRAL SIDESHIFT CARRIAGE MOUNTING CAPSCREWS
2. LOWER BEARING STRIPS
3. LUBE FITTING FOR UPPER BEARINGS
4. FORK POSITIONER SOCKET HEAD MOUNTING CAPSCREWS
5. FORK POSITIONER CARRIER LUBE FITTINGS
6. FORK POSITIONER CYLINDER ROD ANCHORS

Figure 48. Integral Sideshift Carriage With Fork Positioners, Lubrication Points

3. If lift truck is equipped with a fork positioner, lubricate fork positioner carrier at lube fittings and the fork positioner rod anchors with multipurpose grease shown in the Maintenance Schedule. See Figure 48.

STEERING AXLE SPINDLE BEARINGS

Lubricate the spindle bearings on the steering axle. There are four lubricating fittings, two on each side of the steering axle. Use multipurpose grease shown in the Maintenance Schedule. See Figure 49.



1. SPINDLE BEARINGS LUBE FITTINGS
2. TIE RODS LUBE FITTINGS
3. STEERING AXLE

Figure 49. Steering Axle Tie Rods and Spindle Bearings

CONTROL LEVERS AND PEDALS

Lubricate linkages, pedal shafts, control cables (throttle, hood hinges, parking brake), and seat rails. Use silicone spray lubricant, Yale Part No. 504236201.

INSPECT ENGINE ELECTRICAL SYSTEM, CONNECTORS

NOTE: Turn lift truck engine **OFF** before inspecting engine electrical system.

When inspecting the electrical system, check the following:

- Check and clean battery connection. Ensure that connections are tight.
- Check battery for damage or cracks to the case. Replace if necessary.
- Check positive and negative cables for corrosion, rubbing, and chaffing. Tighten connections at both ends.
- Check engine wire harness for rubbing, chaffing, pinching, and cracks or breaks in the wiring.
- Check engine harness connectors. Check to ensure connectors are fitted and locked by pushing the connectors together. Pull on the connector halves to make sure they are locked.
- Check ignition coil wire for hardening, cracking, arching, chaffing, separation, split boot covers, and proper fit.
- Check that all electrical components are securely mounted and retained to the engine or chassis.
- Check the Malfunctioning Indicator Light (MIL), charging, and oil pressure lights for operation by starting the engine and checking that the light illuminates before turning out.

TRANSMISSION OIL, FILTER, BREATHER CHANGE AND WET BRAKE DRIVE AXLE OIL CHANGE

WARNING

At operating temperature, the transmission and wet brake axle oil is HOT. DO NOT permit the hot oil to touch the skin and cause a burn.

CAUTION

The oil used for the wet brake drive axle or transmission should not be contaminated. If either the wet brake drive axle and/or transmission oil becomes contaminated, the oil must be drained and replaced with new oil.

CAUTION

DO NOT permit dirt to enter the transmission or wet brake drive axle when the oil level is checked or the transmission filter is changed. Dirt will contaminate the oil and cause damage to the transmission and wet brake drive axle components.

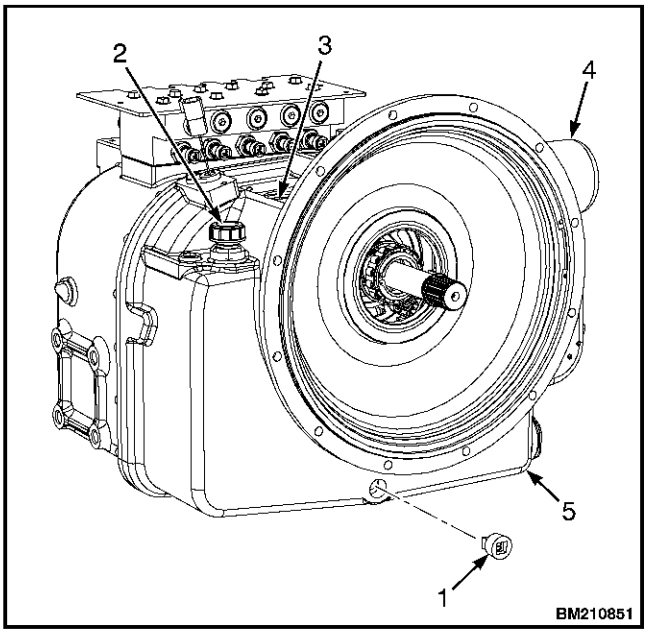
CAUTION

Disposal of lubricants and fluids must meet local environmental regulations.

NOTE: Change the transmission oil filter after the first 500 hours of operation on new lift trucks.

NOTE: Turn lift truck engine **OFF** before changing transmission oil, filter, and breather.

1. The drain plug for the transmission is located on the bell housing side of the transmission sump. Remove drain plug. Drain oil into a container. Be sure container is large enough to hold all the oil. See Maintenance Schedule for transmission oil quantity. Once oil is completely drained, reinstall drain plug. See Figure 50.

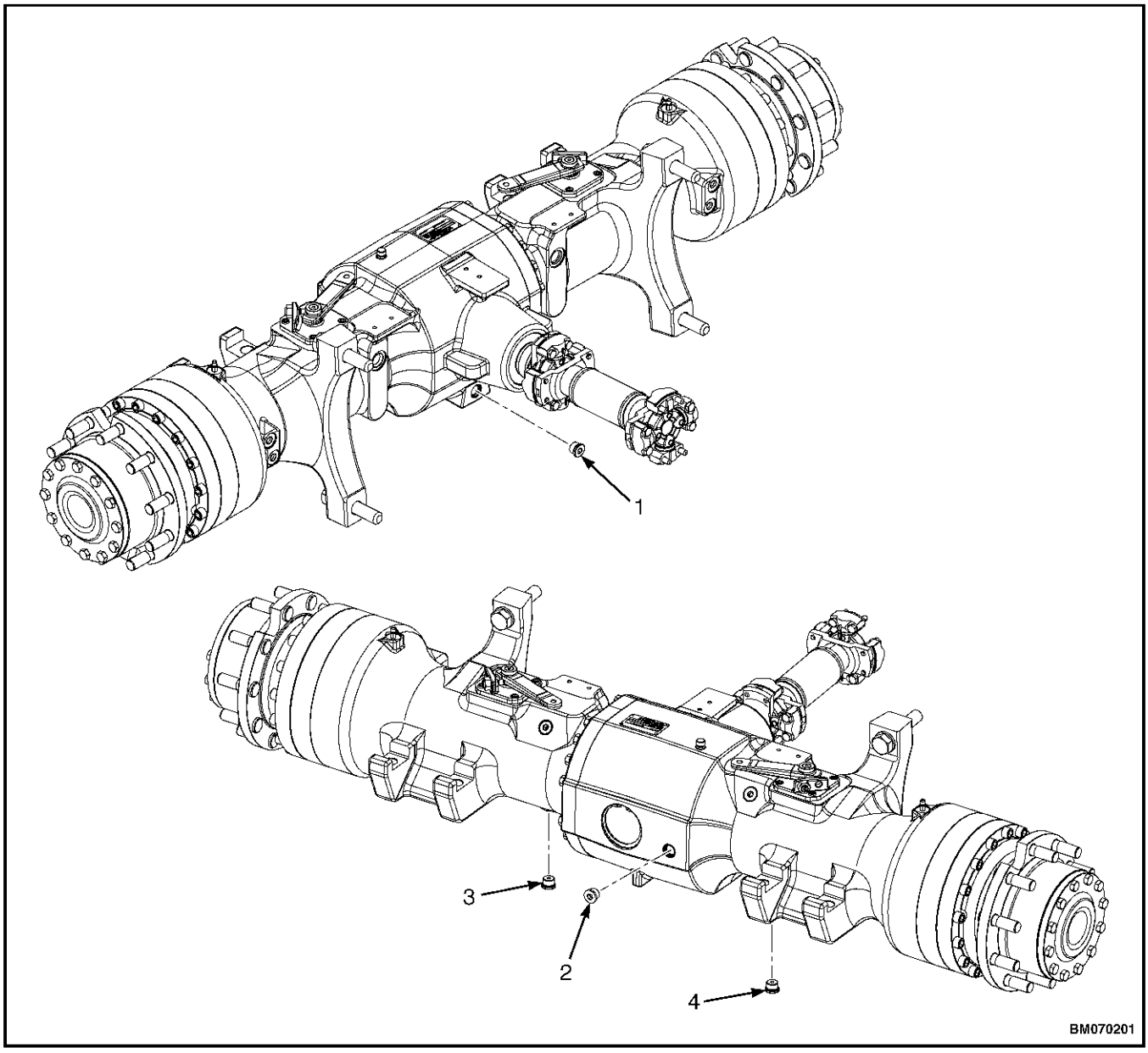


NOTE: ALL MAJOR COMPONENTS AND FRAME COMPONENTS REMOVED FOR THE SAKE OF CLARITY.

1. TRANSMISSION OIL DRAIN PLUG
2. TRANSMISSION OIL BREATHER/OIL DIPSTICK
3. TRANSMISSION OIL FILL HOLE
4. TRANSMISSION OIL FILTER
5. TRANSMISSION

Figure 50. Transmission Oil Change

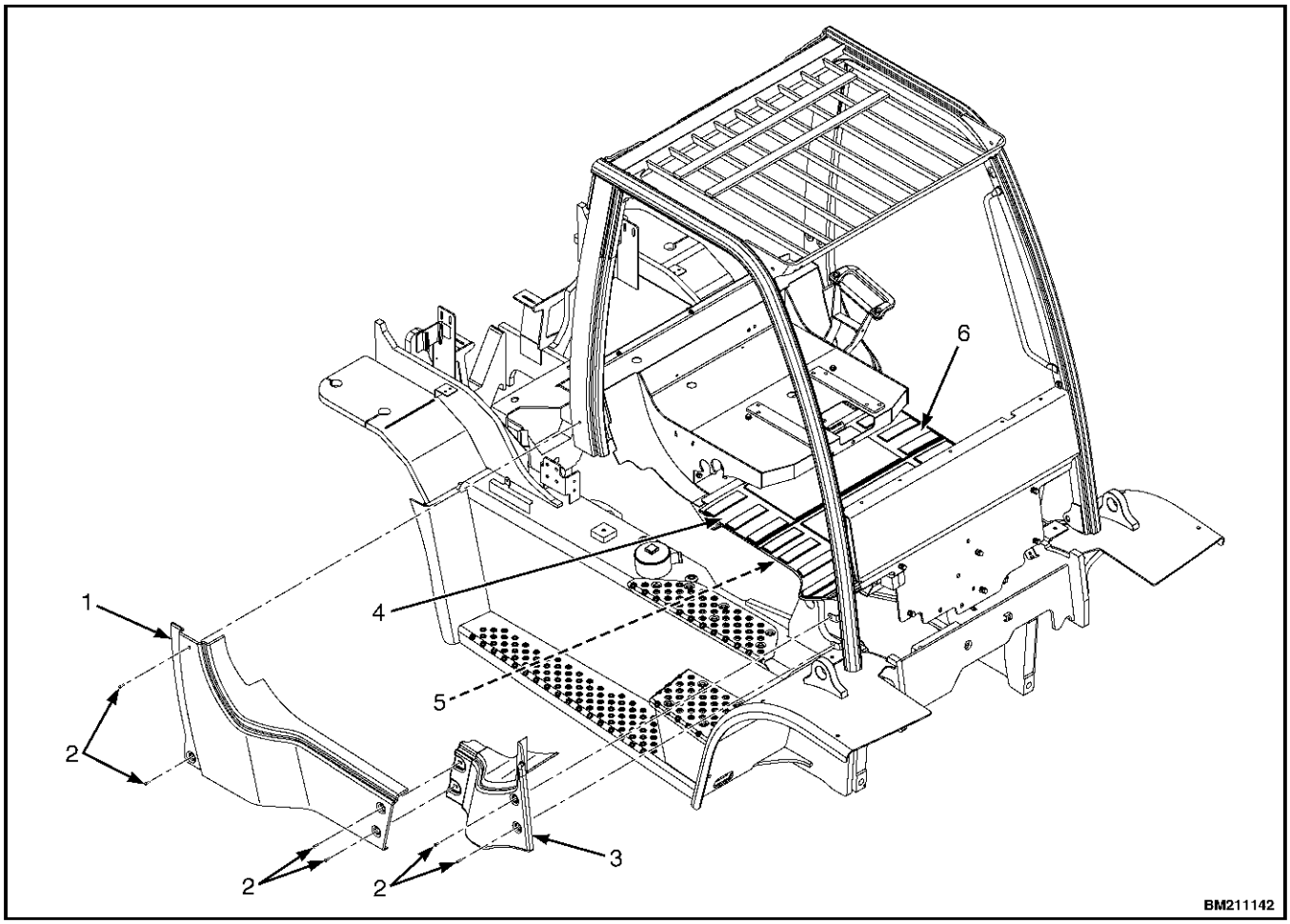
2. Remove all drain plugs from the wet brake axle and drain oil into a container. Be sure container is large enough to hold all the oil. See Maintenance Schedule for wet brake axle oil quantity. When oil has completely drained, install all drain plugs. Tighten left and right chamber drive axle housing arm and center section drain plugs to 30 to 50 N•m (22 to 37 lbf ft). See Figure 51.



1. CENTER SECTION DRAIN PLUG
2. CENTER SECTION FILL/LEVEL PLUG
3. OIL DRAIN PLUG, RIGHT SIDE
4. OIL DRAIN PLUG, LEFT SIDE

Figure 51. Wet Brake Drive Axle Drain and Fill/Level Plug Location

3. Remove floor mat and front and rear floor plate for access to transmission oil filter and dipstick. See Figure 52.



NOTE: RIGHT SIDE SHOWN.

1. RIGHT SIDE REAR COVER
2. SCREWS
3. RIGHT SIDE FRONT COVER
4. REAR FLOOR PLATE
5. FRONT FLOOR PLATE (NOT SHOWN)
6. FLOOR MAT

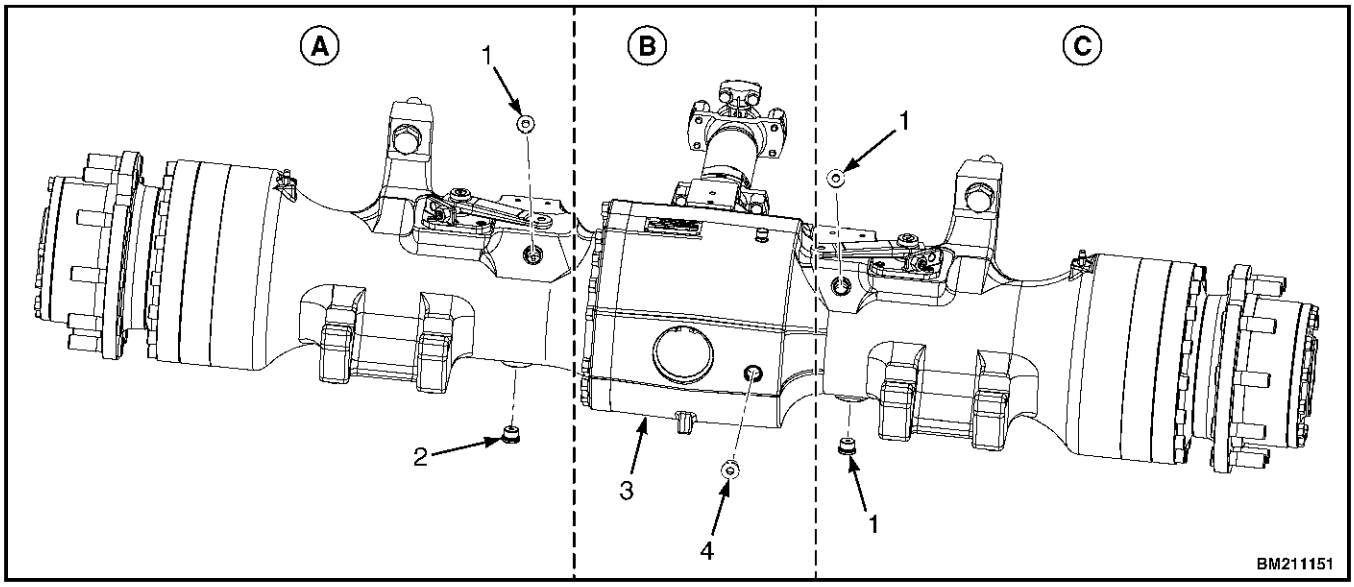
Figure 52. Side Cover Removal

4. Remove and discard old transmission oil filter. Apply clean oil to gasket of new filter. Install new filter and hand tighten.

CAUTION

Before adding oil, ensure the truck is parked and on level ground.

5. Fill wet brake drive axle center section until oil reaches the fill hole. The correct oil and quantity needed are shown in the Maintenance Schedule or Figure 53. Install fill plug and tighten to 48 to 60 N•m (35 to 44 lbf ft).



A. RIGHT DRIVE AXLE HOUSING ARM - USE JDM J20C
B. CENTER SECTION HOUSING - USE SAE J2360 GEAR OIL
C. LEFT DRIVE AXLE HOUSING ARM - USE JDM J20C

1. DRIVE AXLE HOUSING FILL PLUG
2. DRIVE AXLE HOUSING DRAIN PLUG
3. CENTER SECTION DRAIN PLUG (NOT SHOWN)
4. CENTER SECTION FILL/LEVEL PLUG

Figure 53. Oil Application Diagram

6. Add oil to transmission above the **FULL** mark on the dipstick tube. The correct oil and quantity needed is shown in the Maintenance Schedule. See Figure 50.

CAUTION

DO NOT run the engine for more than two minutes. Damage to the transmission bearings can occur if engine runs longer than two minutes and oil level is not at the full mark.

7. Start and run the engine for approximately one to two minutes after fill to allow oil to lubricate parts within the wet brake drive axle housing arms and center section.

NOTE: Transmission oil temperature should be at least 50°C (120°F) when checking oil level.

