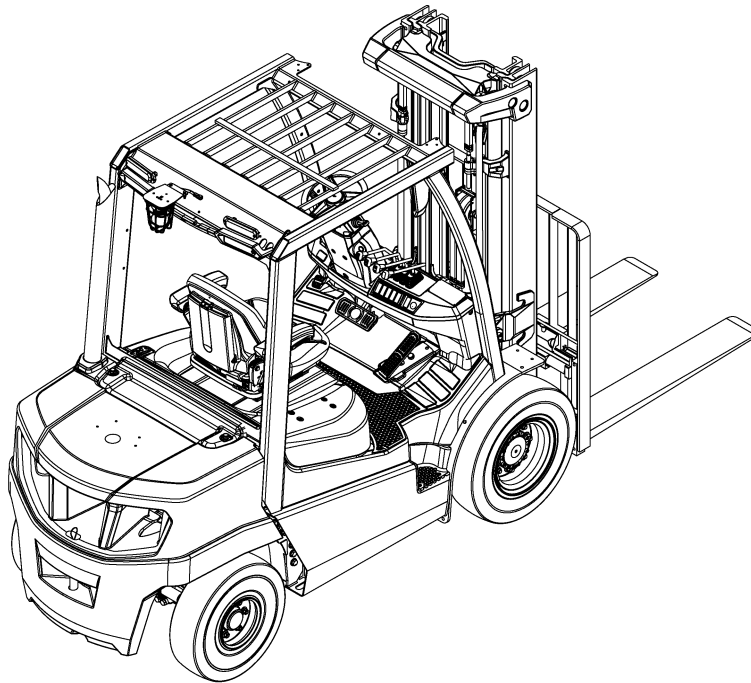


PERIODIC MAINTENANCE

H40A, H50A6, H60A, H70A [R177]



HYSTER

SAFETY PRECAUTIONS

MAINTENANCE AND REPAIR

- The Service Manuals are updated on a regular basis, but may not reflect recent design changes to the product. Updated technical service information may be available from your local authorized Hyster® dealer. Service Manuals provide general guidelines for maintenance and service and are intended for use by trained and experienced technicians. Failure to properly maintain equipment or to follow instructions contained in the Service Manual could result in damage to the products, personal injury, property damage or death.
- When lifting parts or assemblies, make sure all slings, chains, or cables are correctly fastened, and that the load being lifted is balanced. Make sure the crane, cables, and chains have the capacity to support the weight of the load.
- Do not lift heavy parts by hand; always 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 of the service manual.
- Keep the unit clean and the working area clean and orderly.
- Use the correct tools for the job.
- Keep the tools clean and in good condition.
- Always use **HYSTER® APPROVED** parts when making repairs. Replacement parts must meet or exceed the specifications of the original equipment manufacturer.
- Make sure all nuts, bolts, snap rings, and other fastening devices are removed before using force to remove parts.
- Always fasten a **DO NOT OPERATE** tag to the controls of the unit when making repairs, or if the unit needs repairs.
- Strictly follow all **WARNING** and **CAUTION** notes in the operating manual, safety labels, service manual, and other instructions.
- Gasoline, Liquid Propane Gas (LPG), Compressed Natural Gas (CNG), Hydrogen Gas (H₂), and Diesel fuels are flammable and potentially explosive. Hydraulic, transmission, and other fluids and oils are also flammable. Be sure to follow the necessary safety precautions when handling these substances or working on systems containing these substances.
- Lead acid batteries generate flammable gas when they are being charged. Keep fire and sparks away from the area. Make sure the area is well ventilated.
- Lithium-ion batteries should only be used in working environments where the temperature is within the recommended operating range (typically between 0 - 40°C (32 - 104°F)). Extreme temperatures, moisture, improper charging or damage to the battery can cause a fire or explosion.
- Whenever Diagnostic tools are needed for engine, only licensed or certified persons can use Diagnostic tools.

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 ANSI/ITSDF B56.1, UL 558, or UL 583, or which otherwise affect the safe operation of the truck.



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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Introduction

GENERAL

202001-001

NOTE: For any fasteners in this manual that feature standard torque specifications, please refer to **Metric and Inch (SAE) Fasteners 8000SRM0231** for correct specifications.

DISCHARGING THE CAPACITORS



WARNING

DO NOT make repairs or adjustments unless you have been properly trained and authorized to do so. Improper repairs and adjustments can create dangerous operating conditions. **DO NOT** operate a lift truck that needs repairs. Report the need for repairs to your supervisor immediately. If repair is necessary, attach a **DO NOT OPERATE** tag on the steering wheel and disconnect the battery.

Disconnect the battery and discharge the capacitors before opening any compartment covers or inspecting or repairing the electrical system. **DO NOT** place tools on top of the battery. If a tool causes a short circuit, the high current flow from the battery can cause personal injury or property damage.

Some check and adjustments are performed with the battery connected. **DO NOT** connect the battery until the procedure instructs you to do so. Never wear any metallic items on your fingers, arms, or neck. Metal items can accidentally make an electrical connection and cause injury. Before performing any tests or adjustments, block the lift truck to prevent unexpected movement.

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

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

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

DISCHARGING THE CAPACITORS: For trucks with rapid-charge option, the horn cannot be used to discharge capacitors prior to service. Disconnect the battery, then wait five minutes before performing any service on the truck.

1. Ensure the capacitors are discharged by performing Step 2 through Step 6 below.
2. Turn the key or keyless switch to **OFF** position.
3. Disconnect the battery by separating the connector on the battery cable from the connector on the lift truck.
4. Block the drive wheels to prevent the lift truck from moving.
5. Make sure the Emergency-Stop Switch **HAS NOT** been activated. If the Emergency-Stop Switch is activated, rotate the switch to the right until it pops up.
6. Press the horn button on the steering column. Wait 30 seconds to be sure capacitors are fully discharged. If the horn does not sound when the switch is actuated, wait 10 minutes before proceeding with service.
For lift trucks equipped with rapid-charge option, the horn cannot be used to discharge capacitors prior to service. Disconnect the battery, then wait five minutes before performing any service on the truck.

SAFETY PROCEDURES WHEN WORKING NEAR MAST

202001-210



WARNING

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 Service Manual section for the specific mast being repaired.

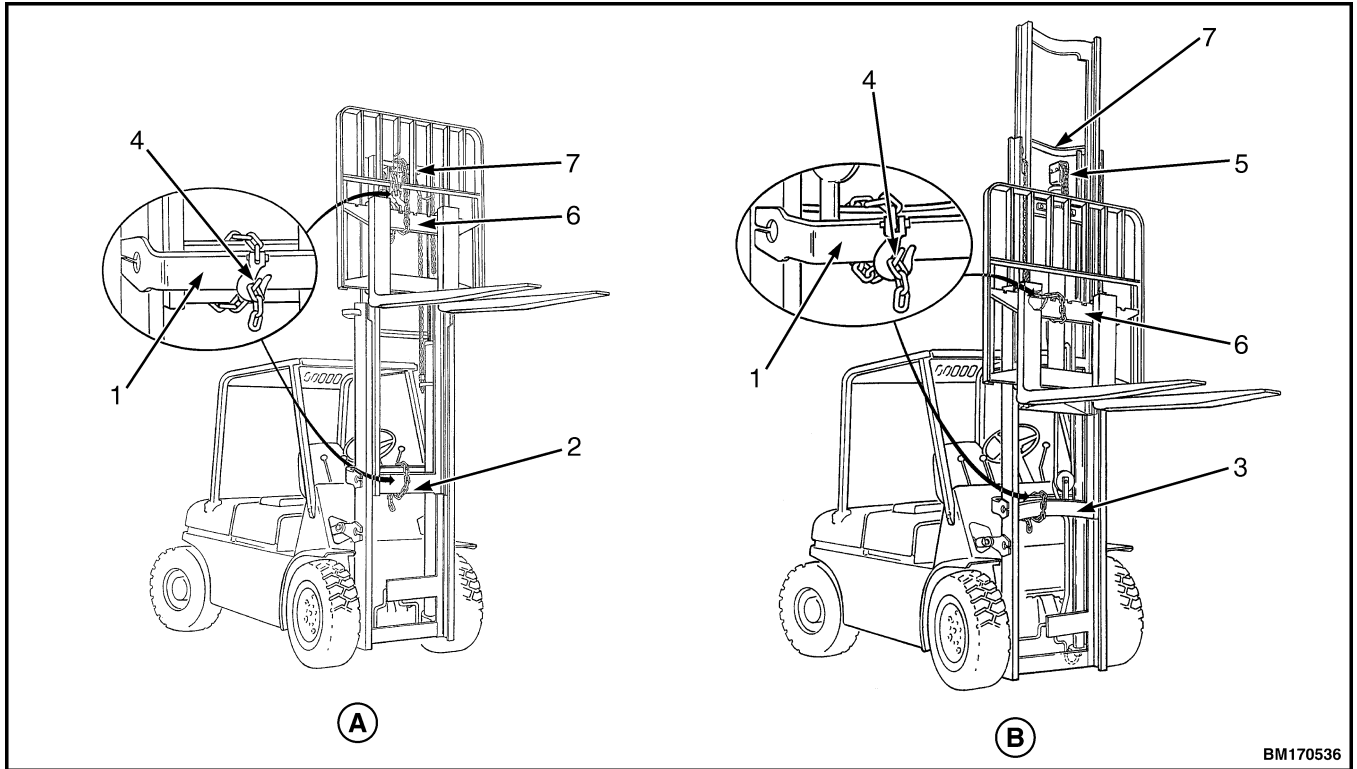
- Never put any part of the body into or under the mast or carriage unless all parts are completely lowered or a safety chain is installed. Also make sure that the power is off and the key is removed. Put a **DO NOT OPERATE** tag in the operator's compartment. Disconnect the battery on electric lift trucks and put a tag or lock on the battery connector.
- Be careful of the forks. When the mast is raised, the forks can be at a height to cause an injury.
- **DO NOT** climb on the mast or lift truck at any time. Use a ladder or personnel lift to work on the mast.
- **DO NOT** use blocks to support the mast weldments or 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.

WHEN WORKING NEAR THE MAST ALWAYS:

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

OR

- 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:
 1. Put mast in vertical position.
 2. Raise mast to align bottom crossmember of weldment that moves within the outer weldment with a stationary crossmember on the 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 1.
 3. Use a 3/8 inch 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.
 4. Lower mast until there is tension in the safety chain and the free-lift cylinder (three-stage) is completely retracted. If running, stop the engine. Apply parking brake. Install a **DO NOT REMOVE** tag on the safety chain(s).
 5. Install another 3/8 inch minimum safety chain between the top or bottom crossmember of the carriage and a crossmember on the outer weldment. See Figure 1.
 6. After lowering or restraining the mast, shut off power and remove key. Put a **DO NOT OPERATE** tag in the operator's compartment.
 7. Disconnect battery on electric lift trucks and put a tag or lock on battery connector.



BM170536

A. TWO-STAGE LFL MAST

B. THREE-STAGE FFL MAST

- 1. OUTER WELDMENT
- 2. INNER WELDMENT
- 3. INTERMEDIATE WELDMENT
- 4. HOOK

- 5. FREE-LIFT CYLINDER
- 6. TOP CROSSMEMBER
- 7. TOP OF OUTER WELDMENT

Figure 1. Two-Stage LFL and Three-Stage FFL Masts

Truck handling and transport

HOW TO MOVE A DISABLED LIFT TRUCK 202001-094

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 lift truck to slide. A slope will also make the lift trucks more difficult to stop.

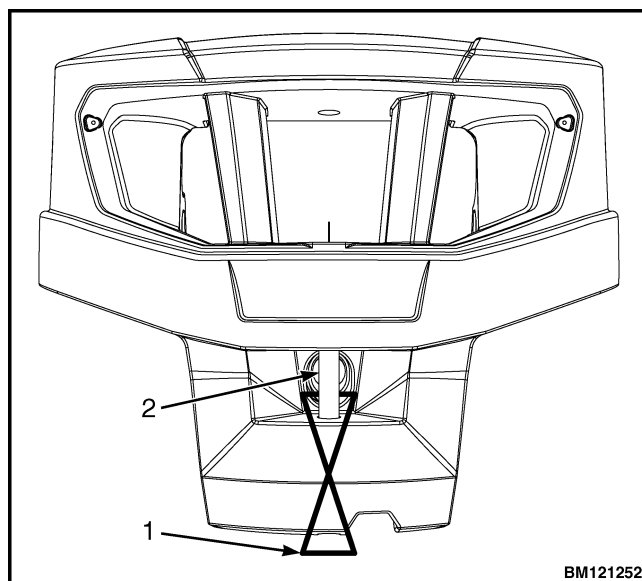
If equipped with an electronic park brake, the brake must be manually released. Stop periodically to ensure the park brake is still released by pumping until firm.

Never lift and move a disabled lift truck unless the disabled lift truck both **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 gross 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 gross 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.

1. The towed lift truck must have an operator.

2. Use a lift truck or a lifting device that could be attached to the mast, to raise the carriage and forks approximately 30 cm (12 in.) from the surface. Install a chain around a mast crossmember and carriage to prevent the carriage and mast channels from moving.
3. If another lift truck is used to tow the disabled lift truck, the towing lift truck must have an equal or larger capacity than the disabled lift truck. Install approximately $\frac{1}{2}$ of the capacity load on forks of the towing lift truck. This $\frac{1}{2}$ capacity load will increase traction of towing lift truck. Keep load as low as possible.
4. 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 2.

Only use a Hyster- approved tow pin. Consult **Parts Manual**.



1. STEEL TOW LINK 2. TOW PIN

Figure 2. Towing the Lift Truck

5. Tow the truck slowly enough as to be able to ensure a controlled stop of both vehicles.

HOW TO PUT A LIFT TRUCK ON BLOCKS 202001-095

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 and structural stability of the truck:

- Mast
- Drive axle
- Engine
- Transmission
- Counterweight
- Rear Frame
- Side Frame

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 that are rated to support the gross weight of the lift truck.



CAUTION

These lift trucks are equipped with fender lifting eyes. The fender 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 fender lifting eyes will damage the truck.

1. Put chocks on each side (front and back) of steering tires to prevent movement of lift truck. See Figure 3.
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, and then place a block under frame behind drive tire. Make sure the jack has a capacity equal to at least half the weight of the lift truck. See Nameplate. Repeat this step on both sides so the truck remains level from left to right.

HOW TO RAISE STEERING TIRES

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

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



- | | |
|-------------------|-----------|
| 1. DRIVE TIRES | 3. BLOCKS |
| 2. STEERING TIRES | 4. CHOCKS |

Figure 3. Put Lift Truck on Blocks

HOW TO CLEAN A LIFT TRUCK 202001-096

WARNING

Engine, exhaust system components and other components can be 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 for more detail.

If it becomes necessary to clean the lift truck, 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 ingress under pressure or if connector is damaged.
6. Avoid spraying in areas containing electrical components such as:
 - Floor Plates
 - Battery Compartment
 - Dash/cowl assembly
 - Armrests with electrical components
7. Clean the battery compartment by using a clean cloth to wash the battery with water. Dry with compressed air. Care should be taken to keep moisture at a minimum as some units have a traction or hydraulic motor directly below the battery compartment.
8. DO NOT pressure wash the battery. Do not use hot water. For cleaning traction batteries, refer to the Battery section of the **Service Manual**.
9. DO NOT pressure wash lift chains, sheaves or load rollers in the mast assembly. Refer to the Chains, Sheaves and Load Rollers maintenance section in this manual for proper cleaning procedures.
10. After cleaning, immediately start and run the lift truck to dry out components.

PUTTING A LIFT TRUCK INTO STORAGE 202001-097

HOW TO PUT INTERNAL COMBUSTION ENGINE (ICE) LIFT TRUCKS IN STORAGE

Proper storage of the lift truck is essential to ensure protection and maximum performance of the truck. The main areas of importance are the engine, hydraulic components, and truck battery. The length of storage time and the storage location determines what procedures you should follow.

Before placing any lift truck in storage, you must choose an area that is clean, dry, and free from airborne contaminants. For safety and increased

usable floor area, remove the forks and tag them with the lift truck serial number.

The following storage procedures are for conditions and temperatures above 0°C (32°F). Adjust these procedures for local conditions and any changes in conditions during storage. The preparations necessary for storage are also determined from the following conditions:

- Short-term storage (one to six months) and long-term storage (over six months).
- Storage Location. A lift truck stored indoors will not require as much external protection as a lift truck stored outdoors.

Short-Term Storage

Perform the following steps to prepare your lift truck for storage (one to six months):

1. Check lubricant and fluid levels. Completely fill the fuel tank. Make sure the coolant mixture will protect cooling system and engine to lowest temperature expected during storage. Make sure all caps and dipsticks are installed correctly.
2. Fully lower the mast. If lift truck is equipped with forks, tilt mast **FORWARD** until the tips of the forks touch the floor. Apply a thin coat of fresh, high grade SAE 30 or 40 weight engine oil to the exposed cylinder rods. If the forks are removed, tilt mast **BACKWARD** until cylinders are completely retracted. This protects the cylinder rods.
3. Check that all switches and accessories are in the **OFF** position.
4. Activate each control lever to relieve hydraulic pressure.
5. Install chocks at the front and rear of the drive wheels. If the lift truck must be left on an incline, put blocks on the downhill side of all wheels so that the lift truck cannot move. For trucks with a manual park brake, **DO NOT USE THE PARK BRAKE**. No special action is required for trucks with automatic park brake.
6. Disconnect the battery cables from the battery. Apply a coating of dielectric grease to the cable connectors and battery terminals to prevent corrosion.

7. Check the tire pressure, if applicable. Confirm the tires have the correct pressure as shown on the lift truck nameplate.
8. Clean the lift truck and engine compartment to prevent corrosion, as described in How to clean a lift truck.
9. If the lift truck is stored outdoors, put an opaque cover over the lift truck to prevent damage from the weather. In wet conditions, a cover will not prevent corrosion to the lift truck. It is preferred to store the truck indoors when possible.

Long-Term Storage

Perform the following steps to prepare the lift truck for storage (6 months or longer):

1. Complete all short-term storage procedures.
2. Wrap or cover all exterior lights, radiator grill, and air vents with a moisture barrier cover. Use tape to hold the covers in place.
3. Remove the battery or batteries from the lift truck. Store the battery or batteries in an approved space. Be sure to follow local regulations. Batteries that are stored for long periods can become damaged. Either keep batteries in service or follow the battery storage procedures below.
4. Spray exterior surfaces and frame with preservative coating.

While the Lift Truck is in Storage

Each month, make a visual inspection for leaks or signs of deterioration. Take corrective action immediately. Check the fluid level in the engine, radiator, hydraulic tank, transmission, and brake master cylinder. Make sure fuel tank is full to prevent tank corrosion.

NOTE: Do not shut down an engine before it reaches operating temperature.

Each month, set the park brake, start engine, and run the engine until normal engine, transmission, and hydraulic operating temperature is reached. This will coat the internal engine components with a film of oil and rid the engine of built-up condensation.

Each month, all hydraulic cylinders must be cycled several times to keep the seals active and to coat the interior walls with oil. Actuate each cylinder, in both directions, until it reaches the stops.

Return lift truck to its storage state for another month.

How to Put Batteries in Storage

Batteries are to be placed on a wooden pallet and stored in a dry, moderately cool area.

Lead acid batteries will slowly "self-discharge" over a period of time due to their chemical makeup. If the self-discharge is left uncontrolled, excessive sulphation can occur which is difficult to reduce and can damage the anodes. A discharged battery with a specific gravity of 1.000 will freeze at -7.8°C (18°F). A fully-charged battery with a specific gravity of 1.280 will freeze at -66°C (-87°F).

This "self-discharge" is due to a chemical reaction; therefore, that chemical reaction can be accelerated by heat resulting in more rapid "self-discharge." The rate of discharge can amount to an average of about 0.001 point drop in specific gravity per day.

The following procedure can be followed when placing a battery in storage or when not in operation for more than 30 days.

1. Give an equalizing charge prior to placing new batteries in storage. Used batteries are to be fully charged, then allowed to balance for approximately three more hours.
2. Neutralize and clean the battery. Clean with a solution of 100 grams (3.5 oz) of sodium bicarbonate (baking soda) to 1 liter (0.25 gal) of water.
3. Store in a cool, dry location.
4. Check each cell in the battery at least once every 30 days and boost charge when specific gravity falls below 1.240. See **Electrical, software, and controls** 2200SRM2304.
5. Cover batteries to protect them from ambient contamination.

If a greasy film forms on the top of a battery, this is acid and must be neutralized with the solution described above.

PREPARING A STORED LIFT TRUCK FOR USE

202001-098

PUTTING A STORED LIFT TRUCK BACK INTO SERVICE

1. Remove all tape, covers, and preservation materials.
2. Check the lift truck for damage and missing components. Repair damage and/or replace missing components.

NOTE: If the lift truck has been stored longer than one year, the following lubricants and fluids must be drained and replaced:

- Engine oil and filter - See Yanmar engine oil and oil filter, Yanmar 2.1L, 3.0L, 3.3L Diesel, Yanmar 2.2L LPG and Bi-fuel .
- Transmission oil and filter - See Transmission oil drain and fill (Powershift).
- Hydraulic oil and filter - See Hydraulic Filter.
- Fuel and filter - See LPG vaporizer and fuel filter.
- Coolant - See Cooling system.

- Brake Fluid - See Brake fluid change (master cylinder).
- Drive Axle Fluid - See Dry brake axle differential and drive axle oil or Wet brake axle differential (center section) oil.

NOTE: Dielectric grease is non-conductive. Before reconnecting the battery cables, clean any dielectric grease from the cable connectors and battery terminals.

3. Clean the battery cables and terminals with a solution of bicarbonate of soda and water. Check the battery voltage. If the voltage is not correct, charge battery. Connect battery cables to battery.
4. When a lift truck is to be put into service after storage, it must be given the 500-hour inspections as shown in the Periodic Maintenance schedules.

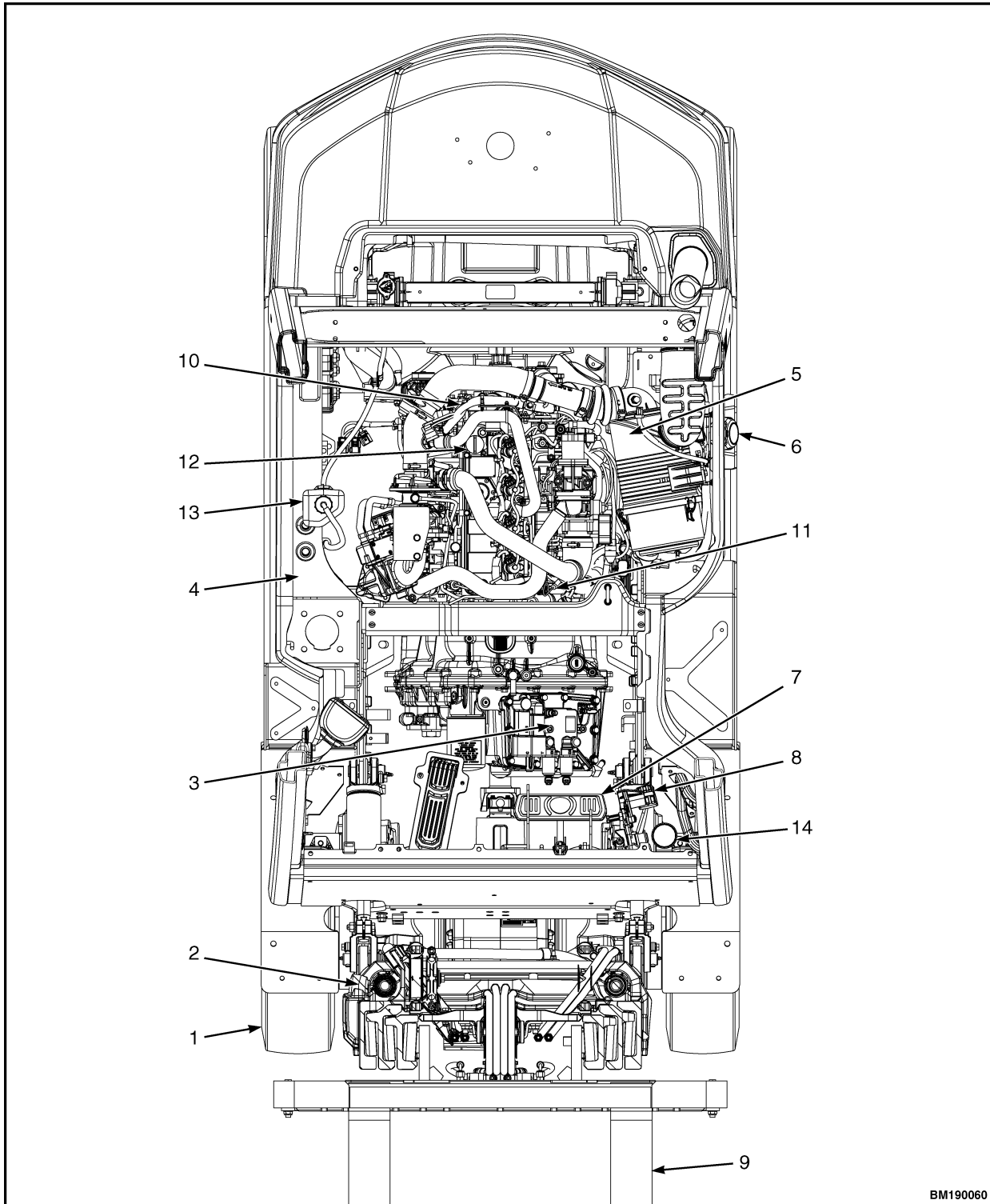
WHEELS AND TIRES 202001-291

To remove and replace wheels and tires, see your Operator Manual or Frame and Main Components Service Manual.

Periodic maintenance (PM) schedule

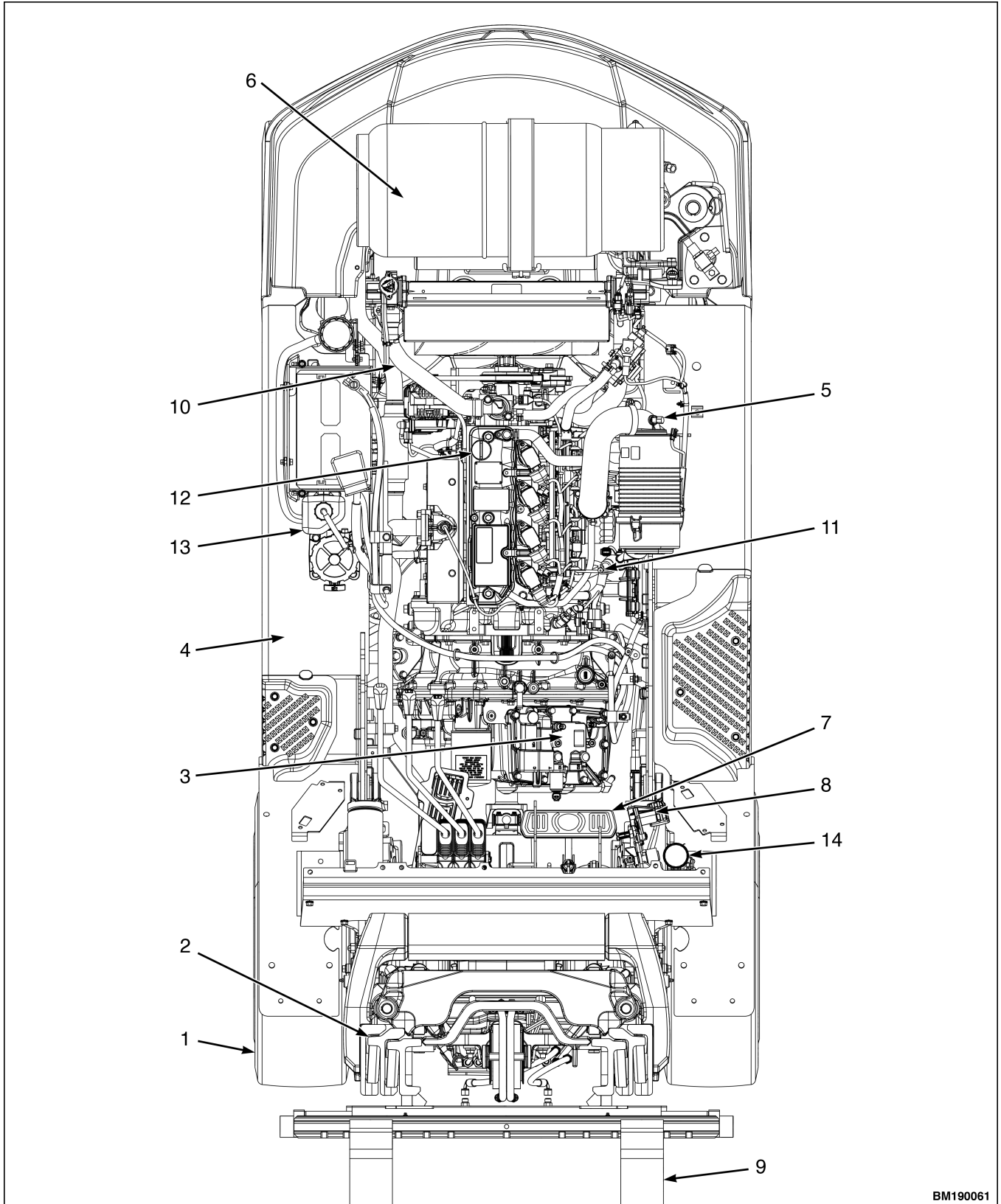
DAILY PERIODIC MAINTENANCE (PM) TASK SCHEDULE

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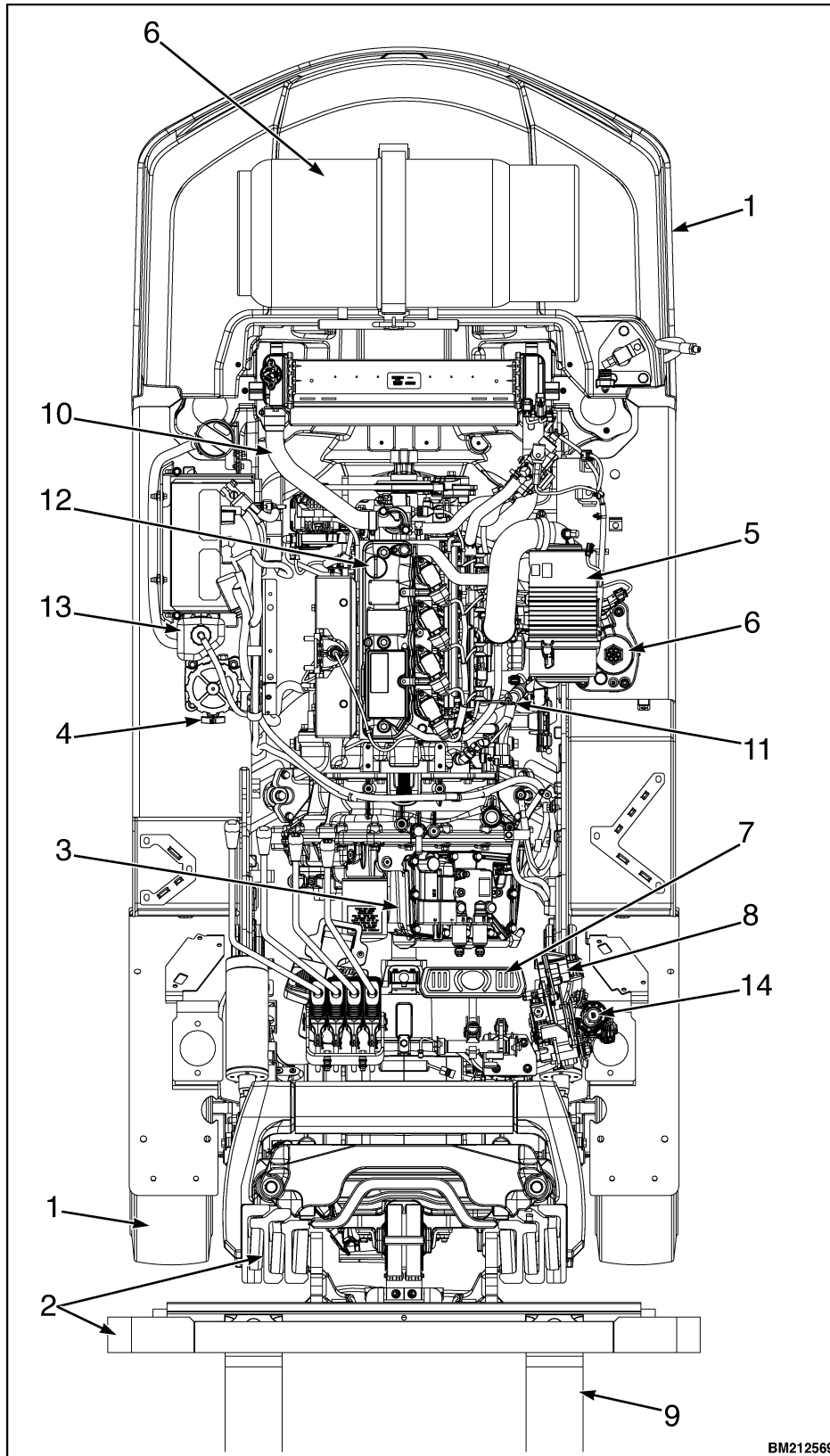
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Figure 4. Maintenance schedule items, 2.1L diesel engine (Daily checks)



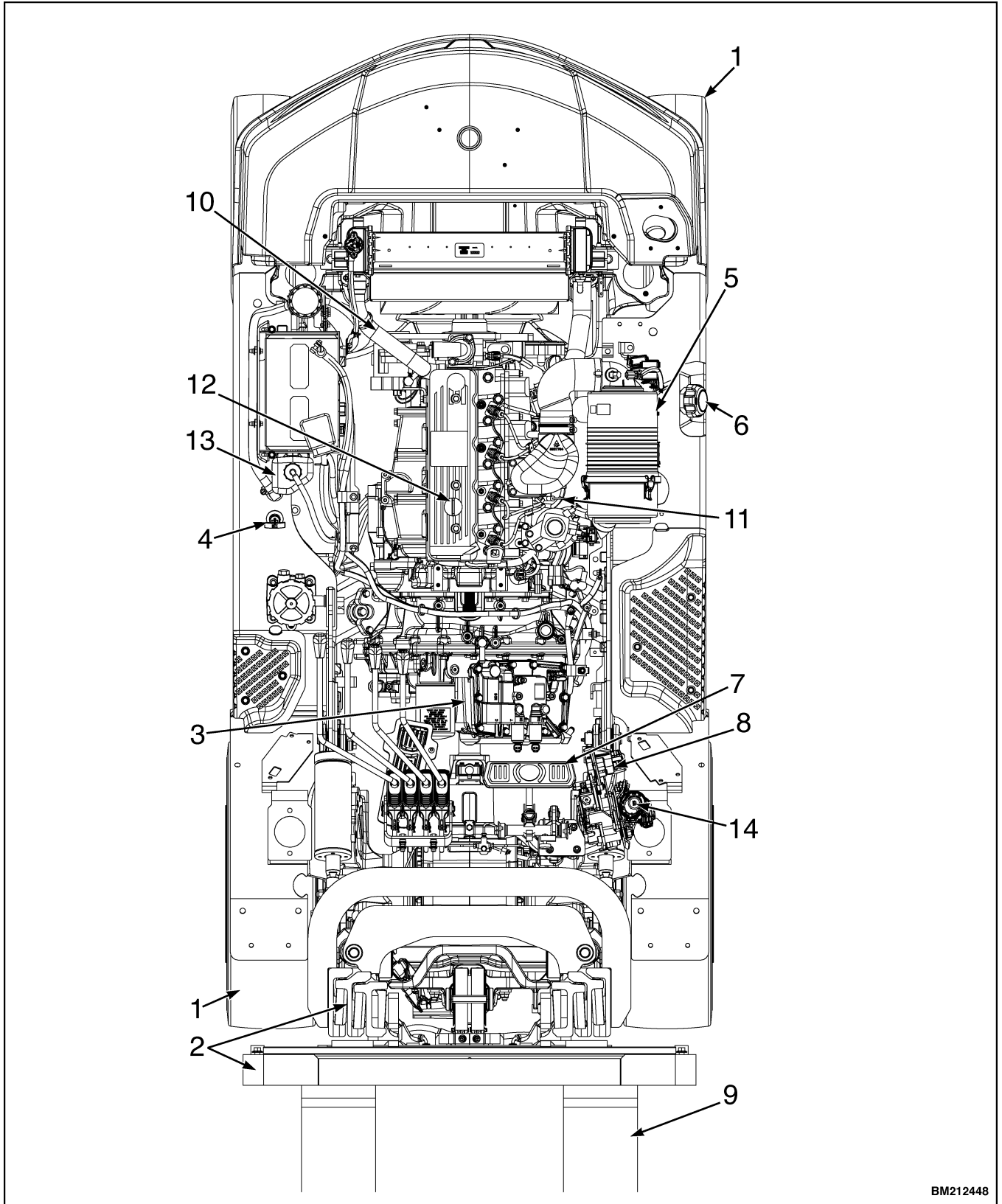
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Figure 5. Maintenance schedule items, 2.2L LPG engine (Daily checks)