8. Turn lift tuck **OFF**. Check oil level at the transmission dipstick and add additional oil at the transmission dipstick to properly fill the transmission. The correct oil and quantity needed are shown in the Maintenance Schedule. See Figure 50.
9. Repeat Step 6, Step 7, and Step 8 until transmission oil level is at the correct level.
10. When oil level is correct, install the front and rear floor plates and floor mat. See Figure 52.

CRANKCASE BREATHER FILTER, KUBOTA 3.8L DIESEL ENGINE

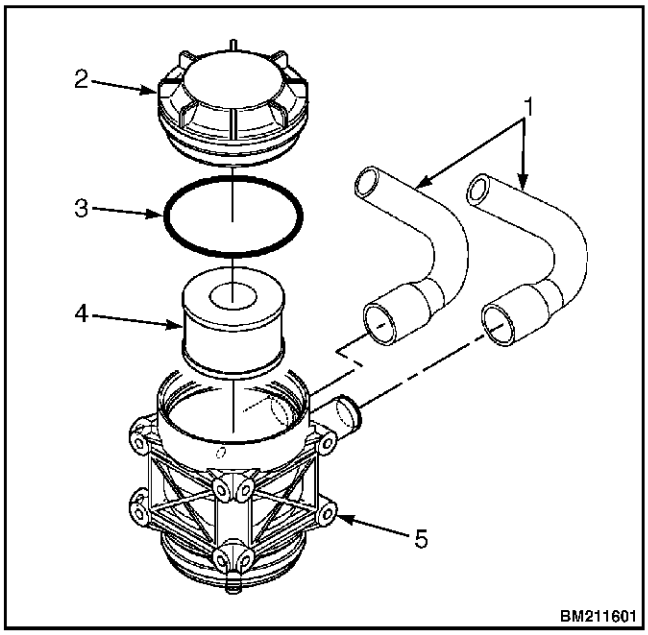
NOTE: This section applies only to emissions compliant Kubota 3.8L diesel engines.

NOTE: Perform this procedure at 1500 hours. Use hour interval only.

Remove

1. Stop engine and allow it to cool.
2. Disconnect two drain hoses coming from upper valve cover and turbo charger at breather element housing. See Figure 54.
3. Cap hose connection ports to prevent debris from entering.

4. Remove top section of breather element housing. See Figure 54.
5. Remove and discard O-ring from top section. See Figure 54.
6. Remove and discard breather element. See Figure 54.



1. DRAIN HOSES
2. TOP SECTION
3. O-RING
4. CRANKCASE BREATHER ELEMENT
5. CRANKCASE BREATHER HOUSING.

Figure 54. Crankcase Breather

Clean and Inspect

CAUTION

A small amount of oil may be present in the breather element housing. Use gloves to prevent skin irritation and wear eye protection.

CAUTION

Disposal of lubricants and fluids must meet local environmental regulations.

Clean and inspect crankcase breather housing for cracks and leaks. If necessary see **Parts Manual** for replacement parts.

Inspect hoses for wear and cracks. Replace if necessary. See **Parts Manual.**

Install

1. Install new breather filter into breather element housing. See Figure 54.
2. Install new O-ring on top section of breather element. See Figure 54.
3. Install breather element housing top section to breather housing. See Figure 54.
4. Remove hose port caps. Connect two drain hoses to upper valve cover and turbo charger. See Figure 54.
5. Start engine and check for leaks.

DEF INJECTOR TIP

NOTE: This section applies only to emissions compliant Kubota 3.8L diesel engines.

NOTE: Check DEF injector tip at 1500 hours. Use hour interval only.

Remove DEF injector from SCR mixer piper, See **Diesel Exhaust Fluid System** section in manual **Frame** 0100YRM2293 for procedures. Check tip of DEF injector for deposits, if there are any solids deposited, wash tip with water, inspect injector several times. After washing with water, inspect injection holes for more deposits. If injector nozzle can not be cleaned, replace DEF injector with new one. See **Parts Manual** for replacement parts.

Maintenance Procedures Every 2000 Hours or Annually

NOTE: Perform the Maintenance Procedures Every 8 Hours or Daily, Maintenance Procedures Every 500 Hours or 6 Months, and Maintenance Procedures Every 1000 Hours or 6 Months prior to performing the procedures in this section.

HYDRAULIC SYSTEM

Hydraulic Filter Assembly, Replace

Remove

WARNING

At operating temperature, the hydraulic oil is HOT. DO NOT permit the hot 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. Dirt can cause damage to the components of the hydraulic system.

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

CAUTION

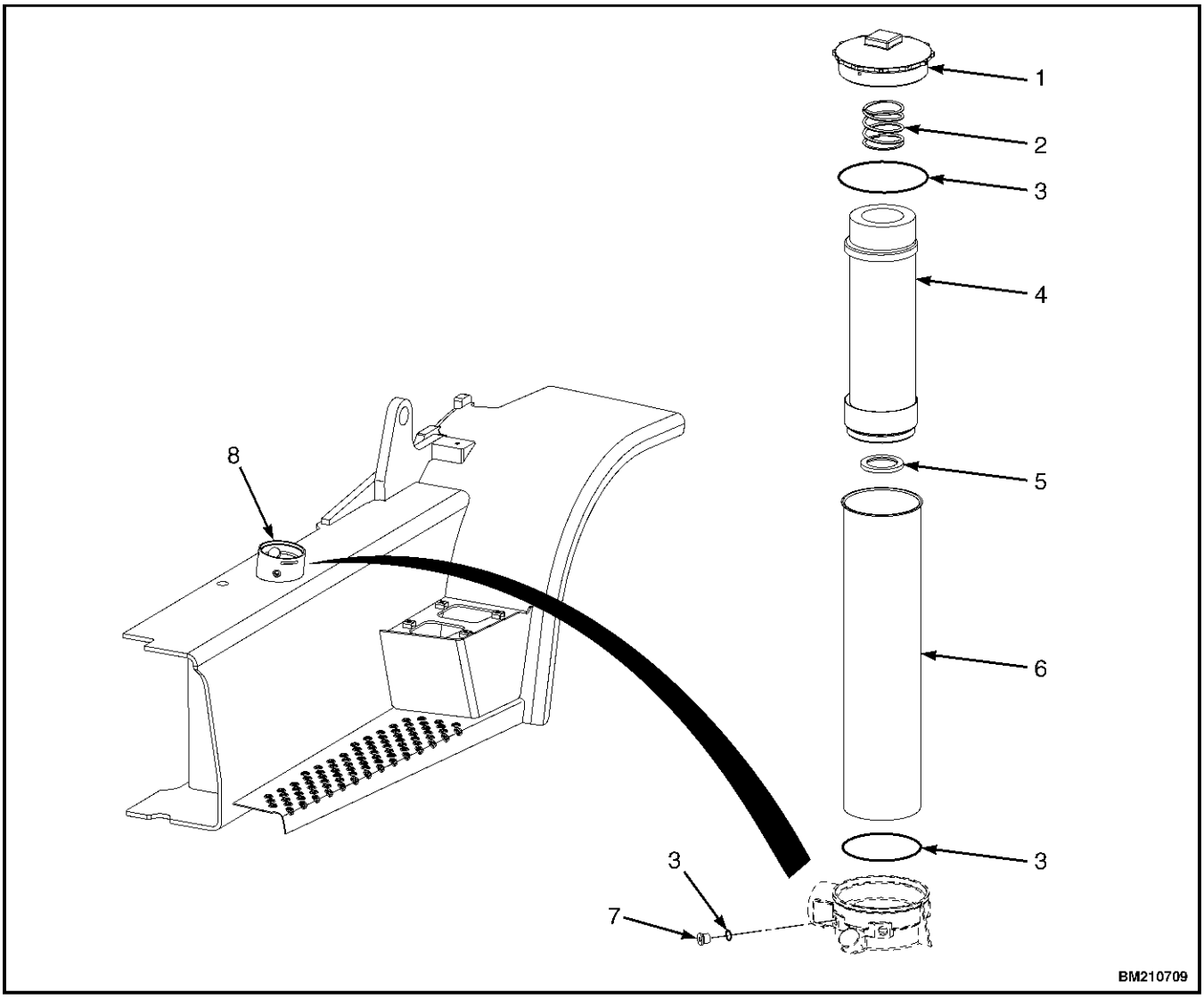
Disposal of lubricants and fluids must meet local environmental regulations.

NOTE: Turn lift truck engine **OFF** before changing hydraulic filter.

1. Put lift truck on a level surface and lower the carriage.
2. Remove four screws and right side rear cover to access hydraulic filter. See Figure 56.

NOTE: Use a container large enough to hold the hydraulic filter assembly and allow for hydraulic oil draining.

3. Unscrew and remove lid, spring, and O-ring from head. See Figure 55.
4. Remove filter, seal, O-ring, and bowl from hydraulic tank and place into container to drain oil. Cover the head to prevent any foreign materials from getting into the hydraulic tank.
5. Remove filter and seal from bowl. See Figure 55.
6. If present, clean contaminants from inside of bowl.



1. LID
2. SPRING
3. O-RING
4. FILTER
5. SEAL
6. BOWL
7. FITTING
8. HEAD

Figure 55. Hydraulic Filter Assembly

Install

1. Lubricate new seal with clean hydraulic oil, and install it on bottom of new hydraulic filter. Install new filter into bowl. See Figure 55.
2. Install hydraulic filter and bowl into hydraulic tank.
3. Install new O-ring, spring, and lid onto head.

CAUTION

Additives may damage the hydraulic system. Before using additives, contact your local Yale dealer.

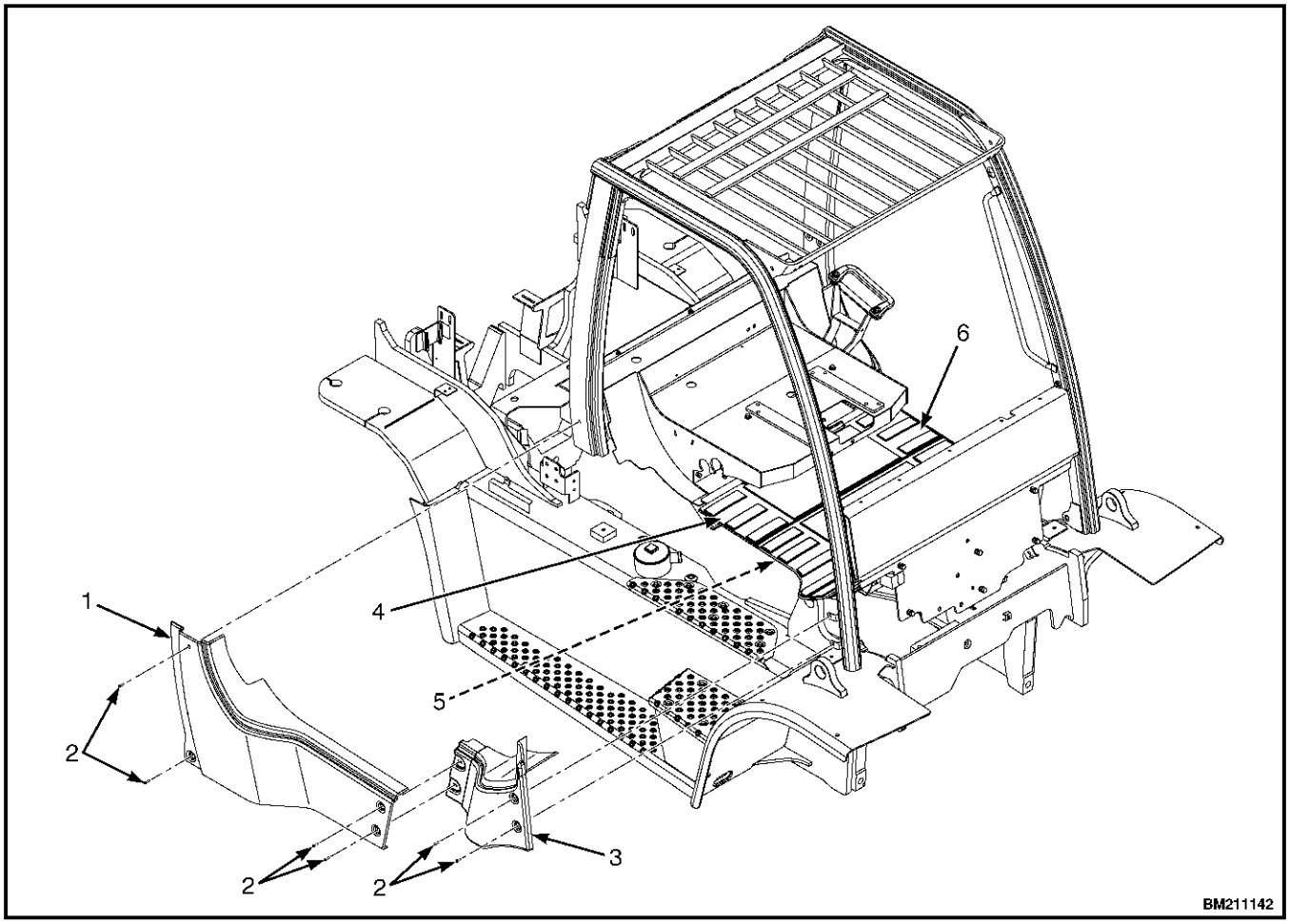
4. Start the truck, and allow it to run for 30 seconds. Check for leaks. Stop engine and check hydraulic oil level. Add oil, if necessary. Use hydraulic oil shown in the Maintenance Schedule.

5. Install right side rear cover using four screws. See Figure 56.

Hydraulic Tank Breather, Replace

NOTE: Turn lift truck engine **OFF** before replacing the hydraulic tank breather.

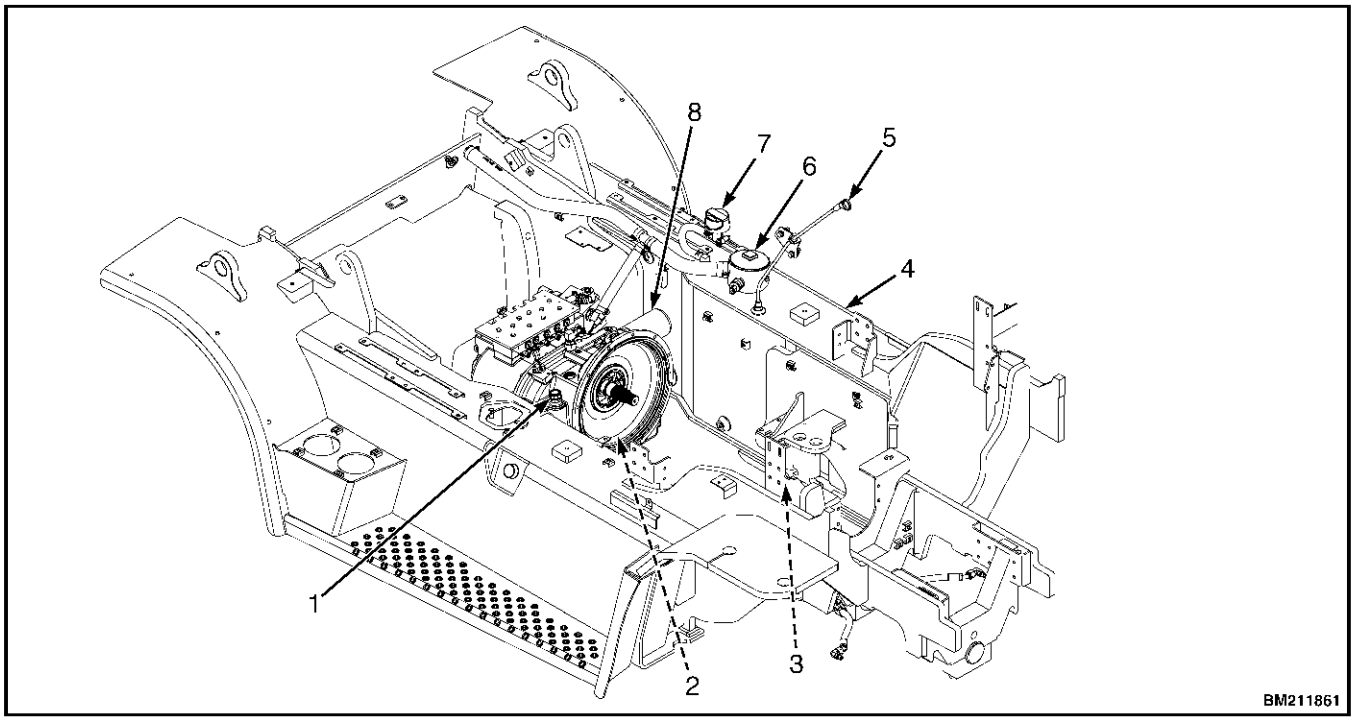
1. Remove four screws and right side rear cover to access the hydraulic tank breather. See Figure 56 and Figure 57.



NOTE: RIGHT SIDE SHOWN.

1. RIGHT SIDE REAR COVER
2. SCREWS
3. RIGHT SIDE FRONT COVER
4. REAR FLOOR PLATE
5. FRONT FLOOR PLATE (NOT SHOWN)
6. FLOORMAT

Figure 56. Side Cover Removal



1. TRANSMISSION OIL BREATHER/OIL DIPSTICK
2. TRANSMISSION OIL DRAIN PLUG
3. HYDRAULIC OIL DRAIN PLUG
4. HYDRAULIC TANK
5. HYDRAULIC OIL DIPSTICK
6. HYDRAULIC OIL FILTER
7. HYDRAULIC TANK BREATHER
8. TRANSMISSION OIL FILTER

Figure 57. Transmission and Hydraulic Oil Checks

2. Unscrew and remove old hydraulic tank breather, and replace with new hydraulic tank breather.

3. Install right side rear cover using four screws. See Figure 56.

COOLING SYSTEM CHECK

1. Put lift truck on a level surface. Stop engine. Place a container, with a capacity large enough to hold coolant quantities shown in Maintenance Schedule, under the radiator drain valve. See Figure 58.

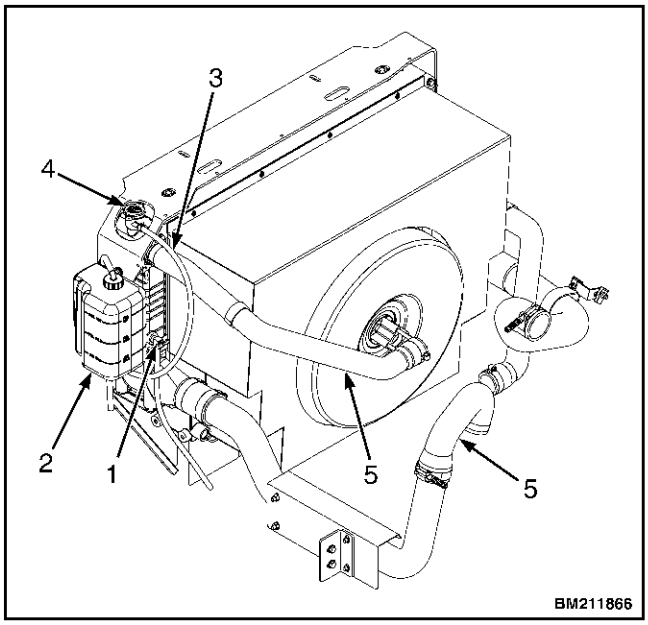
WARNING

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

CAUTION

Disposal of lubricants and fluids must meet local environmental regulations.

2. Open drain valve and remove radiator cap. See Figure 58. Drain coolant into the container. Flush cooling system. Check hoses for damage. Replace any damaged hoses with new hoses, as needed.



NOTE: FRONT VIEW SHOWN.
NOTE: COOLING SYSTEM SHOWN APPLIES TO BOTH EMISSIONS COMPLIANT AND NON-EMISSIONS COMPLIANT ENGINES.

1. DRAIN VALVE
2. AUXILIARY RESERVOIR
3. AUXILIARY RESERVOIR HOSE
4. RADIATOR CAP
5. COOLING SYSTEM HOSES

Figure 58. Cooling System Check

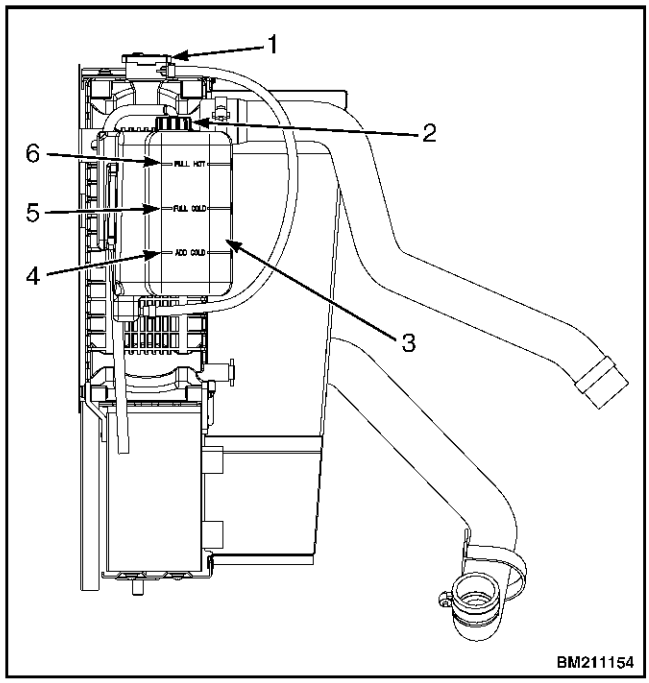
3. Disconnect the hose leading from the auxiliary reservoir to fitting at the top of the radiator under the radiator cap, and drain the reservoir into the same container used for the radiator coolant. Check the reservoir for contaminants and flush, as necessary. Connect the hose back on the fitting at the top of the radiator.

CAUTION

Additives may damage the cooling system. Before using additives, contact your local Yale dealer.

4. Close drain valve. Fill cooling system with the correct coolant, use Ethylene Glycol Boron-free Antifreeze. Purchase a pre-diluted 50/50 solution; or mix 50% concentrate with 50% distilled or deionized water. Fill the auxiliary reservoir to a level between the **ADD** and **FULL** marks on the reservoir. See Figure 59.

5. Install radiator cap. Start engine. Check for leaks. Add coolant to auxiliary coolant reservoir as needed. Coolant level should be between the **ADD** and **FULL** marks on the reservoir.



1. RADIATOR CAP
2. FILL CAP
3. AUXILIARY COOLANT RESERVOIR
4. **ADD** MARK
5. **FULL** COLD MARK
6. **FULL** HOT MARK

Figure 59. Auxiliary Coolant Reservoir

AIR FILTER

The air filter canister should not be opened until an air filter element replacement is required. An air filter element replacement is required when one of the following occurs:

- The optional air flow restriction indicator light on the dash illuminates.
- The optional manual air flow indicator button pops up.
- The specified number of hours has passed since the last filter element replacement.

CAUTION

DO NOT to allow dirt to enter the engine air intake when replacing the air filter element. A small amount of dirt could cause engine damage.

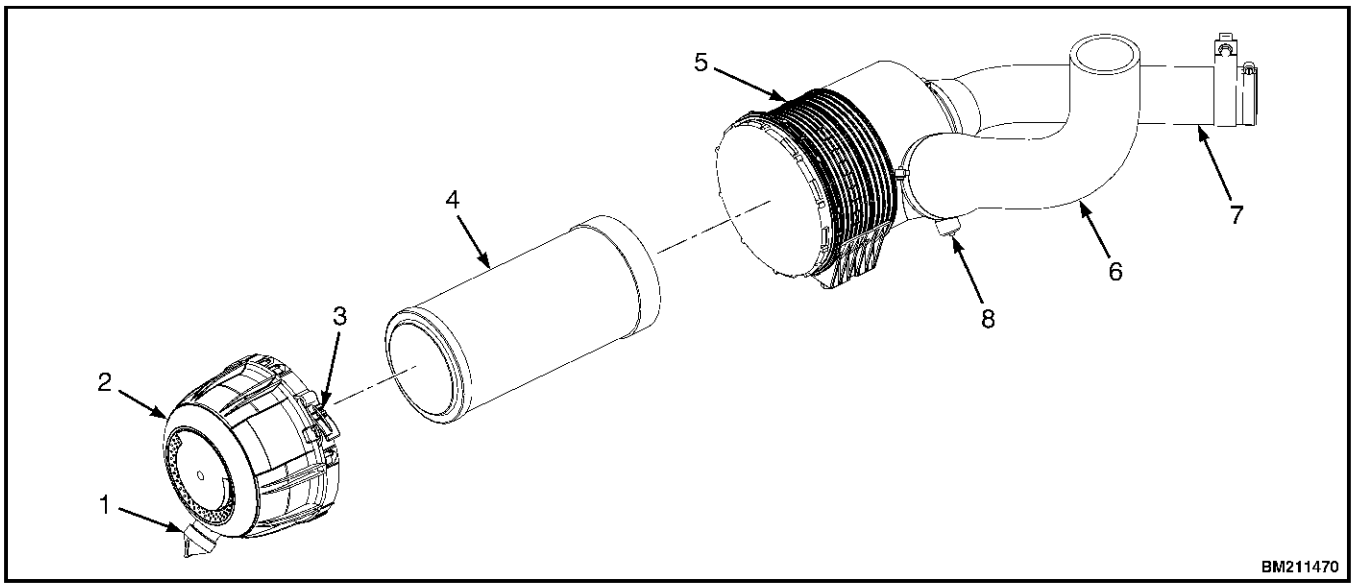
1. Shut off engine. Never open air filter canister or remove filter element with engine running.

2. Unlatch and remove air filter cover. To remove air filter element, press and rotate air filter element counterclockwise about 1/8 turn until the air filter element is free. To assist removal, gently move the end back and forth to help break the seal. See Figure 60.

3. Gently pull air filter element from air filter canister. Avoid dislodging contaminants from the air filter element or knocking it against the canister.

4. With a clean, soft rag, clean the inside surface of the air filter canister. Clean well around the locking tabs that retain the element. Clean tabs make new air filter element installation easier. Be careful not to knock any contaminants into the outlet tube to the engine.

5. Inspect the new air filter element for voids, cuts, tears or indentations in the urethane-sealing surfaces. DO NOT use if damage is detected.



1. DUST DISCHARGE VALVE
2. AIR FILTER COVER
3. AIR FILTER COVER LATCH
4. AIR FILTER ELEMENT
5. AIR FILTER CANISTER
6. AIR INLET HOSE
7. AIR OUTLET HOSE
8. AIR RESTRICTION SWITCH*

*Switch used only on emissions compliant engines

Figure 60. Air Filter Check

CAUTION

The element must be properly installed to ensure adequate engine protection. An improperly installed element may allow dirt and dust to enter and damage the engine.

NOTE: Proper air filter element installation is required to allow the cover to be installed correctly. Never reinstall a used air filter element. Never install a damaged air filter element. Always use a Yale - approved air filter element.

6. Install the new air filter element into the air filter canister. Press and rotate the air filter element 1/8 turn clockwise until fully engaged in the air filter canister. See Figure 60.

CAUTION

During cover installation, DO NOT force the air filter cover on the canister. To do so will result in damage to the air filter element, cover, and possibly the canister.

NOTE: If the air filter element is properly installed, the air filter cover will fit easily into the canister with no gap between the cover and the canister. If the cover does not fit easily, the air filter element is not installed properly. DO NOT use a cover that is bent, damaged, or missing latches.

7. Install the cover into the canister and ensure the **INLET** arrow is in line with the canister inlet.

NOTE: DO NOT use the latches to pull the cover down against the canister. If the cover does not fit completely against the canister with no gaps, the element is not installed correctly.

8. Fasten latches to secure cover to canister. Make sure latches penetrate the slots in both the canister and the cover.

9. Inspect the entire air intake system for leaks. Inspect all clamps for tightness and tighten if necessary. Inspect all hoses for damage. Replace damaged hoses. Inspect the dust discharge valve for damage. If damaged, replace the dust discharge valve. See Figure 60.

FUEL INJECTORS AND FUEL SYSTEM

For removal and cleaning instructions for fuel injectors and other fuel system components on the Kubota 3.8L diesel engine, contact your local **Yale** dealer or see one of the service manuals listed below:

- **Kubota 3.8L Diesel Engine (Tier 4), 55kW With DOC** 0600YRM1961
- **Kubota 3.8L Diesel Engine Stage V, 55kW With DPF** 0600YRM2190
- **Kubota 3.8L Diesel Engine (Non-Compliant, 82kW)** 0600YRM2294
- **Kubota 3.8L Diesel, 82kW Engine (Tier 4, Stage V)** 0600YRM2295

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. Replaced damaged forks. Forks are to be replaced only in sets and not individually.

1. Inspect forks for cracks and wear. Check that fork tips are aligned as shown in . Check that bottom of fork is not worn (item A, Figure 61).

CAUTION

Remove fork latch pins if adding a fork positioner attachment. Damage to forks and other carnage components can occur if fork lat pins are not removed prior to using attachment.

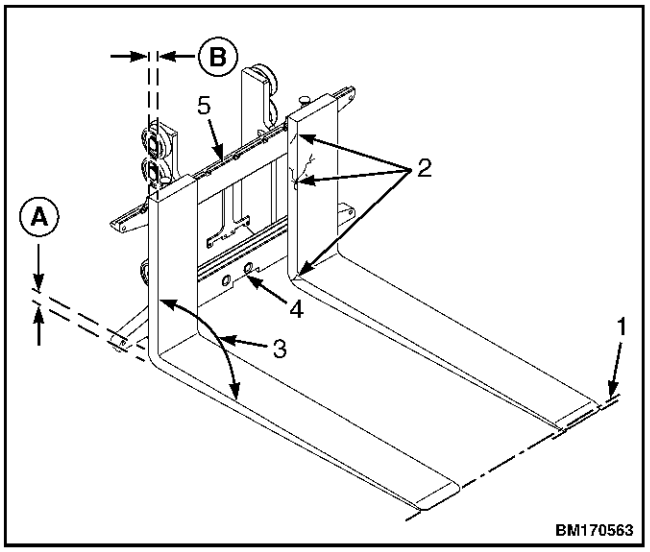
2. Replace any damaged or broken parts that are used to keep forks locked in position.

3. Inspect fork wear. Ensure heel wear is not more than 10% of original thickness. If fork wear is more than 10%, fork must be replaced or rerated. Perform fork wear inspection using a BOL256N1 caliper ruler Yale P/N 550088603 as follows. See Figure 62.

   a. Determine normal thickness of "N" of fork using scale or ruler portion of caliper ruler. Measurement has to be done on fork shank using caliper ruler.

   b. Position caliper at end of heel internal radius (item A, Figure 61) with opening corresponding to measured thickness of fork shank in Step a above. (e.g. for N 1.75 use N 1.75 opening). This is typically the section of fork where wear is greatest. Note that opening distance has been reduced by 10% from nominal thickness.

   c. If fork enters opening, it is mandatory to replace it. DANGER OF BREAKING. Furthermore, a 10% reduction in fork blade thickness results in 20% reduction in operating capacity.



Fork Tip Alignment	
Length of Forks	**3% Dimension**
1200 mm (47 in.)	36 mm (1.42 in.)
1500 mm (59 in.)	45 mm (1.77 in.)
1800 mm (71 in.)	54 mm (2.13 in.)
2100 mm (83 in.)	63 mm (2.48 in.)
2400 mm (94 in.)	72 mm (2.83 in.)

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

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

Figure 61. Forks Check

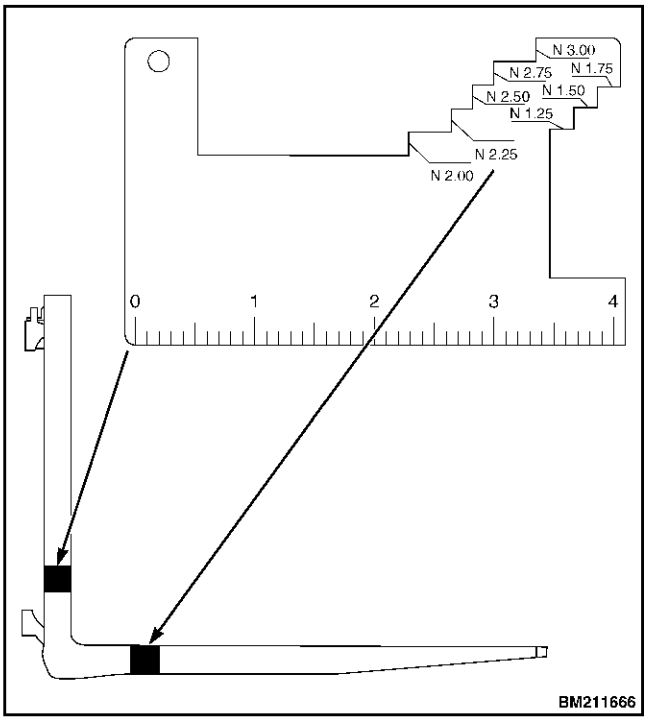


Figure 62. Fork Wear Check

CHECK THROTTLE SHAFT FOR STICKING

Check Throttle body return action to ensure throttle shaft is not sticking. Repair if necessary.

INSPECT EXHAUST MANIFOLD AND PIPING FOR LEAKS

To check the exhaust manifold and piping for leaks, perform the following:

- Check the exhaust manifold at the cylinder head for leaks. Ensure that all bolts and shields are in place.
- Check exhaust pipe fasteners to manifold for leaks to ensure they are tight. Repair if necessary.
- Check all exhaust pipe extension connectors for leaks and tighten, if necessary.
- Visually inspect converter for correct muffler mounting and tail pipe mounting.
- Check for any leaks at the inlet and outlet of the converter.

TRANSMISSION AUTOMATIC CLUTCH CALIBRATION

Calibrate the transmission clutches every 2000 hours or annually. See **Calibration Procedures** 8000YRM1134 for the procedures to calibrate transmission clutches.

BRAKE SYSTEM ACCUMULATOR

The design of the brake system accumulator does not allow for precharge pressure checks or recharge of a failed component. See **Wet Brake System** 1800YRM1977 for procedure on replacing accumulator.

OXYGEN SENSORS

Kubota 3.8L Diesel Engine

See **Electrical System** 2200YRM1954 for procedures to inspect and replace oxygen sensors used on Kubota 3.8L diesel engine.

WHEEL BEARINGS

Steer Wheels, Lubrication

Lubricate the wheel bearings in the hubs for the steer wheels with multipurpose grease as shown in the Maintenance Schedule. See **Steering Axle** 1600YRM1952 for the procedures.

Maintenance Procedures Every 3000 Hours

NOTE: Perform the Maintenance Procedures Every 8 Hours or Daily, Maintenance Procedures Every 500 Hours or 6 Months, Maintenance Procedures Every 1000 Hours or 6 Months, and Maintenance Procedures Every 2000 Hours or Annually checks prior to performing the procedures in this section.

NOTE: The information in this section applies only to emissions compliant Kubota 3.8L diesel engines.

NOTE: For lift trucks equipped with a Kubota 3.8L, 82kW, Stage V emissions compliant diesel engine, cleaning the ash from the DPF can be done at 6000 hours, or whenever the DPF display indicates that the ash must be removed. Follow procedures below to remove, disassemble, service, assemble, and install the DPF.