BM212569

Figure 6. Maintenance schedule items, 2.2L Bi-Fuel engine (Daily checks)



BM212448

Figure 7. Maintenance schedule items, 3.0L or 3.3L Diesel engine (Daily checks)

Table 1. Maintenance Schedule (Daily checks)

Item No.	Item	8 hr/ 1 day	Procedure or Quantity	Specification
1	Tires	X	Check condition	See Nameplate
	Safety labels	X	Replace as necessary	See Parts Manual
2	Mast, carriage, lift chains, attachment	X	Check condition and lubrication	See Parts Manual
	Mast operation: lift and tilt	X	Check operation	
	Header hoses	X	Check for kinked, flattened, stiff or charred hoses	
	Operator restraint system, hip restraints, and seat rails	X	Check condition and operation	
	Hood and seat latches	X	Check condition and operation	
	Engine compartment	X	Remove combustible materials See NOTE 2 and NOTE 3 .	
	Check for leaks - fuel, oil, water	X	Check for leaks See NOTE 1 and NOTE 3 .	
	Hydraulic hoses	X	Check condition. See NOTE 3 .	See Parts Manual
	Visually Inspect Mast Mast hardware Tilt cylinder hardware	X		
10	Coolant hoses	X	Check condition. See NOTE 3 .	See Parts Manual
6	Fuel Tank Diesel	CIL	35.62 liter (9.41 gal)	Additional technical fuel requirements: <ul style="list-style-type: none"> When operating the engine in cold districts or high altitudes, the fuel cetane number should equal 45 or higher Use the fuel that can be used where the temperature is 12°C (53.6°F) lower than the expected lowest temperature to prevent the fuel from freezing
6	Fuel Tank LPG	CIL	33.5LB	

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

Table 1. Maintenance Schedule (Daily checks) (Continued)

Item No.	Item	8 hr/ 1 day	Procedure or Quantity	Specification
	Horn, lights, alarms	X	Check operation	
	Drive shaft	X	Check for audible noise. See Operation, check for procedure.	
7	Service brakes	X	Check operation	
8	Park brake	X	Check operation	
	Steering controls and steering column gas cylinder	X	Check condition and operation	
3	Transmission	X	Check for leaks. See NOTE 3.	
3	Transmission	X	Check operation. See NOTE 3.	
4	Hydraulic oil Yanmar 2.2L LPG Yanmar 2.2L Bi-Fuel Yanmar 3.0L Diesel Yanmar 3.3L Diesel	X	46.4 liter (49.0 qt) See NOTE 3.	ISO - VG 46
4	Hydraulic oil Yanmar 2.1L Diesel	X	34.2 liter (36.1 qt) See NOTE 3.	ISO - VG 46
11	Engine oil level Yanmar 2.2L LPG Yanmar 2.2L Bi-Fuel	X	Maintain oil level. Add as necessary.	API SM or SN
11	Engine oil level Yanmar 2.1L Diesel	X	Maintain oil level. Add as necessary.	API CJ-4 or CK-4
11	Engine oil level Yanmar 3.0L or 3.3L Diesel	X	Maintain oil level. Add as necessary.	API CH-4 or CI-4
12	Engine oil fill cap	X	Check condition and operation	See Parts Manual
4	Engine oil dipstick	X	Check condition and operation. Replace as necessary.	See Parts Manual
5	Air filter	X CIL	1 Filter	See Parts Manual
9	Forks	X	Check Condition	
X=Check C=Change L=Lubricate CIL=Check Indicator Light during operation				

Table 1. Maintenance Schedule (Daily checks) (Continued)

Item No.	Item	8 hr/ 1 day	Procedure or Quantity	Specification
	Fork positioner (Bolzoni option)	X	Check condition and operation. See Daily periodic maintenance (PM) task procedures.	
	Fuel water separator Yanmar 2.1L Diesel	CIL	Drain water as necessary	
	Fuel water separator Yanmar 3.0L or 3.3L Diesel	CIL	Drain water as necessary	
13	Coolant level Yanmar 2.1L Diesel Yanmar 2.2L LPG Yanmar 2.2L Bi- Fuel	X	Fill overflow bottle as required. 10.5 liter (11.1 qt)	Trucks built prior to May 2021, use either a 50% water/50% ethylene-glycol boron free, silicate free mixture or BASF® Glysantin® G40 coolant. Protects cooling system down to -37°C (-34.6°F) Trucks built after May 2021, use Valvoline Zerex G40 coolant. Protects cooling system down to -37°C (-34.6°F)
13	Coolant level Yanmar 3.0L Diesel Yanmar 3.3L Diesel	X	Fill overflow bottle as required. 11.5 liter (12.2 qt)	Trucks built prior to May 2021, use either a 50% water/50% ethylene-glycol boron free, silicate free mixture or BASF® Glysantin® G40 coolant. Protects cooling system down to -37°C (-34.6°F) Trucks built after May 2021, use Valvoline Zerex G40 coolant. Protects cooling system down to -37°C (-34.6°F)
14	Dry Brake Axle Brake fluid Master Cylinder	CIL	0.25 liter (0.5 pt)	SAE J-1703 DOT-3
14	Wet Brake Axle Brake fluid Master Cylinder	CIL	0.35 liter (0.74 pt)	SAE J-1703 DOT-3
	Lift height sensor	X	Check condition and operation	

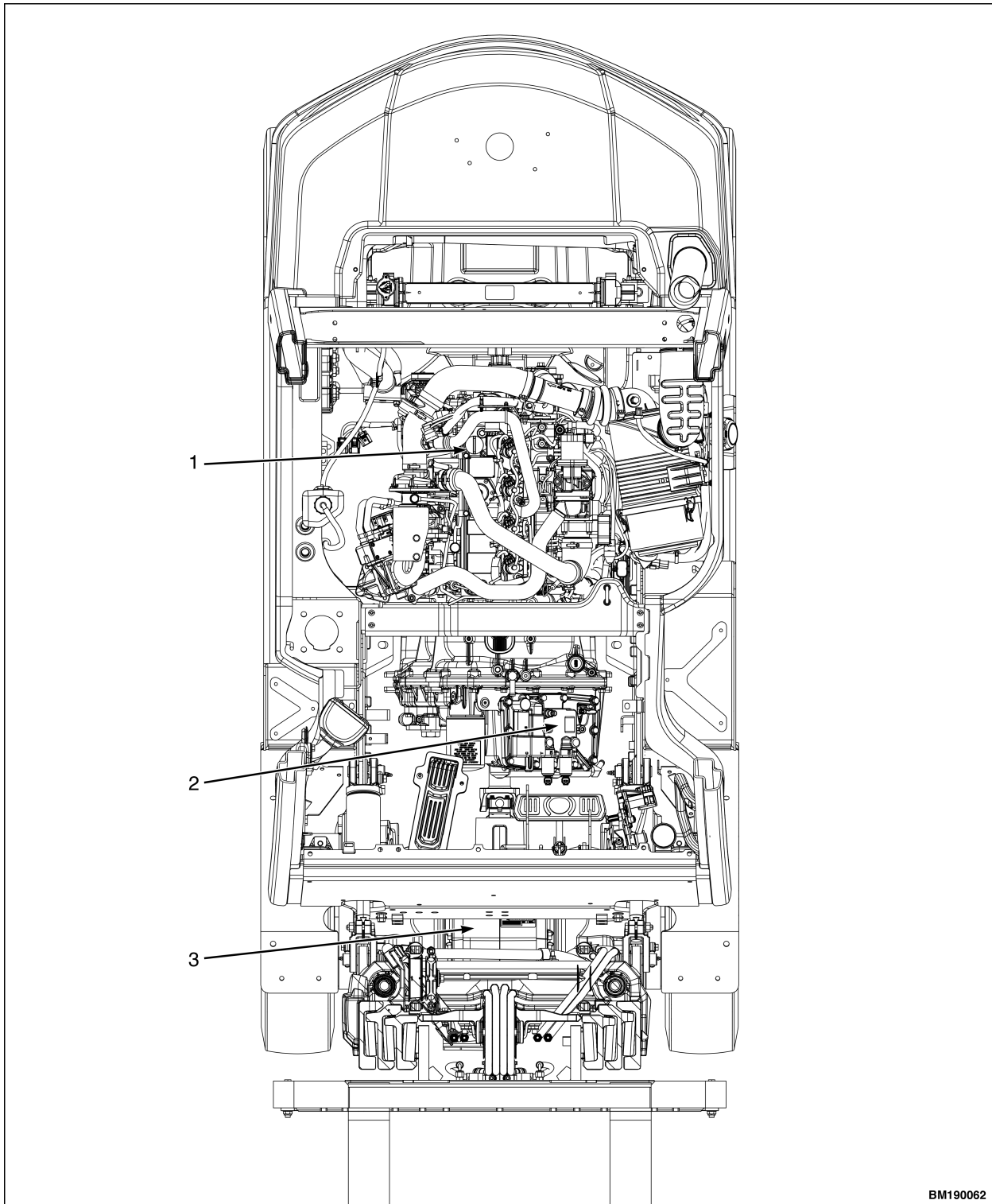
X=Check C=Change L=Lubricate CIL=Check Indicator Light during operation

Table 1. Maintenance Schedule (Daily checks) (Continued)

Item No.	Item	8 hr/ 1 day	Procedure or Quantity	Specification
		CIL		
NOTE 1: Check fuel system for leaks prior to any service or maintenance activity.				
NOTE 2: Recommended service intervals are based on a normal application in a clean environment. Applications involving contaminated environments such as high levels of air borne debris (dust and waste paper); chemical or abrasive compounds; poor ground conditions; intensive usage at high performance levels; or other abnormal conditions will require more frequent servicing. At your request your Hyster dealer will advise you of the appropriate service intervals based on an application survey.				
NOTE 3: Turn lift truck engine OFF prior to performing maintenance or checks in engine compartment. Confirm hood is open.				
NOTE 4: If following a 500 hour oil change schedule, engine oil used must be API SM or SN.				
NOTE 5: Yanmar 2.1L Diesel with DPF ONLY. If oil level on dipstick is greater than 10mm above the Full mark on the dipstick, engine oil must be changed immediately due to excessive fuel dilution of engine oil.				

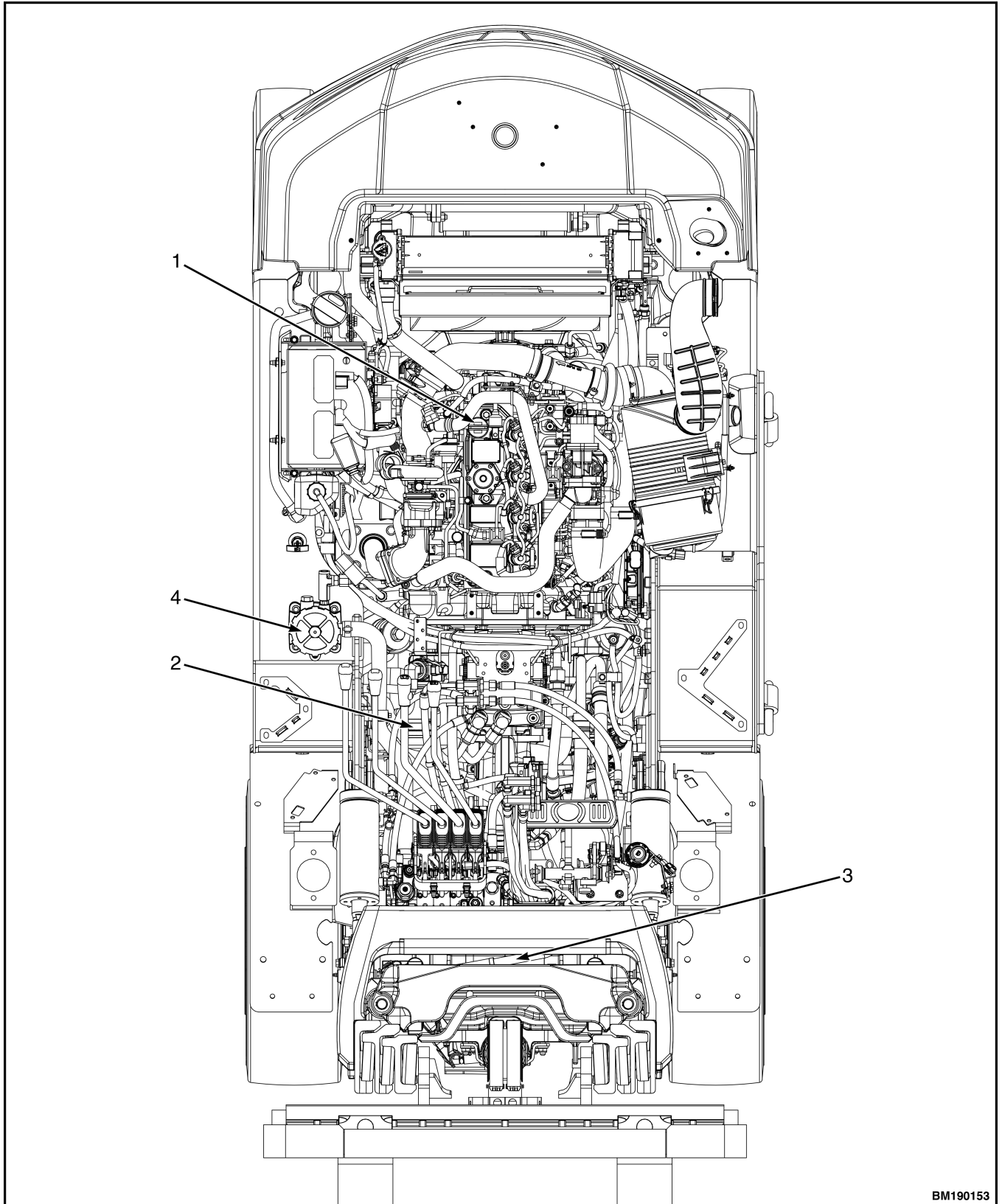
**FIRST 150 HOURS OR SIX WEEKS
PERIODIC MAINTENANCE (PM)
SCHEDULE**

202001-100



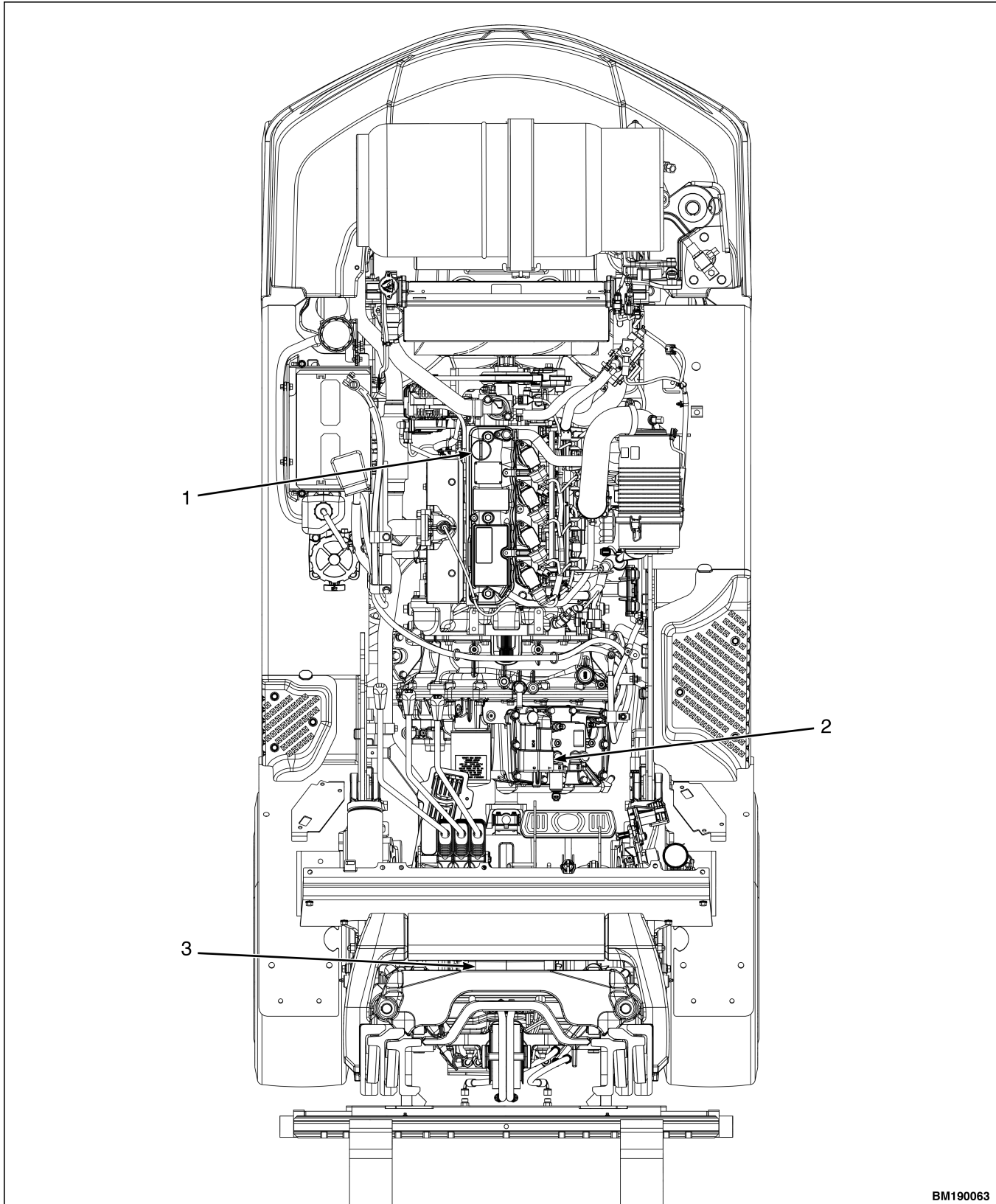
BM190062

Figure 8. Maintenance schedule items, 2.1L diesel engine with Powershift transmission (150 hours)



BM190153

Figure 9. Maintenance schedule items, 2.1L diesel engine with Hydrostatic transmission (HST) (150 hours)



BM190063

Figure 10. Maintenance schedule items, 2.2L LPG engine with Powershift transmission (150 hours)

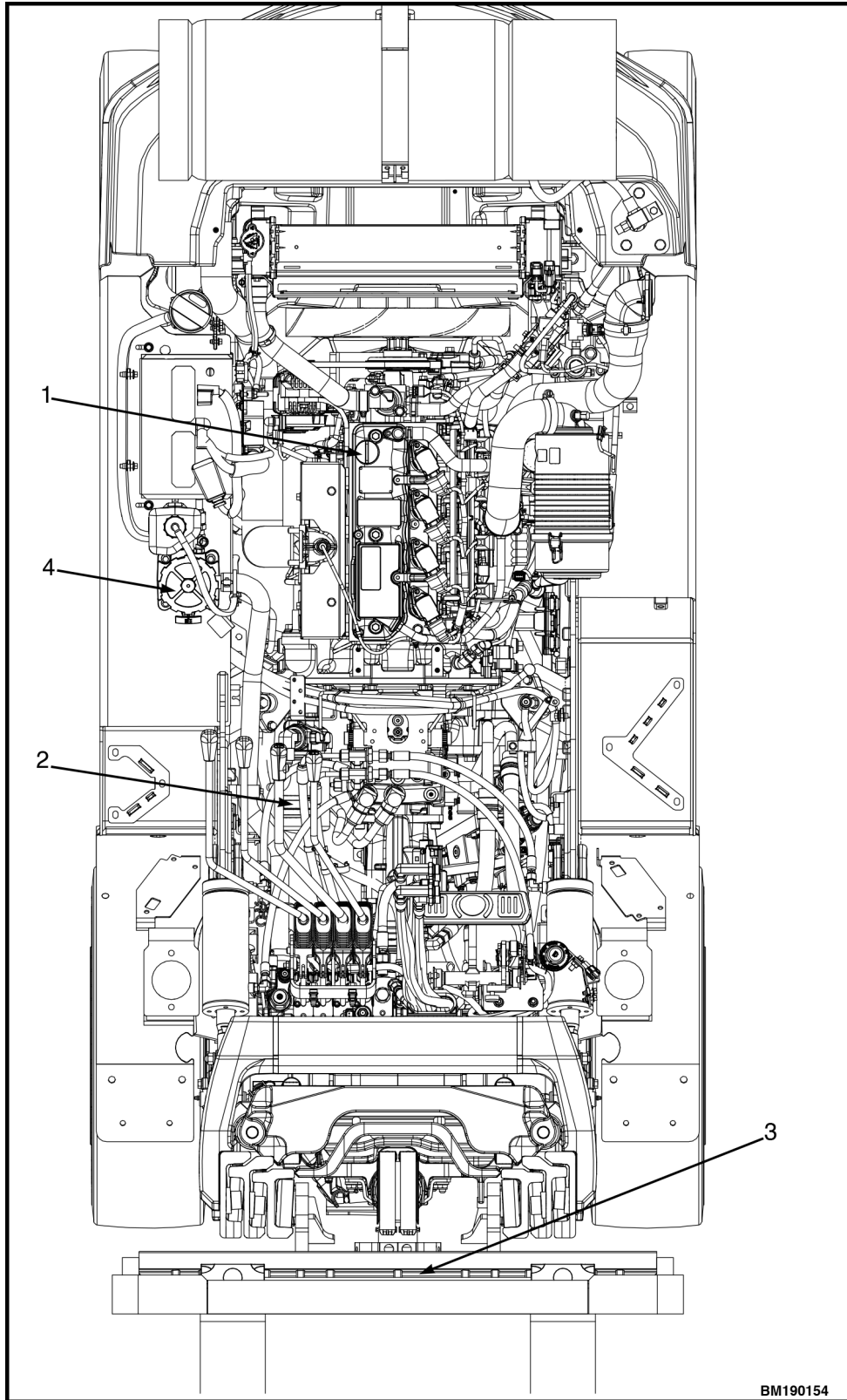


Figure 11. Maintenance schedule items, 2.2L LPG engine with Hydrostatic transmission (150 hours)

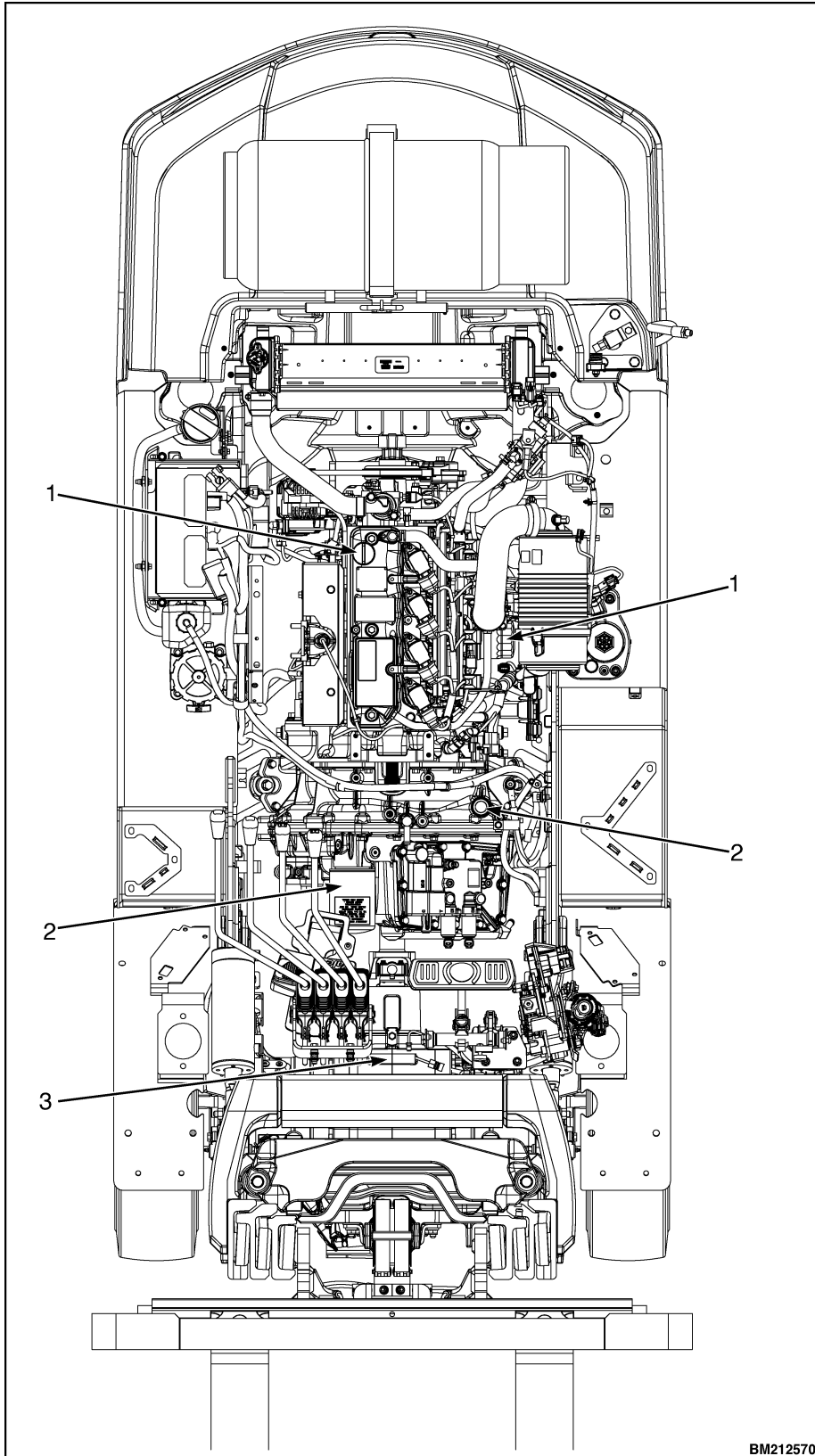
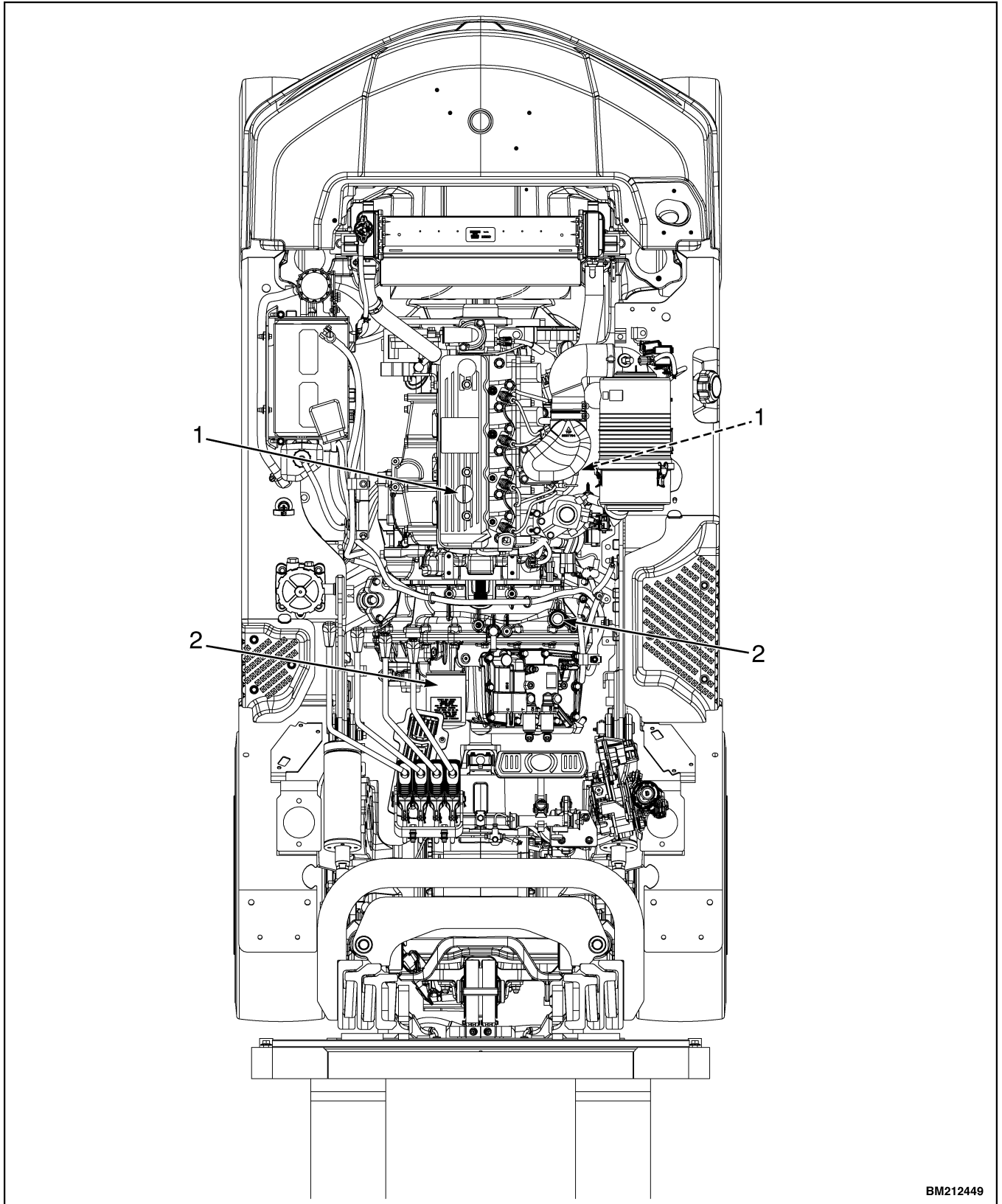


Figure 12. Maintenance schedule items, 2.2L Bi-Fuel engine (150 hours)



BM212449

Figure 13. Maintenance schedule items, 3.0L or 3.3L Diesel engine (150 hours)

Table 2. Maintenance schedule items (First 150 hours or Six weeks)

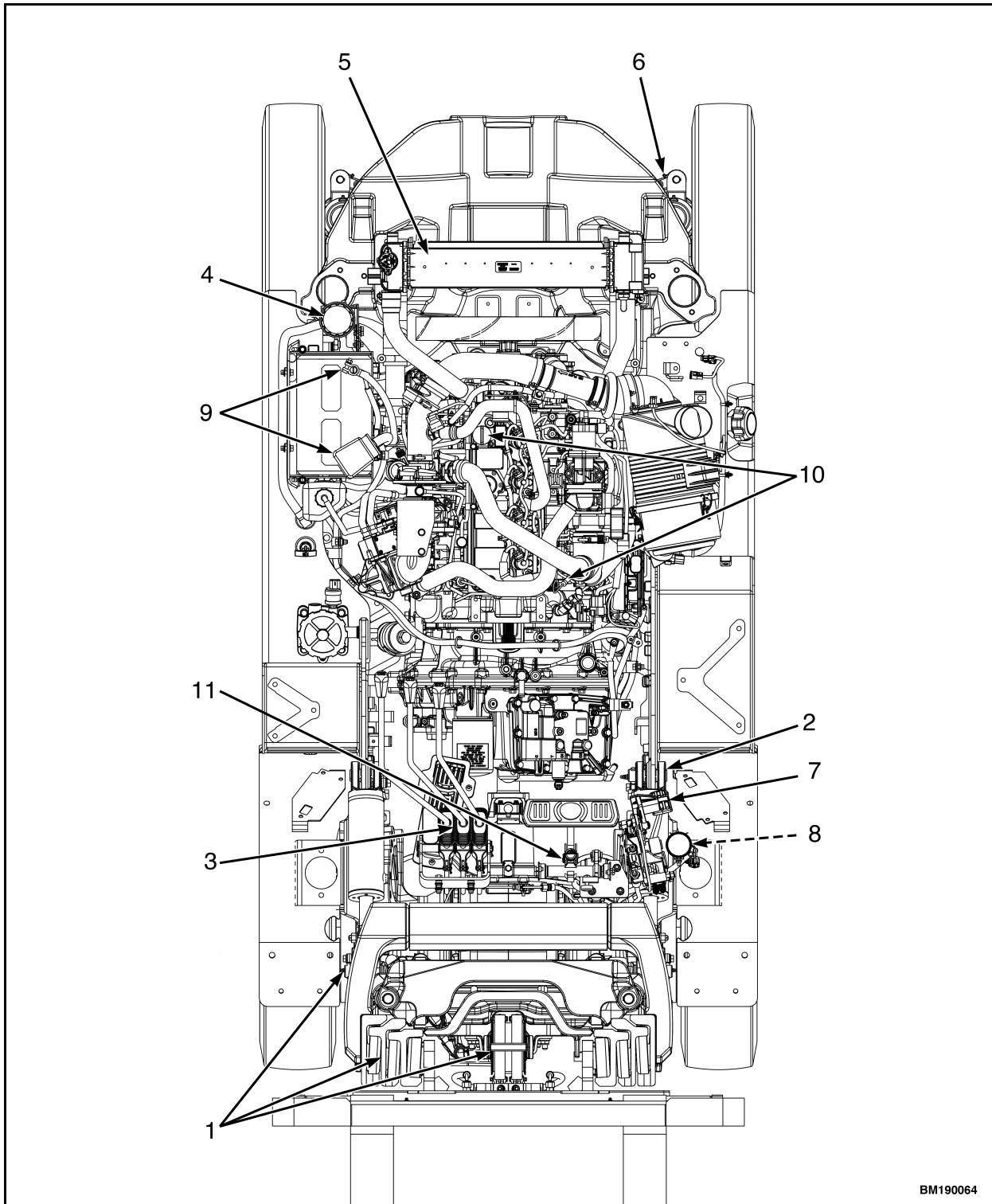
Item No.	Item	150 hrs/ 6 weeks	Procedure or Quantity	Specification
1	Engine Oil Yanmar 2.1L Diesel	C	7.4 liter (7.8 qt) See NOTE 1 and NOTE 2	API CJ-4 or CK
1	Engine Oil Yanmar 2.2L LPG Yanmar 2.2L Bi-Fuel	C	7.4 liter (7.8 qt) See NOTE 1 and NOTE 2	See NOTE 3
1	Engine Oil Yanmar 3.0L or 3.3L Diesel	C	9.4 liter (9.93 qt) See NOTE 1 and NOTE 2	API CH-4 or CI-4
1	Engine Oil filter Yanmar 2.1L Diesel Yanmar 2.2L LPG Yanmar 2.2L Bi-Fuel Yanmar 3.0L or 3.3L Diesel	C	Replace filter as required. See NOTE 1 and NOTE 2	See Parts Manual
2	Powershift Transmission Oil Dry Brake Axle Drain and Fill	C	11 liter (11.6 qt) See NOTE 1	Shell Spirax S4 TXM
2	Powershift Transmission Oil Wet Brake Axle Drain and Fill	C	15.5 liter (16.4 qt) See NOTE 1	Shell Spirax S4 TXM
2	Powershift Transmission Oil Filter	C	Replace filter as required.	See Parts Manual
4	Hydrostatic Transmission Oil Drain and Fill	C	5 liter (5.3 qt)	Shell Spirax S4 TXM
2	Hydrostatic Transmission Oil Filter	C	Replace filter as required.	See Parts Manual
3	Dry Brake Drive Axle Differential Oil (Center section) Drain and Fill	C	1.8 liter (1.9 qt)	80W-90 API GL-5
3	Wet Brake Drive Axle w/Powershift Transmission Differential Oil (Center section) Drain and Fill	C	1.4 liter (1.5 qt)	80W-90 API GL-5
3	Wet Brake Drive Axle w/Hydrostic Transmission Differential Oil (Center section) Drain and Fill	C	1.4 liter (1.5 qt)	80W-90 API GL-5
3	Wet Brake Drive Axle Wheel Ends Drain and Fill	C	2.6 liter (2.7 qt)	J20C
	Drive Shaft	X	Inspect for residue or leaking grease. See Drive shaft inspection for procedure.	