DIESEL PARTICULATE FILTER

Remove

WARNING

The lift truck must be put on blocks for some types of maintenance and repairs. The removal of the following assemblies will cause large changes in the center of gravity: mast, drive axle, engine and 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.**

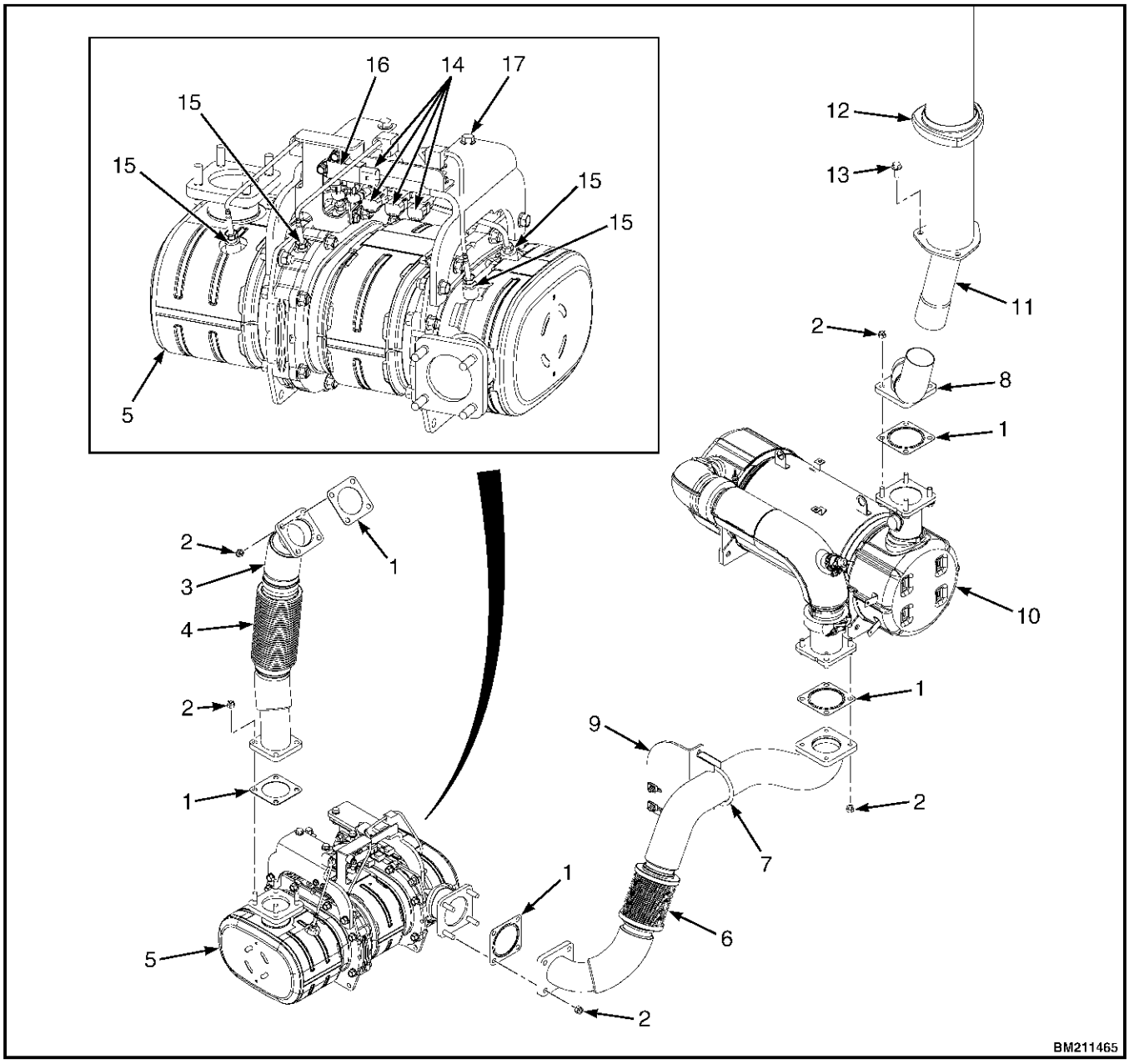
The surface must be solid, even and level when the lift truck is put on blocks. Make sure that any blocks used to support the lift truck are solid, one-piece units. See the procedure How to Put Lift Truck on Blocks in the Operating Manual.

NOTE: Some components may require penetrating lubricant to assist in their removal. **DO NOT** apply penetrating lubricant to gaskets or electronics.

NOTE: Allow exhaust components to cool before attempting to service them.

1. Put lift truck on blocks. See How to Put Lift Truck on Blocks section of this manual.

2. Remove four lock nuts that connect exhaust pipe (exhaust manifold to DPF) and the exhaust manifold on the engine. See Figure 63.



1. GASKET
2. LOCKNUT
3. EXHAUST PIPE (EXHAUST MANIFOLD TO DPF)
4. HEAT SHIELD
5. DIESEL PARTICULATE FILTER (DPF)
6. EXHAUST PIPE (DPF OUT)
7. CLAMP
8. EXHAUST PIPE
9. SUPPORT BRACKET
10. SCR
11. EXHAUST PIPE (OVERHEAD EXHAUST)
12. FLANGE COVER
13. CAPSCREW
14. TEMPERATURE SENSOR
15. DIFFERENTIAL PRESSURE PIPE
16. DIFFERENTIAL PRESSURE SENSOR
17. SENSOR CONNECTORS
18. DPF MOUNTING CAPSCREW
19. NUT

Figure 63. Diesel Particulate Filter and Exhaust System

3. Remove four locknuts that connect exhaust pipe (exhaust manifold to DPF) and the DPF. See Figure 63.

4. Remove exhaust pipe (exhaust manifold to DPF). See Figure 63.

5. Remove gaskets and discard.

6. Disconnect the sensor connectors from wiring harness. See Figure 63.

7. Remove four locknuts that connect exhaust pipe (DPF out) and DPF. See Figure 63.

WARNING

The DPF is heavy. Make sure lifting device has enough capacity to lift DPF. The DPF weighs approximately 25 kg (55 lb). Make sure not to damage the DPF muffler assembly by falling or impact as it contains a ceramic filter. Even if there is no apparent damage, a dropped or shocked DPF will need to be replaced with a new one.

8. Position a rolling jack or transmission jack under the lift truck and support the bottom of the DPF.

9. Remove four DPF mounting capscrews and nuts from the DPF and frame mount. See Figure 63.

10. Lower rolling jack or transmission jack with DPF and remove from under lift truck.

11. Store DPF in a safe location away from traffic and other potential hazards. Cap ends of DPF to prevent debris and other contaminants from entering DPF.

12. Remove four locknuts that connect exhaust pipe (DPF out) and SCR. See Figure 63.

13. Remove exhaust pipe (DPF out) from lift truck.

NOTE: Exhaust pipe (overhead exhaust) (11, Figure 63) must be removed before removing the counterweight and other components of the exhaust system. See the section Counterweight Repair for the removal procedures for the counterweight.

14. Remove flange cover and flange bolts that secure exhaust pipe (overhead exhaust) to the counterweight. See Figure 63.

15. Remove clamp that attaches exhaust pipe (elbow) to exhaust pipe (overhead exhaust) together. See Figure 63.

16. Remove exhaust pipe (overhead exhaust). See Figure 63.

17. Remove counterweight. See **Frame** 0100YRM2293 for the removal procedures for the counterweight.

18. Remove four locknuts that attaches exhaust pipe (elbow) and SCR together. See Figure 63.

19. Remove exhaust pipe (elbow). See Figure 63.

20. Remove clamp securing exhaust pipe to mounting bracket. See Figure 63.

21. Remove clamp that attaches exhaust pipe (elbow) and exhaust pipe (DPF out) together. See Figure 63.

22. Remove SCR. See Figure 63.

Disassemble

1. Remove M8 capscrew and square nut securing DPF's pressure tubes. See Figure 64.

2. Remove hose clamps securing hoses to pressure tubes. See Figure 64.

3. Disconnect pressure tubes from their fittings on DPF. Mark which pressure tube goes to which fitting on the DPF to aid in installation. See Figure 64.

4. Pull pressure tube from pressure hose on pressure sensor and remove pressure tubes from DPF. See Figure 64.

5. Disconnect temperature sensors from fittings on DPF. Mark temperature sensors and their corresponding fittings on DPF to aid in installation. See Figure 64.

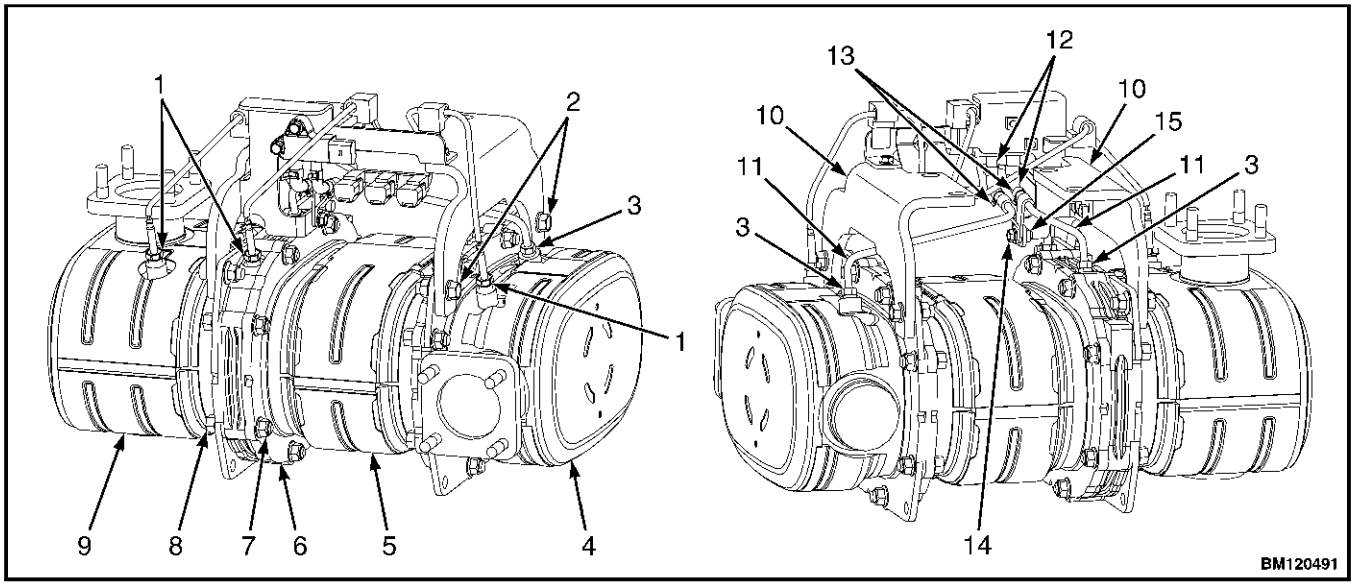
6. Remove four mounting capscrews and four mounting nuts from DPF to mounting bracket. See Figure 64.

7. Remove mounting bracket.

8. Remove 16 capscrews and nuts. See Figure 64.

9. Remove DOC from DPF collar and DPF filter compartment. See Figure 64.

10. Remove DPF filter compartment from DPF outlet. See Figure 64.



1. TEMPERATURE SENSOR
2. MOUNTING CAPSCREWS
3. PRESSURE TUBE FITTING
4. DPF OUTLET
5. FILTER COMPARTMENT (DPF)
6. DPF COLLAR
7. NUT
8. CAPSCREW
9. DIESEL OXIDATION CATALYST (DOC)
10. MOUNTING BRACKET
11. PRESSURE TUBE
12. PRESSURE HOSE
13. CLAMP
14. M8 CAPSCREW
15. SQUARE NUT

Figure 64. Diesel Particulate Filter

Servicing the Diesel Particulate Filter, Pressure Tubes, and Pressure Hoses

ALERT

For lift trucks equipped with a Kubota 3.8L, Stage V, 55kW and 82kW emissions certified diesel engine, equipped with a DPF, remove the ash content every 6000 hours or when ash meter on DPF display indicates a full DPF. Whichever occurs first.

See manual **Frame** 0100YRM2293, section **Diesel Particulate Filter (DPF)**, for procedures to remove the ash content and clean the filter, and for procedures for servicing the pressure tubes and pressure hoses.

Assemble

1. Wipe off anti-seize or lubricating compound from threads of temperature sensors and pressure tube fittings.
2. Apply new anti-seize or lubricating compound to threaded ends of temperature sensors and pressure tube fittings.
3. Assemble DPF outlet, with new gasket, to DPF filter compartment with new or cleaned filter using eight capscrews and eight nuts. **DO NOT** tighten capscrews and nuts. See Figure 64.
4. Assemble DPF filter compartment, with new gasket, to DPF collar and the DPF collar, with new gasket, to the DOC using eight capscrews and eight nuts. **DO NOT** tighten capscrews and nuts. See Figure 64.
5. In a star pattern begin tightening the 16 capscrews and nuts to 49 to 55 N•m (37 to 41 lbf ft).
6. Install mounting bracket using four mounting capscrews and four mounting nuts. **DO NOT** tighten capscrews and nuts. See Figure 64.

7. Install (3) temperature sensors in their designated fittings as indicated during removal. Tighten to 25 to 34 N•m (18 to 25 lbf ft). See Figure 64.

8. Install hose clamps on pressure tubes. See Figure 64.

9. Install pressure tubes into hose ends at pressure sensor and tighten threaded end of pressure tube to fitting indicated during removal. Tighten pressure tube fittings to 16 to 22 N•m (12 to 16 lbf ft). See Figure 64.

10. Pinch hose clamps and slide into position sealing pressure tubes and pressure hose together. See Figure 64.

11. Tighten four mounting capscrews and mounting nuts securing DPF to mounting bracket to 49 to 55 N•m (37 to 41 lbf ft). See Figure 64.

12. Install M8 capscrew and square nut securing pressure tubes to mounting bracket. Tighten capscrew and square nut to 24 to 27 N•m (18 to 20 lbf ft). See Figure 64.

Install

1. Remove caps from DPF and using a rolling floor jack or transmission jack install DPF under lift truck.

2. Using rolling floor jack or transmission jack, lift DPF up to frame mount in lift truck.

3. Install four mounting capscrews and nuts into DPF and frame mount. See Figure 63. Tighten lock nuts to 49 to 55 N•m (37 to 41 lbf ft).

4. Connect sensor connectors to wiring harness.

5. Install new gasket, exhaust pipe (DPF out), and four lock nuts. See Figure 63. Tighten lock nuts to 49 to 55 N•m (37 to 41 lbf ft).

NOTE: DO NOT tighten exhaust clamps until complete exhaust system has been installed in lift truck.

6. Install new gasket, exhaust pipe (DPF out), and four lock nuts onto DPF. Tighten lock nuts to 49 to 55 N•m (37 to 41 lbf ft). See Figure 63.

NOTE: DO NOT tighten exhaust clamps until complete exhaust system has been installed in lift truck.

7. Install clamp on exhaust pipe to mounting bracket.

NOTE: DO NOT tighten exhaust clamps until complete exhaust system has been installed in lift truck.

8. Install new gasket, exhaust pipe (elbow), and four locknuts onto SCR. Tighten lock nuts to 49 to 55 N•m (37 to 41 lbf ft). See Figure 63.

9. Install counterweight. See **Frame** 0100YRM2293 for installation procedures.

NOTE: DO NOT tighten exhaust clamps until complete exhaust system has been installed in lift truck.

10. Install exhaust pipe (overhead exhaust) onto exhaust pipe (elbow). Make sure exhaust pipes sleeve together completely before installing clamps. See Figure 63.

11. Install flange cover and capscrews securing exhaust pipe (overhead exhaust) to counterweight. See Figure 63.

12. Install new gasket, exhaust pipe (exhaust manifold to DPF), and four locknuts onto DPF. See Figure 63. Tighten lock nuts to 49 to 55 N•m (37 to 41 lbf ft).

13. Install new gasket, exhaust pipe (exhaust manifold to DPF), and four locknuts onto exhaust manifold. See Figure 63. Tighten lock nuts to 49 to 55 N•m (37 to 41 lbf ft).

14. Align exhaust pipes and tighten all clamps.

DIESEL EXHAUST FLUID (DEF) SYSTEM

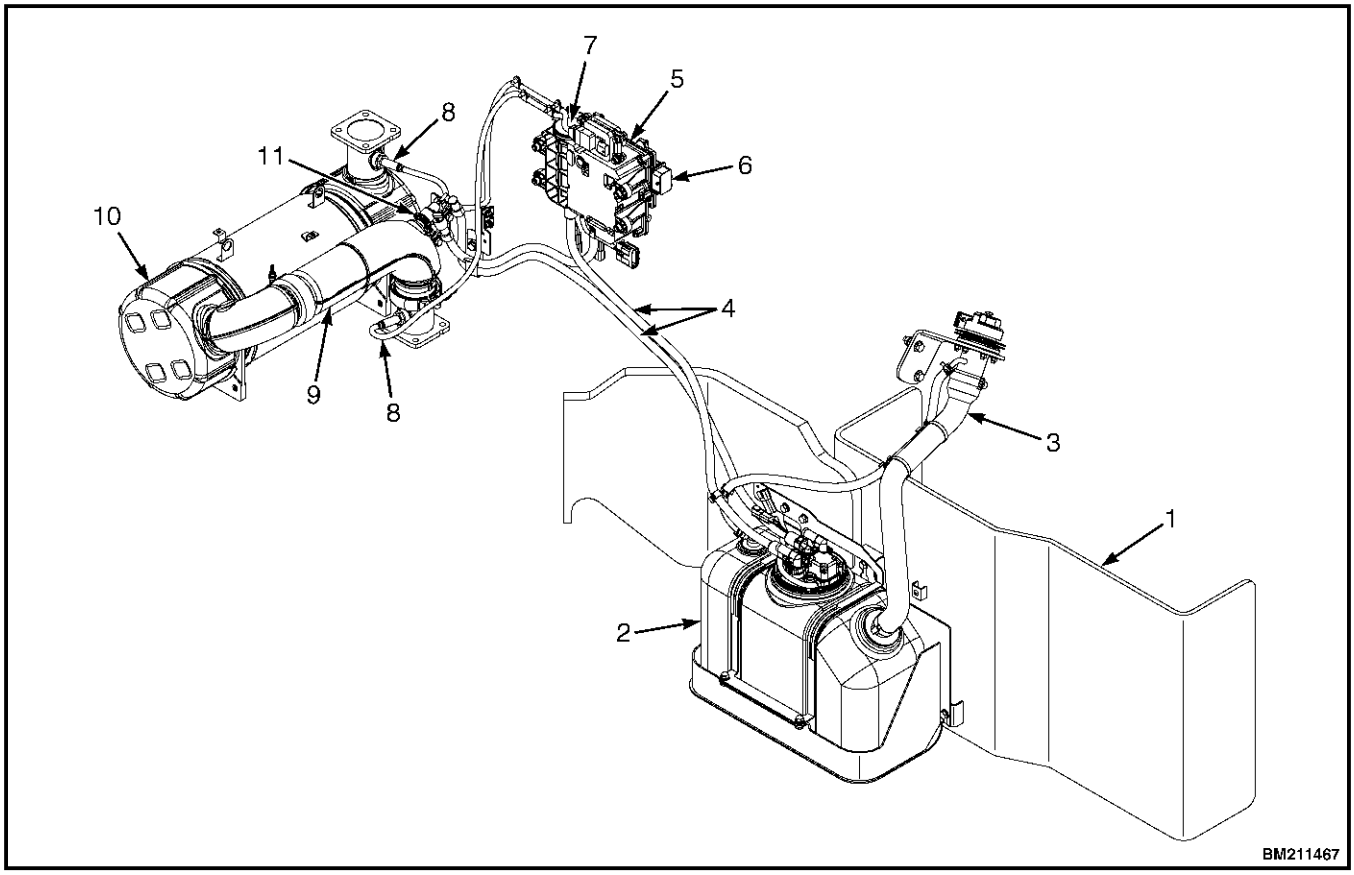
This lift truck is equipped with a Diesel Exhaust Fluid System (DEF) that connects to the Selective Catalyst Reduction (SCR) unit to reduce smog emissions.