X=Check, C=Change

Table 2. Maintenance schedule items (First 150 hours or Six weeks) (Continued)

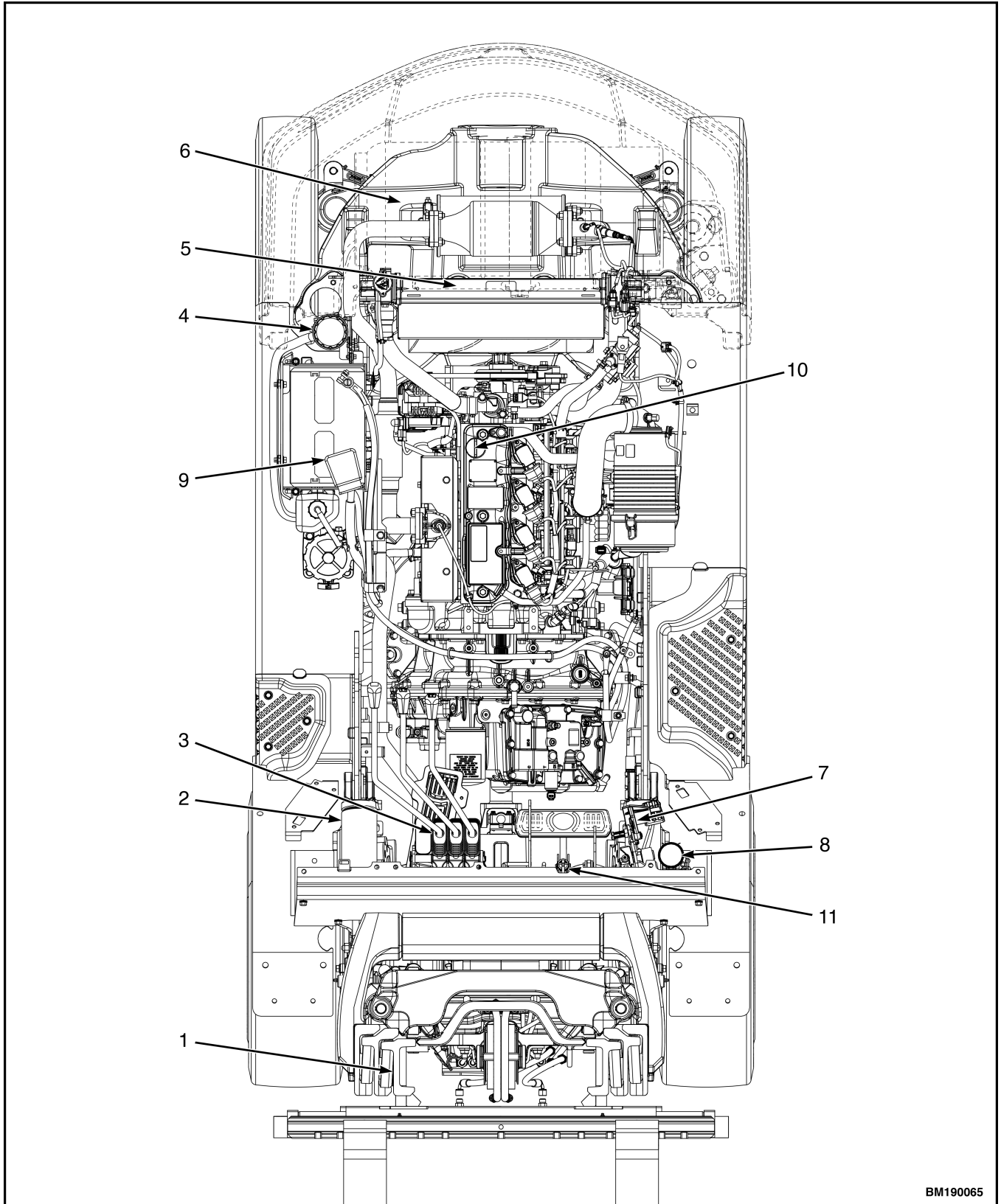
Item No.	Item	150 hrs/ 6 week s	Procedure or Quantity	Specification
	Tilt Cylinder Mounting Hardware	X	Inspect torque. See Tilt cylinder mounting hardware inspection for procedure.	
NOTE 1: Turn lift truck engine OFF prior to performing maintenance or checks in engine compartment. Confirm hood is open.				
NOTE 2: Change engine Oil and filter after first 150 hours of operation and change engine Oil and filter every 500 hours or 6 months thereafter.				
NOTE 3: Yanmar 2.2L LPGor Bi-Fuel ONLY- Truck is shipped from the factory containing “Shell Rotella T6 5W-30 Multi Vehicle”. If replacing with factory oil, engine oil may be changed every 1,000 hours or two years. If replacing with any other oil, engine oil must be changed every 500 hours or 1 year.				
X=Check, C=Change				

EVERY 500 HOURS OR THREE MONTHS 202001-102
PERIODIC MAINTENANCE (PM)
SCHEDULE



BM190064

Figure 14. Maintenance schedule items, 2.1L Diesel engine (500 hours)



BM190065

Figure 15. Maintenance schedule items, 2.2L LPG engine (500 hours)

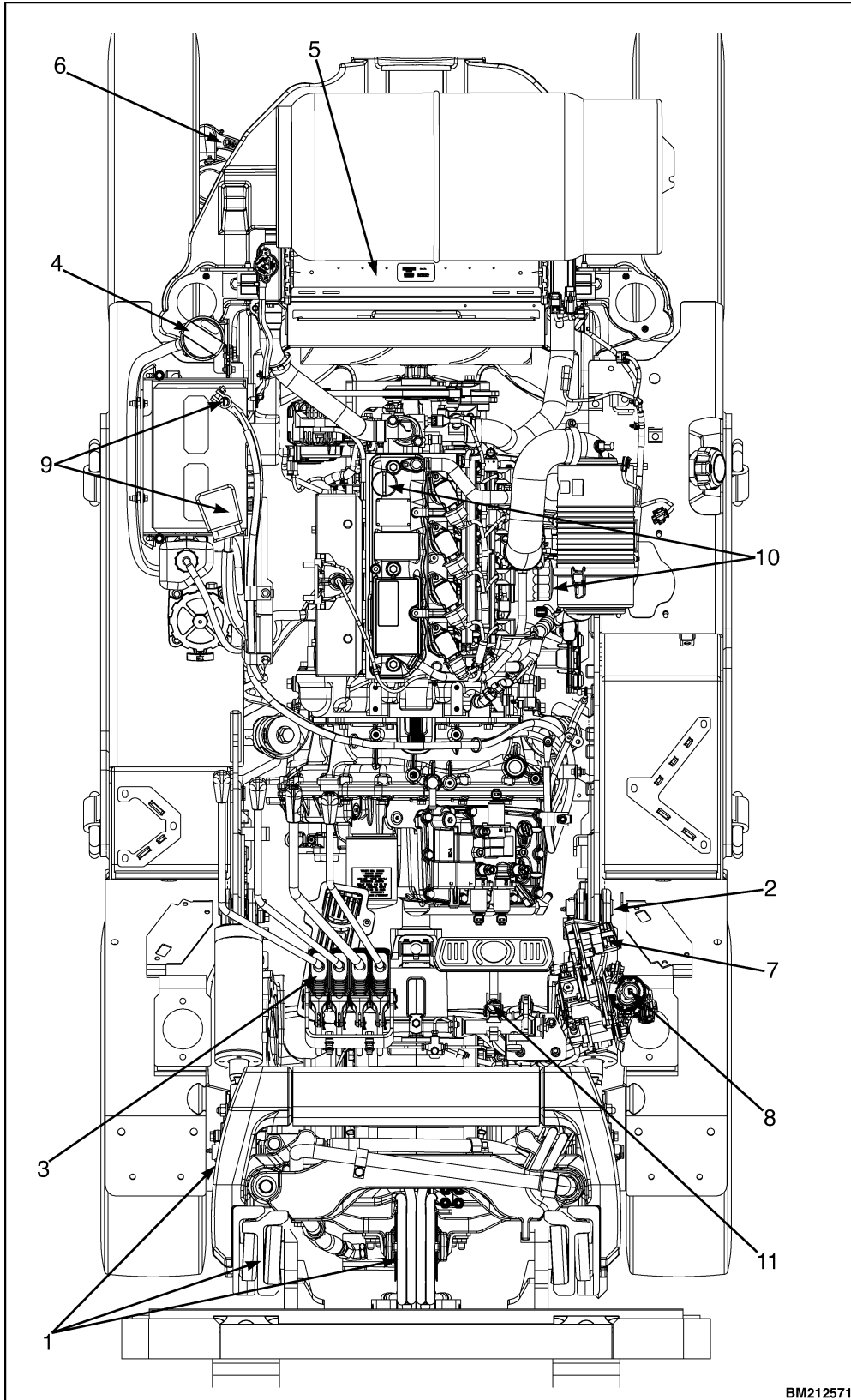
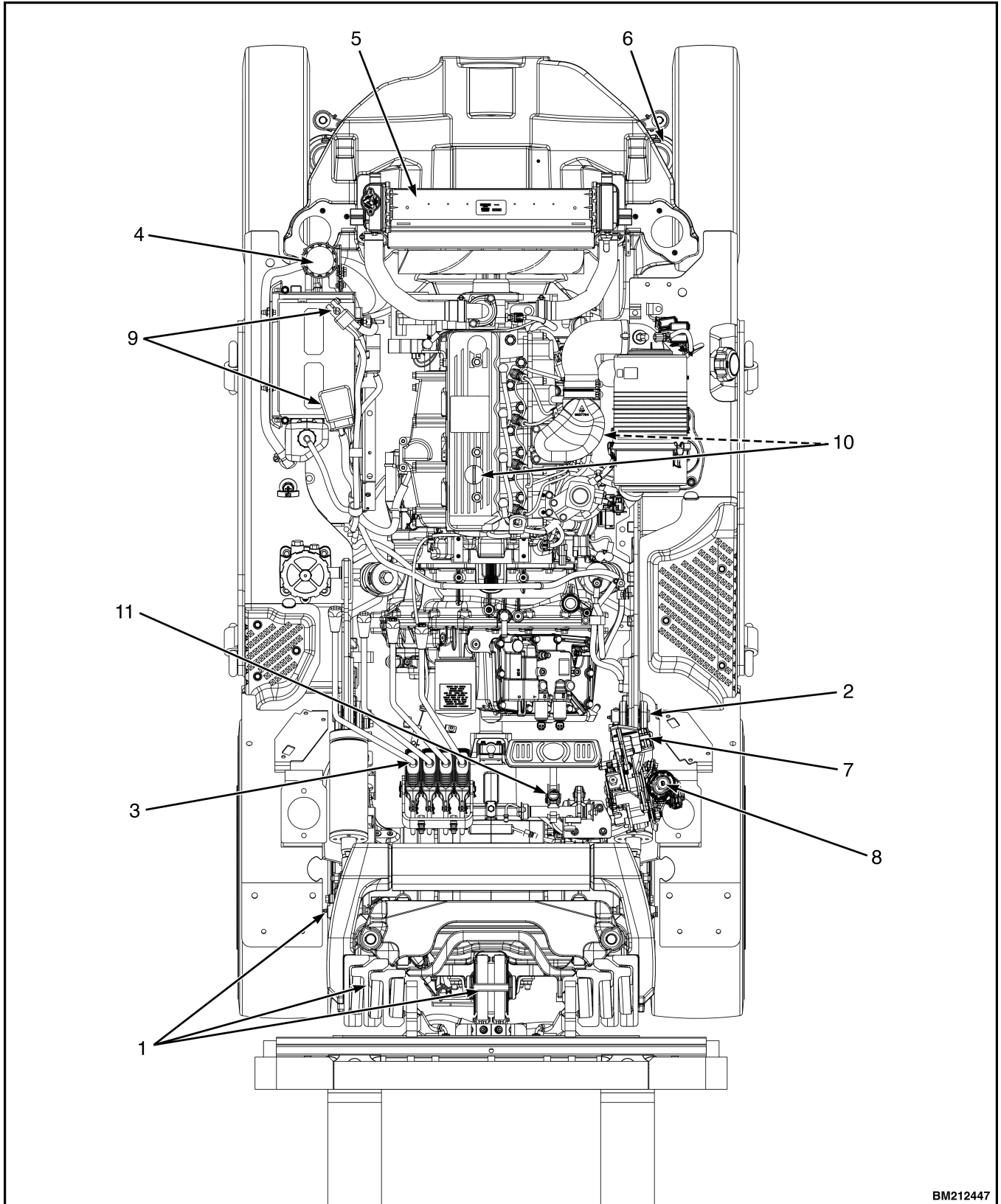


Figure 16. Maintenance schedule items, 2.2L Bi-Fuel engine (500 hours)



BM212447

Figure 17. Maintenance schedule items, 3.0L or 3.3L Diesel engine (500 hours)

Table 3. Maintenance Schedule (Every 500 Hours or Three Months)

Item No.	Item	500 hrs or 3 mo	Procedure or Quantity	Specification
4	Hydraulic tank breather	X	Inspect and replace as required. See NOTE 3.	See Parts Manual.
6	Steer axle tie rods	L	4 fittings.	Multipurpose grease. See NOTE 4.
9	Battery cables and terminals	X	Clean. See NOTE 3.	
5	Clean debris from radiator and oil cooler	X	See NOTE 1 and NOTE 3.	
1	Mast Slide surfaces and load rollers	L	Lubricate as required. See NOTE 5.	Multipurpose grease. See NOTE 4.
1	Mast Header hoses	X	Check condition.	
1	Mast Lift chains	L	Check for wear. Lubricate with spray lubricant as required. See NOTE 2. For heavy duty applications, soaking the lift chains in oil may be necessary. For procedure see Lift Chain Lubrication in Every 500 hours or Three Months periodic maintenance (PM) procedures.	SAE 30W engine oil
1	Mast Pivot pin	L	2 fittings.	Multipurpose grease. See NOTE 4.
1	Mast Sideshift carriage	L	Lubricate as required. 2 fittings.	Multipurpose grease. See NOTE 4.
1	Mast Sideshift carriage upper/lower bearings	L	Lubricate as required. 4 bearings.	Multipurpose grease. See NOTE 4.
	Fork positioner (Bolzoni option)	L	Lubricate the guide tubes and sliding surfaces. See Every 500 hours or Three Months periodic maintenance (PM) procedures.	Class EP2 grease

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

Table 3. Maintenance Schedule (Every 500 Hours or Three Months) (Continued)

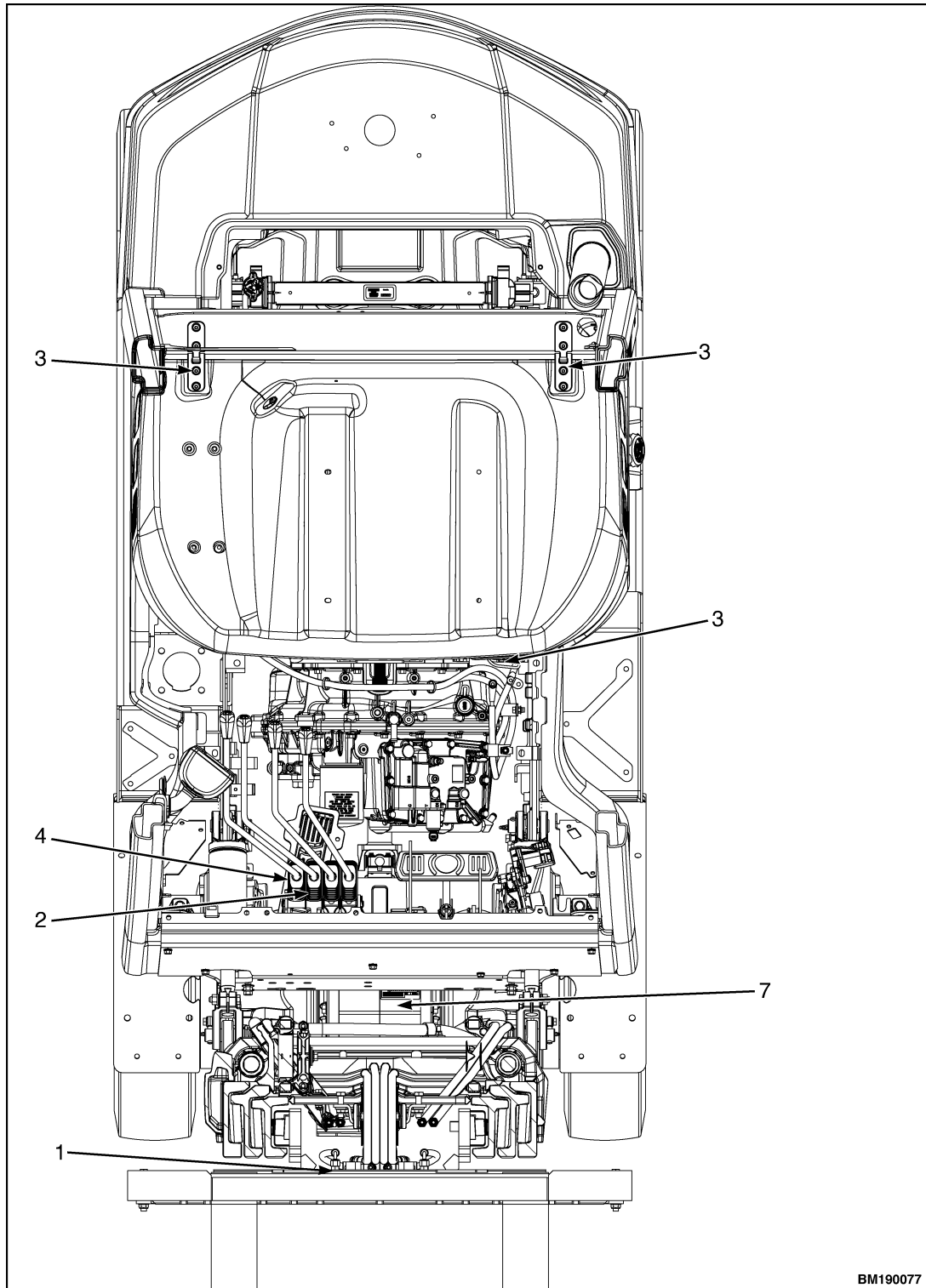
Item No.	Item	500 hrs or 3 mo	Procedure or Quantity	Specification
2	Tilt Cylinder pins Rod end Cylinder end	L	4 fittings.	Multipurpose grease. See NOTE 4 .
	Tilt Cylinder Adjustment	X	Check condition of spacers. Adjust rod ends.	
	Tilt Cylinder Mounting Hardware	X	Inspect torque. See Tilt cylinder mounting hardware inspection for procedure.	
8	Brake master cylinder pin	L		SAE 10W-30 Minimum specification API SL ILSAC GF3 SAE J2362
3	Manual control levers	X	Check condition and operation of each lever. Lubricate bushings.	Use silicone spray lubricant (328388)
7	Park brake adjustment	X	Adjust. See NOTE 3 .	
11	Brake pedal linkage	L	Lubricate as required. See NOTE 5 .	Use silicone spray lubricant (328388)
10	Engine oil filter 2.1L Diesel 2.2L LPG 2.2L Bi-Fuel 3.0L or 3.3L Diesel	C	Replace. See Every 500 hours or Three Months periodic maintenance (PM) procedures.	See Parts Manual
10	Engine oil 2.1L Diesel	C	7.4 liter (7.8 qt)	SAE 5W-30 engine oil CK-4
10	Engine oil 3.0L or 3.3L Diesel	C	9.4 liter (9.3 qt)	API CH-4 or CI-4
If following a 500 Hour Engine Oil Change Schedule				
10	Engine oil 2.2L LPG 2.2L Bi-Fuel	C	7.4 liter (7.8 qt)	API SM or SN
If following a 1000 Hour Engine Oil Change Schedule				
10	Engine oil level 2.2L LPG	X	Add engine oil to the full mark on dipstick	See NOTE 6
X=Check C=Change L=Lubricate CIL=Check Indicator Light during operation				

Table 3. Maintenance Schedule (Every 500 Hours or Three Months) (Continued)

Item No.	Item	500 hrs or 3 mo	Procedure or Quantity	Specification
	2.2L Bi-Fuel			
<p>NOTE 1: 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 Hyster dealer will advise you of the appropriate service intervals based on an application survey.</p>				
<p>NOTE 2: Lubricate at first sign of visible surface rust or as needed to abate chain noise.</p>				
<p>NOTE 3: Turn lift truck engine OFF prior to performing maintenance or checks in engine compartment. Confirm hood is open.</p>				
<p>NOTE 4: Multipurpose grease with 2 to 4% Molybdenum Disulfide.</p>				
<p>NOTE 5: Lubricate mast every three months, if mast has been in service less than 1000 hour.</p>				
<p>NOTE 6: Yanmar 2.2L LPG and Bi-Fuel ONLY- If following a 1000 hour oil change schedule, engine oil used must be either “Shell Rotella T6 5W-30 Multi Vehicle” or “Shell Rimula R6 LME Plus 5W-30”.</p>				

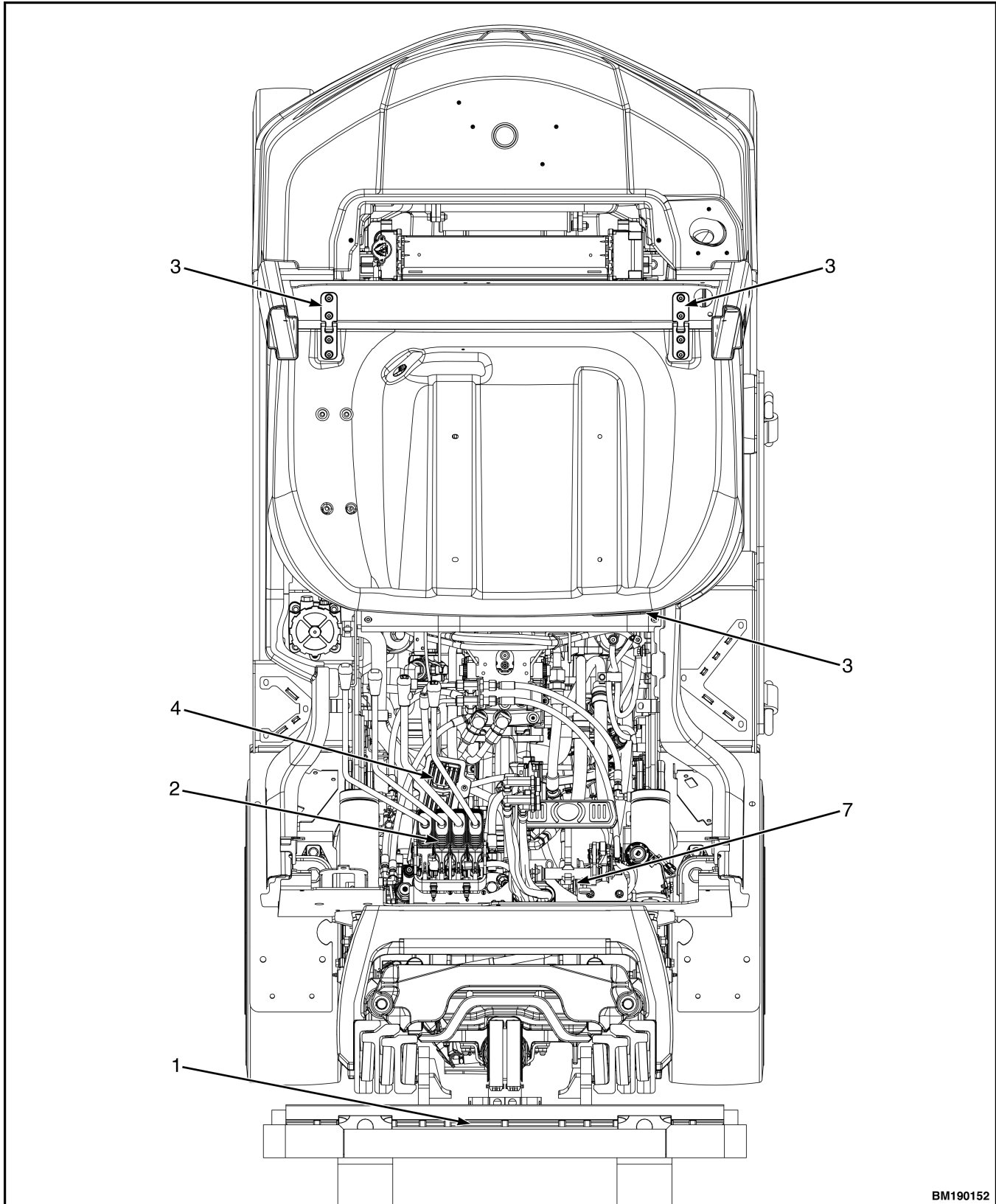
**EVERY 1000 HOURS OR SIX MONTHS
PERIODIC MAINTENANCE (PM)
SCHEDULE**

202001-103



BM190077

Figure 18. Maintenance schedule items, 2.1L Diesel engine with Powershift transmission (1000 hour)



BM190152

Figure 19. Maintenance schedule items, 2.1L Diesel engine with Hydrostatic transmission (1000 hour)

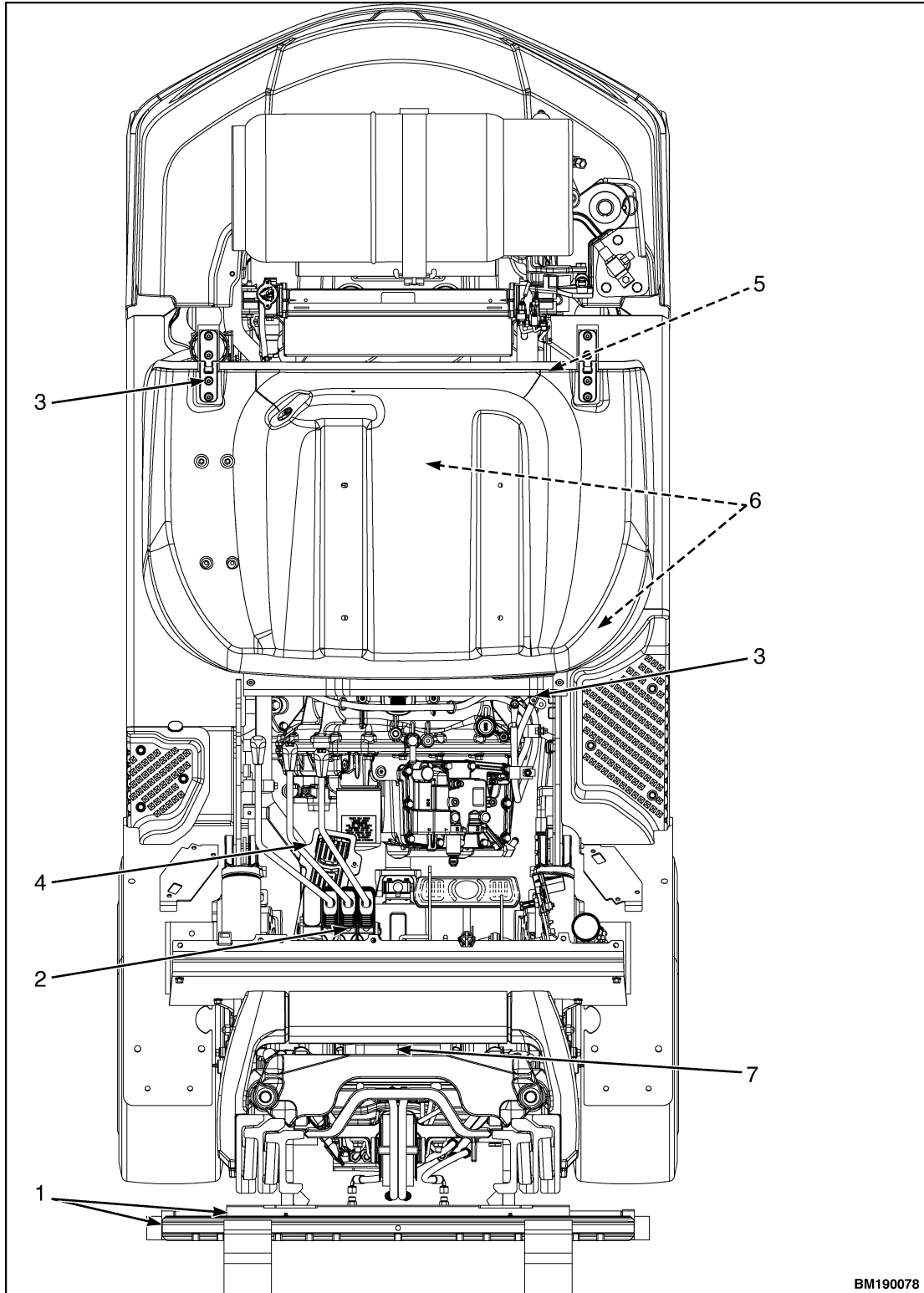


Figure 20. Maintenance schedule items, 2.2L LPG engine with Powershift transmission (1000 hour)

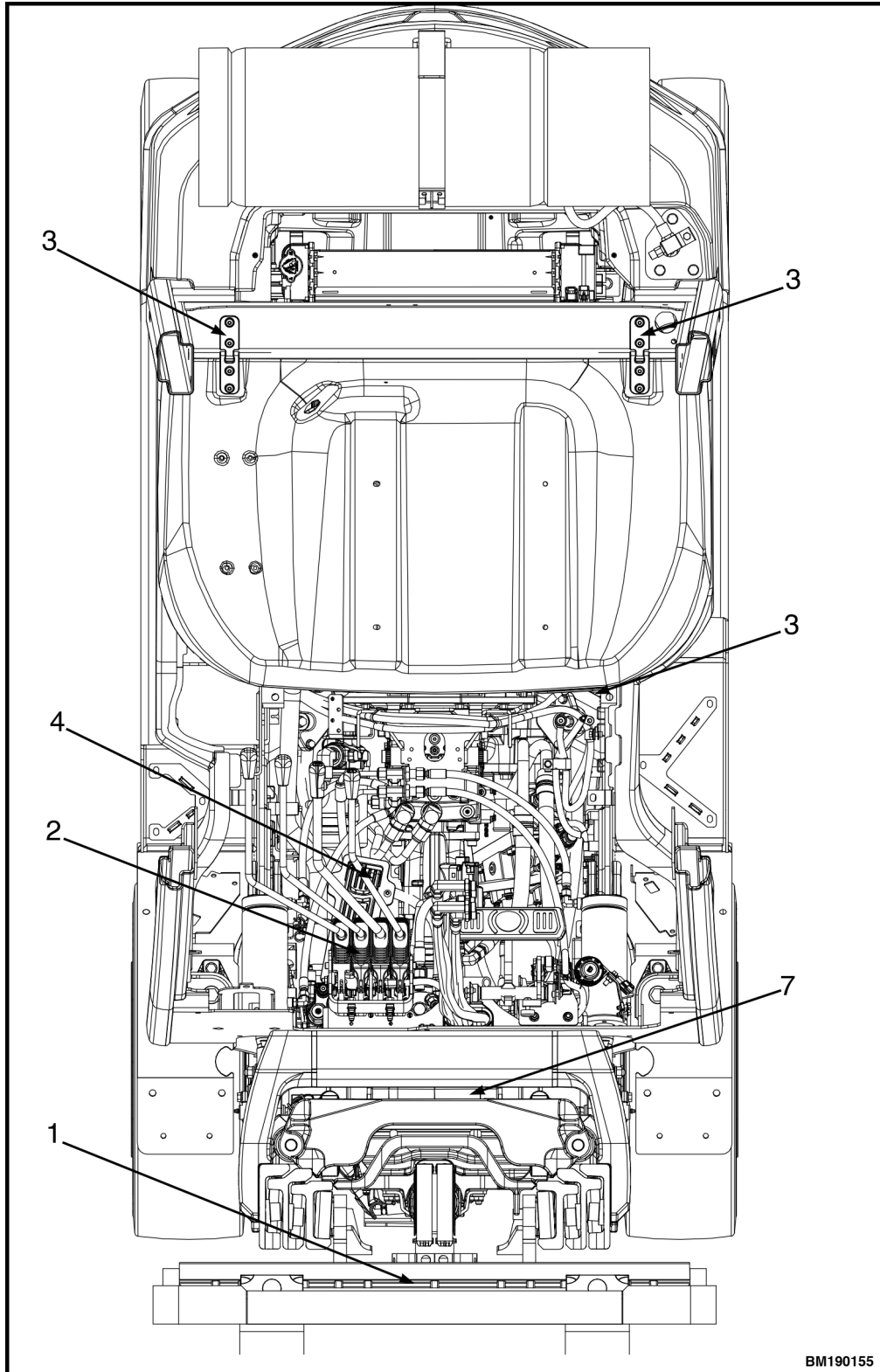


Figure 21. Maintenance schedule items, 2.2L LPG engine with Hydrostatic transmission (1000 hour)

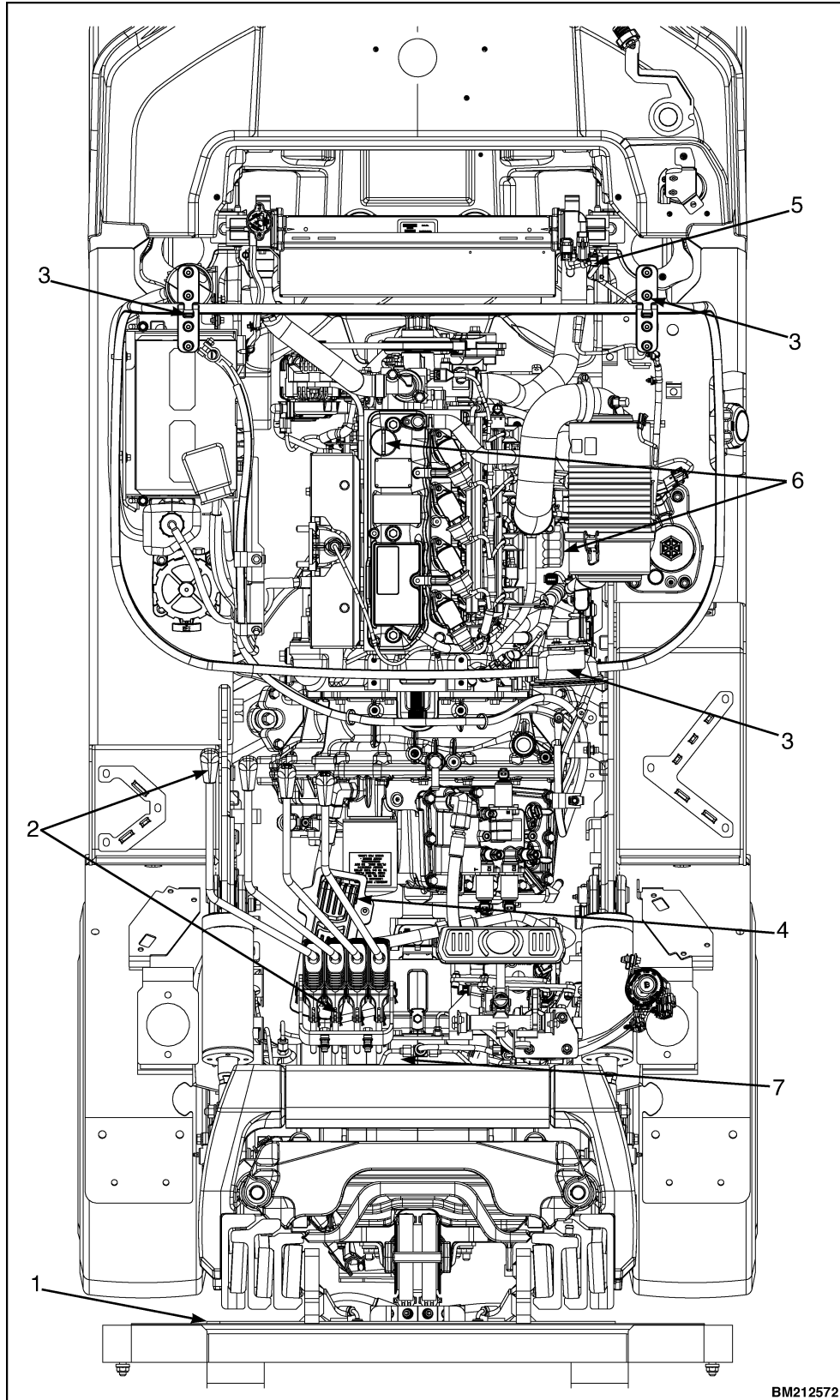
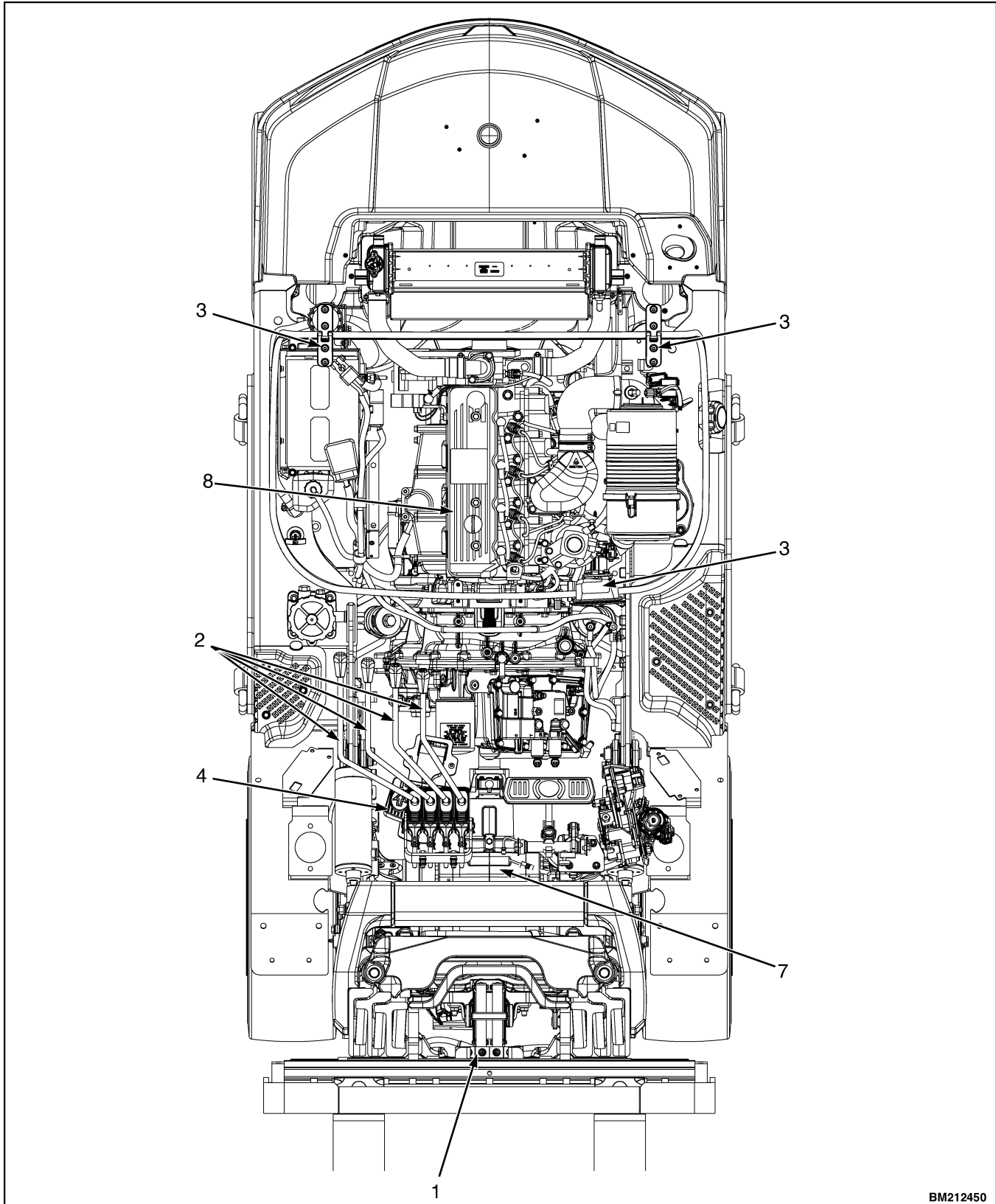