The DEF is a solution of de-ionized water and 32.5% Urea sprayed into the exhaust stream at the SCR to consume NOx gases. As the DEF solution is sprayed into the exhaust stream, it converts CO_2 and NOx to Nitrogen (N_2) and water (H_2O) to reduce smog emissions.

The DEF and SCR system consists of the following components (see Figure 65):

- DEF Tank
- DEF Supply Unit (with Pump and Filter)

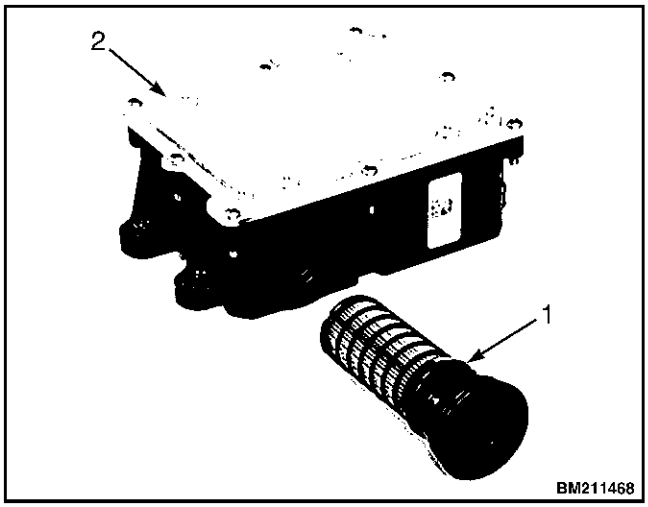
- DEF System Electrical Control Unit
- DEF Supply/Return Tubes
- DEF Mixing Pipe
- NOx Sensors
- SCR Unit



1. FRAME
2. DEF TANK
3. DEF FILL NECK
4. DEF SUPPLY/RETURN TUBE
5. DEF SUPPLY UNIT
6. DEF ELECTRICAL CONTROL UNIT
7. DEF SUPPLY UNIT FILTER
8. NOX SENSOR
9. DEF MIXING PIPE
10. SCR UNIT
11. TEMPERATURE SENSOR

Figure 65. DEF and SCR System

The DEF supply unit filter is a serviceable component. Using a socket or wrench, remove filter from supply unit. Replace with new filter and tighten with socket or wrench. **DO NOT** overtighten. See Figure 66.



1. DEF FILTER 2. DEF HOUSING

Figure 66. DEF Filter and Housing

Maintenance Procedures Every 4000 Hours or 2 Years

NOTE: Perform the Maintenance Procedures Every 8 Hours or Daily, Maintenance Procedures Every 500 Hours or 6 Months, Maintenance Procedures Every 1000 Hours or 6 Months, and Maintenance Procedures Every 2000 Hours or Annually prior to performing the procedures in this section.

HYDRAULIC OIL, REPLACE

WARNING

At operating temperature the hydraulic oil is HOT. DO NOT permit the hot 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. Dirt can cause damage to the components of the hydraulic system.

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

CAUTION

Disposal of lubricants and fluids must meet local environmental regulations.

NOTE: Heavy-duty or contaminated applications will require hydraulic oil change at 2000 hours.

NOTE: Replace the hydraulic oil filter at the same time the oil is changed.

NOTE: Check and clean hydraulic oil strainer screen, every time hydraulic oil is changed.

1. Remove four screws and right side rear cover to access hydraulic oil dipstick and filter. See Figure 56.

2. Replace the hydraulic oil as described below:

   a. Place a container with a minimum capacity of 71.7 liter (75.8 qt) under the drain plug at the bottom of the hydraulic tank. To drain the oil, remove the drain plug from the bottom of the hydraulic tank. See Figure 67.

   b. When the tank is empty, inspect the inside of the tank for any foreign matter or possible fungus. If necessary, clean the inside of the tank in accordance with the instructions found in **Frame** 0100YRM2293.

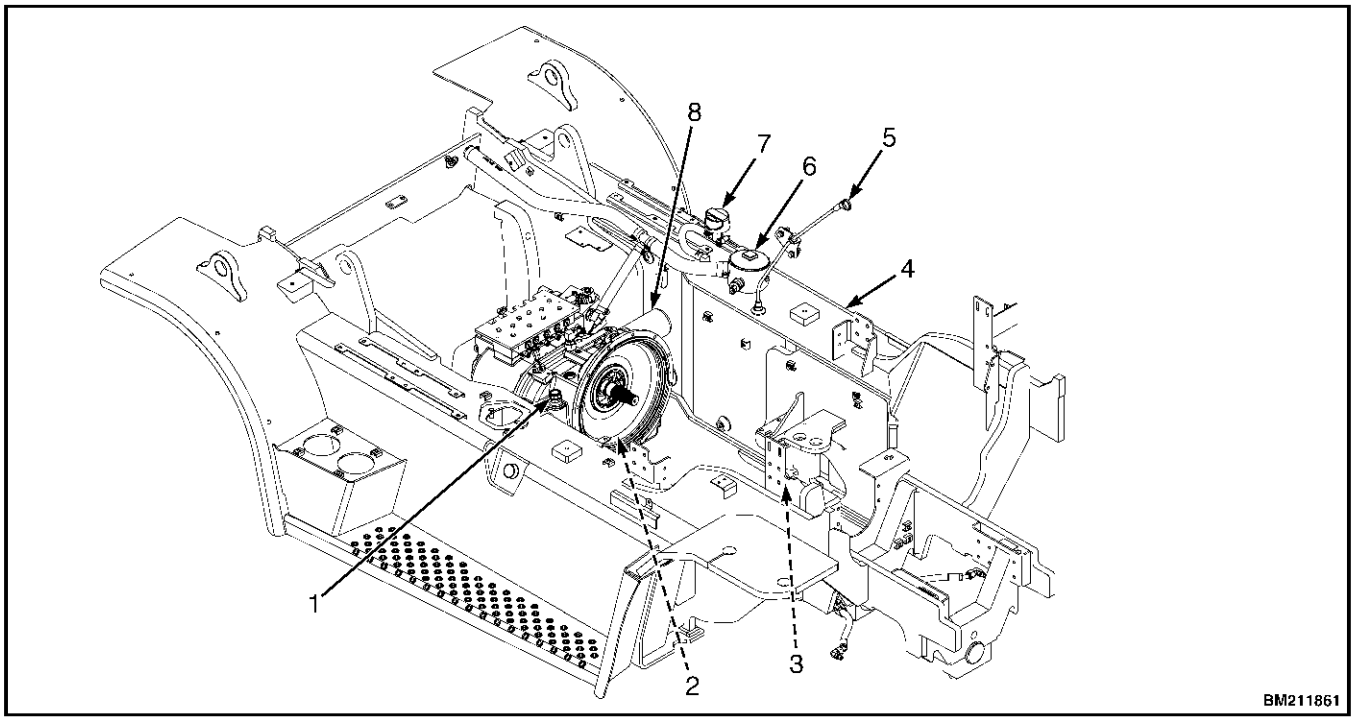
   c. When either the inspection or the cleaning of the tank is completed, install the drain plug in the bottom of the hydraulic tank. Tighten drain plug to 38 N•m (28 lbf ft).

CAUTION

Additives may damage the hydraulic system. Before using additives, contact your local Yale dealer.

3. Fill hydraulic tank with oil specified in the Maintenance Schedule.

4. When the oil level is correct, install right side rear cover using four screws. Operate system and check for leaks.



1. TRANSMISSION OIL BREATHER/OIL DIPSTICK
2. TRANSMISSION OIL DRAIN PLUG
3. HYDRAULIC OIL DRAIN PLUG
4. HYDRAULIC TANK
5. HYDRAULIC OIL DIPSTICK
6. HYDRAULIC OIL FILTER
7. HYDRAULIC TANK BREATHER
8. TRANSMISSION OIL FILTER

Figure 67. Transmission and Hydraulic Oil Checks

Fuel Filter Water Removal

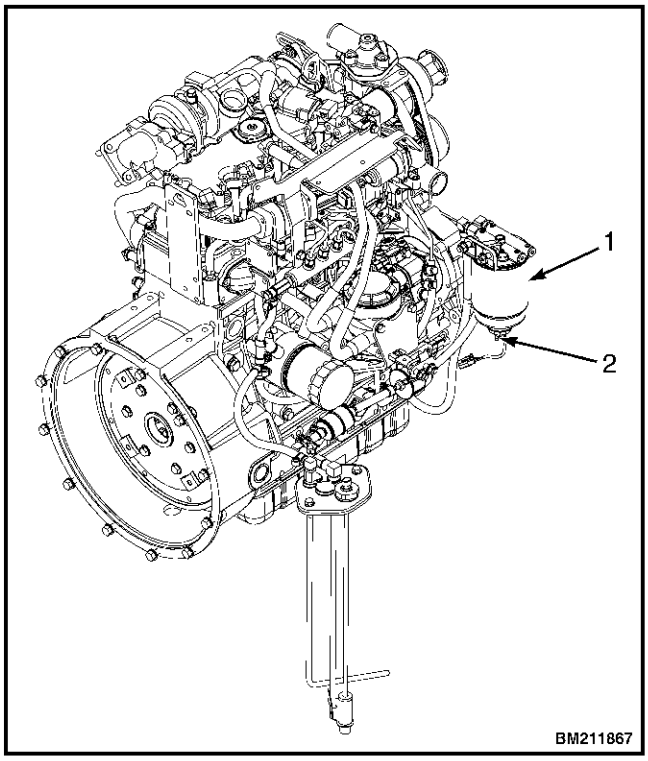
NOTE: The following procedure pertains to lift trucks equipped with an emissions compliant and non-emissions compliant Kubota 3.8L diesel engine.

1. Shut off the engine.

NOTE: The drain valve is located on the bottom of fuel/water separator.

NOTE: The fuel/water separator is located on the right side of the engine.

2. To access the fuel/water separator and drain valve, raise the hood. See Figure 68.



1. FUEL/ WATER SEPARATOR
2. DRAIN VALVE

Figure 68. Engine Fuel Filter Drain Valve Location

CAUTION

Drain water/fuel into a container and dispose in accordance with local environmental regulations.

3. Turn the drain valve **counterclockwise** approximately 3 ½ turns. Drain fuel filter until clear fuel is visible.

CAUTION

DO NOT overtighten when closing the drain valve. Overtightening can damage the threads.

4. Close the drain valve by lifting and turning **clockwise** until it is hand-tight.

5. Check Indicator Light (CIL) should be off and truck should be ready to start.

Lift Chain Adjustments

WARNING

When working on or near the mast, see Safety Procedures When Working Near Mast in the beginning of this manual.

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.

DO NOT try to find hydraulic leaks by putting your hand on hydraulic components under pressure. Hydraulic oil can be injected into the body by the pressure.

During test procedures for the hydraulic system, fasten the load to the carriage with chains to prevent it from falling. Keep all personnel away from the lift truck during the tests.

When lift chains are correctly adjusted:

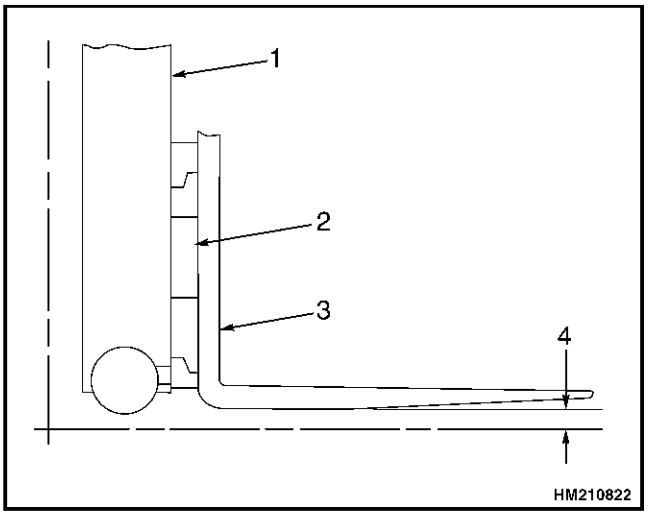
- Tension will be the same on each chain of chain set. Check tension by pushing on both chains at the same time.
- Chain length will be correct.
- Chains must travel freely through complete cycle.

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

1. When adjusting lift chains on forklift trucks equipped with the forks installed, go to Step 2. If forklift truck is equipped with an attachment without forks, go to Step 3.

NOTE: Prior to performing adjustment procedures, make sure forklift truck is parked on a level surface and the mast is in the vertical position.

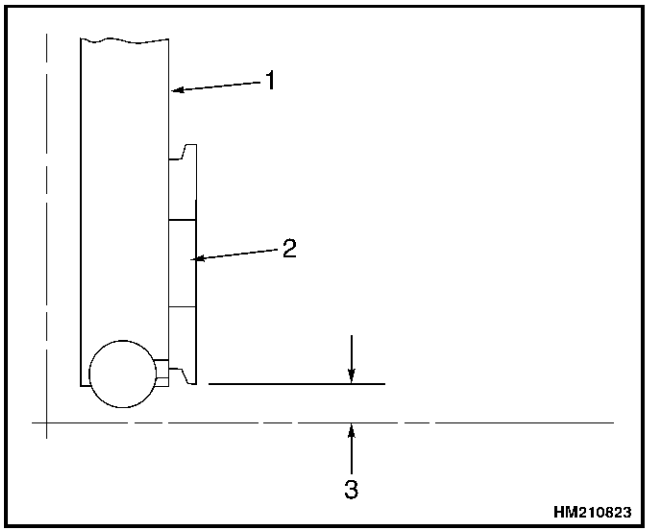
2. Adjust chain anchors which support the carriage until bottom of the fork heel is 12 +3.0/−6.0 mm (0.47 +0.12/−0.24 in.) above floor level. See Figure 69.



1. MAST
2. CARRIAGE
3. FORK
4. HEEL OF FORK IS 12 +3.0/−6.0 mm (0.47 +0.12/−0.24 in.) ABOVE THE FLOOR LEVEL.

Figure 69. Lift Chain Adjustments With Forks Installed

3. Adjust chain anchors which support carriage until the bottom of lower carriage bar is above the floor level as shown in Table 5. See Figure 70.



1. MAST
2. CARRIAGE
3. DISTANCE FROM FLOOR TO LOWER CARRIAGE BAR

Figure 70. Lift Chain Adjustment Without Forks Installed

In Table 5, the masts are divided by class. Each class is determined by the lifting capability of the lift cylinders. The Class II mast would have the lift capability of 2.5-3.5 tons, Class III has the lift capability of 3.5-4.0 tons, and Class IV has the lift capability of 4.0-7.0 tons.

Table 5. Carriage Chain Adjustment, Forks Not Installed

Class II and Class III	82.5 ±3 mm (3.25 ±0.12 in.)
Class IV	133.5 ±3 mm (5.26 ±0.12 in.)

Jump-Starting the Lift Truck

JUMP-STARTING USING A BATTERY CHARGER



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.

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

1. Disconnect the negative battery terminal of the lift truck being started.
2. Always connect positive jumper cable to positive terminal of discharged battery and negative jumper cable to negative terminal.
3. Always connect jumper cable, that is the ground cable, last.
4. Always connect jumper cables to discharged battery before connecting them to booster battery.

JUMP-STARTING A LIFT TRUCK USING ANOTHER LIFT TRUCK



WARNING

To prevent possible arcing between the two lift trucks, make sure that the lift trucks are not touching.



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. Always connect positive jumper cable to positive terminal of discharged battery and negative jumper cable to negative terminal.
2. Always connect jumper cable, that is the ground cable, last.
3. Always connect jumper cables to discharged lift truck battery before connecting them to the fully-charged lift truck battery.

Welding Repairs

WARNING

Welding can cause a fire or an explosion. Always follow the instructions in the Frame section if a fuel or hydraulic tank must be welded. Make sure there is no fuel, oil, or grease near the weld area. Make sure there is good ventilation in the area where the welding must be done.

DO NOT heat, weld, or bend forks. Forks are made of special steel using special methods. The strength of the overhead guard can be reduced by welding or heating. Get information from your dealer for Yale lift trucks before welding on a mast.

Forklift frames and components may be painted with a catalyzed paint such as polyurethane or a two-part primer. Welding, burning, or other heat sufficient to cause thermal decomposition of the paint may release isocyanates. These chemicals are allergic sensitizers to the skin and respiratory tract and overexposure may occur without odor warning. Should work be performed, utilize good industrial hygiene practices including removal of all paint (prime and finish coats) to the metal around the area to be welded, local ventilation, and/or supplied-air respiratory protection.

CAUTION

When an arc welder is used, always disconnect the ground cable from the battery in the lift truck. This action will prevent damage to the alternator or the battery.

Connect the ground clamp for the arc welder as close as possible to the weld area. This action will prevent damage to a bearing from the large current from the welder.

Some repairs require welding. If an acetylene or arc welder is used, make sure procedures in previous **WARNING** and **CAUTION** are done.

See the American National Standard *Safety in Welding and Cutting,* AWS Z 49.1 - 1999.

Overhead Guard Changes

WARNING

DO NOT weld mounts for lights or accessories to the legs of the overhead guard. Changes that are made by welding or by drilling holes that are too big or in the wrong location can reduce the strength of the overhead guard.

See your dealer for Yale lift trucks BEFORE performing any changes to the overhead guard.

No welding or drilling on legs of overhead guard is permitted as per previous **WARNING**.

Wheel and Tire Replacement

GENERAL

The series of lift trucks covered in this service manual have pneumatic tires or solid rubber tires that look like pneumatic tires. These variations in tires also cause a variation in the types of wheels and the disassembly and assembly procedures.

PNEUMATIC TIRE WITH TUBE, REPAIR

Remove Wheels From Lift Truck

WARNING

A solid rubber tire that is the same shape as a pneumatic tire can be installed on a three-piece or four-piece wheel for a pneumatic tire. DO NOT make changes in the parts of the rim if this type of solid rubber tire is installed instead of a pneumatic tire. Changes to the parts of the rim can cause a failure of the wheel and cause an accident.

WARNING

The type of tire and the tire pressure (pneumatic tires) are shown on the Nameplate. Make sure the Nameplate is correct for the type of tires on the lift truck.

WARNING

Wheels must be changed and tires repaired by trained personnel only.

Deflate tire completely before removing the wheel from the lift truck. If dual wheels are used, deflate both tires. Air pressure in the tires can cause the tire and rim parts to explode, causing serious injury or death.

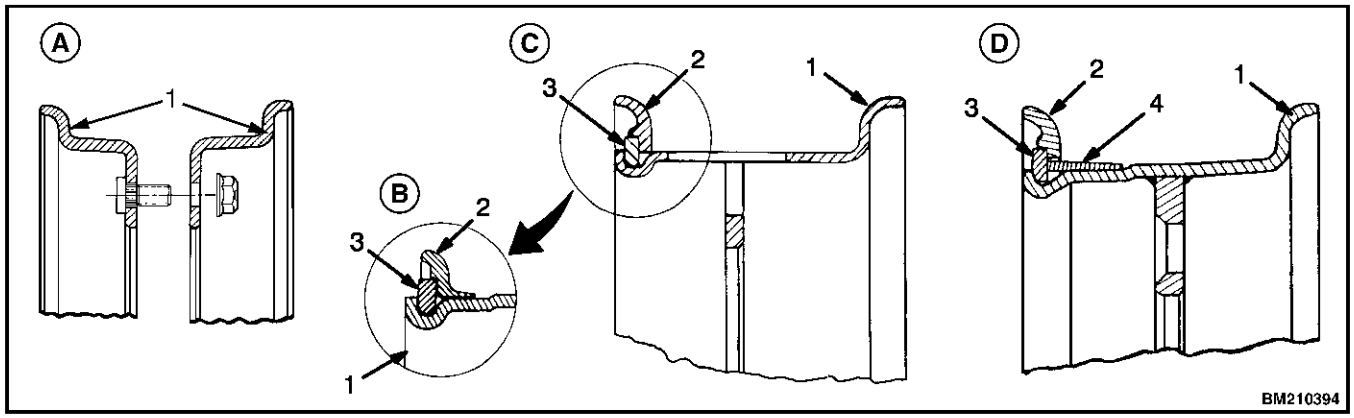
Always wear safety glasses.

Never loosen the nuts that hold the inner and outer wheel halves together when there is air pressure in the tire.

1. Put lift truck on blocks as described in the General section at the beginning of this manual.
2. Remove air from tire. Remove valve core to make sure all air is out of inner tube. Push a wire through valve stem to make sure valve stem does not have a restriction.
3. Remove wheel nuts and remove wheel and tire from lift truck. Lift truck tires and wheels are heavy.

Remove Tire From Wheel

NOTE: When you disassemble the wheels, see Figure 71. There are several types of wheels used on this series of lift trucks.



A. TWO-PIECE WHEEL
B. OPTIONAL RIM ASSEMBLY
C. THREE-PIECE WHEEL
D. FOUR-PIECE WHEEL

1. WHEEL RIM
2. SIDE FLANGE
3. LOCK RING
4. FLANGE SEAT

Figure 71. Types of Pneumatic Wheels

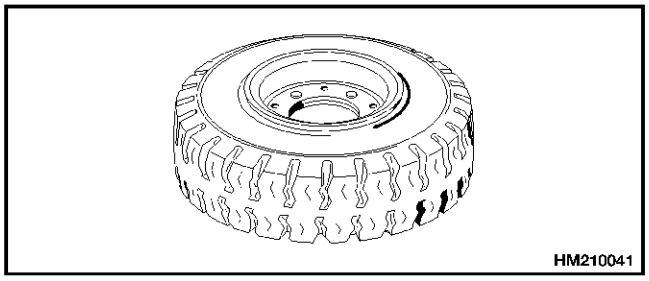
Remove Tire From Two-Piece Wheel

WARNING

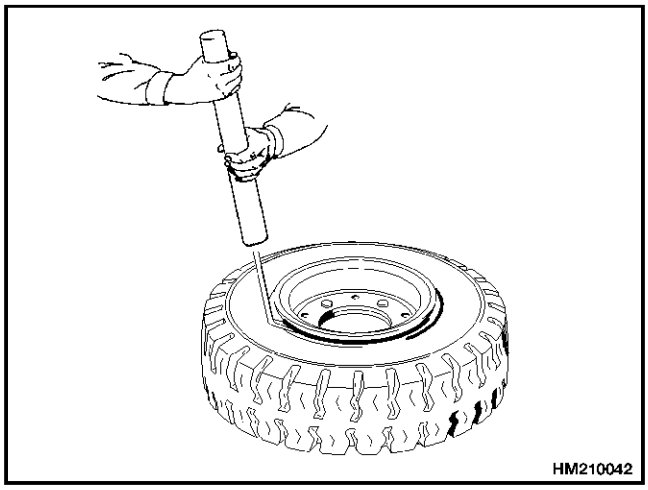
Make sure all the air pressure is removed from the tire before a wheel is disassembled. Air pressure in the tires can cause the tire and rim parts to explode, causing serious injury or death.

Keep tire tools in firm contact with the wheel parts. If the tool slips, it can move with enough force to cause an injury.

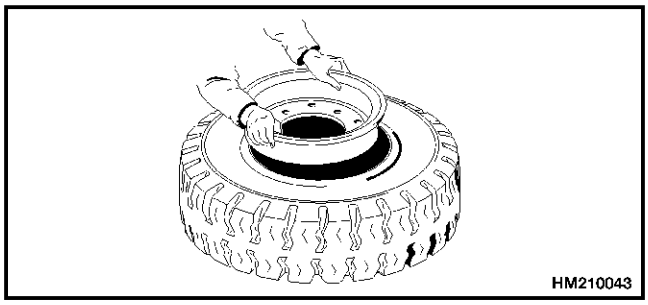
STEP 1.
Remove nuts that fasten wheel rims together.



STEP 2.
Loosen tire bead from wheel rim.



STEP 3.
Remove wheel rims from tire. Remove inner tube and flap.



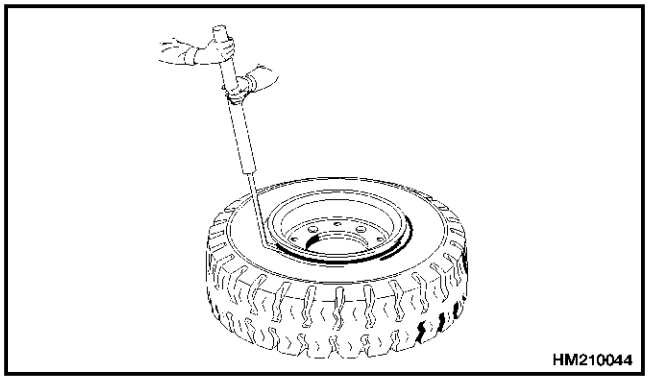
Remove Tire From Three- and Four-Piece Wheels

WARNING

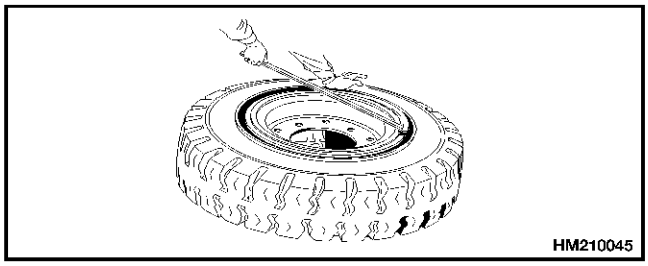
Make sure all the air pressure is removed from the tire before a wheel is disassembled. Air pressure in the tires can cause the tire and rim parts to explode, causing serious injury or death.

Keep tire tools in firm contact with the wheel parts. If the tool slips, it can move with enough force to cause an injury.

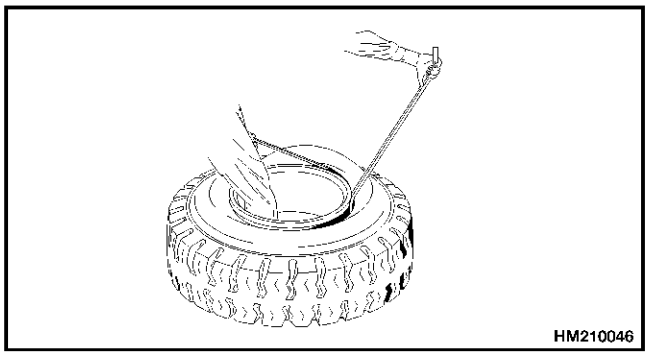
STEP 1.
Loosen tire bead from side flange.



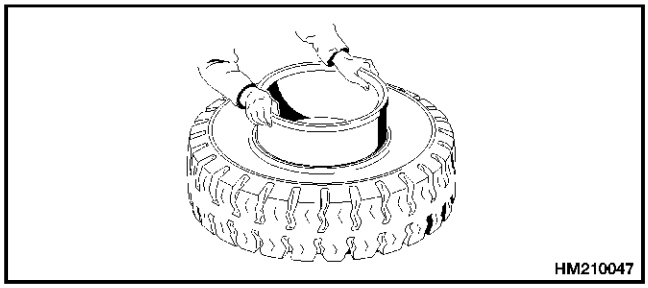
STEP 2.
Put tire tool into slot between lock ring and wheel rim. Remove lock ring and side flange. If there is a flange seat, remove it.


HM210045

STEP 3.
Loosen bead from other side of wheel rim. Remove valve stem from wheel.


HM210046

STEP 4.
Remove wheel from tire.


HM210047

Install Wheel in Tire

WARNING

Damage to the tire and wheel assembly and injury or death can occur if you do not do the following procedures:

- **Clean and inspect all parts of the wheel before installing the tire.**
- **DO NOT use any damaged or repaired wheel parts.**
- **Make sure all parts of the wheel are the correct parts for that wheel assembly.**
- **DO NOT mix parts between different types or manufacturers of wheels.**
- **DO NOT mix types of tires, type of tire tread, or wheel assemblies of different manufacturers on any one lift truck.**

DO NOT use a steel hammer on the wheel. Use a rubber, lead, plastic, or brass hammer to put parts together. Make sure the side ring is in the correct position. The ends of the side ring must not touch. The clearance at the ends of the lock ring will be approximately 13 to 25 mm (0.5 to 1.0 in.) after it is installed. If the clearance is wrong, the wrong part has been used.

1. Clean and inspect all parts of wheel. Paint any parts that have rust or corrosion.

2. Install new inner tube in tire. Used tubes and flaps can cause tire failure.

WARNING

DO NOT lubricate the tire bead with antifreeze or petroleum based liquid. Vapors from these liquids can cause an explosion during inflation or use.

3. Apply a rubber lubricant or a soap solution to the tire bead and tube.

4. Install new tire flap.

WARNING

DO NOT lubricate the tire bead with antifreeze or petroleum based liquid. Vapors from these liquids can cause an explosion during inflation or use.

5. Make sure rim is the correct size for tire. Lubricate part of wheel that contacts bead and flap.

CAUTION

DO NOT use pneumatic-shaped, solid tires on two-piece bolt together drive wheels. Spinning may occur.

6. Install the three-piece or four piece wheel in the tire a shown in Install Three-Piece or Four-Piece Wheel in Tire.

7. Install the two-piece wheel in the tire as shown in Install Tire on Two-Piece Wheel.

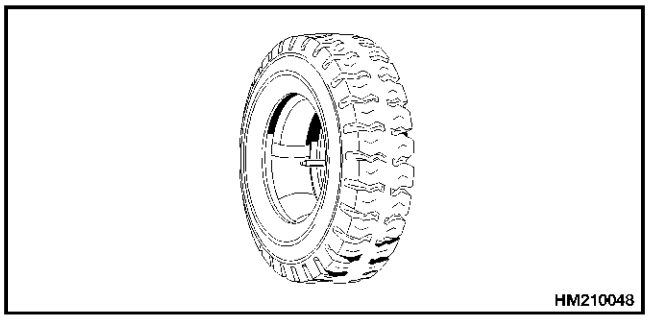
Install Three-Piece or Four-Piece Wheel in Tire

WARNING

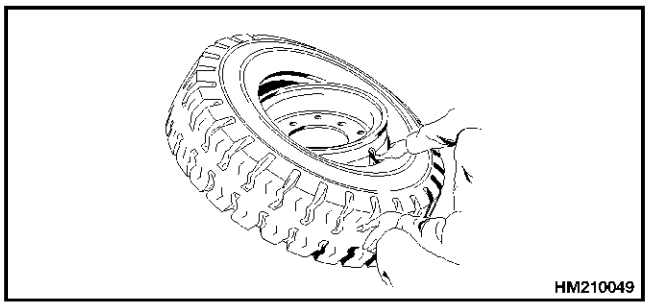
Make sure all of the air pressure is removed from the tire before a wheel is disassembled. Air pressure in the tires can cause the tire and rim parts to explode causing serious injury or death.

Keep tire tools in firm contact with the wheel parts. If the tool slips, it can move with enough force to cause an injury.

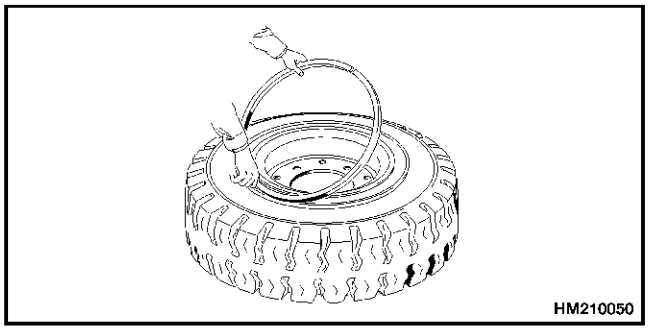
STEP 1.
Install inner tube and rubber flap in tire.



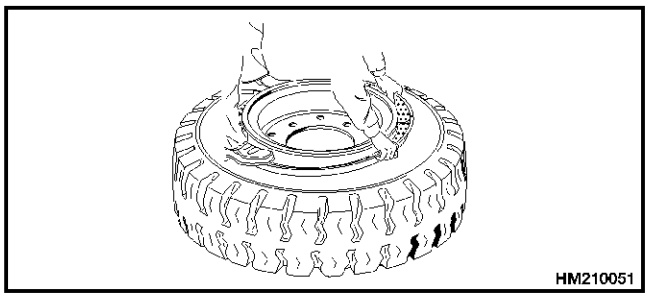
STEP 2.
Install wheel rim in tire. Make sure stem of inner tube is aligned with slot in rim.



STEP 3.
Turn over rim and tire. Put blocks under rim so rim is 8 to 10 cm (3 to 4 in.) above floor. Install flange seat (if used) and lock ring.


HM210050

STEP 4.
Put lock ring in the correct position on rim. Add air pressure to tire as described in Install Wheel in Tire.


HM210051

Install Tire on Two-Piece Wheel

WARNING

Wheels can explode and cause injury or death if the following procedures are not followed:

- **Clean and inspect all parts of the wheel before installing the tire.**
- **DO NOT use any damaged or repaired wheel parts.**
- **Make sure all parts of the wheel are the correct parts for that wheel assembly.**
- **DO NOT mix parts between different types or manufacturers of wheels.**
- **DO NOT mix types of tires, type of tire tread, or wheel assemblies of different manufacturers on any one lift truck.**

DO NOT use a steel hammer on the wheel. Use a rubber, lead, plastic, or brass hammer to put parts together. Make sure the side ring is in the correct position. The ends of the side ring must not touch. The clearance at the ends of the lock ring will be approximately 13 to 25 mm (0.5 to 1.0 in.) after it is installed. If the clearance is wrong, the wrong part has been used.

CAUTION

DO NOT use pneumatic-shaped solid tires on two-piece bolt together drive wheels. Spinning may occur.

1. Clean and inspect all parts of wheel. Paint any parts that have rust or corrosion.
2. Install new inner tube in tire. Used tubes and flaps can cause tire failure.

WARNING

DO NOT lubricate the tire bead with antifreeze or petroleum-based liquid. Vapors from these liquids can cause an explosion during inflation or use.