Figure 22. Maintenance schedule items, 2.2L Bi-Fuel engine (1000 hour)



BM212450

Figure 23. Maintenance schedule items, 3.0L or 3.3L Diesel engine (1000 hour)

Table 4. Maintenance schedule (1000 hours or Six Months)

Item No.	Item	1000 hrs/ 6 mo	Procedure or Quantity	Specification
1	ISS carriage -Upper and lower bearings	X	Check for wear. Replace if necessary. See NOTE 1.	See Parts Manual
1	ISS carriage -Lower mounting hooks	X	Check for wear. Replace if necessary. See NOTE 1.	See Parts Manual
4	Accelerator pedal -Linkage	L	Lubricate as required. See NOTE 3.	Use silicone spray lubricant (328388)
2	Hydraulic controls -Levers	L	Lubricate as required. See NOTE 3.	Use silicone spray lubricant (328388)
2	Hydraulic controls -Linkage	L	Lubricate as required. See NOTE 3.	Use silicone spray lubricant (328388)
3	Hood -Hinges	L	Lubricate as required. See NOTE 3.	Use silicone spray lubricant (328388)
3	Hood -Latch	L	Lubricate as required. See NOTE 3.	Use silicone spray lubricant (328388)
	Seat Slides	L	Lubricate as required. See NOTE 3.	Use silicone spray lubricant (328388)
5	Fuel filter 2.2L LPG Engine 2.2L Bi-Fuel Engine	C	Replace.	See Parts Manual
	Fuel Filter 3.0L Diesel Engine 3.3L Diesel Engine	C	Replace.	See Parts Manual
	Fuel Separator 2.1L Diesel Engine 3.0L Diesel Engine 3.3L Diesel Engine	C	Replace filter	See Parts Manual
	Inspect engine electrical connectors	X	See NOTE 2.	
	Steer axle king pin	L	2 fittings.	Multipurpose grease. See NOTE 4.
7	Dry Brake Drive Axle Differential Oil Drain and Fill	C	1.8 liter (1.9 qt)	80W-90 API GL-5

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

Table 4. Maintenance schedule (1000 hours or Six Months) (Continued)

Item No.	Item	1000 hrs/ 6 mo	Procedure or Quantity	Specification
7	Wet Brake Drive Axle w/ Powershift Transmission Differential Oil (Center section) Drain and Fill	C	1.4 liter (1.5 qt)	80W-90 API GL-5
7	Wet Brake Drive Axle w/ Hydrostatic Transmission Differential Oil (Center section) Drain and Fill	C	1.4 liter (1.5 qt)	80W-90 API GL-5
	LPG Vaporizer 2.2 LPG Engine 2.2L Bi-Fuel Engine		Drain Tar.	See Drain LPG vaporizer
8	Intake and Exhaust Valve 3.0L Diesel Engine 3.3L Diesel Engine	X	Check and Adjust	
	Cab Door Hinges	L	4 fittings	Multipurpose grease. See NOTE 4.
	Cab Door Latches and Pins	L	Lubricate as required.	Use silicone spray lubricant (328388)
	Cab Air Filter	C	Replace.	See Parts Manual
	LPG Tank Bracket Latch Swing-out and swing- out/drop-down bracket only	L	Lubricate as required. See LPG tank bracket latch lubrication for procedure.	Multipurpose grease. See NOTE 4.
	Drive Shaft	X	Inspect for residue or leaking grease. See Drive shaft inspection for procedure.	
	Mast -Lift chains	L	Check for wear. See NOTE 5. For lubrication procedure see Lift Chain Lubrication in Every 1000 hours or Six Months periodic maintenance (PM) procedures.	SAE 30W engine oil
	Fork positioner (Bolzoni option)	X	Check condition and operation	

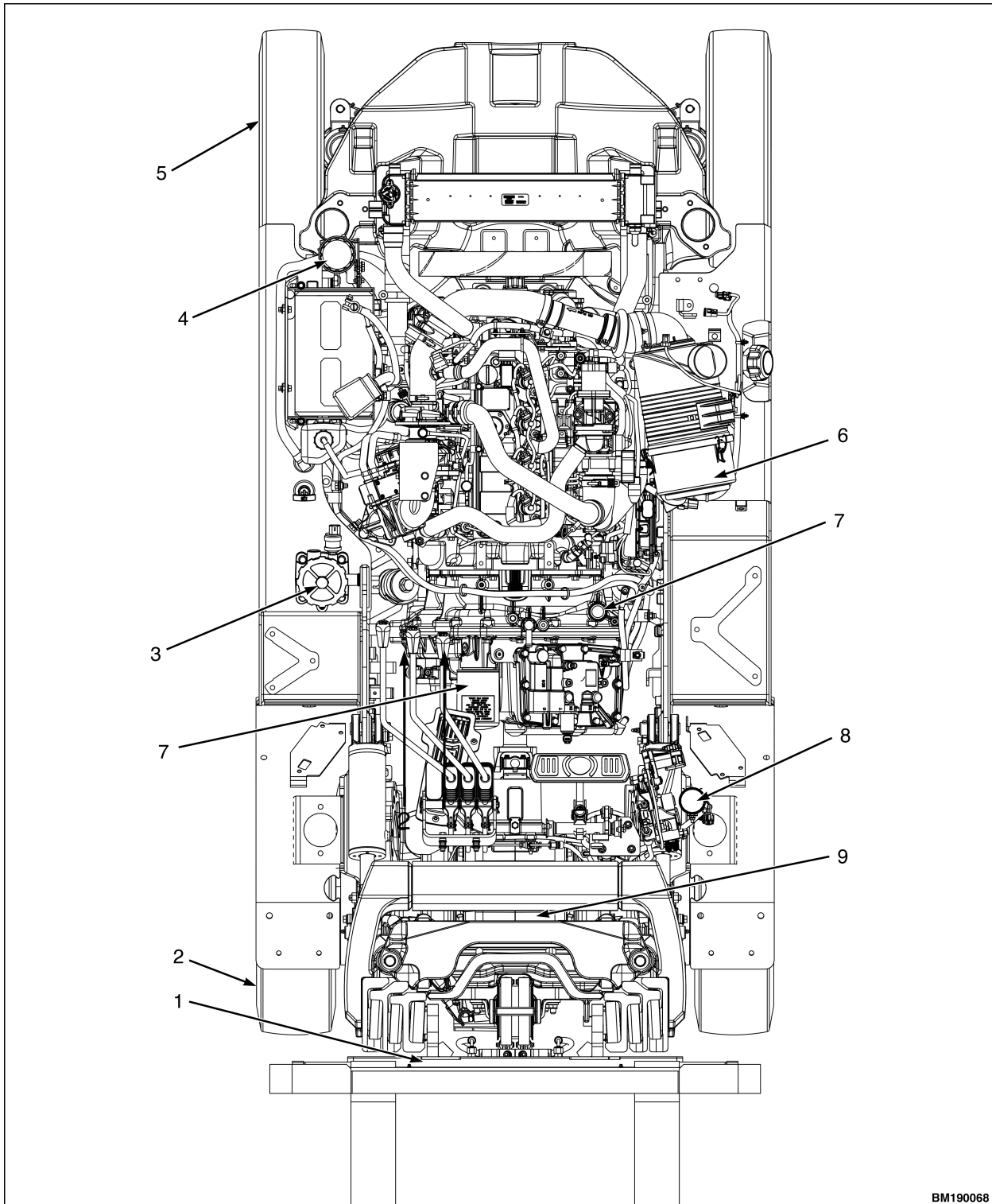
X=Check C=Change L=Lubricate CIL=Check Indicator Light during operation

Table 4. Maintenance schedule (1000 hours or Six Months) (Continued)

Item No.	Item	1000 hrs/ 6 mo	Procedure or Quantity	Specification
If following a 1000 Hour Engine Oil Change Schedule				
6	Engine Oil 2.2 LPG engine 2.2L Bi-Fuel engine	C	7.4 liter (7.8 qt)	See NOTE 6
6	Engine Oil Filter 2.2 LPG engine 2.2L Bi-Fuel engine	C	Replace filter. See NOTE 1	See Parts Manual
<p>NOTE 1: 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 Hyster dealer will advise you of the appropriate service intervals based on an application survey.</p>				
<p>NOTE 2: Turn lift truck engine OFF prior to performing maintenance or checks in engine compartment. Confirm hood is open.</p>				
<p>NOTE 3: Lubricate mast every three months, if mast has been in service less than 1000 hour.</p>				
<p>NOTE 4: Multipurpose grease HCE-38 with 2 to 4% Molybdenum Disulfide.</p>				
<p>NOTE 5: Lubricate at first sign of visible surface rust or as needed to abate chain noise.</p>				
<p>NOTE 6: Yanmar 2.2L LPG and Bi-Fuel ONLY- If following a 1000 hour oil change schedule, engine oil used must be either "Shell Rotella T6 5W-30 Multi Vehicle" or "Shell Rimula R6 LME Plus 5W-30".</p>				
<p>X=Check C=Change L=Lubricate CIL=Check Indicator Light during operation</p>				

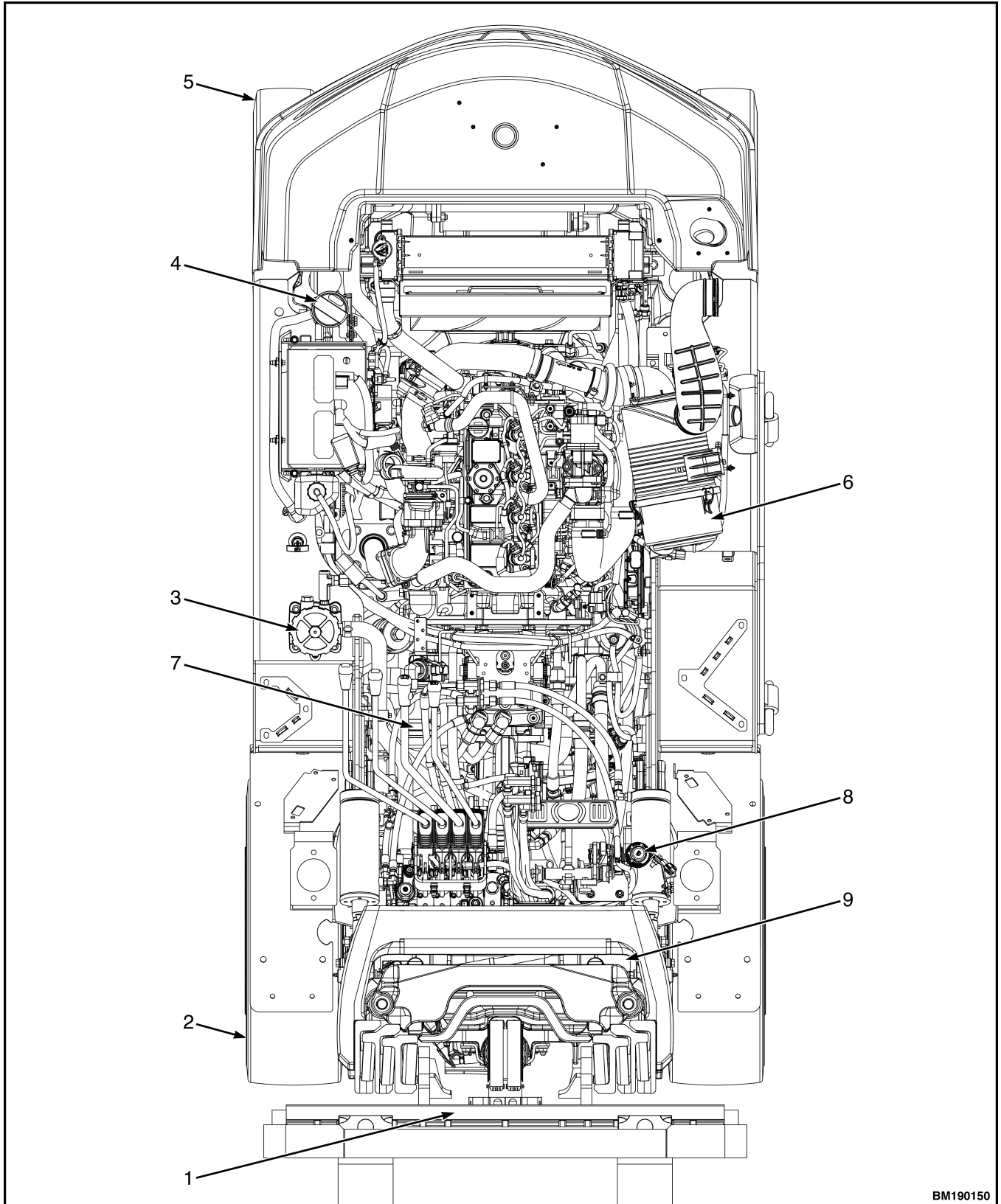
**EVERY 2000 HOURS OR ONE YEAR
PERIODIC MAINTENANCE (PM)
SCHEDULE**

202001-105



BM190068

Figure 24. Maintenance schedule items 2.1L diesel engine with Powershift transmission (2000 hours)



BM190150

Figure 25. Maintenance schedule items 2.1L diesel engine with Hydrostatic transmission (2000 hours)

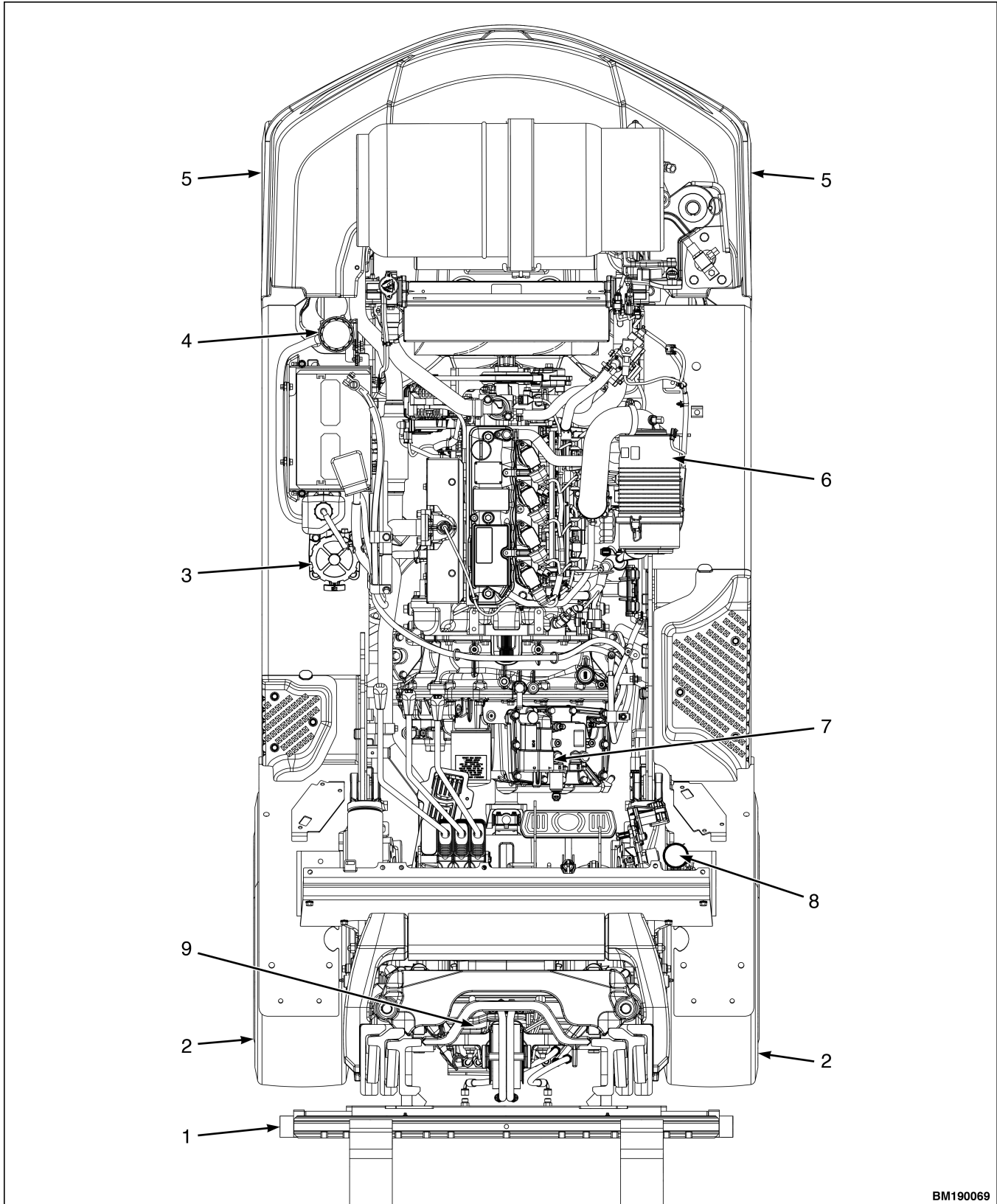


Figure 26. Maintenance schedule items 2.2L LPG engine with Powershift transmission (2000 hours)

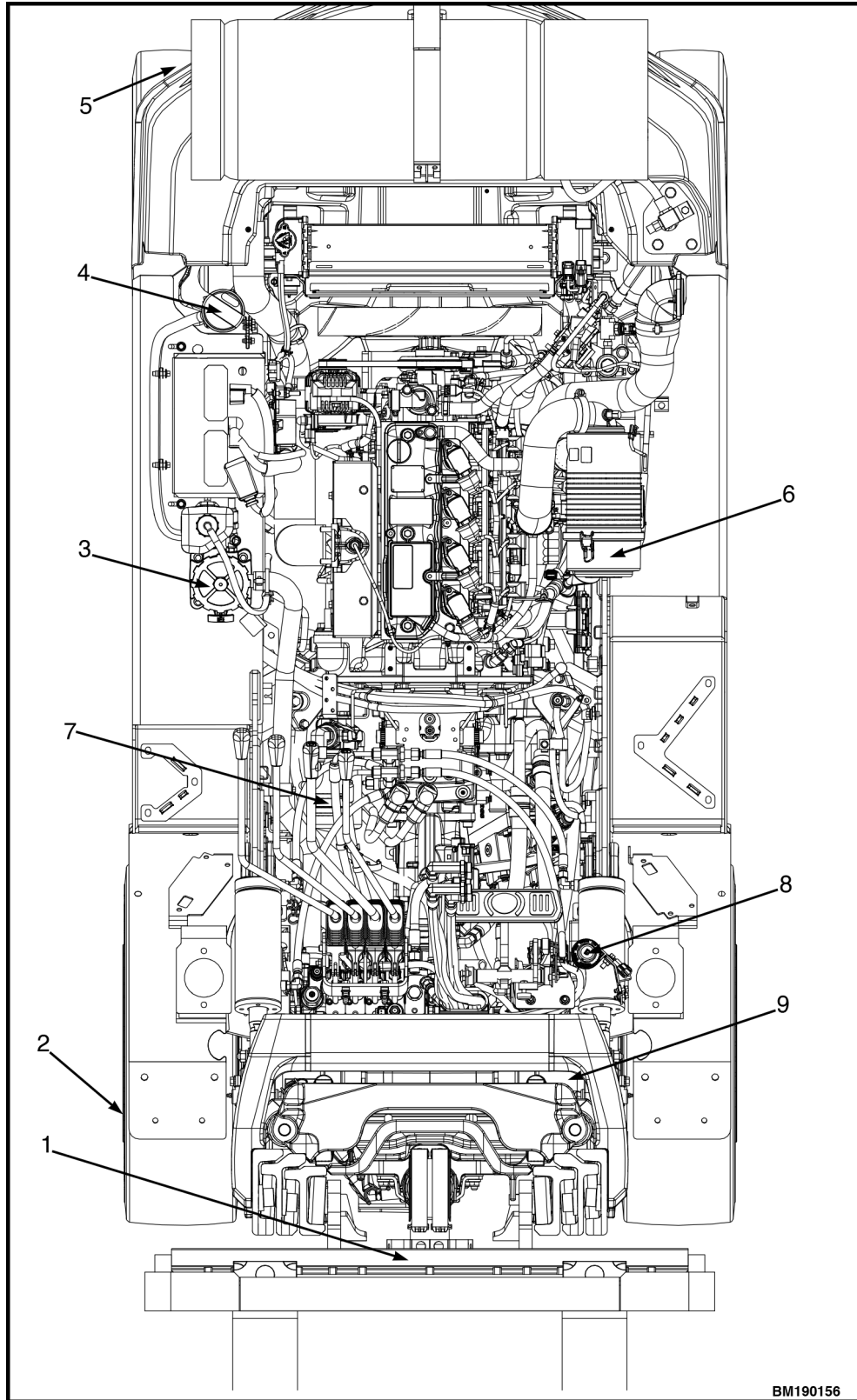


Figure 27. Maintenance schedule items 2.2L LPG engine with Hydrostatic transmission (2000 hours)

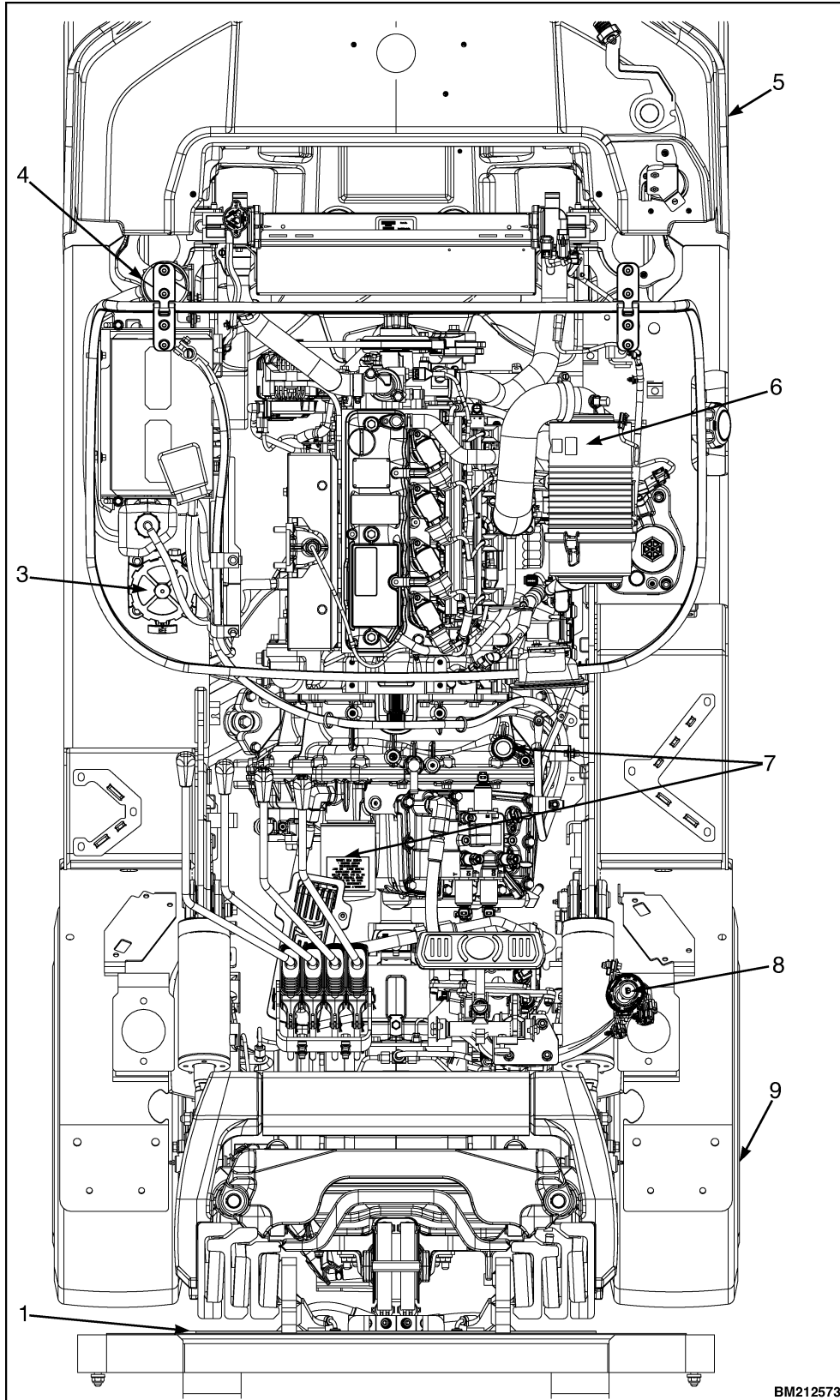
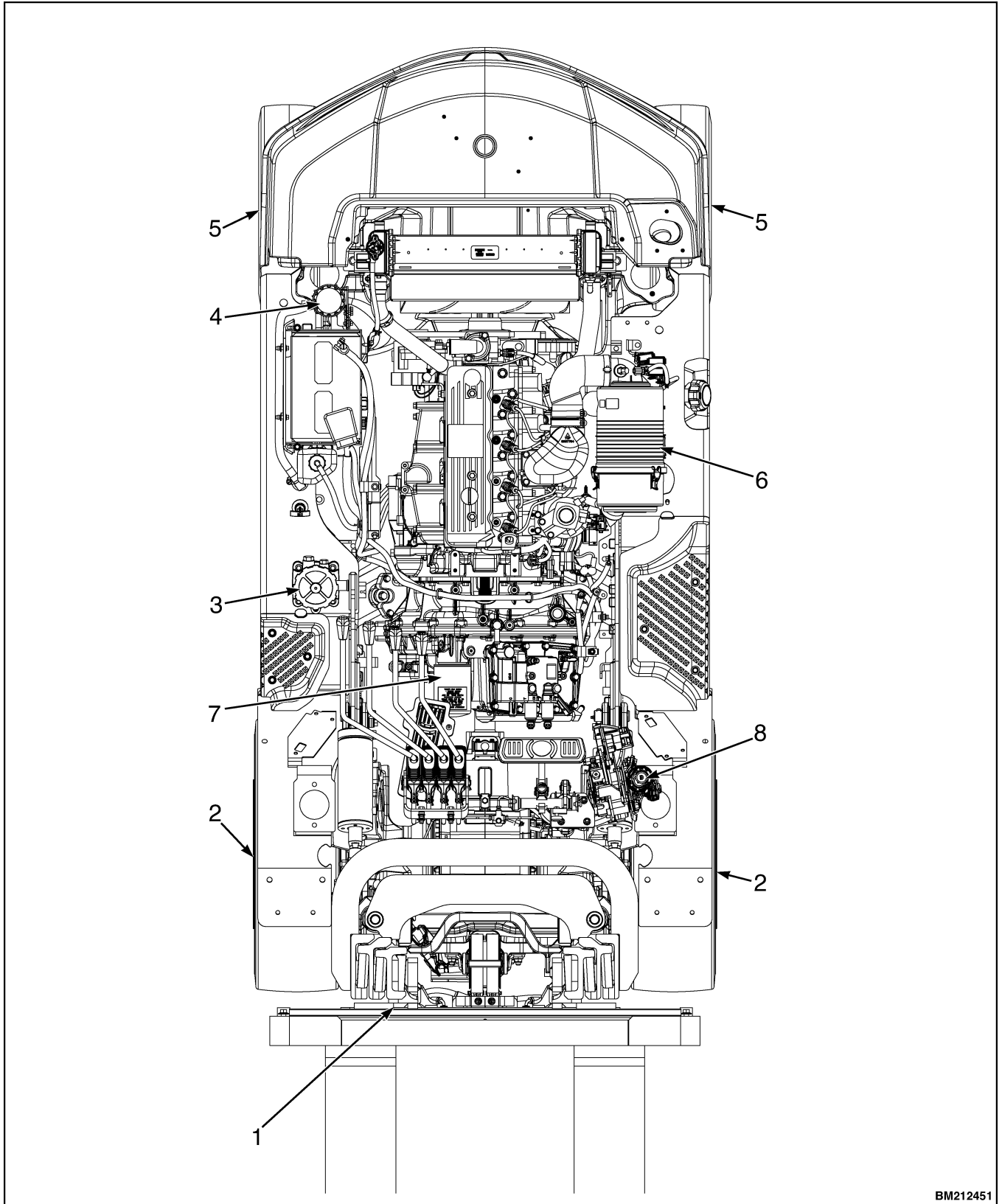


Figure 28. Maintenance schedule items, 2.2L Bi-Fuel engine (2000 hours)



BM212451

Figure 29. Maintenance schedule items 3.0L or 3.3L engine (2000 hours)

Table 5. Maintenance Schedule (2000 hrs or One Year)

Item No.	Item	2000 hrs or 1 yr	Procedure or Quantity	Specification
3	Hydraulic oil filter	C	1 filter. See NOTE 1 and NOTE 2 .	See Parts Manual
4	Hydraulic tank breather	C	Inspect and replace as necessary. See NOTE 1 and NOTE 2 .	See Parts Manual
6	Air cleaner	C	1 filter. See NOTE 1 , NOTE 2 , NOTE 3 , NOTE 4 , and NOTE 5 .	See Parts Manual
7	Powershift Transmission oil Dry Brake Axle Drain and fill	C	11 liter (11.6 qt) See NOTE 1 and NOTE 2 .	Shell Spirax S4 TXM
7	Powershift Transmission oil Wet Brake Axle Drain and fill	C	15.5 liter (16.4 qt) See NOTE 1 and NOTE 2 .	Shell Spirax S4 TXM
7	Powershift Transmission oil filter	C	1 filter. See NOTE 1 and NOTE 2 .	See Parts Manual
7	Powershift Transmission oil breather	C	Replace as required.	See Parts Manual
3	Hydrostatic Transmission oil Drain and fill	C	5 liter (5.3 qt) See NOTE 1 and NOTE 2 .	Shell Spirax S4 TXM
7	Hydrostatic Transmission oil filter	C	1 filter. See NOTE 1 and NOTE 2 .	See Parts Manual
1	ISS carriage -Upper and lower bearings	C	Replace as required.	See Parts Manual
8	Dry Brake Axle Brake fluid (master cylinder) -drain and fill	C	0.25 liter (0.5 pt) See NOTE 2 .	
8	Wet Brake Axle w/Powershift Transmission Brake fluid (master cylinder) -drain and fill	C	0.35 liter (0.74 pt) See NOTE 2	
8	Wet Brake Axle w/Powershift Transmission Brake fluid (master cylinder) -drain and fill	C	0.35 liter (0.74 pt) See NOTE 2	
8	Wet Brake Axle w/Hydrostatic Transmission Brake fluid (master cylinder) -drain and fill	C	0.35 liter (0.74 pt) See NOTE 2	
8	Wet Brake Axle w/Hydrostatic Transmission Brake cooling fluid -drain and fill	C	4.8 liter (10.1 pt)	

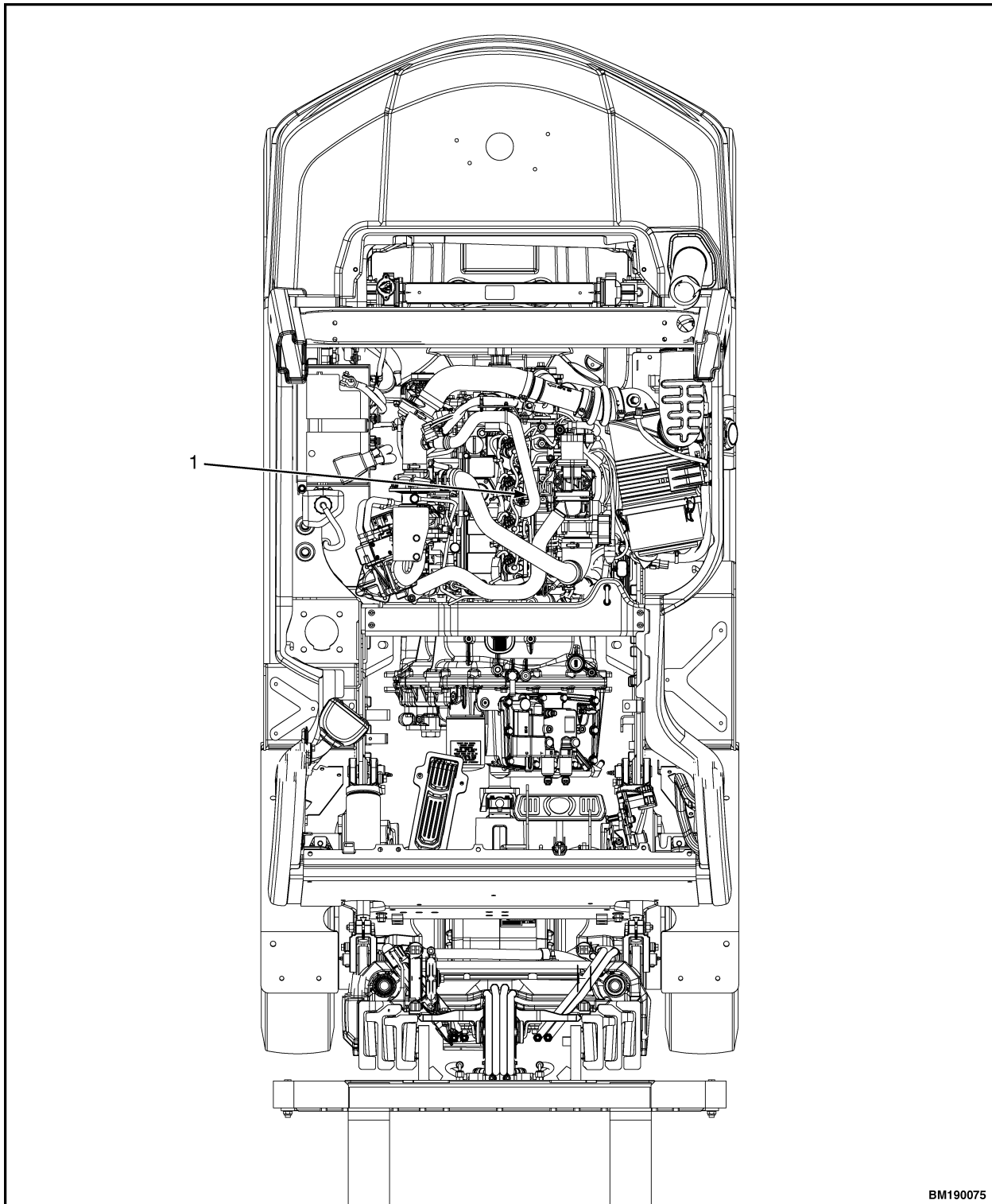
X=Check C=Change L=Lubricate CIL=Check Indicator Light during operation

Table 5. Maintenance Schedule (2000 hrs or One Year) (Continued)

Item No.	Item	2000 hrs or 1 yr	Procedure or Quantity	Specification
2	Service brake thickness Dry brake axle	X	Check lining thickness.	
9	Wet brake drive axle wheel ends drain and fill	C	2.6 liter (2.7 qt)	J20C
2	Dry brake axle -Wheel bearing	L	Check grease	Multipurpose grease See NOTE 6
5	Steer axle -Wheel bearing	L	Check grease	Multipurpose grease See NOTE 6.
	EGR cooling	X		
	EGR pipe and other connecting elbows	X		
<p>NOTE 1: 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 Hyster dealer will advise you of the appropriate service intervals based on an application survey.</p>				
<p>NOTE 2: Turn lift truck engine OFF prior to performing maintenance or checks in engine compartment. Confirm hood is open.</p>				
<p>NOTE 3: In dirty or dusty environments, replace at 1000 hours or as needed.</p>				
<p>NOTE 4: Do not open the air filter canister except to change the air filter element. See Every 2000 hours or One Year periodic maintenance (PM) procedures to change air filter element.</p>				
<p>NOTE 5: Replace the safety filter element with every third(3) primary filter element replacement.</p>				
<p>NOTE 6: Multipurpose grease with 2 to 4% Molybdenum Disulfide.</p>				
<p>X=Check C=Change L=Lubricate CIL=Check Indicator Light during operation</p>				