3. Apply a rubber lubricant or a soap solution to tire bead and tube.
4. Install new tire flap.

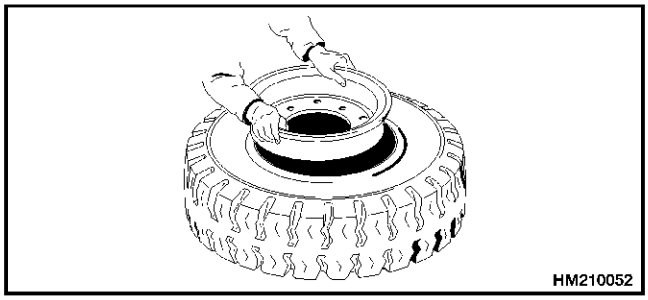
WARNING

DO NOT lubricate the tire bead with antifreeze or petroleum-based liquid. Vapors from these liquids can cause an explosion during inflation or use.

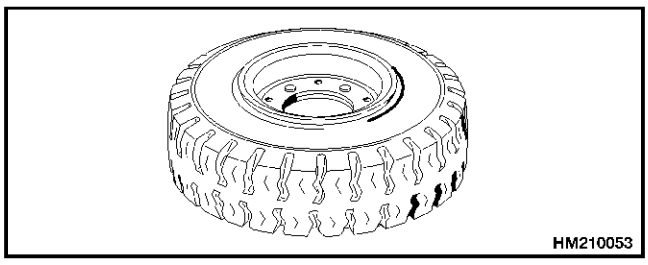
5. Make sure rim is the correct size for tire. Lubricate part of wheel that contacts bead and flap.

Install Two-Piece Wheel in Tire

STEP 1.
Install inner tube and rubber flap in tire. Install both halves of wheel rim in tire. Make sure stem of inner tube is aligned with slot in rim.



STEP 2.
Tighten nuts that hold rim halves together to 175 N•m (130 lbf ft). Add air pressure to tire (see Nameplate).



ADD AIR TO PNEUMATIC TIRES WITH TUBE

WARNING

Add air pressure to the tires only in a safety cage. Inspect the safety cage for damage before use. When air pressure is added, use a chuck that fastens onto the valve stem of the inner tube. Make sure there is enough hose to permit the operator to stand away from the safety cage when air pressure is added to the tire.

DO NOT sit or stand by the safety cage. DO NOT use a hammer to try and correct the position of the side flange or lock ring when the tire has air pressure greater than 20 kPa (3 psi).

1. Put tire in a safety cage.
2. Add 20 kPa (3 psi) of air pressure to tire. See Figure 72.
3. Check that all wheel parts are correctly installed. Hit lock ring lightly to make sure it is in the seat.
4. If installation is correct, add air pressure to tire to the specified pressure.
5. Check that all wheel parts are correctly installed. If installation is not correct, remove all air pressure from tire. Remove valve core to make sure all air pressure has been removed and then make adjustments. The clearance at the ends of the lock ring will be approximately 13 to 25 mm (0.5 to 1.0 in.) when the tire has the correct air pressure.

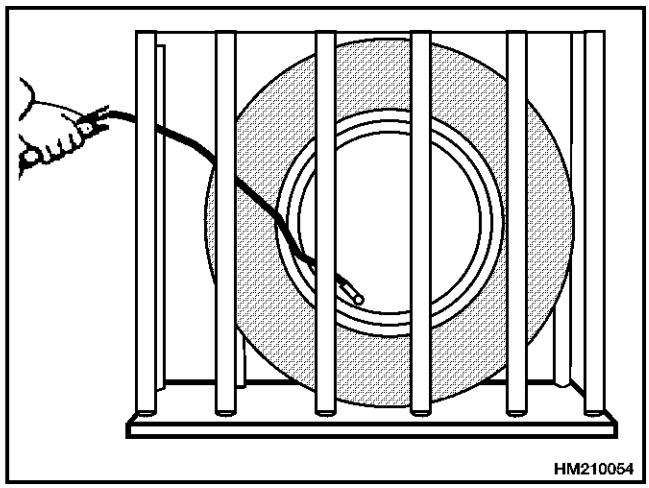


Figure 72. Add Air to Tires

Install the Wheels

Install wheel on hub. Tighten nuts in a cross pattern to 610 to 680 N•m (450 to 500 lbf ft) for both drive wheels nuts steer wheels nuts. If the wheels are the two-piece rims, make sure nuts that fasten rim halves together are toward brake drum when they are installed.

Dual Drive Wheels, Install

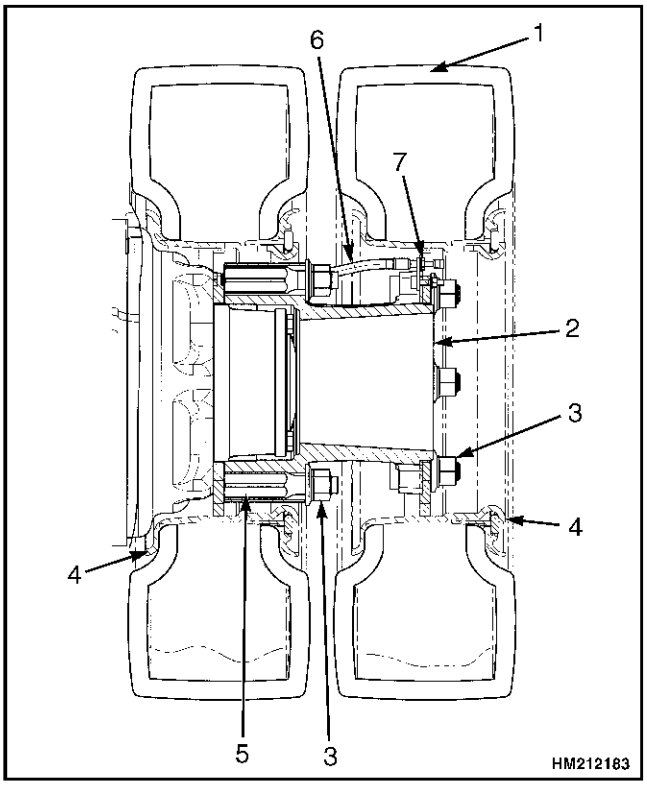
NOTE: Some lift trucks have dual drive wheels. The following procedures describe the steps to install dual sets of wheels.

1. Install inner wheel on hub. If wheels are the two-piece rims, make sure nuts that fasten rim halves together are toward brake drum when they are installed.

2. Install wheel adapter spacers on the inner wheel studs and tighten spacers to 100 to 125 N•m (74 to 92 lbf ft). Install the dual hub assembly and inner wheel nuts on the spacers and tighten the wheel nuts to 610 to 680 N•m (450 to 500 lbf ft). See Figure 73.

3. Install outer wheel on dual hub assembly. Tighten nuts to a torque value of 610 to 680 N•m (450 to 500 lbf ft). If wheels are the two-piece rims, make sure nuts that fasten rim halves together are toward brake drum when they are installed.

4. Install valve extension bracket and tighten the attaching nut to 8 N•m (70 lbf in). Install valve extension hose into the bracket. See Figure 73.



1. TIRE
2. DUAL HUB ASSEMBLY
3. WHEEL NUT
4. WHEEL
5. WHEEL ADAPTER SPACER
6. VALVE EXTENSION
7. BRACKET

Figure 73. Dual Drive Wheels Installation

PNEUMATIC TUBELESS TIRE, REPAIR

Remove Wheels From Lift Truck

WARNING

Wheels must be changed and tires repaired by trained personnel only.

Deflate tire completely before removing the wheel from the lift truck. If dual wheels are used, deflate both tires. Air pressure in tires can cause the tire and rim parts to explode causing serious injury or death.

Always wear safety glasses.

Never loosen the nuts that hold the inner and outer wheels halves together when there is air pressure in the tire.

The Tubeless Bead Seal (TBS) enables tubeless tires to be used on wheel rims that were designed to be used with a tube.

The main component of a TBS is a special rubber ring that fits inside the tire between the tire beads to ensure the air tightness of the existing wheel and the tubeless tire assembly. See Figure 71.

1. Put lift truck on blocks as described in General section at the beginning of this manual.
2. Remove the valve cap and core to remove all air from the tire.
3. Remove the wheel nuts and remove the wheel and tire from the lift truck. Lift truck tires and wheels are heavy.

Remove Tire From Wheel

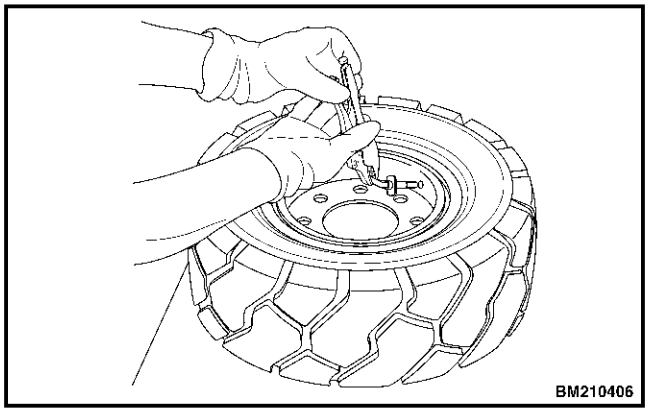
WARNING

Make sure all of the air pressure is removed from the tire before a wheel is disassembled. Air pressure in the tires can cause the tire and rim parts to explode causing serious injury or death.

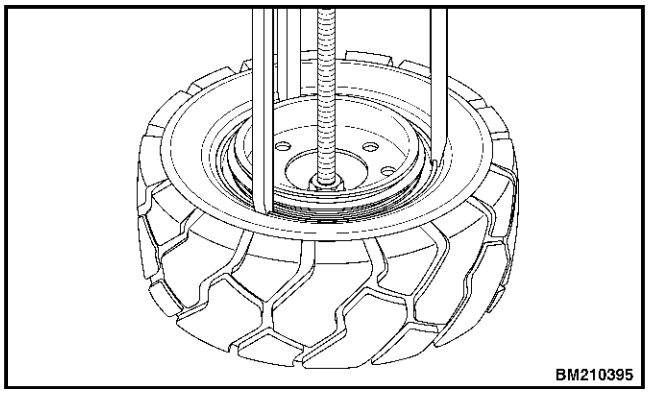
Keep tire tools in firm contact with the wheel parts. If the tool slips, it can move with enough force to cause injury.

NOTE: There are several types of wheels used on these lift trucks. When disassembling wheels, see Figure 71.

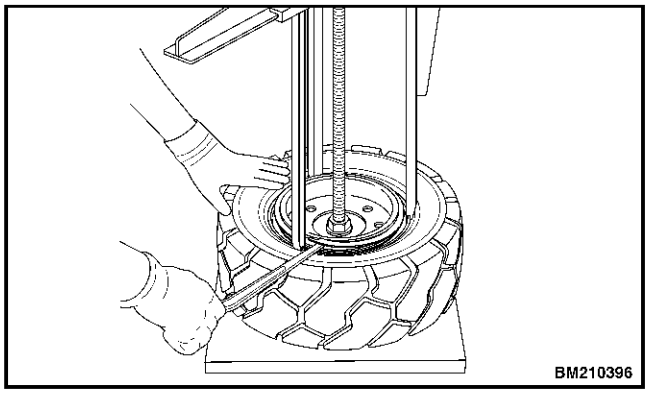
STEP 1.
If wheel rim is a three- or four-piece rim, turn the valve 1/4 turn and remove valve from wheel.



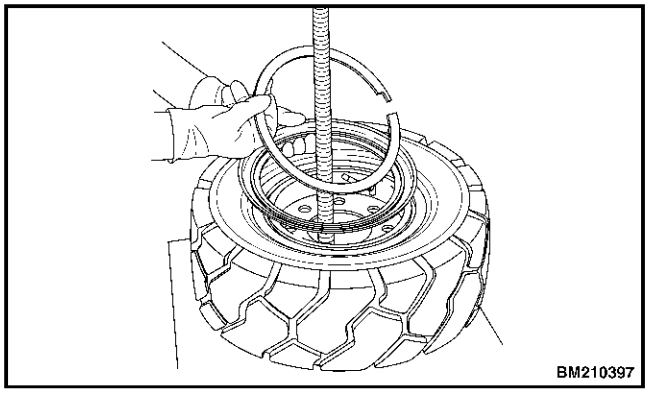
STEP 2.
Put wheel and tire assembly on the press. Position the feet of the press on the loose flange. Press down on loose flange to expose the locking ring.



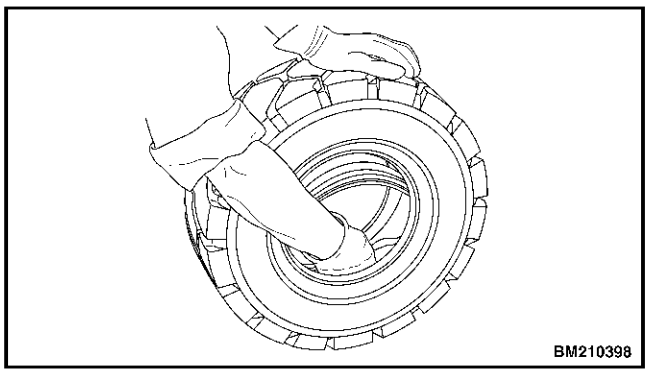
STEP 3.
Remove the loose flange locking ring and the advance band (four-piece wheel only) using a tire tool.



STEP 4.
Remove the press and remove the loose flange locking ring and the advance band (four-piece wheel only) from the tire and wheel assembly.



STEP 5.
Push the TBS toward the inside of the tire to remove it.



Install Tire on Wheel

WARNING

Damage to the tire and wheel assembly and injury or death can occur if you do not do the follow procedures:

- **Clean and inspect all parts of the wheel before installing the tire.**
- **DO NOT use any damaged or repaired wheel parts.**
- **Make sure that all parts of the wheel are the correct parts for that wheel assembly.**
- **DO NOT mix parts between different types or manufacturers of wheels.**
- **DO NOT mix types of tires, type of tire tread, or wheel assemblies of different manufacturers on any one lift truck.**

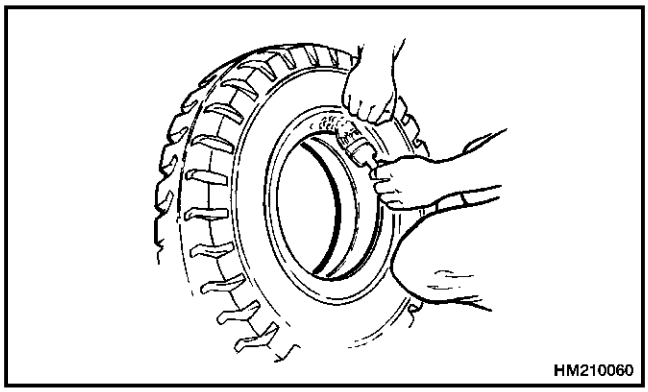
WARNING

DO NOT use a steel hammer on the wheel. Use a rubber, lead, plastic, or brass hammer to put parts together.

WARNING

DO NOT lubricate the tire bead with antifreeze or petroleum-based liquid. Vapors from these liquids can cause an explosion during inflation or use.

STEP 1.
Clean interior and exterior bead of the tire. Lubricate tire beads and the inside of the tire, up to the tire shoulders. Apply lubricant to the entire underside of the TBS.

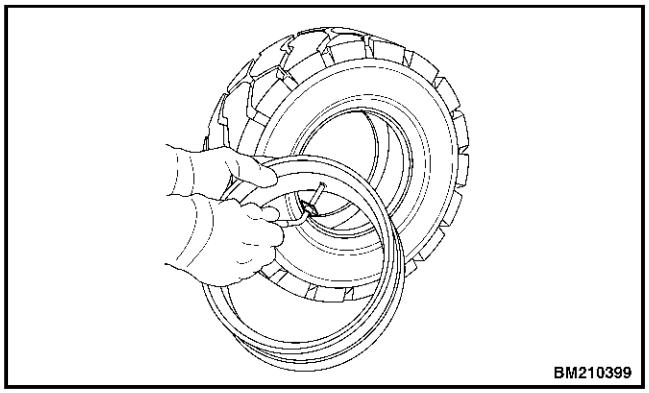


NOTE: If the wheel rim width is less than 152 mm (6 in.), the TBS will contain one valve hole to accommodate the needle valve. If the wheel rim width is greater than 152 mm (6 in.), the TBS will have two holes for the needle valve.

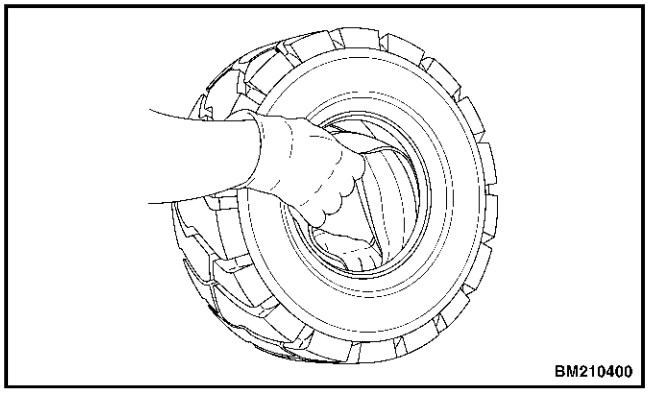
One hole is centrally located and the other is offset, to ensure the correct positioning of the valve in the valve slot. The valve hole that is not used should be sealed with a small plastic plug.

STEP 2.
Apply lubricant to the needle valve and the valve hole that will be used (see **NOTE**) by inserting and removing the lubricated valve several times. If a three- or four-piece wheel is being used, remove the valve. If a two-piece wheel is being used, leave valve in valve hole.

If the TBS has two-valve holes, lubricate the plastic plug and insert into valve hole that will not be used.

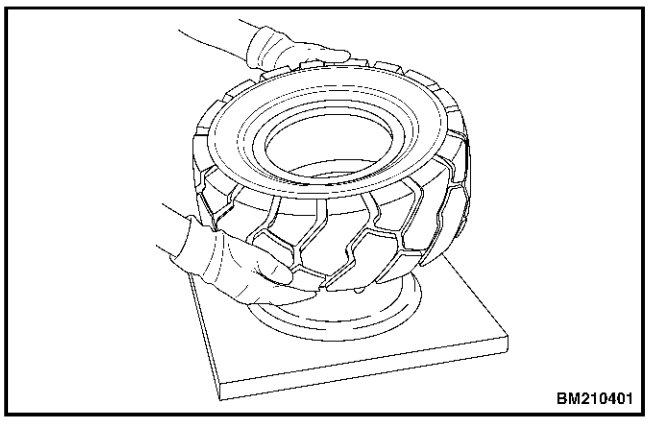

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STEP 3.
Place the TBS inside the tire, making sure that the wings of the TBS are not folded over. Make a mark on the tire to note the position of the valve hole in the TBS.

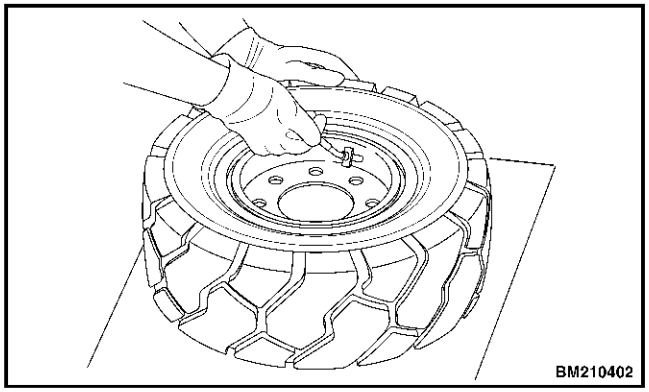

BM210400

STEP 4.
Apply lubricant to the rim. If a four-piece wheel is being used, lubricate the advance band. Slide the tire and the TBS onto the wheel.

Line up the valve hole in the TBS with the valve slot in the wheel. Lubricate and insert the valve into the valve hole. Make sure it is fully inserted.

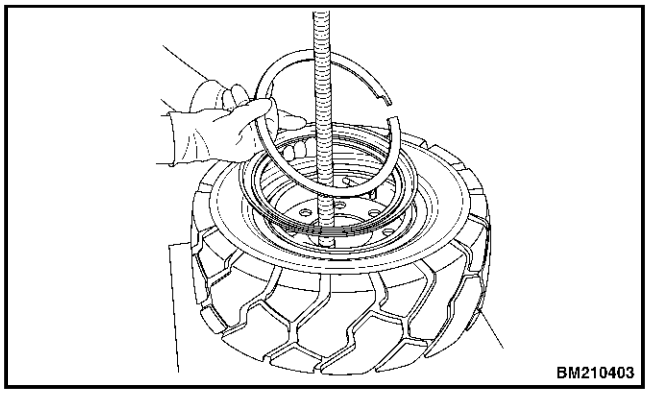

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STEP 5.
Place the wheel and tire assembly on a flat surface. Turn the valve a 1/4 turn to lock the collar under the edges of the rim valve slot.


BM210402

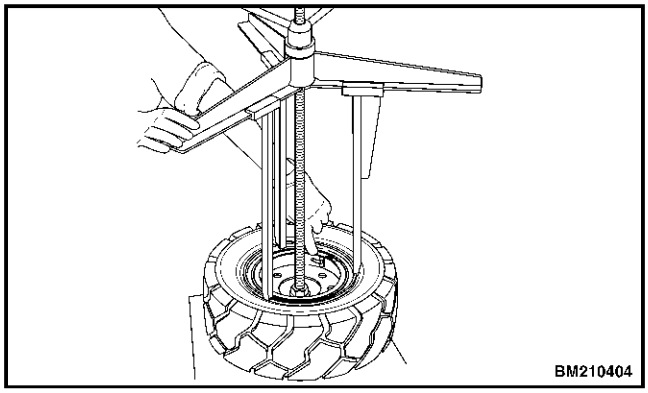
STEP 6.
Raise the tire and position the base and threaded stem of the press through the hole in the center of the wheel. Insert in wheel assembly, the following parts:

- Advance band (four-piece wheel only)
- Loose flange
- Locking ring

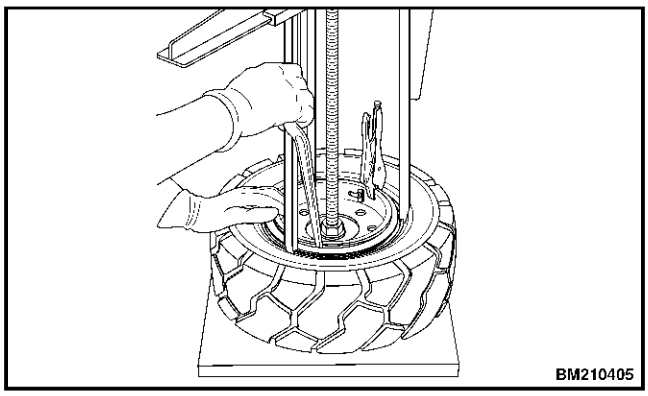


STEP 7.
Position the advance band. Ensure that it does not go in too far and damage the valve. Position the arms of the press onto the loose flange.

Push down on the press to depress the tire beads until locking ring groove is fully exposed.



STEP 8.
Insert tire tool into the locking ring groove, and a vise grip on other end. Remove vise grip. Release the press and check that all component parts are correctly positioned. Replace the valve core.



STEP 9.
Inflate tire to 103 kPa (15 psi). Tap wheel with a mallet to ensure all components are correctly sealed. Remove the press from wheel and tire assembly.

Add Air to Pneumatic Tubeless Tire

WARNING

Add air pressure to tires only in safety cage. Inspect safety cage for damage before use. When air pressure is added, use a chuck that fastens onto valve stem. Make sure there is enough hose to permit operator to stand away from safety cage when air pressure is added to tire.

DO NOT sit or stand by safety cage.

1. Put tire in safety cage. See Figure 74.
2. Add air to tire to the recommended air pressure that is shown on the Nameplate. Install valve cap to ensure air stays in the tire.

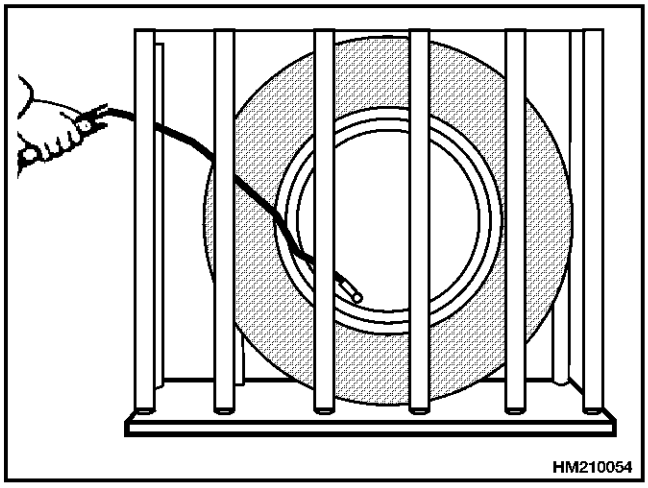


Figure 74. Add Air to Tires

Wheels, Install

Install wheel on hub. Tighten nuts in a cross pattern to 610 to 680 N•m (450 to 500 lbf ft) for both drive wheels nuts steer wheels nuts. If the wheels are the two-piece rims, make sure nuts that fasten rim halves together are toward brake drum when they are installed.

SOLID RUBBER TIRES ON PNEUMATIC WHEELS, CHANGE

WARNING

Wheels must be changed and tires repaired by trained personnel only.

Always wear safety glasses.

1. Put lift truck on blocks as described in General section at the beginning of this manual.
2. Remove wheel nuts and remove wheel and tire from lift truck. Lift truck tires and wheels are heavy.

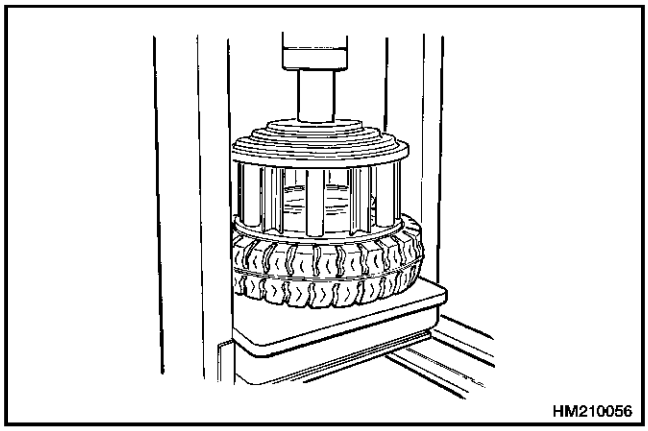
Remove Wheel From Tire

NOTE: When you disassemble the wheels, see Figure 71. There are several types of wheels used on these series of lift trucks.

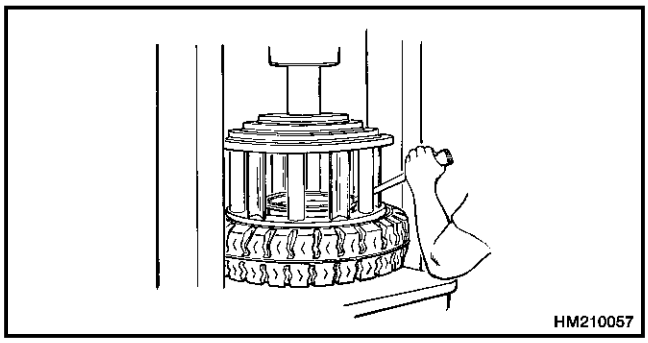
WARNING

Keep tire tools in firm contact with the wheel. If the tool slips, it can move with enough force to cause serious injury. Always wear safety glasses.

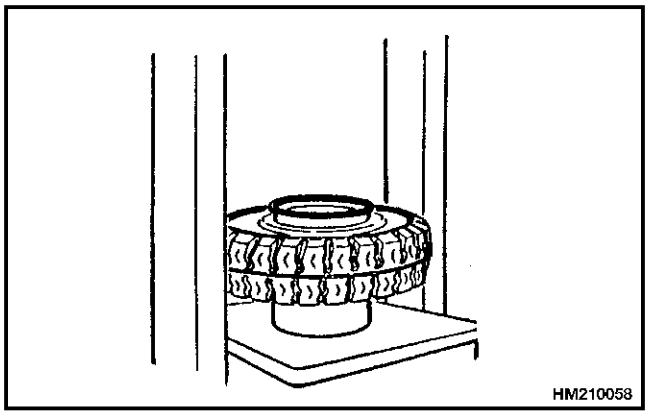
STEP 1.
Put wheel rim on bed of press. Put cage in position on tire. Use press to push tire away from side flange.



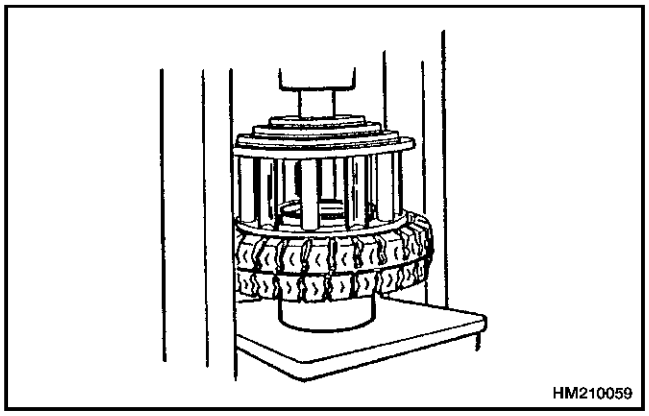
STEP 2.
Put tire tool into slot between lock ring and wheel rim. Remove lock ring and side flange.



STEP 3.
Turn tire over. Put a support under wheel rim. Make sure wheel rim is at least 150 to 200 mm (6 to 8 in.) from bed of press.



STEP 4.
Put cage in position on tire. Use press to push tire from wheel rim.



Install Tire on Wheel

WARNING

Damage to tire and wheel assembly and injury or death can occur if you do not do the following procedures.

- **Clean and inspect all parts of the wheel before installing the tire.**
- **DO NOT use any damaged or repaired wheel parts.**
- **Make sure all parts of the wheel are the correct parts for that wheel assembly.**
- **DO NOT mix parts between different types or manufacturers of wheels.**
- **DO NOT mix types of tires, type of tire tread, or wheel assemblies of different manufacturers on any one lift truck.**

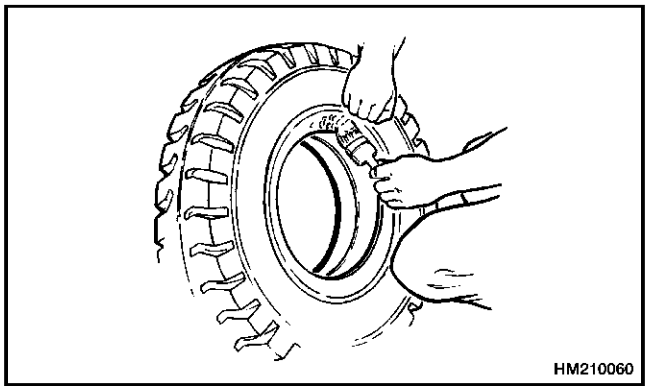
DO NOT use a steel hammer on the wheel. Use a rubber, lead, plastic, or brass hammer to put parts together. Make sure the side ring is in the correct position. The ends of the side ring must not touch. The clearance at the ends of the lock ring will be approximately 13 to 25 mm (0.5 to 1.0 in.) after it is installed. If the clearance is wrong, the wrong part has been used.

CAUTION

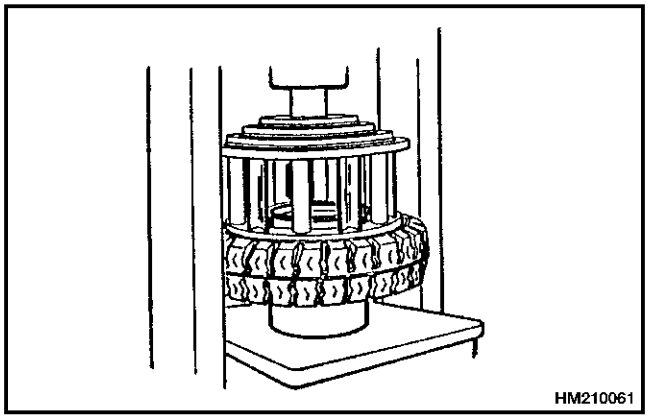
Too much lubricant can cause the tire to slide and move around the wheel rim.

NOTE: When you assemble the wheels, see Figure 71. There are several types of wheels used on these series of lift trucks. DO NOT use a two-piece pneumatic wheel for solid rubber tires.

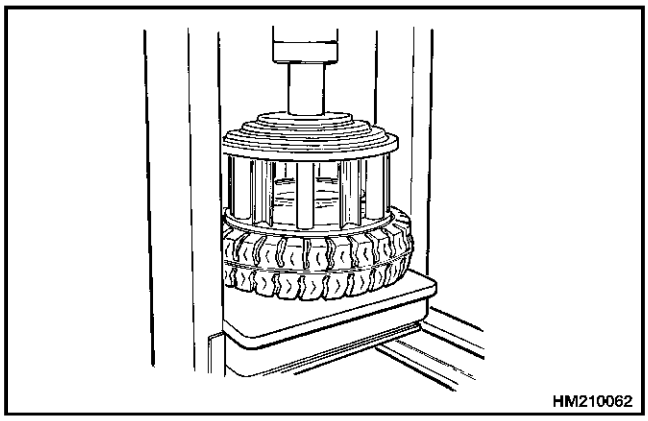
STEP 1.
Lubricate wheel rim and inner surface of tire with tire lubricant or soap.


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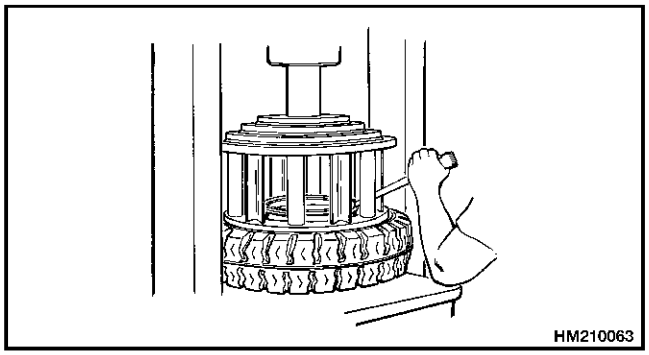
STEP 2.
Put wheel rim on bed of press. Put tire over wheel rim. Put cage in position on tire. Use press to install tire on wheel rim.


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STEP 3.
Remove cage and put flange seat (if used), side ring, and lock ring in position on wheel rim. Install cage on tire. Use press to push tire onto wheel rim so side flange and lock ring can be installed.


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STEP 4.
While the cage is holding the tire on the wheel rim, install lock ring. Use a tire tool to make sure lock ring is in the correct position.



Adhesives and Sealants

Yale Part No.	Loctite® Part No.	Description	Size
501702901	222	Small Screw Threadlock (Purple)	50 ml
505965518	242	Removable Threadlock (Blue)	10 ml
580012519	271	High Strength Threadlock (Red)	10 ml
501702904	290	Low Viscosity Threadlock (Green)	50 ml
518806679	422	SuperBonder® Adhesive	3 ml
500009917	515	Gasket Eliminator (Purple)	50 ml
518795676	567	Pipe Sealant with Teflon®	50 ml
502058904	595	Super Flex® Silicone	100 ml
504226218	767	Antiseize Compound	1 lb
150015825		Chisel Gasket Remover (10 Aerosol cans per case)	18 oz

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Teflon® is a registered trademark of Du Pont de Nemours Co., Inc.