**EVERY 3000 HOURS OR EIGHTEEN
MONTHS PERIODIC MAINTENANCE (PM)
SCHEDULE**

202001-104



BM190075

Figure 30. Maintenance schedule items, 2.1L diesel engine (3000 hours)

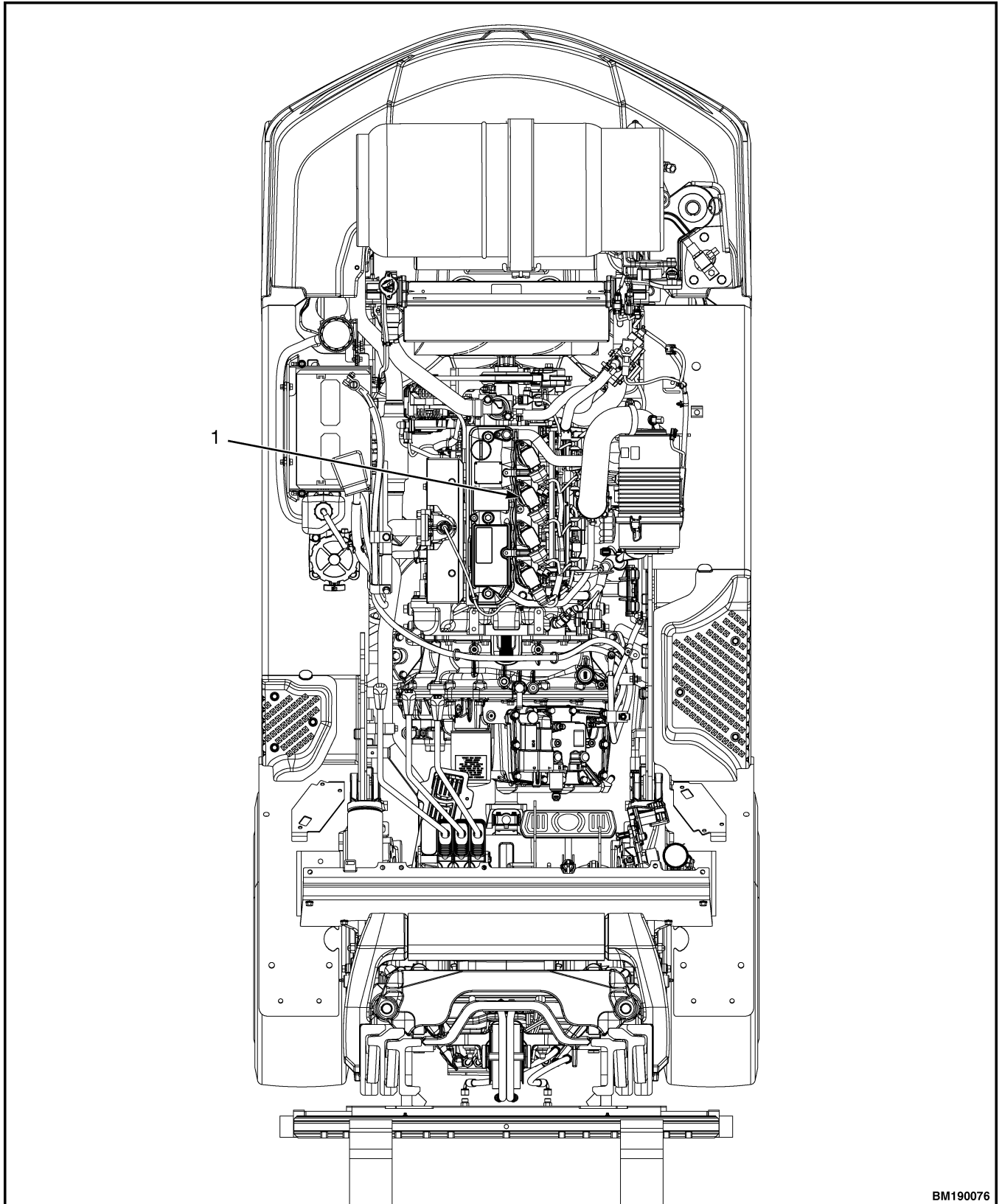


Figure 31. Maintenance schedule items, 2.2L LPG engine (3000 hours)

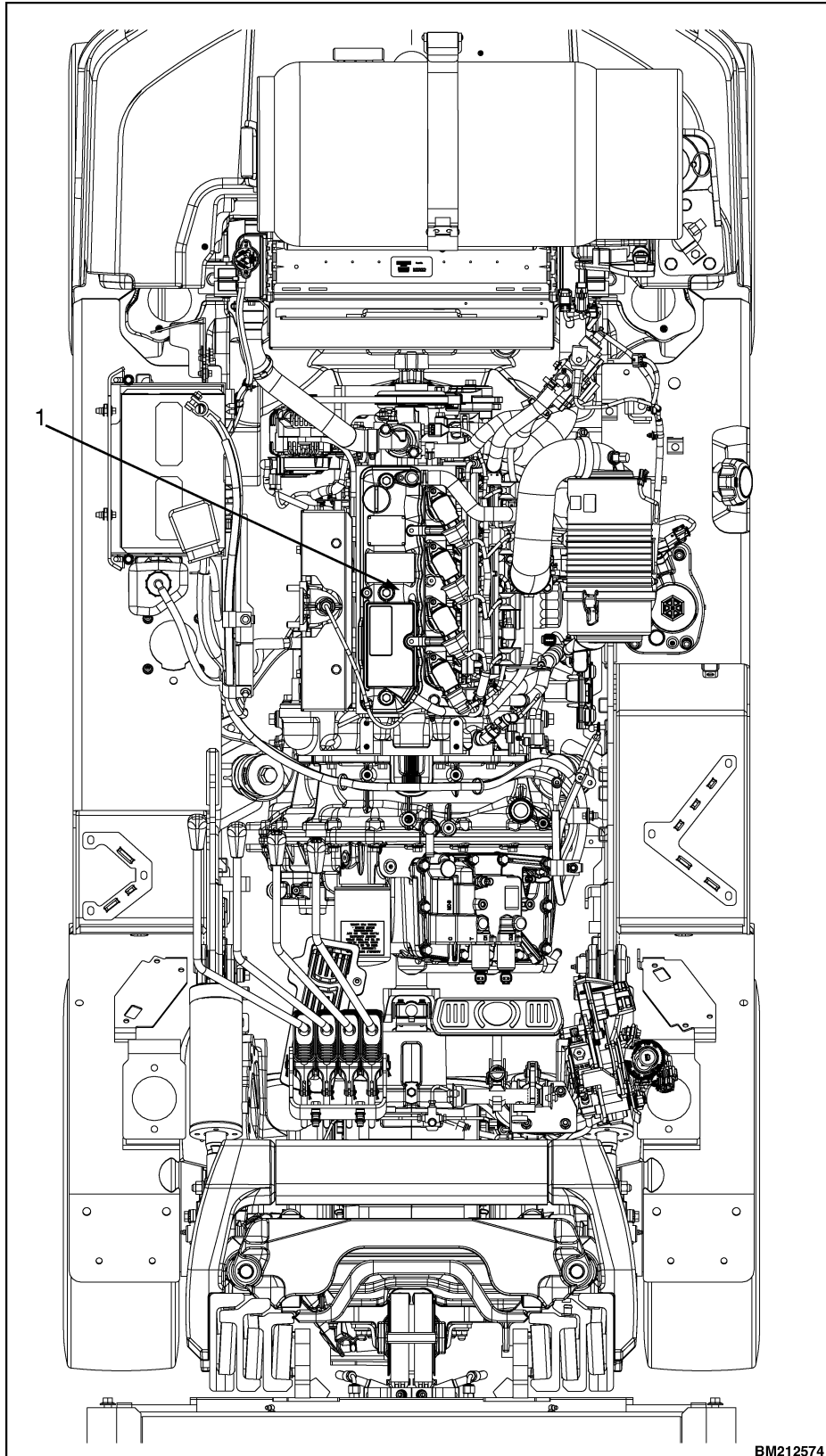


Figure 32. Maintenance schedule items, 2.2L Bi-Fuel engine (3000 hours)

Table 6. Maintenance schedule items (3000 hours or Eighteen Months)

Item No.	Item	3000 hrs/ 18 mo	Procedure or Quantity	Specification
1	Intake and exhaust valve 2.2L LPG engine 2.2L Bi-Fuel engine 2.1L Diesel engine	X	Check and adjust.	
X=Check				

**EVERY 4000 HOURS OR TWO YEARS
PERIODIC MAINTENANCE (PM)
SCHEDULE**

202001-106

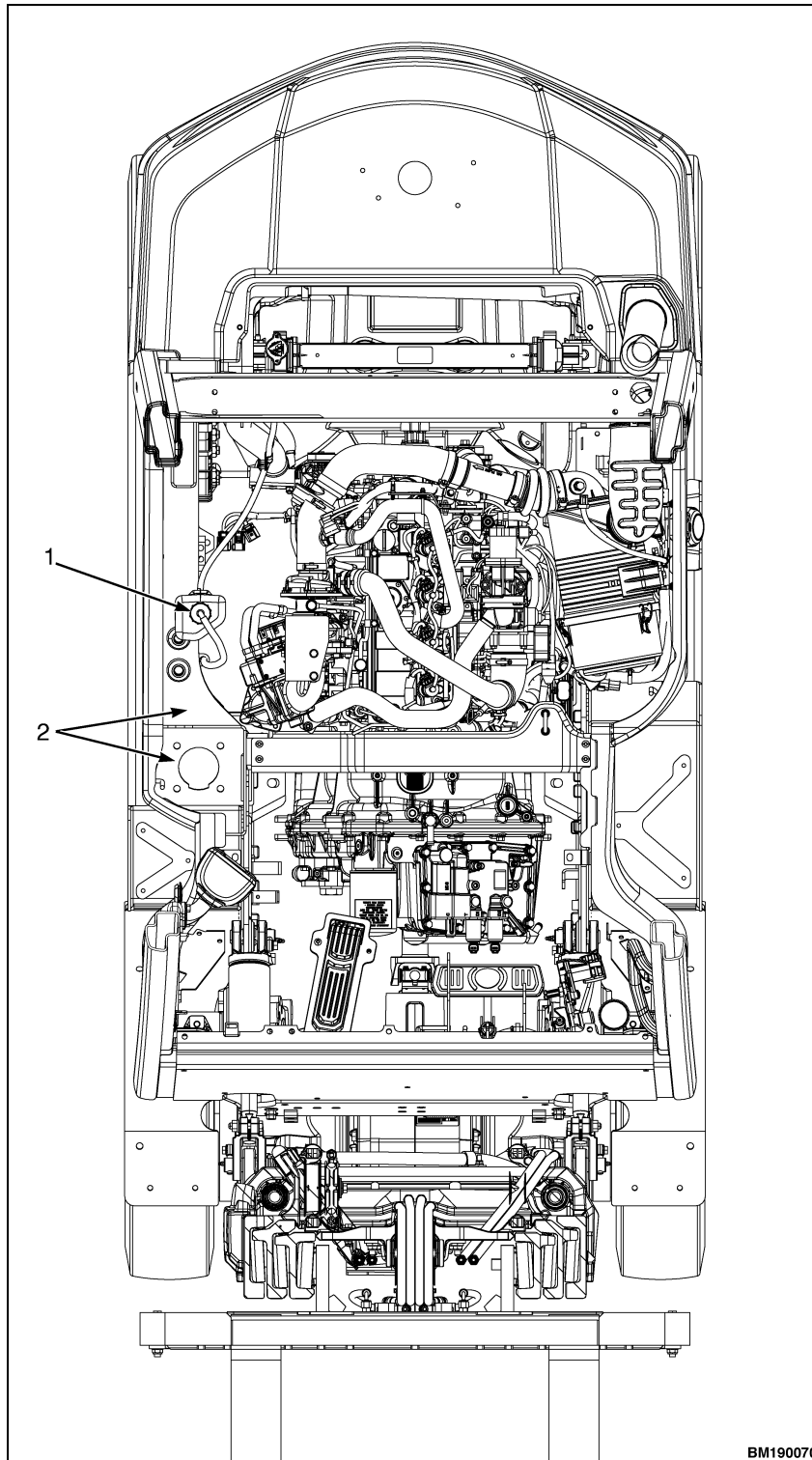
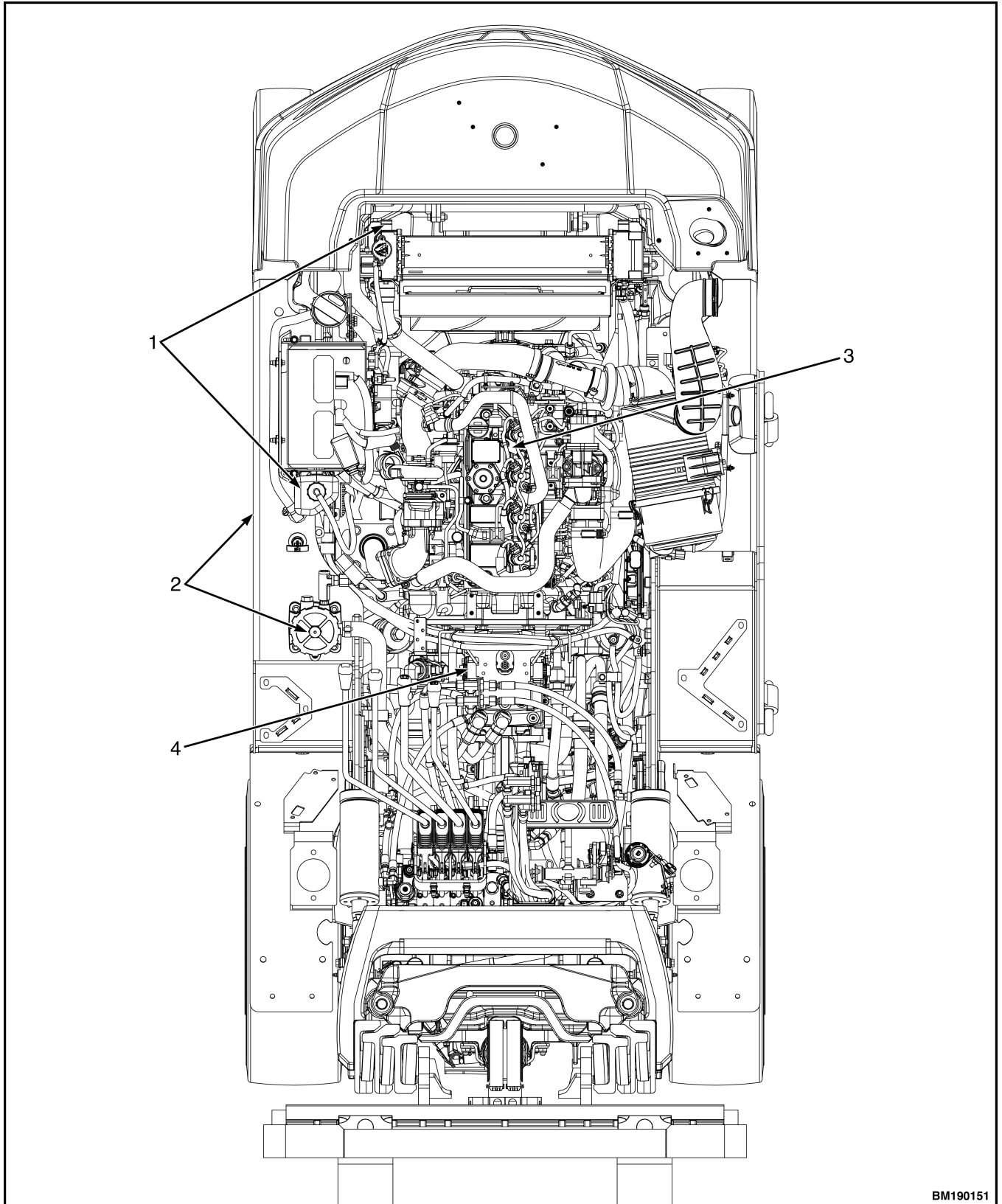
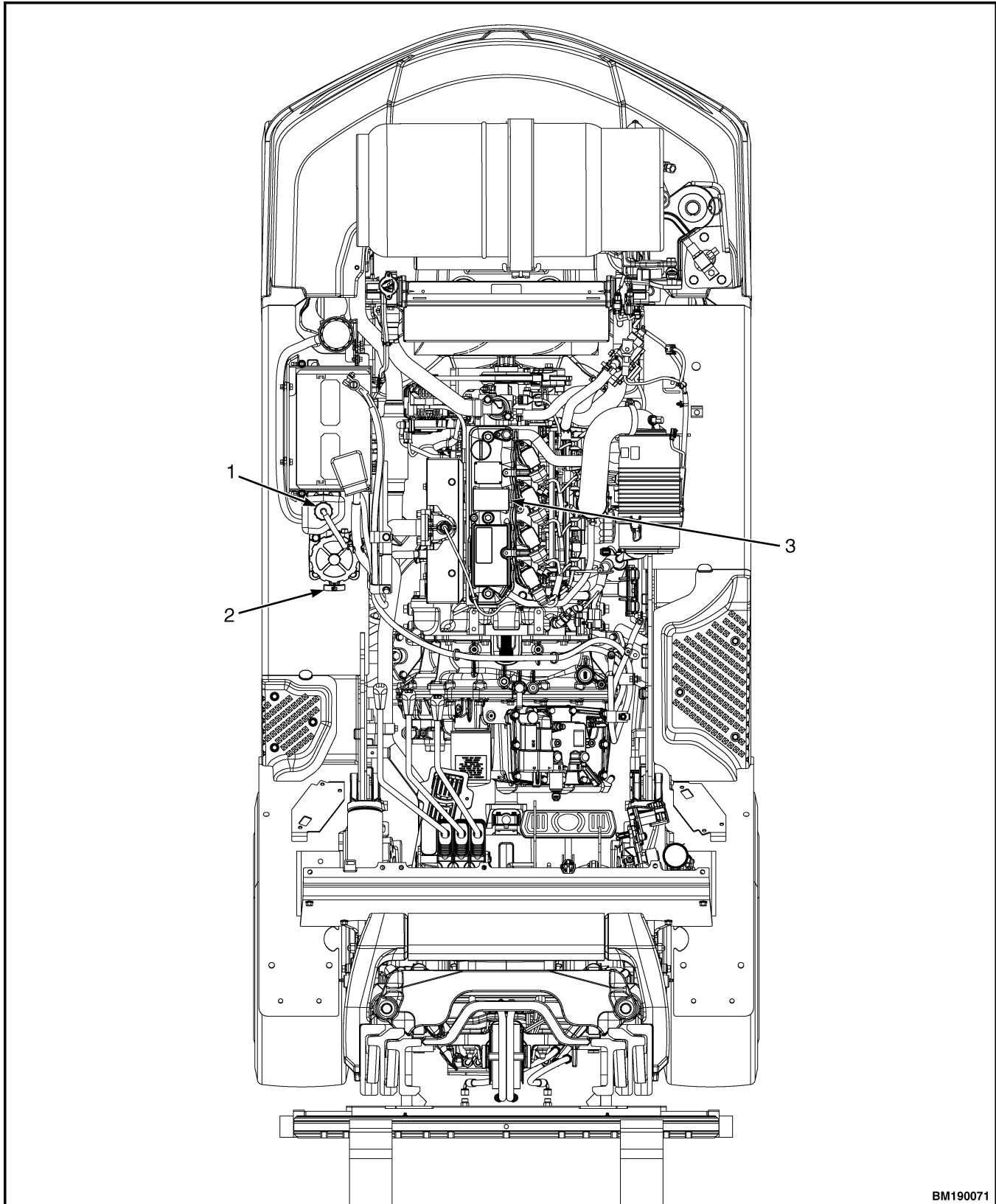


Figure 33. Maintenance schedule, 2.1L diesel engine with Powershift transmission (4000 hours)



BM190151

Figure 34. Maintenance schedule, 2.1L diesel engine with Hydrostatic transmission (4000 hours)



BM190071

Figure 35. Maintenance schedule, 2.2L LPG engine with Powershift transmission (4000 hours)

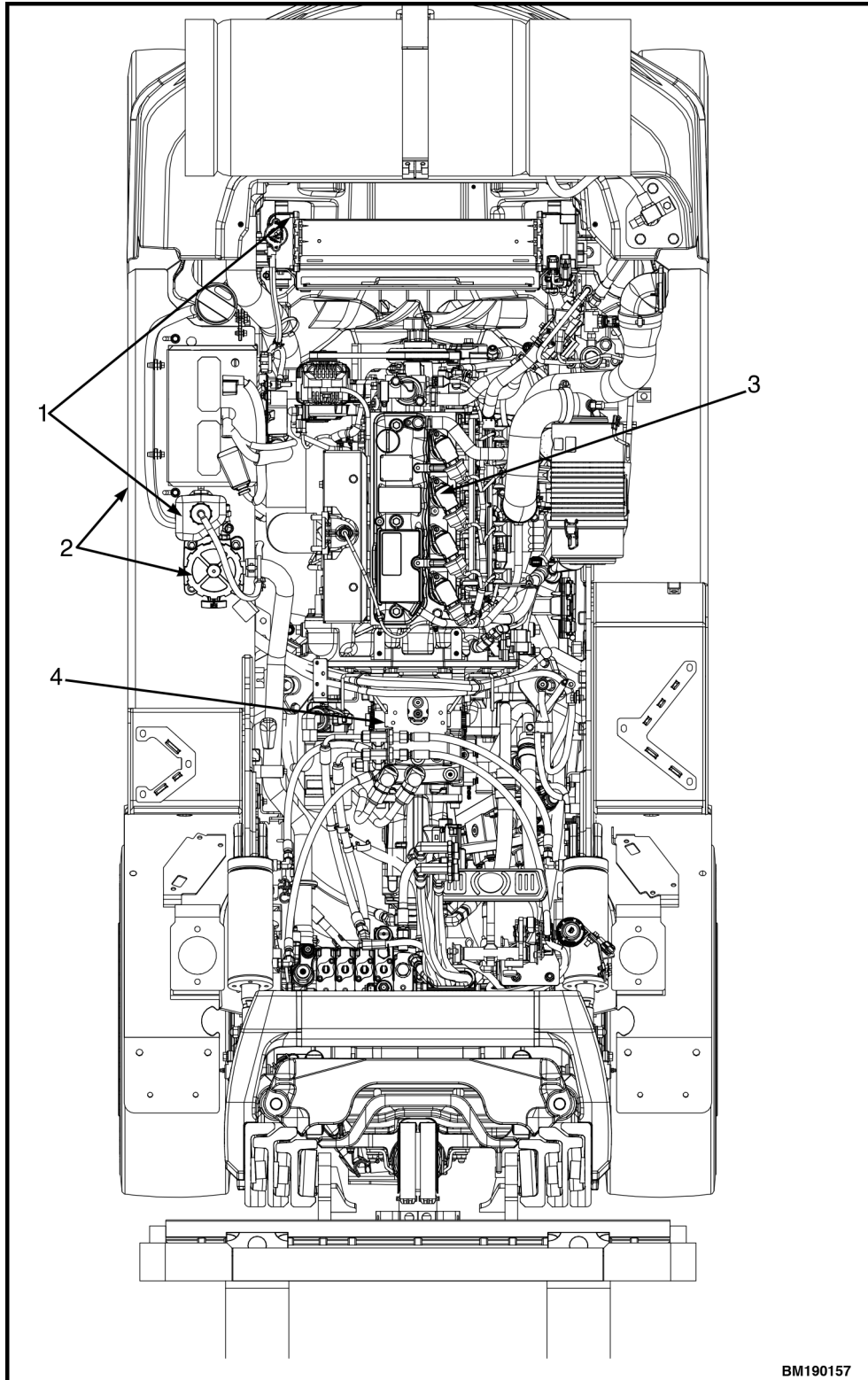


Figure 36. Maintenance schedule, 2.2L LPG engine with Hydrostatic transmission (4000 hours)

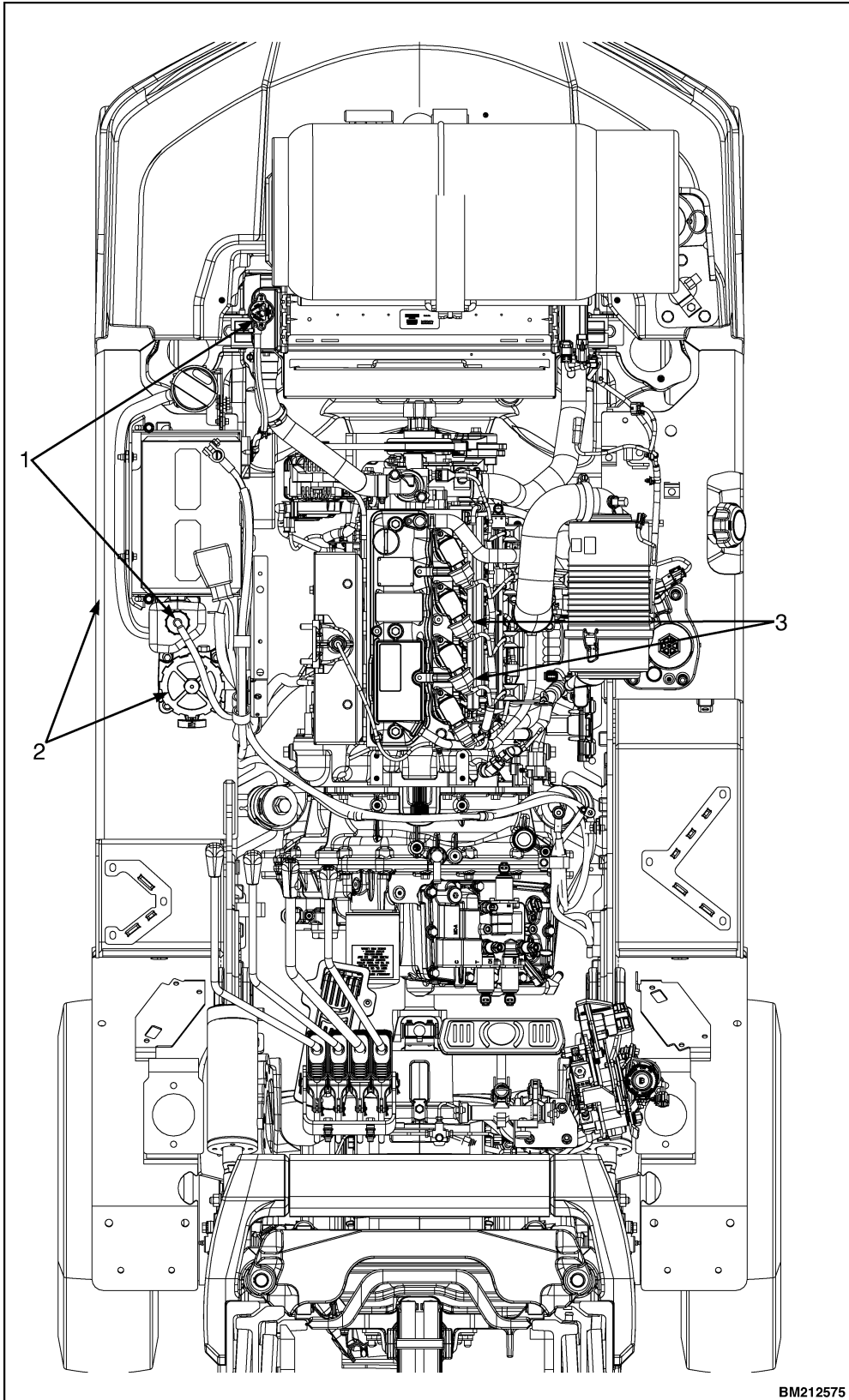


Figure 37. Maintenance schedule items, 2.2L Bi-Fuel engine (4000 hours)

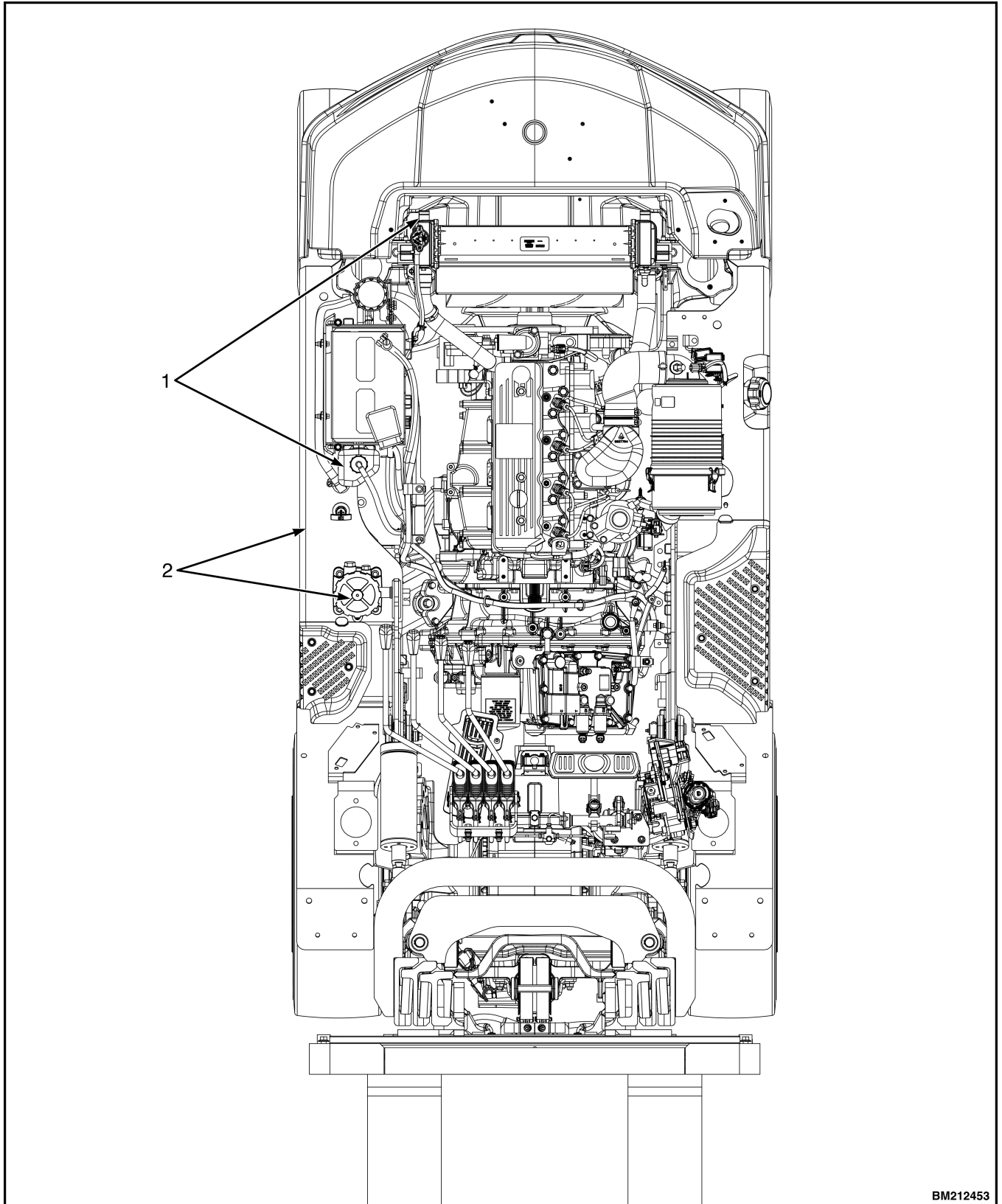


Figure 38. Maintenance schedule items, 3.0L or 3.3L Diesel engine (4000 hours)

Table 7. Maintenance schedule items (4000 hours or Two Years)

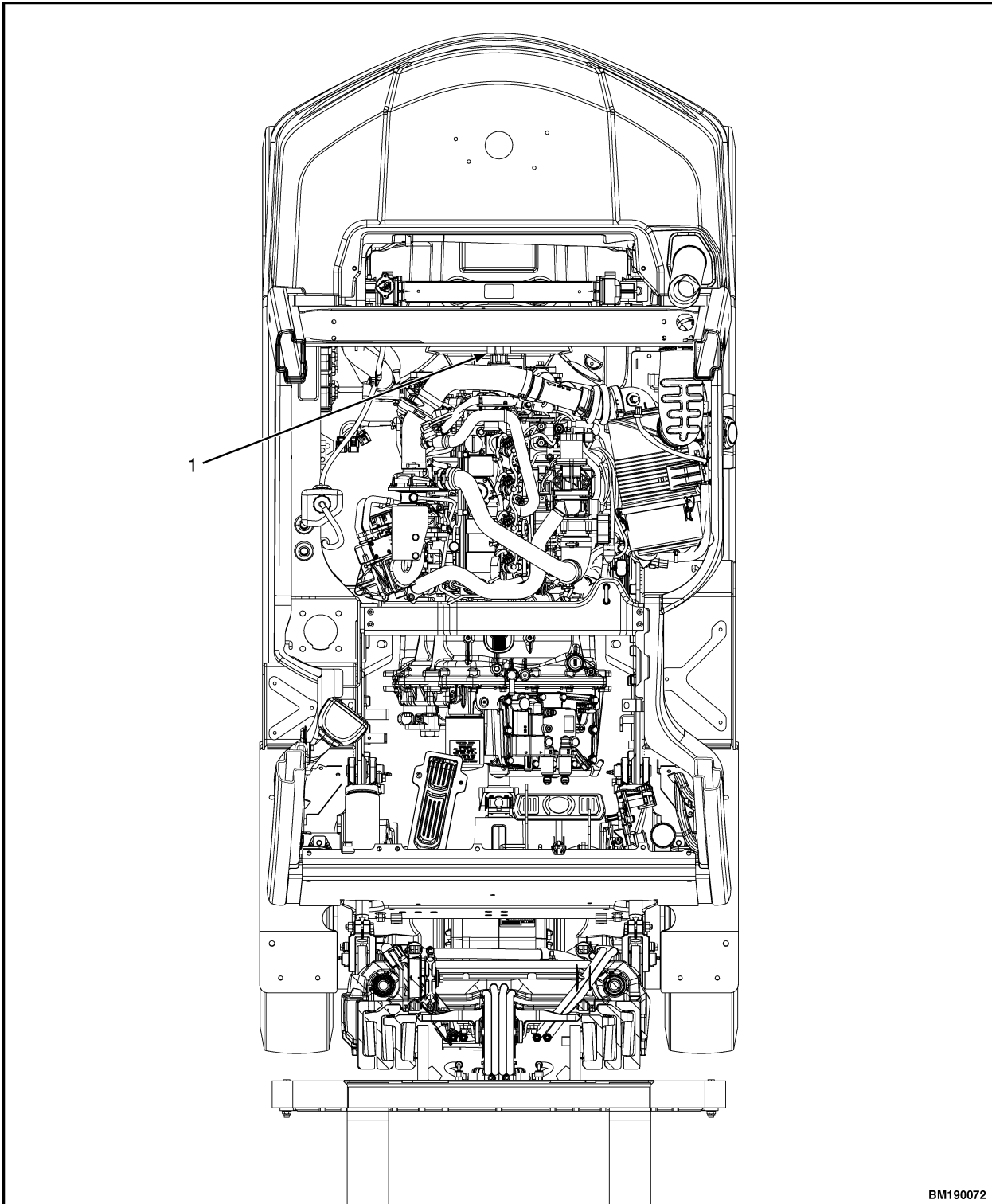
Item No.	Item	4000 hrs or 2 yrs	Procedure or Quantity	Specification
1	Cooling system Drain and fill Yanmar 2.1L Diesel Yanmar 2.2L LPG Yanmar 2.2L Bi-Fuel	C	10.5 liter (11.1 qt) NOTE 2	Trucks built prior to May 2021, use either a 50% water/50% ethylene-glycol boron free, silicate free mixture or BASF® Glysantin® G40 coolant. Protects cooling system down to -37°C (-34.6°F) Trucks built after May 2021, use Valvoline Zerex G40 coolant. Protects cooling system down to -37°C (-34.6°F)
1	Cooling system Drain and fill Yanmar 3.0L Diesel Yanmar 3.3L Diesel	C	11.5 liter (12.2 qt) NOTE 2	Trucks built prior to May 2021, use either a 50% water/50% ethylene-glycol boron free, silicate free mixture or BASF® Glysantin® G40 coolant. Protects cooling system down to -37°C (-34.6°F) Trucks built after May 2021, use Valvoline Zerex G40 coolant. Protects cooling system down to -37°C (-34.6°F)
2	Hydraulic oil Drain and fill Yanmar 2.2L LPG Yanmar 2.2L Bi-Fuel Yanmar 3.0L Diesel Yanmar 3.3L Diesel	C	46.4 liter (49 qt) NOTE 1, NOTE 2, NOTE 3, NOTE 4	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
2	Hydraulic oil Drain and fill Yanmar 2.1L Diesel	C	34.2 liter (36.1 qt) NOTE 1, NOTE 2, NOTE 3, NOTE 4	ISO - VG 46 Hydraulic Oil Shell - Tellus Oil 46 Shell - Tellus Premium 46

C=Change

Table 7. Maintenance schedule items (4000 hours or Two Years) (Continued)

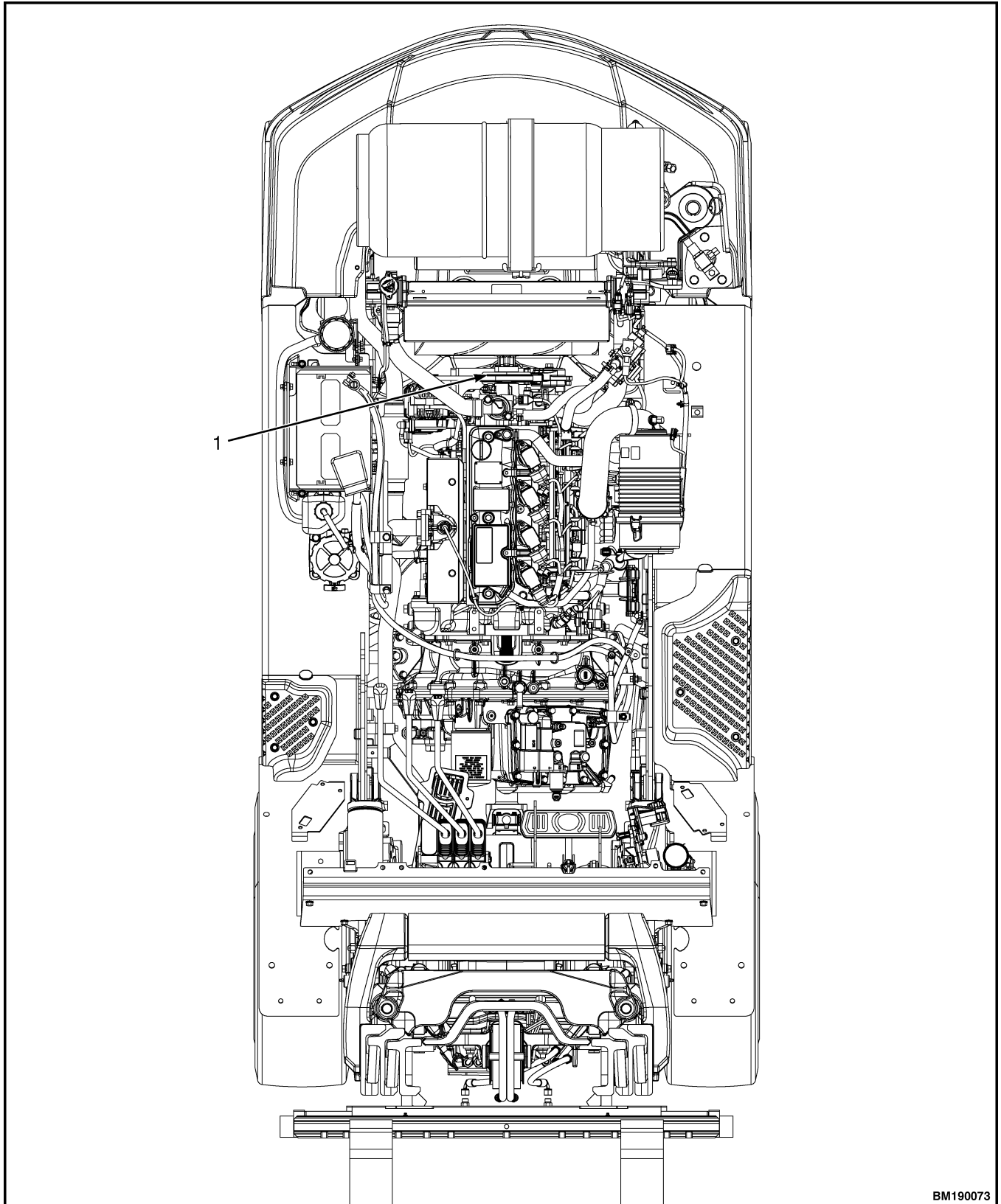
Item No.	Item	4000 hrs or 2 yrs	Procedure or Quantity	Specification
				Texaco - Rando HD 46 Exxon - Nuto H 46 Mobil - DTE 25 -15°C (5°F) and Above
	Hydraulic Suction Strainer	C	Replace.	See Parts Manual
3	Spark plugs Yanmar 2.2L LPG Yanmar 2.2L Bi-Fuel	C	Replace as required	See Parts Manual
4	Hydrostatic Transmission Chain case oil	C	0.8 liter (1.7 qt) NOTE 2, NOTE 5	HCE 102
NOTE 1: Heavy-duty or high-temperature operations require more frequent checks.				
NOTE 2: Turn lift truck engine OFF prior to performing maintenance or checks in engine compartment.				
NOTE 3: Hydraulic oil sampling and analysis is a recommended practice. See Hydraulics cleanliness procedures in Hydraulics 1900SRM2302 manual 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 4: Check and clean hydraulic oil strainer screen, every time hydraulic oil is changed.				
NOTE 5: Clean magnetic drain plug with every oil change.				

EVERY 5000 HOURS OR THIRTY MONTHS 202001-101
PERIODIC MAINTENANCE (PM)
SCHEDULE



BM190072

Figure 39. Maintenance schedule, 2.1L diesel engine (5000 hours)



BM190073

Figure 40. Maintenance schedule, 2.2L LPG engine (5000 hours)

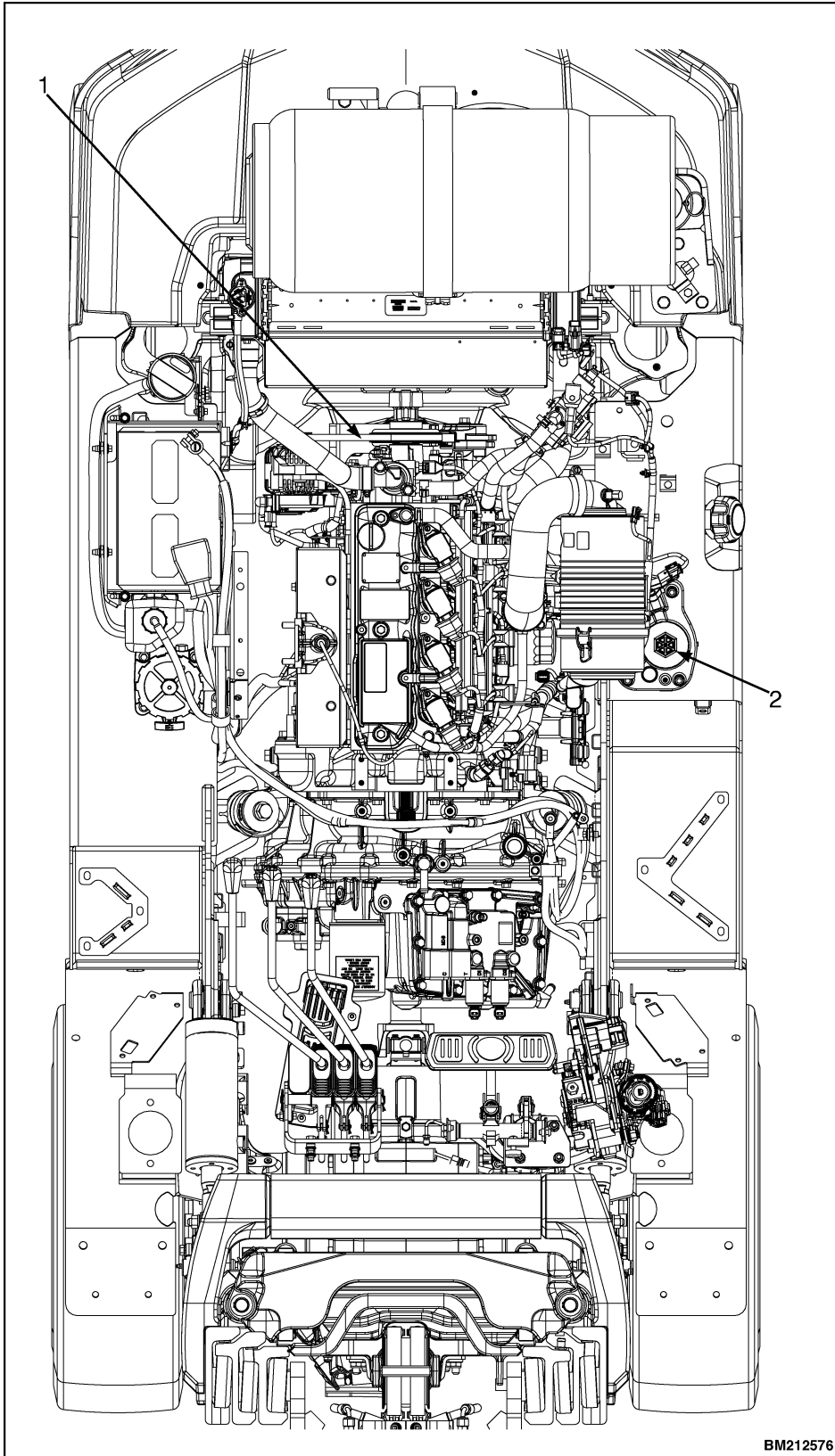
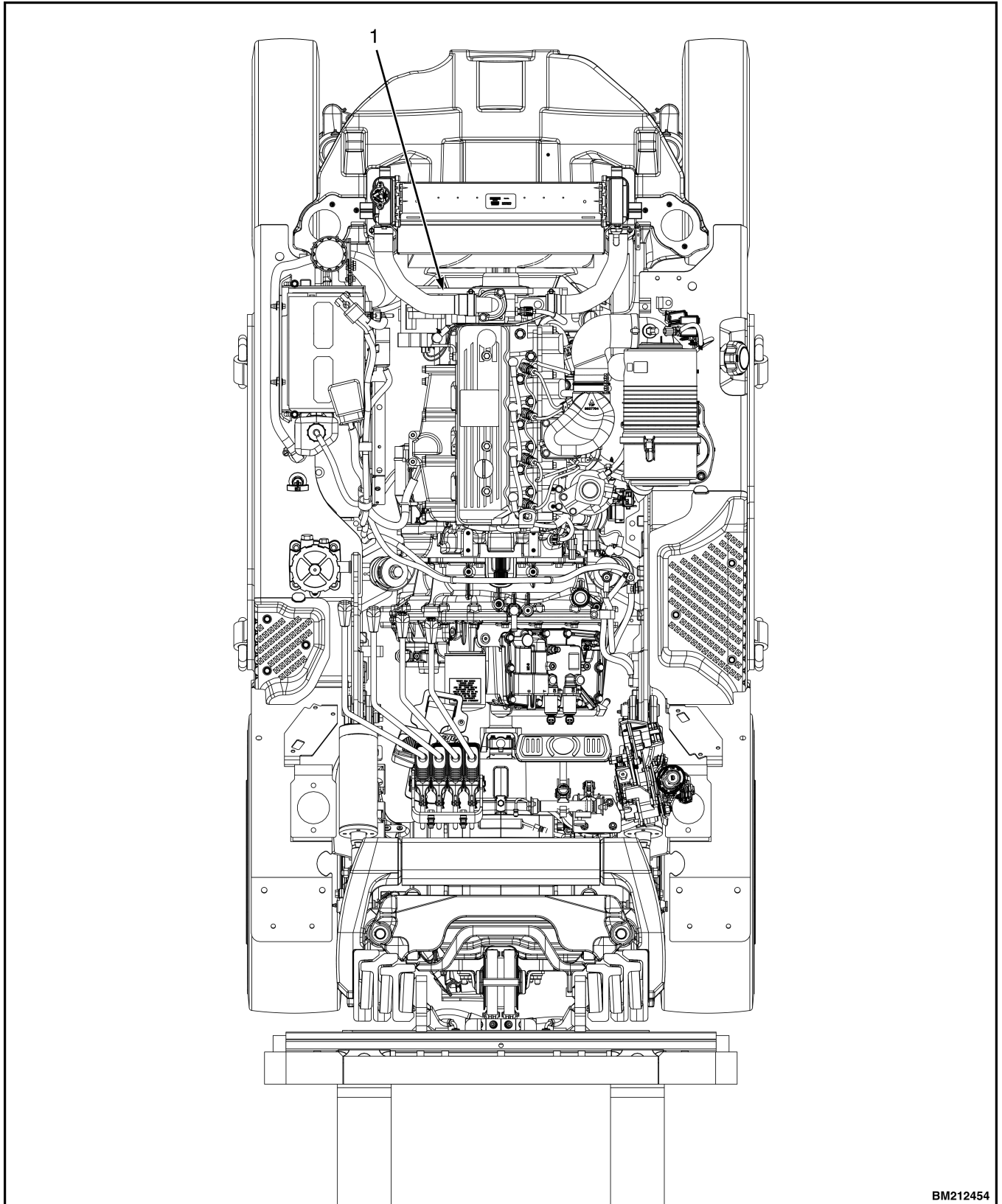


Figure 41. Maintenance schedule items, 2.2L Bi-Fuel engine (5000 hours)



BM212454

Figure 42. Maintenance schedule items, 3.0L or 3.3L Diesel engine (5000 hours)

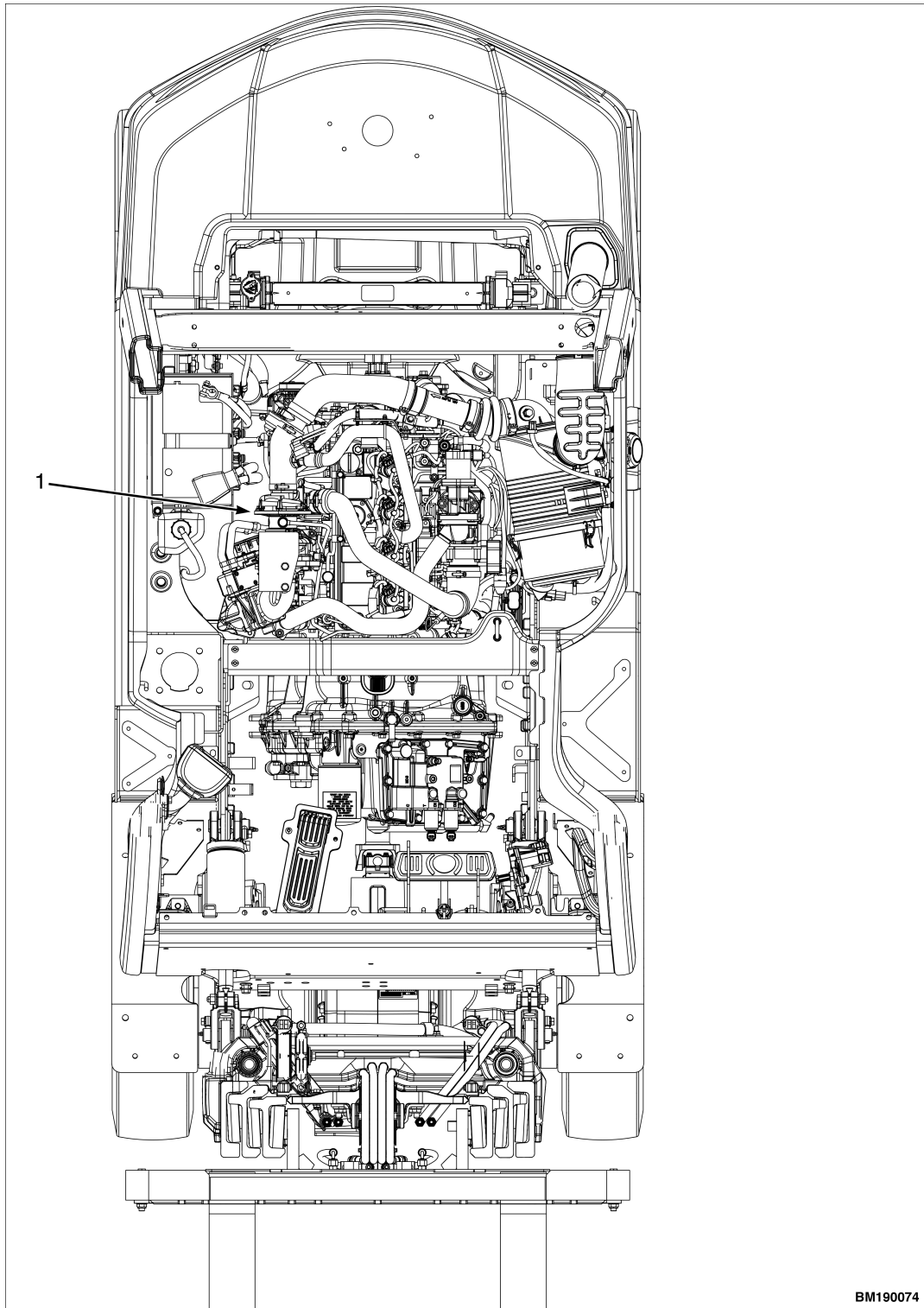
Table 8. Maintenance schedule items (5000 hours or Thirty Months)

Item No.	Item	5000 hrs/ 30 mo	Procedure or Quantity	Specification
1	Drive belt (V-belt) replace	C	Replace as required	See Parts Manual
2	Fuel Filter - Gasoline 2.2L Bi-Fuel Engine	C	Replace	See Parts Manual

C=Change

**EVERY 6000 HOURS OR THREE YEARS
PERIODIC MAINTENANCE (PM)
SCHEDULE**

202001-107



BM190074

Figure 43. Maintenance schedule, 2.1L diesel engine (6000 hours)

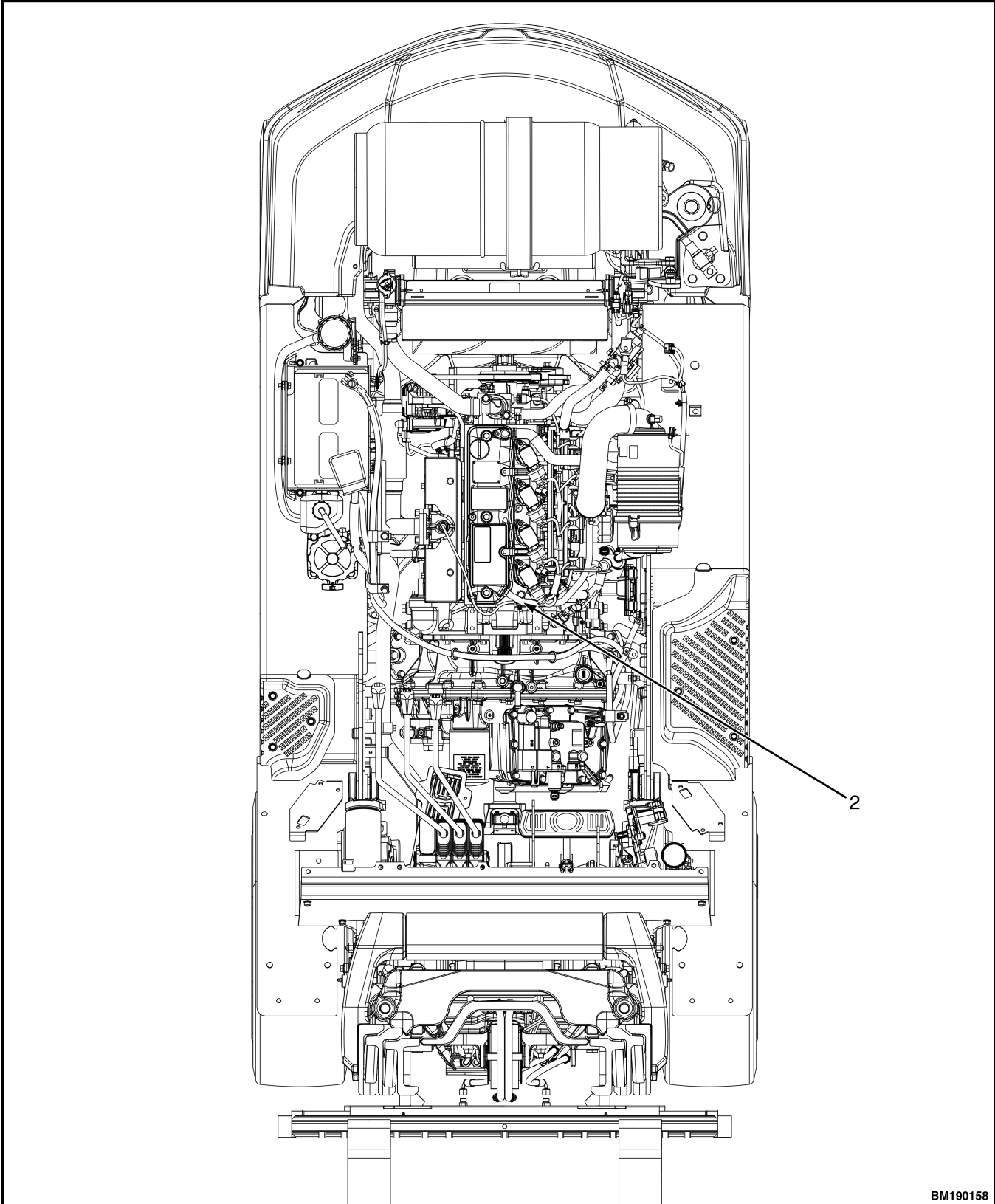
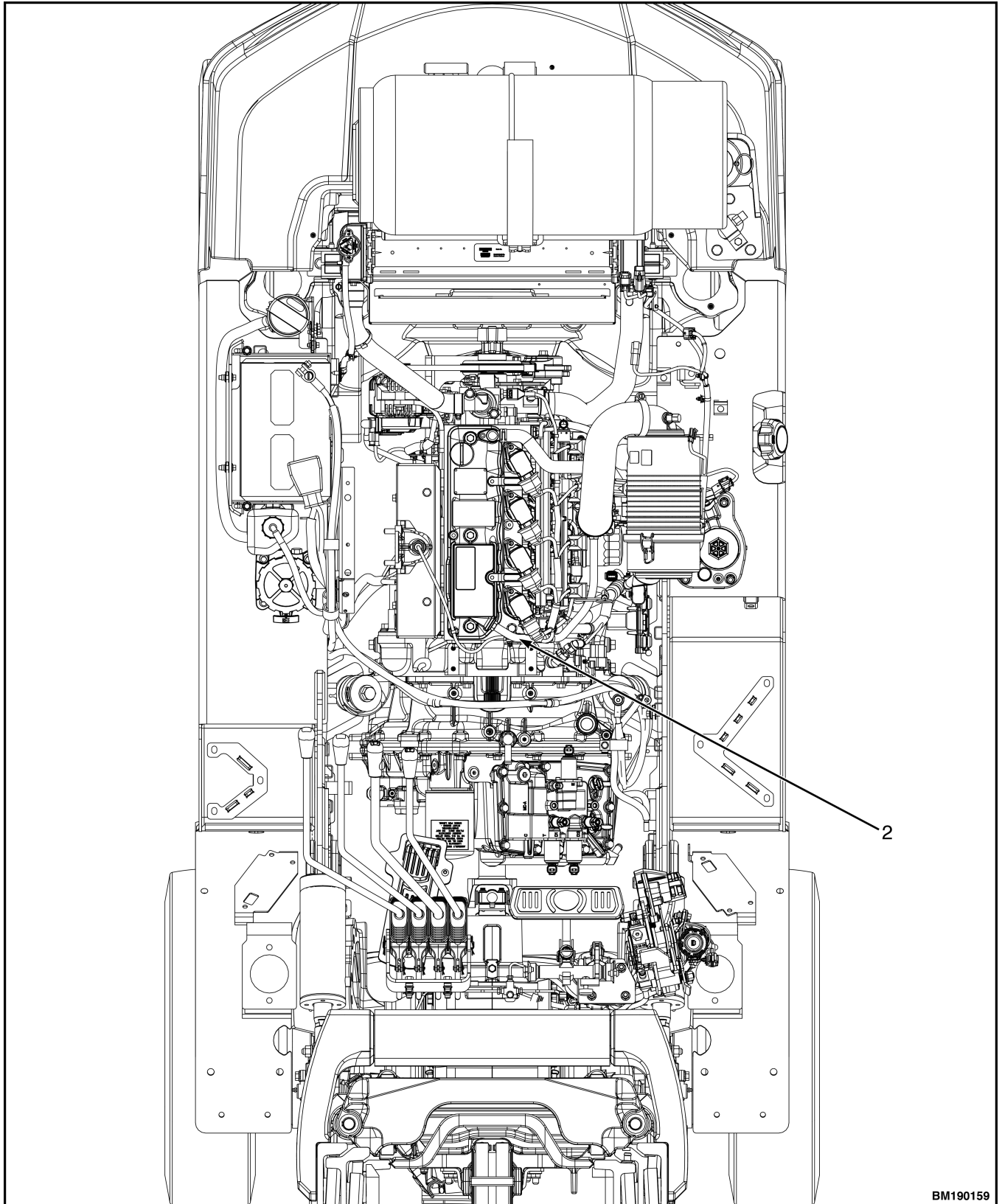


Figure 44. Maintenance schedule, 2.2L LPG engine (6000 hours)



BM190159

Figure 45. Maintenance schedule, 2.2L Bi-Fuel engine (6000 hours)

Table 9. Maintenance schedule items (6000 hours or three years)

Item No.	Item	6000 hrs/ 3 yr	Procedure or Quantity	Specification
1	Diesel particulate filter 2.1 Diesel Engine	X	Clean as required	See Parts Manual
2	PCV Valve 2.2 LPG Engine 2.2 Bi-Fuel Engine	C	Replace as Required	See Parts Manual
	Air cleaner	C	Replace Safety Filter Element	See Parts Manual
<p>NOTE 1: See 6000 hour periodic maintenance (PM) procedures in Periodic Maintenance 8000SRM2305 to clean Diesel Particulate Filter (DPF).</p> <p>X=Check</p>				

Periodic maintenance (PM) procedures

DAILY PERIODIC MAINTENANCE (PM) TASK PROCEDURES 202001-108

HOW TO MAKE CHECKS WITH ENGINE STOPPED



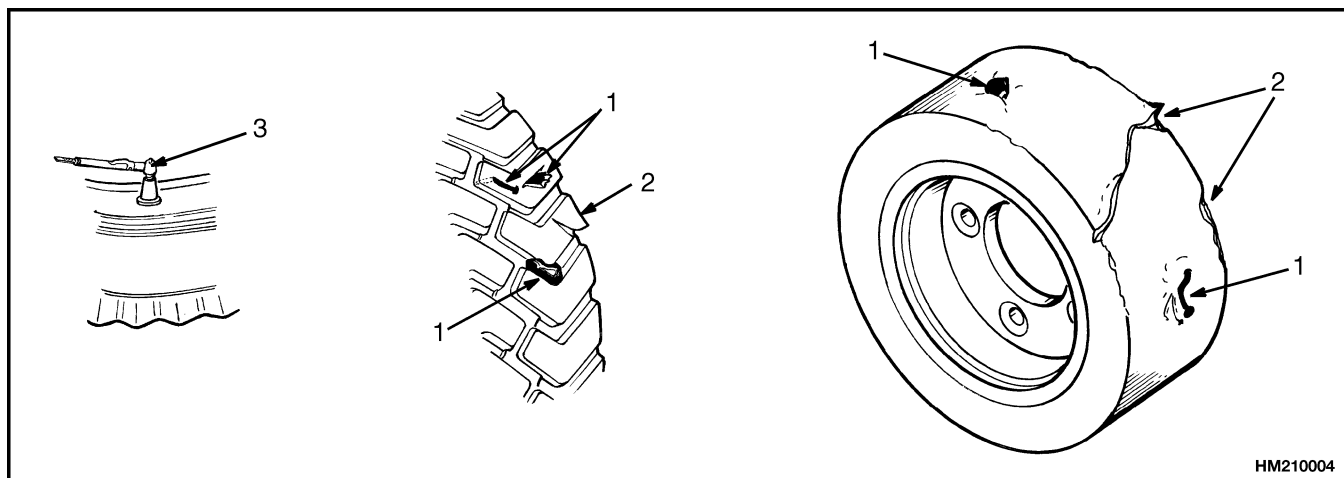
WARNING

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.

Put lift truck on a level surface. Lower carriage and forks, stop the engine, and apply park brake. Open hood 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 tires for damage. Check tread and remove any objects that will cause damage. Check for bent or damaged rims. Check for loose or missing hardware. Remove any wire, strapping, or other material that is wrapped around the axle. See Figure 46.



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

Figure 46. Tire check

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.

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 Label replacement in **Front End 4000SRM2303** manual for correct location of safety labels. See **Parts Manual** for part numbers of the safety labels.

Mast, carriage, lift chains, header hoses, attachment

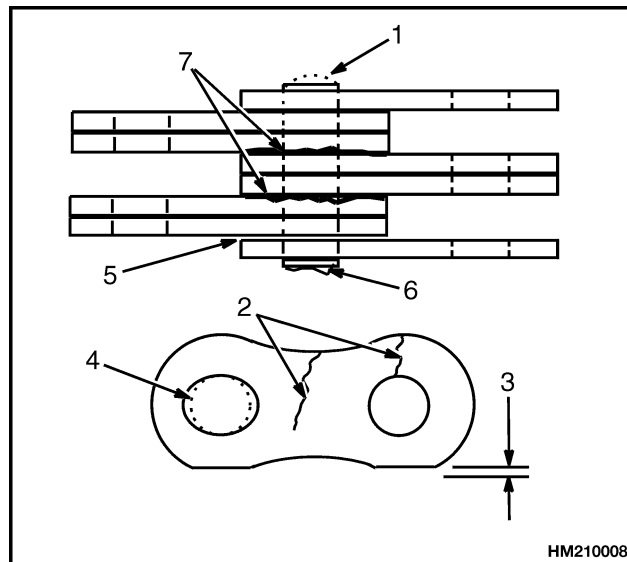
WARNING

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. DO NOT try to correct the alignment of the fork tips by bending the forks or adding shims. 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.

DO NOT operate fork lift without lateral fork stops in place. Forks may disengage from fork carriage.

1. Inspect welds on mast and carriage for cracks. Make sure that capscrews and nuts are tight.
2. Inspect channels for wear in areas where the rollers travel. Inspect rollers for wear or damage.
3. Inspect load backrest extension for cracks and damage.
4. If lift truck is equipped with an integral sideshift carriage or attachment, inspect the parts for cracks and wear. Make sure the parts that fasten the integral sideshift carriage or attachment to carriage are in good condition.
5. Visually inspect:
 - Hoses, including header hoses, and fittings for hydraulic leaks.
 - Hose cover for cuts, cracks or exposed reinforcement.
 - Defective or broken clamping devices or sheaves.
 - Proper tracking during operation.
6. Adjust, repair, or replace any hose or component as necessary. See **Front End 4000SRM2303** manual.
7. Check that lift chains are correctly lubricated. Use SAE 30W engine oil as necessary to lubricate lift chains.

8. Inspect all lift chains for cracks or broken links, and worn or turned pins. See Figure 47.
9. Inspect all chain anchors and pins for cracks and damage.
10. Make sure lift chains are adjusted so that they have equal tension. **Adjustments or replacement of the lift chains must be done by authorized personnel.** See **Front End 4000SRM2303**



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

Figure 47. Lift chain check

Visual Inspection of Mast, Mast Hardware, and Tilt Cylinder Hardware



WARNING

Mast racking occurs when the mast or tilt cylinder setup is out of adjustment, or the hardware is loose, worn, or missing. Mast components and hardware should be checked at each shift to reduce the risk of severe injury or death.

NEVER work under a raised carriage or forks. Lower the carriage or 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.

Inspect mast components

- Check for loose, missing, or damaged components
- Ensure all components are in working condition
- Check for any excessive wear
- Ensure mast mounts are in good condition with no excessive wear
- Inspect the trunnion bearings
- Inspect the rod ends of the tilt cylinder

Inspect mast and mast mount hardware

- Look for loose, missing, or damaged hardware
- Ensure all hardware appears tight with no signs of wear or movement

Operator restraint system

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

The seat belt, armrests, seat and mounting, hood, and latches are all part of the operator restraint system. Each item must be checked to make sure it is attached securely, functions correctly, and is in good condition. See Operator restraint system repair, in **Operator's Cab** 0100SRM2298 manual.

Seat belt-operational checkout

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

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

belt cannot be pulled from the retractor assembly or the belt will not retract, replace the seat belt assembly.

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

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 retracting portion of the seat belt must fasten correctly into the buckle portion. The seat belt must be in good condition. Replace the seat belt if damage or wear is evident. See Operator restraint system repair in **Operator's Cab** 0100SRM2298 manual for procedure.

Seat adjustments

Non-Suspension Seat

1. Fore and aft adjustment - it is recommended that the seat be adjusted so that the thigh is horizontal to the ground so that the best ergonomic position is achieved. See Figure 48.

Full-Suspension Seat

1. Fore and aft adjustment - it is recommended that the seat be adjusted so that the thigh is horizontal to the ground so that the best ergonomic position is achieved. See Figure 48.

2. Operator weight adjustment - the handle can be turned anticlockwise to increase or clockwise to 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 depending on which way the handle is turned. See Figure 48.

Air-Suspension Seat

1. Fore and aft adjustment- The fore/aft adjustment is released by lifting the locking lever. See Figure 48. After making the adjustment, the locking lever will latch into the desired position with an audible click. The driver's seat may not be moved into another position when it is locked. See Figure 48.

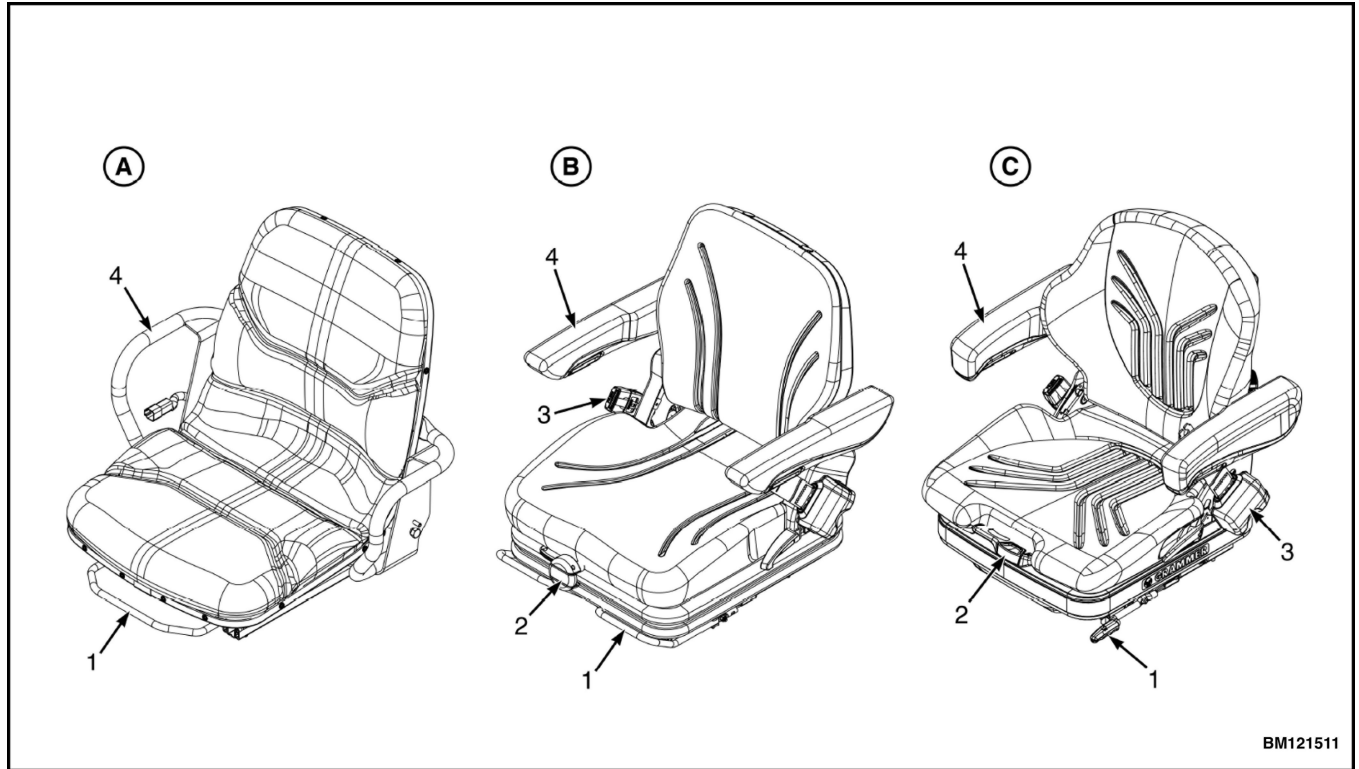


CAUTION

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 set for each operator.

2. Operator weight adjustment - The seat is adjusted for the driver's weight with the driver sitting on the seat with their feet positioned on the seat with their feet positioned on the pedals. Fold out the weight adjustment lever completely, hold it at the front and move it upwards or downwards (10 movements from minimum or maximum). See Figure 48. Before every new movement, bring the lever back to the starting position (audible locking sound). The operators weight has been set correctly, when the arrow is in the middle of the viewing window. When the operators weight has been set, fold the lever back into locking position. See Figure 48.



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- A. NON-SUSPENSION SEAT
- B. FULL-SUSPENSION SEAT

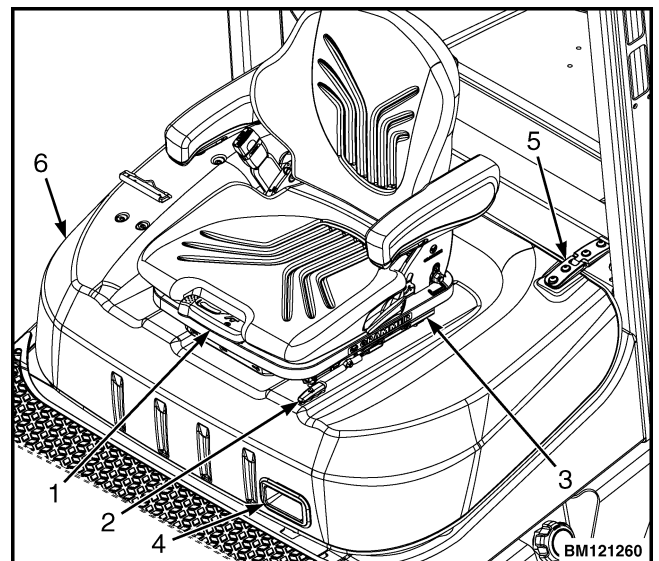
- C. AIR-SUSPENSION SEAT

- 1. FORE/AFT ADJUSTMENT LEVER
- 2. WEIGHT ADJUSTMENT LEVER/KNOB
- 3. SEAT BELT
- 4. ARMREST

Figure 48. Seat Adjustments

Hood and seat latches

Make sure seat rails and fore/aft lever are not loose. Seat rails must lock tightly in position, but move freely when unlocked. See Figure 49. Seat rails must be correctly fastened to the hood and the hood fastened to the hinges on the frame. Check the hood to make sure it is fastened correctly and will not move. If adjustment is required, see Covers repair in **Operator's Cab 0100SRM2298** manual.



BM121260

Figure 49. Seat and hood

Legend for Figure 49.

1. OPERATOR WEIGHT ADJUST LEVER
2. FORE/AFT ADJUST LEVER
3. SEAT RAIL
4. HOOD LATCH
5. HOOD HINGE
6. HOOD

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 leaks to maintenance for repair. Leaks often indicate a need for repair of damaged or worn components. Leaks in the LPG fuel system are usually not visible unless ice is present. There is however, usually a strong odor. Fuel leaks **MUST** be repaired **IMMEDIATELY**.

Check fuel system for leaks and the condition of parts. When fuel is added to lift truck, see section **HOW TO ADD FUEL TO THE LIFT TRUCK** in the **Operating Manual**.

Also check the condition of radiator or heater hoses that are not leaking. Soft or cracked hoses need to be replaced before a major leak occurs.

Hydraulic hoses

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

Coolant hoses

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

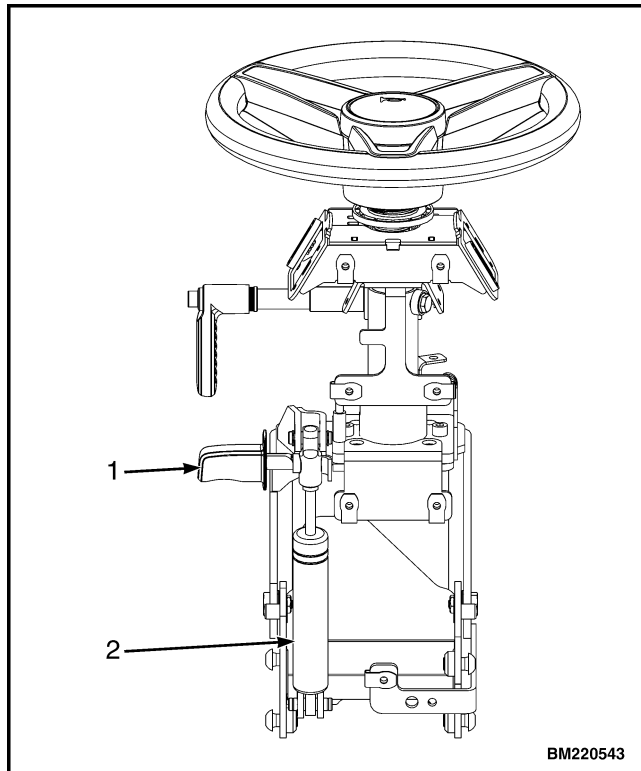
Steering column gas cylinder

NOTE: The gas cylinder is a feature only of the premium steer column.

Make sure the gas cylinder for the steering column operates correctly.

- Release the tilt lever. Confirm the column moves.
- Lock the tilt lever. Confirm the column does not move.

The cylinder must **NOT** allow the column to move unless tilt lever is released. See Figure 50.



1. TILT LEVER
2. GAS CYLINDER

Figure 50. Steering column gas cylinder and tilt lever

Transmission (Powershift)

Check transmission for leaks and damaged or loose components. Heavy-duty or high temperature operations can require more frequent checks.

Transmission oil level (Powershift)



WARNING

At operating temperature, the transmission oil is HOT. DO NOT permit the hot oil to touch the skin. Skin that comes in contact with hot oil may be burned.

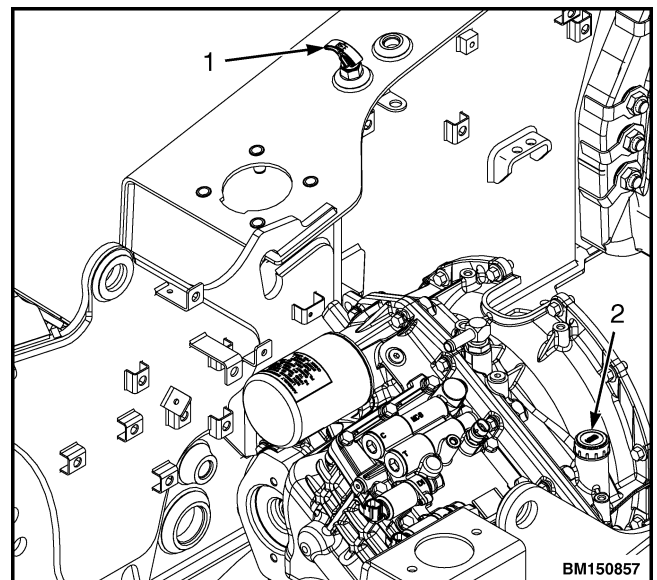


CAUTION

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

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

1. If engine has been running, turn the engine off. Wait for one minute or longer prior to checking the oil level.
2. Check the transmission oil level and refer to for correct fill specification.
3. If transmission oil is low, add oil to the transmission at the dipstick tube, filling to the correct level as indicated on the dipstick. Use correct oil as shown in the First 150 hours or Six weeks periodic maintenance (PM) schedule. DO NOT overfill.



1. HYDRAULIC OIL DIPSTICK
2. TRANSMISSION OIL DIPSTICK

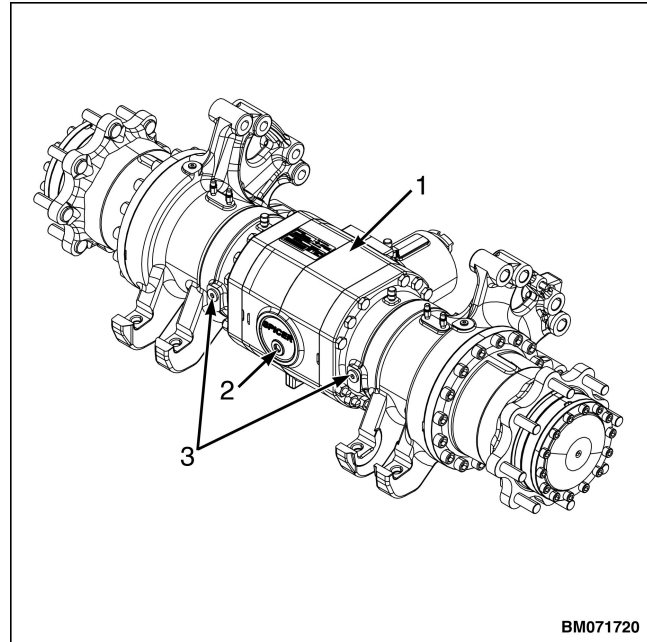
Figure 51. Transmission and hydraulic oil check

Differential and drive axle oil

The dry brake axle and the center section of the wet brake axle use the same oil supply. The oil level must be between 0 to 10 mm (0 to 0.40 in.) below the bottom edge of fill hole.

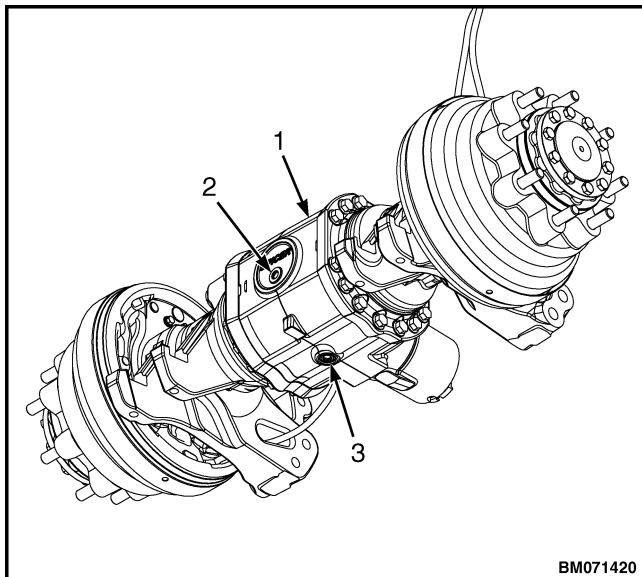
1. Loosen the wheel end check/fill plugs (item 3, Figure 53). Oil should leak at threads.
 - If oil is present at the threads, tighten plugs.
 - If no oil escapes from threads, check for restriction or obstruction.

2. Locate the check/fill plug that covers the fill hole for checking the oil level on the front of the differential housing (item 2, Figure 52 or Figure 53).
3. Remove the plug and place a finger into the fill hole to feel if fluid level is at the bottom edge of the fill hole. See Figure 52 or Figure 53. If oil is low, add oil as shown in the First 150 hours or Six weeks periodic maintenance (PM) schedule until oil level is between 0 to 10 mm (0 to 0.40 in.) below the bottom edge of fill hole.
4. Install the fill plug and check for leaks. Torque to 35 to 50 N (25.8 to 36.9 lbf ft).



1. WET BRAKE DRIVE AXLE
2. CENTER SECTION CHECK/FILL PLUG
3. WHEEL END CHECK/FILL PLUGS

Figure 53. Wet Brake Axle Fluid Fill



1. DRY BRAKE DRIVE AXLE
2. CHECK/FILL PLUG
3. DRAIN PLUG

Figure 52. Dry Brake Axle Fluid Fill

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.

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 five minutes before checking the oil level. Keep hydraulic oil at the correct level as indicated on the dipstick. Use correct oil as shown in Daily periodic maintenance (PM) task schedule.

Check hydraulic system for leaks and damaged or loose components. Heavy-duty or high-temperature operations can require more frequent checks.

Engine oil

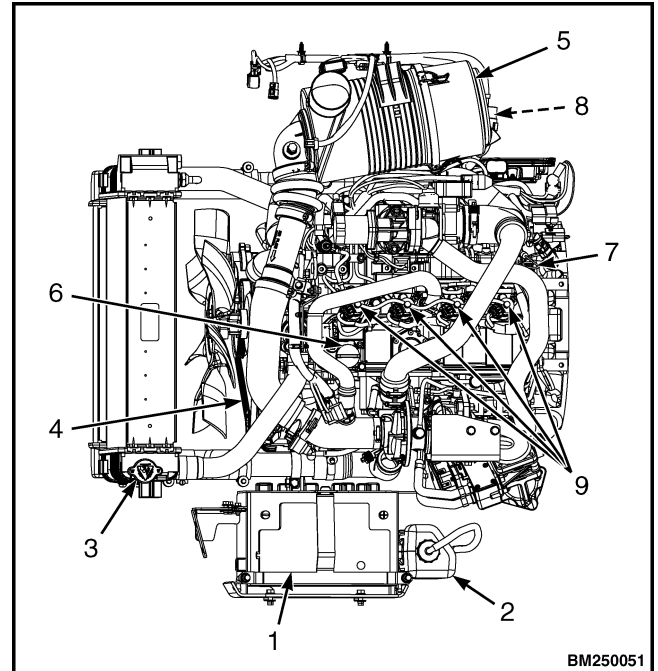
After the engine has stopped, wait five minutes before checking the oil level. Keep oil at correct level as indicated on the dipstick. Use the correct oil as shown in the Daily periodic maintenance (PM) task schedule.

A red icon for the engine oil pressure will display on the user interface. See Figure 54. During normal operation, the icon will display until correct oil pressure is obtained, at which time the icon will go **OFF**.



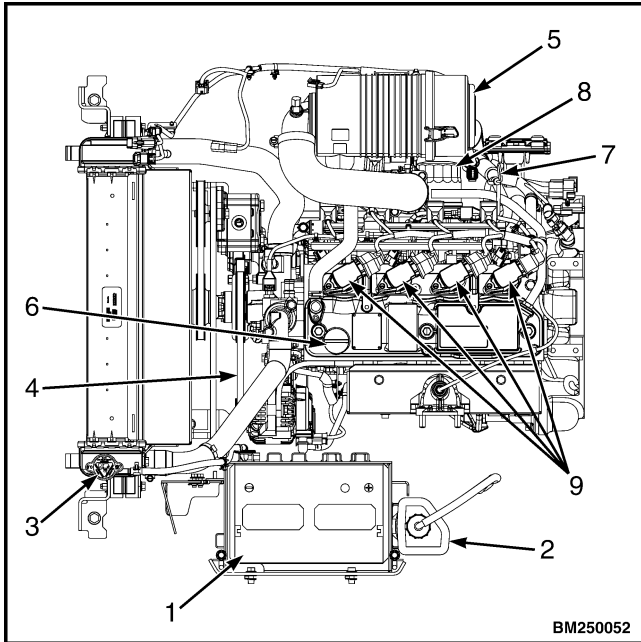
Figure 54. Engine oil pressure

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, and oil level reads **FULL** on the dipstick. See Figure 55, Figure 56, Figure 57, Figure 58, or Figure 59.



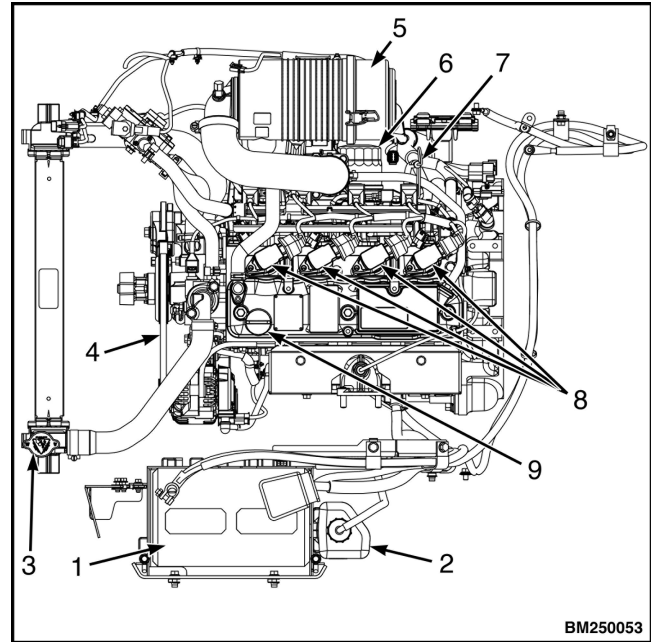
1. BATTERY
2. COOLANT RESERVOIR
3. RADIATOR CAP
4. DRIVE BELT
5. AIR FILTER
6. ENGINE OIL FILL
7. DIPSTICK
8. ENGINE OIL FILTER
9. FUEL INJECTORS

Figure 55. Yanmar 2.1L diesel engine maintenance points



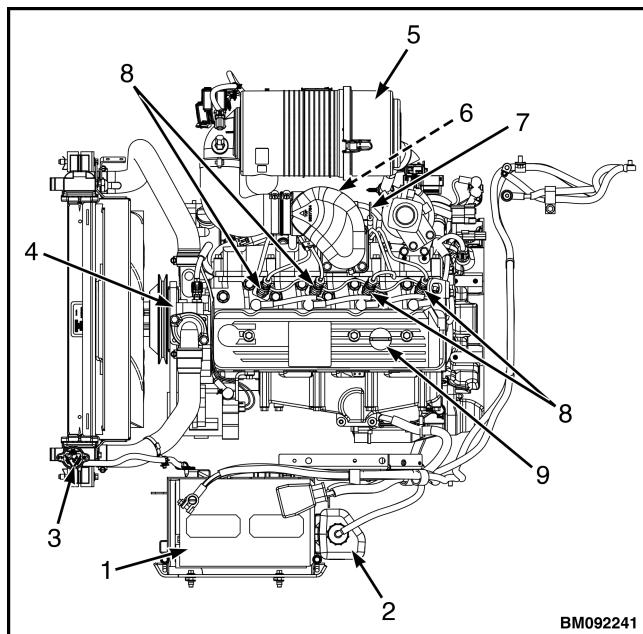
1. BATTERY
2. COOLANT RESERVOIR
3. RADIATOR CAP
4. DRIVE BELT
5. AIR FILTER
6. ENGINE OIL FILL
7. DIPSTICK
8. ENGINE OIL FILTER
9. FUEL INJECTORS

Figure 56. Yanmar 2.2L LPG engine maintenance points



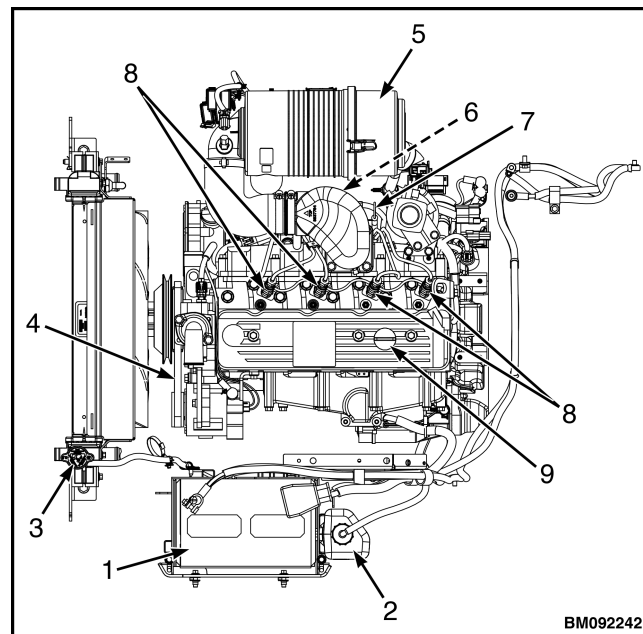
1. BATTERY
2. COOLANT RESERVOIR
3. RADIATOR CAP
4. DRIVE BELT
5. AIR FILTER
6. ENGINE OIL FILTER
7. DIPSTICK
8. FUEL INJECTORS
9. ENGINE OIL FILL

Figure 57. Yanmar 2.2L Bi-Fuel engine maintenance points



1. BATTERY
2. AUXILIARY COOLANT RESERVOIR
3. RADIATOR CAP
4. DRIVE BELT
5. AIR FILTER
6. ENGINE OIL FILTER
7. DIPSTICK
8. FUEL INJECTOR
9. ENGINE OIL FILL

Figure 58. Yanmar 3.0L diesel engine maintenance points



1. BATTERY
2. AUXILIARY COOLANT RESERVOIR
3. RADIATOR CAP
4. DRIVE BELT
5. AIR FILTER
6. ENGINE OIL FILTER
7. DIPSTICK
8. FUEL INJECTOR
9. ENGINE OIL FILL

Figure 59. Yanmar 3.3L diesel engine maintenance points

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 air filter restrictions icon displays on the user interface screen. See Figure 60.
- If equipped, the manual air flow indicator is red.
- The specified number of hours has passed since the last filter element replacement.



Figure 60. Air filter restrictions icon

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

Forks

NOTE: Forks must be removed or 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.

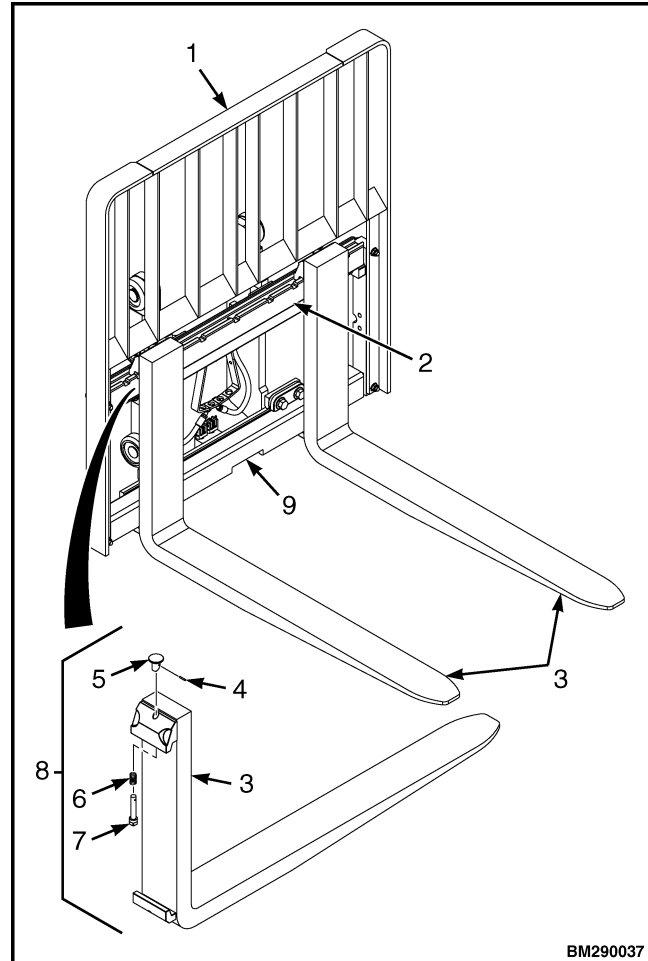
Inspect



WARNING

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

1. Inspect forks for cracks and wear. Check alignment of fork tips. The difference in height of fork tips must be less than three percent of the length of the forks. See Table 10 and Figure 62. If forks do not meet specification, they both must be replaced.
2. Check for smooth and proper operation of fork lock pins or components and lubricate, as necessary.
3. Check that the pins for the forks keep the forks in position on the carriage (see Figure 61). If the pin does not remain engaged in the carriage slot, replace with a new pin. If the pin is damaged, replace pin parts.



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

Figure 61. Carriage and forks

4. 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 Hyster P/N 4092984 as follows. See Figure 63.
 - 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 62) with the opening corresponding to the measure thickness of the fork shank in Step a above (e.g. 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.

**WARNING**

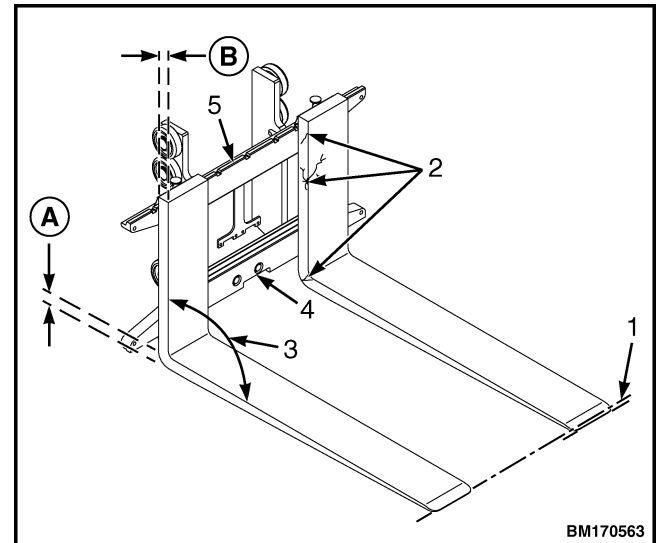
To reduce the risk of fork breakage or personal injury, replace both forks before resuming operation.

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

Table 10. Fork Tip Alignment

Fork Tip Alignment Specifications			
Standard Fork Lengths		Maximum Fork Tip Difference*	
mm	(in.)	mm	(in.)
914	(36)	27	(1.08)
1000	(39)	30	(1.17)
1016	(40)	30	(1.2)
1067	(42)	32	(1.26)
1100	(43)	33	(1.29)
1200	(47)	36	(1.41)
1207	(47.5)	36	(1.42)
1219	(48)	37	(1.44)
1372	(54)	41	(1.62)
1524	(60)	46	(1.80)
1829	(72)	55	(2.16)

*Difference of alignment between fork tips must be no more than 3% of the total fork length.



- 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 62. Fork Checks

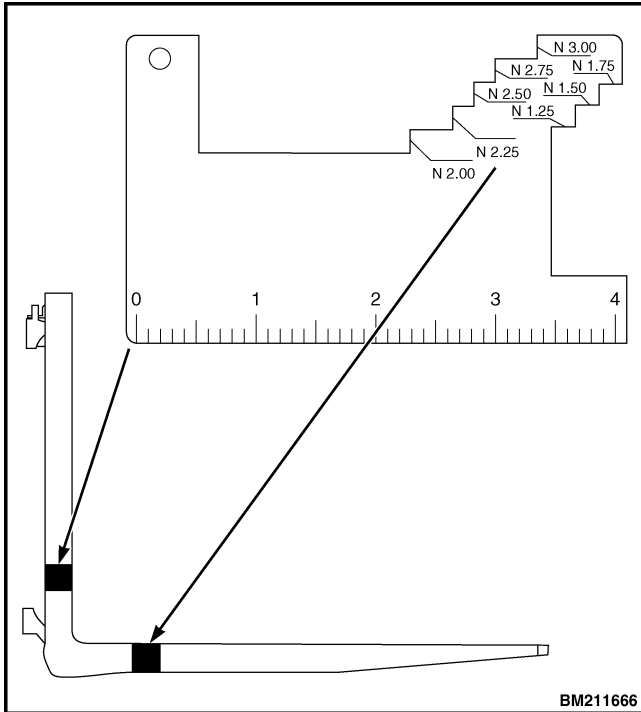


Figure 63. Fork wear check

5. If replacement of forks is necessary, see **Parts Manual** for correct parts and Fork removal and replacement in **Front End 4000SRM2303** for procedure.

ISS Fork positioner (Bolzoni option)

At the start of every work shift, check the following points and inform maintenance personnel of any problems.

Reference Figure 64 below, while performing the following checks:

- Check that there is no play in the coupling (item 7) between the fork supports and actuator rod.
- Check that the pins (item 8) and cotter pins of the actuator bracket are correctly positioned.
- Check the tightness of the fork locking screws (item 6).
- Check that the fork positioner sliding bushing capscrews (item 5) are tight.
- Check that the guide tube locking screws (item 1) are tight.
- Check for leaks from the fork positioner actuators (item 11).
- Check the cleanliness and greasing of the fork positioner guide tubes (item 2).

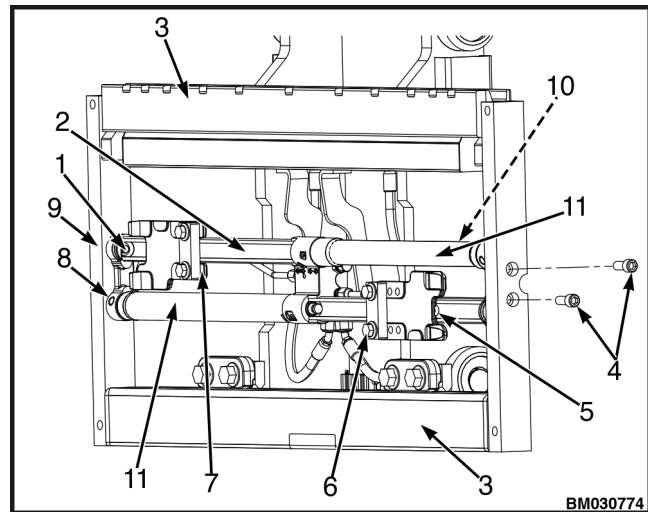


Figure 64. Fork positioner checks

- Check the cleanliness and greasing of the fork sliding surfaces (item 3).
- Check that there is no play between the fork positioner assembly and the carriage (item 9).
- Check that the mounting screws (item 4) securing the fork positioner to the carriage are tight.
- Check there are no deformations or damage to the fork positioner assembly or carriage.
- Visually inspect the hydraulic hoses and tubes for leaks.

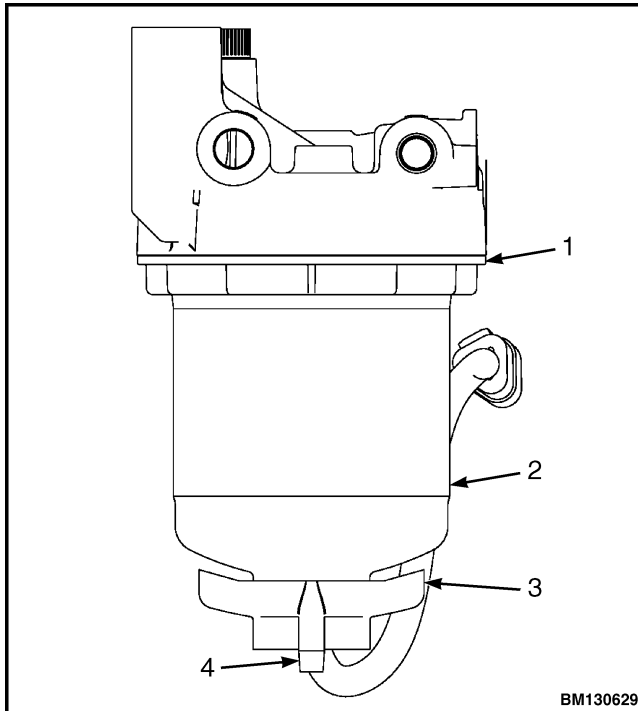
1. GUIDE TUBE LOCKING SCREW
2. GUIDE TUBE
3. FORK SLIDING SURFACES
4. MOUNTING SCREWS
5. FORK SUPPORT SLIDING BUSHING CAPSCREW
6. FORK LOCKING SCREWS
7. FORK POSITIONER ACTUATOR ROD COUPLING
8. PIN AND COTTER PIN
9. CARRIAGE
10. NAMEPLATE
11. ACTUATORS

Fuel Filter/Water Separator

Drain water from the fuel filter/water separator when the warning indicator on the display is **ON** during operation. The fuel filter/water separator is located at left-hand side of the truck.

1. Open the drain valve by turning the valve counterclockwise until draining occurs. See Figure 65.

2. Drain water into a cup until clean fuel flows from the valve.
3. Close the valve.



1. FILTER HEAD
2. WATER SEPARATOR (FUEL FILTER)
3. SENSOR (WATER IN FUEL)
4. DRAIN VALVE

Figure 65. Fuel Filter/Water Separator

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.



WARNING

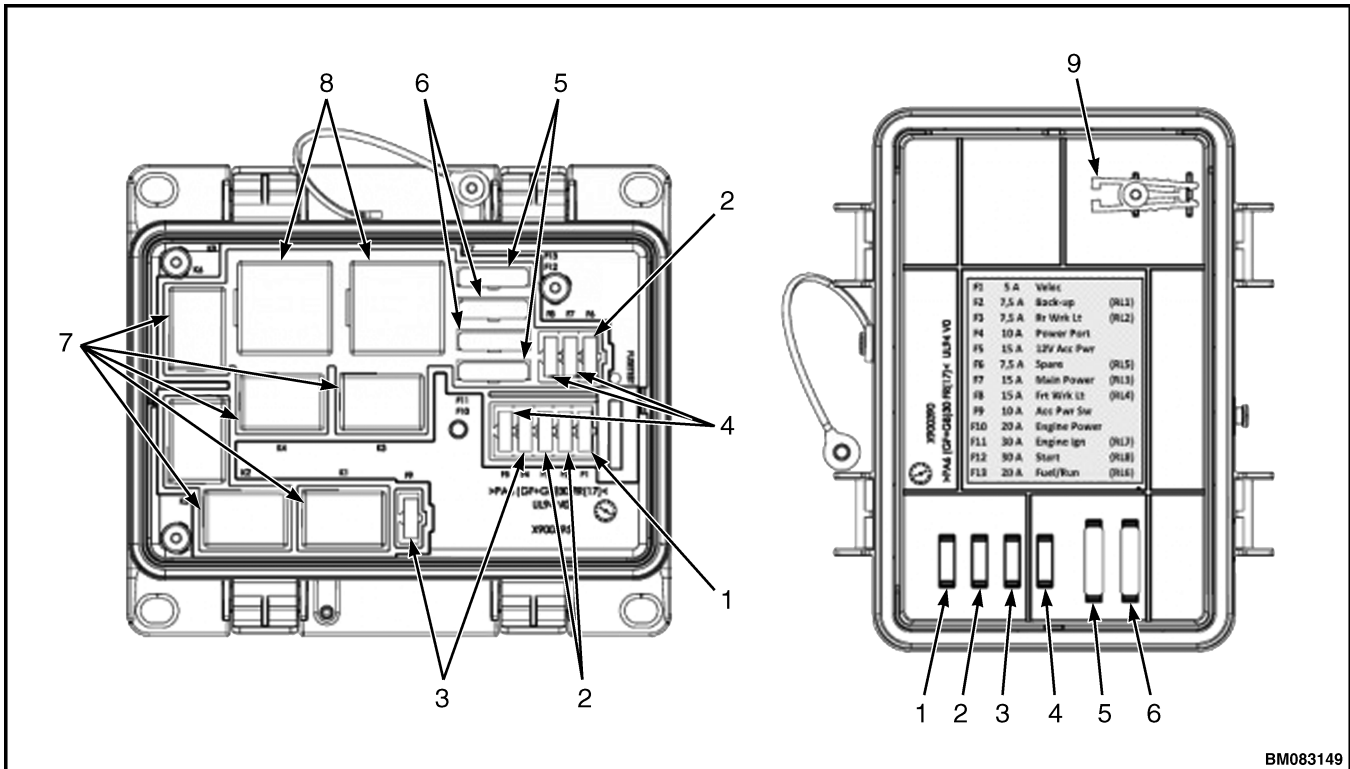
FASTEN YOUR SEAT BELT! The seat belt is installed to help the operator stay on the truck if the lift truck tips over. IT CAN ONLY HELP IF IT IS FASTENED.

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 park brake and put the transmission in **NEUTRAL**. Make the checks carefully.

Indicator lights, horn, fuses, and relays

Turn truck on. All icons will display on the user interface up for two seconds (start check) when system power is turned **ON**. See User interface

(display) in **Electrical, software, and controls** 2200SRM2304. 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. Press the engine start button if lift truck is equipped with this button. If icons do not operate correctly, stop the engine and check the fuses. The fuses are located in the Power Distribution Module (PDM) which is under the floor plate on the left side near the front left step. See Figure 66.



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NOTE: COVER REMOVED FOR CLARITY.

- 1. FUSE (5 AMP)
- 2. FUSE (7.5 AMP)
- 3. FUSE (10 AMP)
- 4. FUSE (15 AMP)
- 5. FUSE (20 AMP)
- 6. FUSE (30 AMP)
- 7. RELAY-MICRO
- 8. RELAY-MINI
- 9. FUSE PULLER

Figure 66. PDM showing fuses and relays

Service brakes

Brake fluid level



WARNING

Small amounts of water in the brake system can cause reduced braking performance if the water reaches the wheel cylinder areas. **DO NOT** allow water entry. Ensure that the sealed reservoir lid is correctly replaced.

On lift trucks with dry brake drive axles, only use the specified brake fluid in the master cylinder. See Daily periodic maintenance (PM) task schedule.

On lift trucks with wet brake drive axles, only use the specified brake oil from sealed container in the master cylinder. See Daily periodic maintenance (PM) task schedule.



WARNING

If the brake system has a power assist (or boosted master cylinder), braking will be more difficult if the engine is not running.

Loss of fluid from the brake fluid reservoir indicates a leak. Repair the brake system before using the lift truck. Replace the brake fluid in the system if there is dirt or water in the system.

There is an icon on the user interface for the brake fluid. See Figure 67. If the icon is on when the engine is running, the brake fluid level in the reservoir is too low.



Figure 67. Brake fluid low icon

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 transmission is in reverse and 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**. If repair is necessary, see Pedals and linkage repair in **Operator's Cab** 0100SRM2298.

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

Check the condition of the drive shaft by operating the lift truck in forward direction then change quickly to reverse, while listening for an audible "clunk" noise. If a noise is detected, this could mean the drive shaft hardware has become loose and must be tightened. See Every 1000 hours or Six Months periodic maintenance (PM) procedures for procedure.

Park brake, Dry Brake Axle

Make sure service brakes are adjusted and the operation of the automatic adjuster mechanism is correct before park brake is adjusted.

Lift trucks with a MONOTROL® pedal. The 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 park brake is applied.

NOTE: Make sure park brake is disengaged before making adjustment.

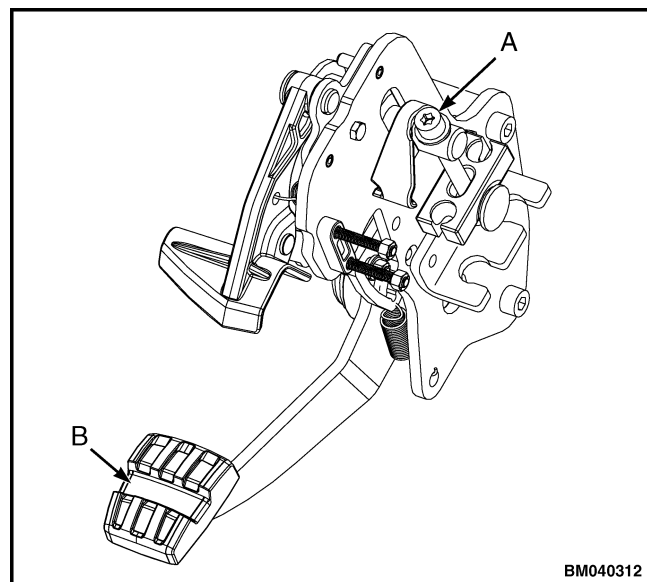
1. Confirm the truck is on a level surface, with the engine off and transmission in neutral.
2. Use a T-40 torx driver to adjust the park brake cable tension bolt (A, Figure 68) until a peak force applied to the pedal is required to fully engage the park brake pedal. See Table 11 for peak force.

NOTE: **DO NOT HIT THE PEDAL OVERTRAVEL STOP WHEN TAKING THIS MEASUREMENT.**

Table 11. Peak Pedal Force

Capacity	Peak Force
1.0T - 2.5T	247 - 257 N (55.5 - 57.8 lbf ft)
2.7T - 3.0T	301 - 311 N (67.7 - 70 lbf ft)
3.5T	348 - 365 N (78.2 - 82.1 lbf ft)

3. Actuate the park brake a minimum of three additional times before verifying the final adjustment setting.
4. Adjustment procedure will allow burnished brakes to hold the truck with rated load on 15% grade.



- A. CABLE TENSION ADJUSTMENT BOLT
 B. PEDAL

Figure 68. Park brake adjustment

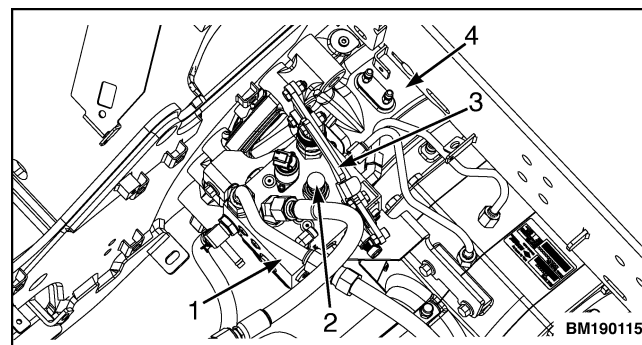
Park Brake, Wet Brake Axle

Wet brake equipped trucks come standard with a spring applied, hydraulically released park brake. When the truck is running and the park brake is commanded to release, pressurized fluid counteracts the springs and releases the brake. If the truck needs to be moved without the engine running, the park brake can be manually released with the following procedure using the on-board hand pump. See Figure 69.

1. Remove floor mat and front/rear floor plates.

2. Locate the hand pump isolator valve and push knob (item 2, Figure 69) towards the valve block. It should click into its new position.
3. Unfold the pump handle (item 3, Figure 69) and lock it into the extended position.
4. Pump handle through its entire travel range for approximately 20 cycles. Pump resistance will be substantial when the brake reaches the fully released state.
5. When the truck has been moved to a new location, manually apply the park brake by pulling the hand pump isolator valve knob away from the valve block. See Figure 69.

A manually overridden park brake should only be considered a temporary condition. Without a continuous supply of pressurized oil, the brake circuit will bleed off and the park brake will re-apply within 10 to 20 minutes. If this occurs before the truck reaches its destination, Step 4 will need to be repeated. Additionally, if the engine is started while the isolator valve is pushed in the valve will automatically reset and normal park brake behavior will resume.



1. PARK BRAKE VALVE
2. HAND PUMP ISOLATOR VALVE KNOB
3. PUMP HANDLE
4. WET BRAKE AXLE

Figure 69. Park Brake Override

Engine oil pressure

There is an icon for the engine oil pressure on the user interface. During normal operation, the icon will display when the key switch is turned to **ON** and will stay until correct oil pressure is obtained, at which time the icon will go off.



Figure 70. Engine oil pressure

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 by filling oil as indicated on the dipstick.

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 116°C (241°F) on lift trucks with powertrain protection system. See **Engine Shutdown** procedures in the **Operating Manual**.

There is an icon on the user interface for the coolant temperature. The icon will display 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 icon displays when engine is running, the coolant and engine are too hot (amber coolant temperature icon will display when temperature reaches 105°C (221°F), the red coolant temperature icon will display at 110°C (230°F), and the alarm and shutdown countdown will begin at 116°C (241°F)). Stop engine and check coolant level in the coolant recovery reservoir.

Make sure coolant level is between the **ADD** and **FULL** marks on the auxiliary coolant reservoir. See Figure 71. 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 Hyster dealer. NEVER mix coolant types or brands without draining the cooling system completely first.

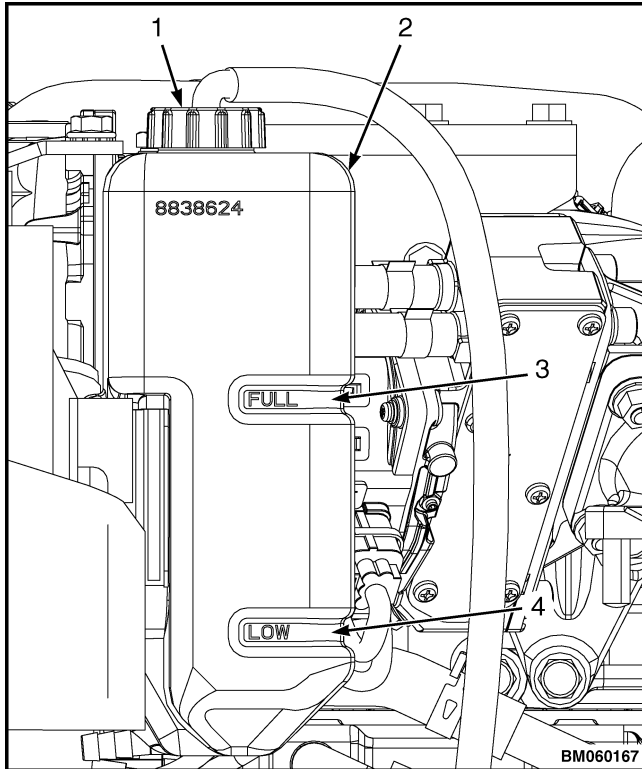
If coolant is added, see Daily periodic maintenance (PM) task schedule for correct solution.



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. Turn engine **OFF** and clean the radiator with compressed air or water as needed. Check for and remove any debris on the radiator core and oil cooler. 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. FILL CAP
2. COOLANT RESERVOIR
3. FULL MARK
4. LOW MARK

Figure 71. Coolant reservoir

Lift system, operate

WARNING

When working on or near the mast, see **Safety Procedures When Working Near Mast** at the end of this section.

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**.

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.

Perform the following checks and inspections:

1. Turn engine **OFF** and check for leaks in the hydraulic system. Check condition of hydraulic hoses and tubes.

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

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

Check lift height sensor

1. Confirm all checks in the previous section have been successfully completed. See **Lift system, operate**.
2. Raise the carriage above the height of the outer mast channel.
3. Confirm the visual indicator for the lift height sensor indicates an elevated mast condition.
4. Lower the carriage to ground level.
5. Verify that the visual indicator for the lift height sensor is no longer visible.
6. If the indicator for the lift height sensor is not functioning properly, notify a supervisor or service technician.

FIRST 150 HOURS OR SIX WEEKS PERIODIC MAINTENANCE (PM) PROCEDURES 202001-109

YANMAR ENGINE OIL AND OIL FILTER, YANMAR 2.1L, 3.0L, 3.3L DIESEL, YANMAR 2.2L LPG AND BI-FUEL



WARNING

Engine lubricating oil may be hot and can cause burns. Use caution while working with hot engine oil. Failure to comply could result in death or serious injury.



WARNING

Always wear eye protection when working with engine oil. Failure to comply could result in serious injury.

NOTE: Only use the engine oil specified. Other oils may affect warranty coverage, cause internal engine components to seize and/or shorten engine life.

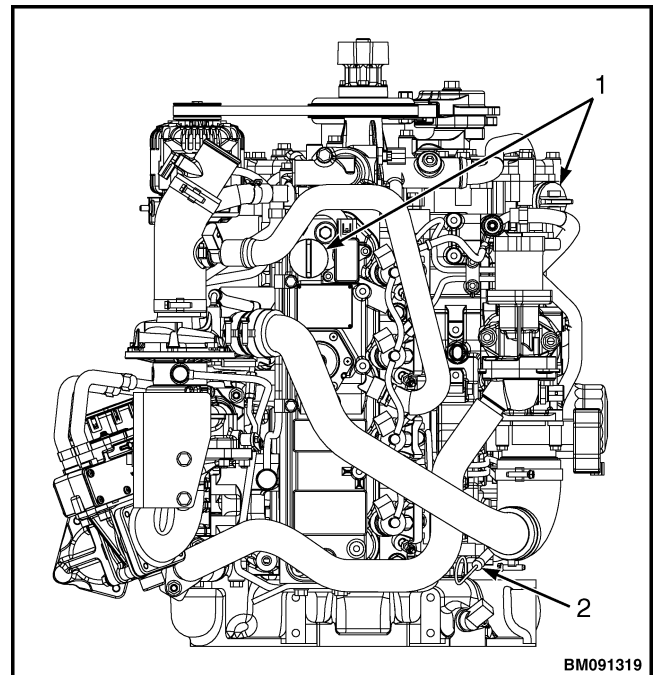
Prevent dirt and debris from contaminating the engine lubricating oil. Carefully clean the exterior of the oil cap and the surrounding area before removing the cap/dipstick assembly.

Do not mix different types of engine lubricating oil. This may negatively affect the lubricating properties of the engine lubricating oil.

Do not overfill. Overfilling may result in white exhaust smoke, engine overspeed or internal damage.

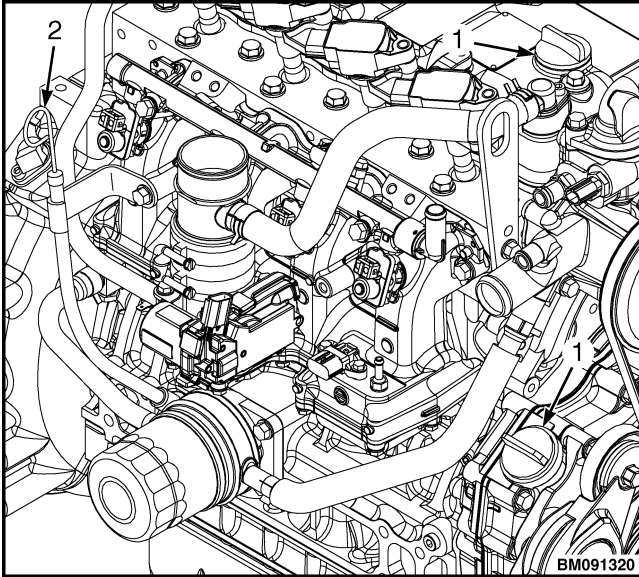
1. Make sure the engine is level.
2. Start the engine and bring it up to operating temperature.
3. Turn the engine **OFF**.
4. Loosen the oil fill cap to vent the engine crankcase and allow the engine lubricating oil to drain more easily.
5. Place a container with a capacity greater than 7.4 liter (7.8 qt) under the oil pan.

6. Remove the drain plug on the oil pan to drain the engine lubricating oil into the container.
7. After all engine lubricating oil has been drained from the engine, reinstall the drain plug back into the oil pan. Torque to 53.9 to 63.7 N·m (39.8 to 47.0 lbf ft).
8. Use a filter wrench and turn the engine lubricating oil filter counterclockwise to remove. Discard the engine lubricating oil filter.
9. Apply clean oil to the gasket of the new filter. Insert the new filter.
10. Turn the filter by hand until the gasket contacts the mounting surface. Then use the filter wrench to tighten. Torque to 19.6 to 23.5 N·m (14 to 17 lbf ft).
11. Fill with engine oil as specified in the First 150 hours or Six weeks periodic maintenance (PM) schedule, until full mark is reached on the dipstick. See Figure 72 or Figure 73.



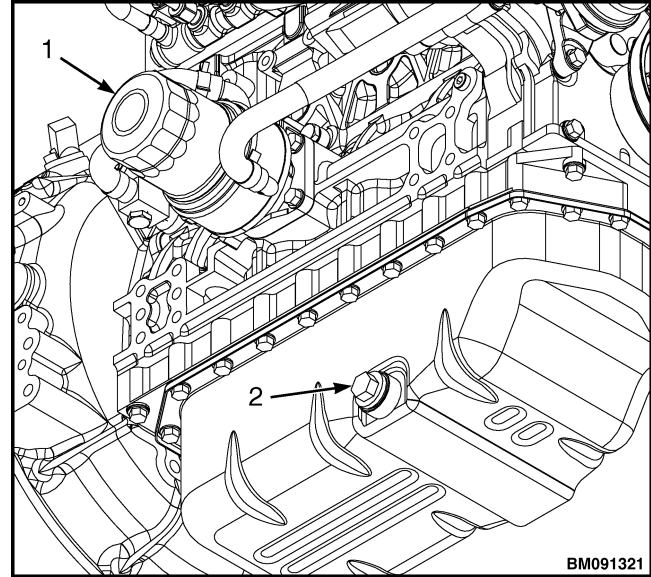
1. ENGINE OIL FILL CAP
2. ENGINE OIL DIPSTICK

Figure 72. Engine oil fill (Yanmar 2.1L diesel)



1. ENGINE OIL FILL CAPS
2. ENGINE OIL DIPSTICK

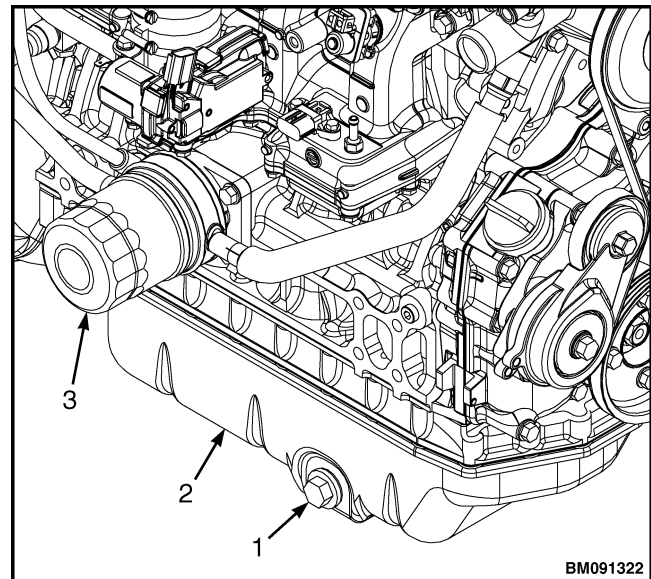
Figure 73. Engine oil fill (Yanmar 2.2L LPG and Bi-Fuel)



1. OIL FILTER
2. DRAIN PLUG

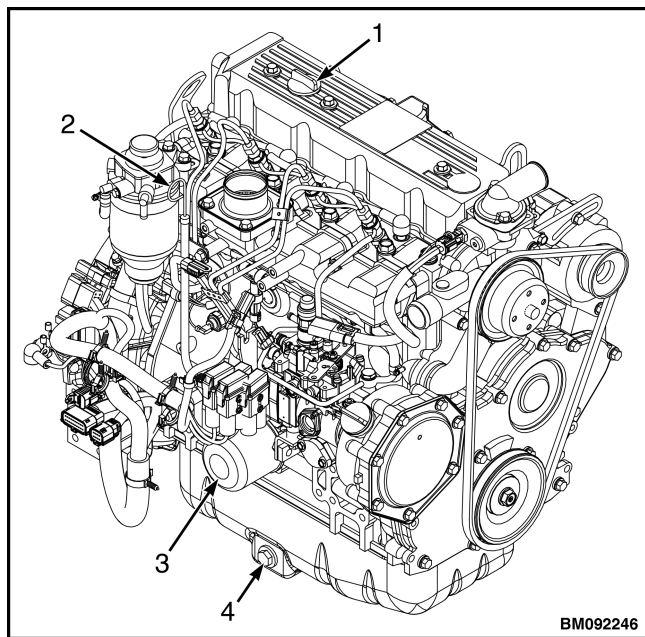
Figure 74. Engine oil change (Yanmar 2.1L diesel)

12. Start the engine.
13. Run the engine until the engine oil reaches operating temperature.
14. Inspect the area around the oil filter for leaks. Shut the engine off and check the oil dipstick again. Add more engine oil if necessary.
15. Reinstall the oil fill cap. If any engine lubricating oil is spilled, clean it with a clean cloth.



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

Figure 75. Engine oil change (Yanmar 2.2L LPG and Bi-Fuel)



1. ENGINE OIL FILL CAP
2. ENGINE OIL DIPSTICK
3. OIL FILTER
4. DRAIN PLUG

Figure 76. Engine oil fill or change (Yanmar 3.0L or 3.3L Diesel)

TRANSMISSION OIL LEVEL (POWERSHIFT)



WARNING

At operating temperature, the transmission oil is **HOT**. **DO NOT** permit the hot oil to touch the skin. Skin that comes in contact with hot oil may be burned.



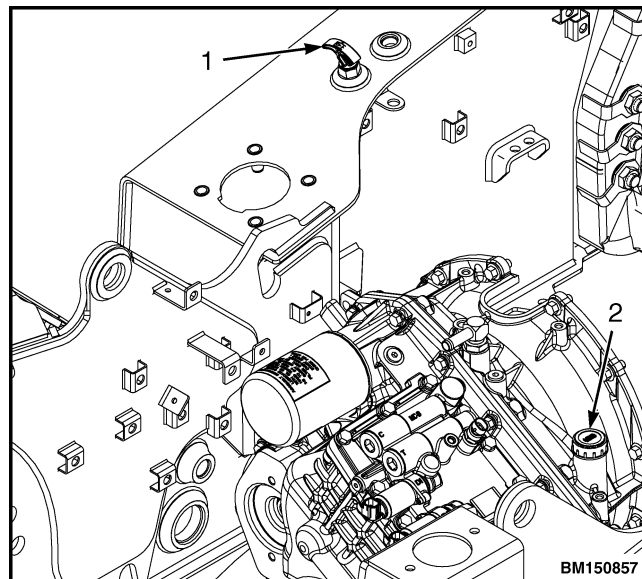
CAUTION

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

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

1. If engine has been running, turn the engine off. Wait for one minute or longer prior to checking the oil level.

2. Drain transmission oil from the transmission. See Electronic Powershift transmission removal and replacement in **Drive Train** 0900SRM2301.
3. Add oil to the transmission at the dipstick tube, filling to the correct level as indicated on the dipstick. Use correct oil as shown in the Every 500 hours or Three Months periodic maintenance (PM) schedule. **DO NOT** overfill.



1. HYDRAULIC OIL DIPSTICK
2. TRANSMISSION OIL DIPSTICK

Figure 77. Transmission and hydraulic oil check

TRANSMISSION OIL LEVEL, HYDROSTATIC TRANSMISSION (HST)



WARNING

At operating temperature, the transmission oil is **HOT**. **DO NOT** permit the hot oil to touch the skin. Skin that comes in contact with hot oil may be burned.



CAUTION

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

1. Confirm engine is on a level surface.

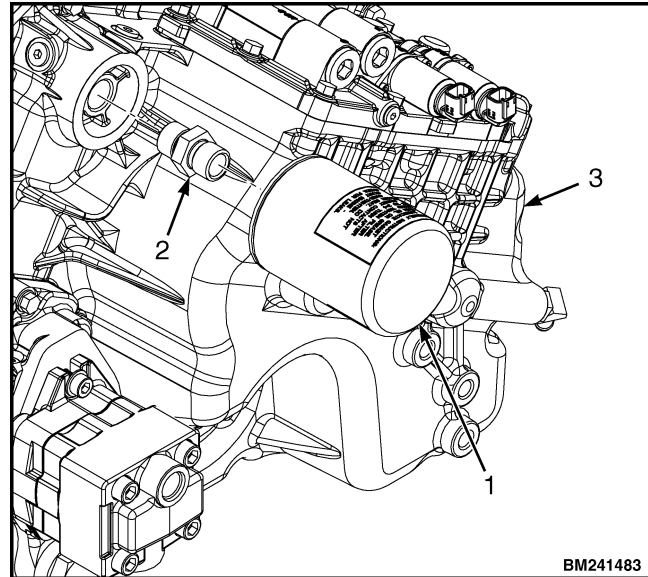
2. If engine has been running, turn the engine off. Wait for one minute or longer prior to checking the oil level.

NOTE: The hydrostatic transmission uses hydraulic fluid drawn from the hydraulic tank. There is not a separate process for draining and filling the HST. Drain and fill the hydraulic tank instead.

3. Remove all hydraulic oil from the hydraulic tank. See Every 4000 hours or Two Years periodic maintenance (PM) procedures for procedure.
4. Fill hydraulic tank with oil as specified in the Every 4000 hours or Two Years periodic maintenance (PM) schedule.
5. When correct oil level is reached, operate the system and check for leaks.

TRANSMISSION OIL FILTER (POWERSHIFT)

1. Locate the Powershift transmission oil filter. See Figure 78.
2. Turn the transmission oil filter counterclockwise to unthread and loosen. Remove the transmission oil filter.
3. Locate new transmission oil filter. See **Parts Manual** for correct part number.
4. Lubricate the transmission oil filter gasket with oil or grease.
5. Thread the new transmission oil filter clockwise to install onto the transmission.
6. Turn the filter until the gasket touches the housing. Then tighten 1/2 to 3/4 turn.

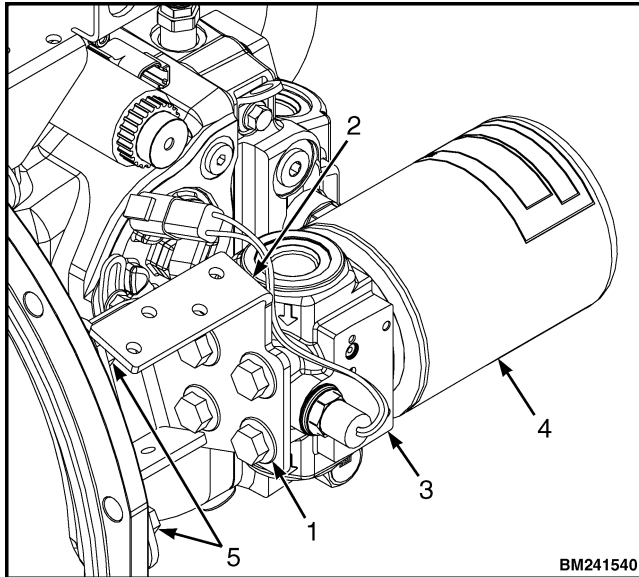


1. FILTER
2. FITTING
3. TRANSMISSION

Figure 78. Transmission oil filter

TRANSMISSION OIL FILTER (HST)

1. Locate the HST transmission oil filter. See Figure 79.
2. Turn the transmission oil filter counterclockwise to unthread and loosen. Remove the transmission oil filter.
3. Locate new transmission oil filter. See **Parts Manual** for correct part number.
4. Lubricate the transmission oil filter gasket with oil or grease.
5. Thread the new transmission oil filter clockwise to install onto the transmission.



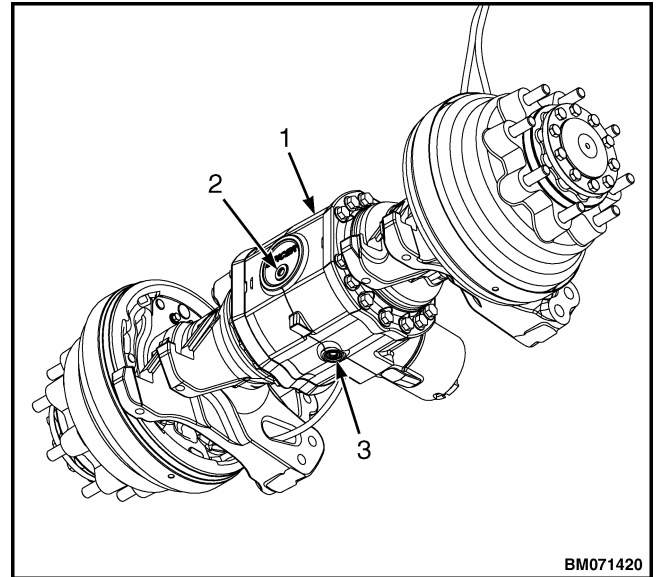
1. CAPSCREW
2. BRACKET
3. FILTER HEAD
4. TRANSMISSION FILTER
5. CAPSCREW

Figure 79. Transmission oil filter

DRY BRAKE AXLE DIFFERENTIAL AND DRIVE AXLE OIL

NOTE: The oil level must be between 0 to 10 mm (0 to 0.40 in.) below the bottom edge of fill hole.

1. Place a suitable container with a capacity of at least 3 liter (3.2 qt) below the drive axle drain plug.
2. Remove the drive axle drain plug. See Figure 80.
3. Drain all oil from the drive axle.
4. Install the drain plug. Torque to 35 to 50 N·m (25.8 to 36.9 lbf ft).
5. Add oil via the check/fill plug (item 2, Figure 80) in the amount indicated in the First 150 hours or Six weeks periodic maintenance (PM) schedule. Tighten to 35 to 50 N·m (25.8 to 36.9 lbf ft).



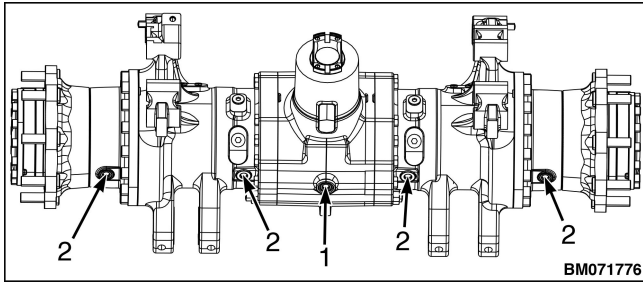
1. DRIVE AXLE
2. CHECK/FILL PLUG
3. DRAIN PLUG

Figure 80. Drive axle fluid drain and fill

WET BRAKE AXLE DIFFERENTIAL (CENTER SECTION) AND WHEEL END OIL

NOTE: For the wet brake drive axle, the oil drain and fill procedures for the drive axle differential (center section) and drive axle wheel ends may be performed in concert with each other. The steps below describe the procedure for draining and filling oil in both the center section (which occurs at initial 150 hours and again every 1,000 hours) and the wet brake axle wheel ends (occurs at initial 150 hours and again every 2,000 hours, in alignment with transmission oil and filter service). If the center section oil has already been drained as part of the 1,000 hour scheduled maintenance, skip to Step 8.

1. Place a suitable container with a capacity of at least 9 liter (9.5 qt) below the drive axle drain plugs.
2. Remove the drain plug from the center section of the drive axle (item 1, Figure 81).



1. CENTER SECTION DRAIN PLUG
2. WHEEL END DRAIN PLUG

Figure 81. Drive axle drain ports

3. Drain all oil from the center section.
4. Place the removed plug back into the port on the center section of the drive axle. Torque to 35 to 50 N•m (25.8 to 36.9 lbf ft).
5. Locate the center section check/fill port (item 2, Figure 82).
6. Remove the plug in the center section check/fill port, and use this port to fill the center section with 80W-90 oil in the amount indicated in the First 150 hours or Six weeks periodic maintenance (PM) schedule.
7. Install the plug back in the check/fill port and tighten the plug. Torque to 35 to 50 N•m (25.8 to 36.9 lbf ft).
8. Remove the wheel end drain plugs from the drive axle (item 2, Figure 81).
 - Drain all oil.
 - Reinstall plugs and tighten. Torque to 35 to 50 N•m (25.8 to 36.9 lbf ft).
9. Fill the wheel ends of the drive axle with transmission oil by performing one of the following procedures:

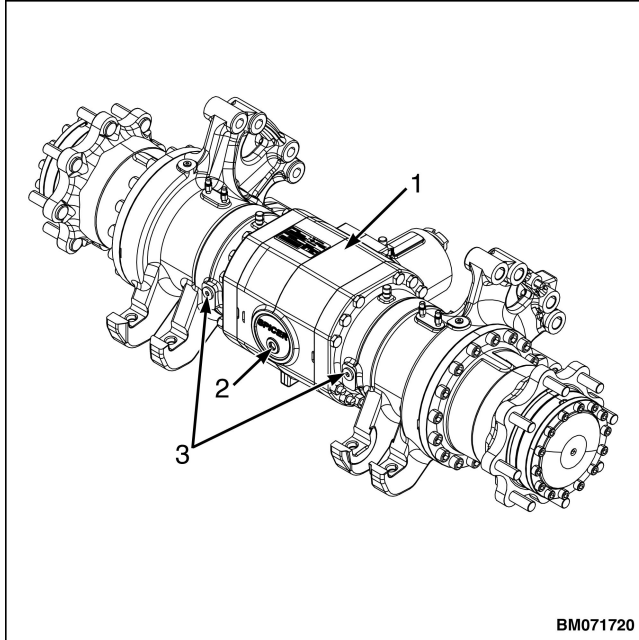
Fill transmission

- a. Confirm the truck is off and transmission oil fill lines are connected to the drive axle and all plugs are in place.
- b. Add oil to the transmission.
 - For Powershift transmission, see Transmission oil level (Powershift).
 - For Hydrostatic transmission, see Transmission oil level, Hydrostatic transmission (HST).

- c. Start the truck and allow the transmission oil to cycle through the system and fill the drive axle.
- d. Turn the truck off and wait one minute or longer for transmission oil to cool.
- e. Check transmission oil level again. If oil level is low, repeat Item a. through Item e. until oil level on dipstick reads FULL.

Fill drive axle and transmission

- a. Confirm the truck is off and transmission oil fill lines are connected to the drive axle and all plugs are in place.
 - b. Remove the two plugs that cover the wheel end oil check/fill ports. There is one located on each side of the drive axle center section. See item 3, Figure 82.
 - c. Fill each port with about 1.5 liter (50 oz) of transmission oil (each wheel end holds roughly 2 liter (68 oz) of oil).
 - d. Install the plugs back in the wheel end oil check/fill ports and tighten each plug. Torque to 35 to 50 N•m (25.8 to 36.9 lbf ft).
 - e. To fill the remainder of the drive axle, add oil to the transmission.
 - For Powershift transmission, see Transmission oil level (Powershift).
 - For Hydrostatic transmission, see Transmission oil level, Hydrostatic transmission (HST).
 - f. Start the truck and allow the transmission oil to cycle through the system and fill the drive axle.
 - g. Turn the truck off and wait one minute or longer for transmission oil to cool.
 - h. Check transmission oil level again. If oil level is low, repeat Item e. through Item h. until oil level on dipstick reads FULL.
- 10. Loosen the wheel end check/fill plugs. Oil should leak at threads.**
- If oil is present at the threads, tighten plugs.
 - If no oil escapes from threads, check for restriction or obstruction.

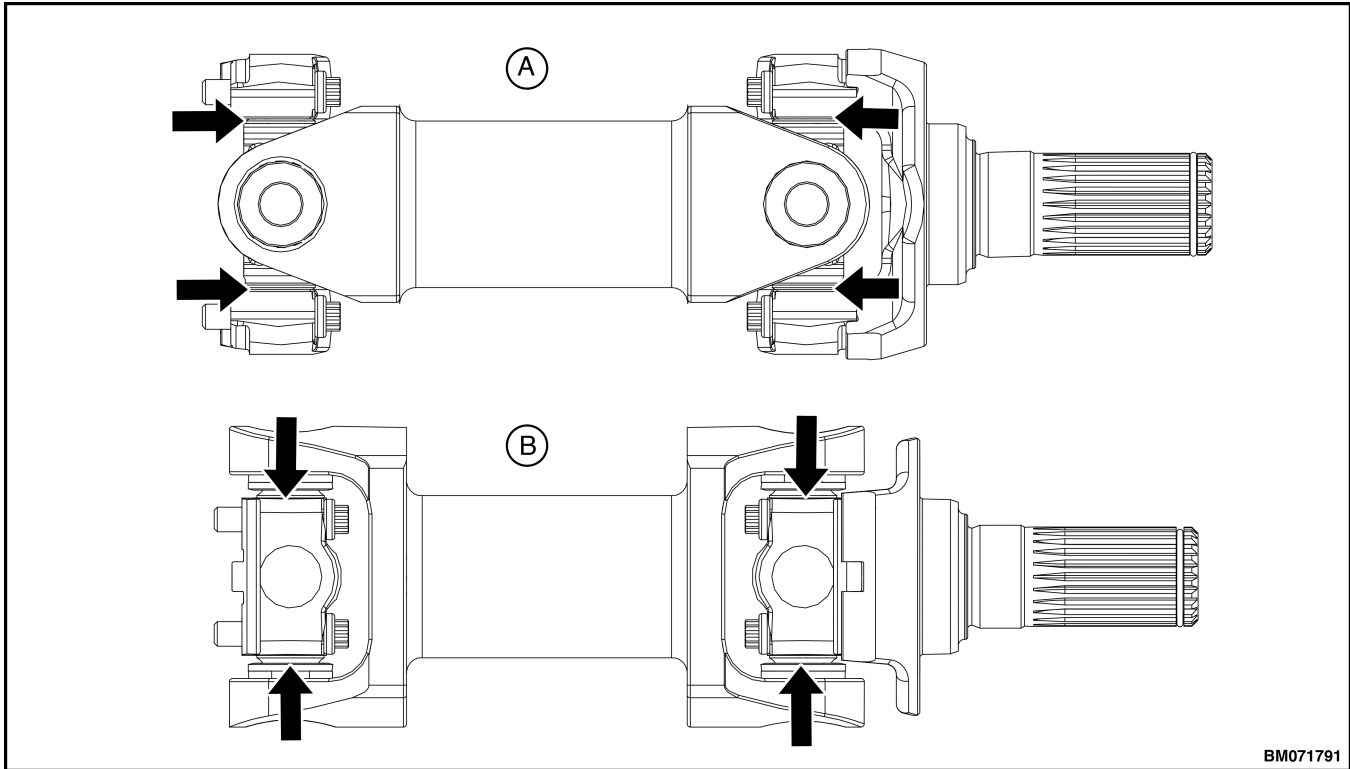


1. WET BRAKE DRIVE AXLE
2. CENTER SECTION CHECK/FILL PLUG
3. WHEEL END OIL CHECK/FILL PLUG

Figure 82. Wet Brake Axle Fluid Fill

DRIVE SHAFT INSPECTION

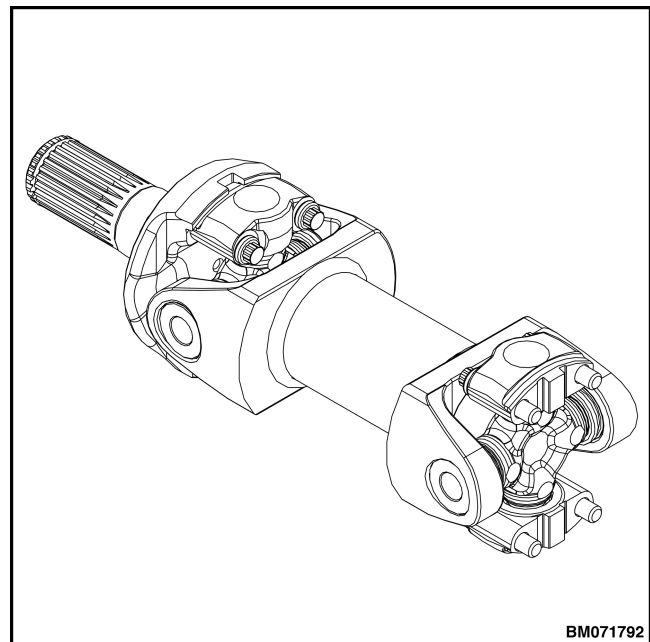
1. Park the truck on a level surface and turn the truck off.
2. Place blocks under the frame of the truck. See How to put a lift truck on blocks.
3. Release the park brake.
 - If your truck features a dry brake axle, pull the park brake lever to release.
 - If your truck features a wet brake axle, use the SAHR pump to bleed hydraulic fluid from the brakes, then release the park brake.
4. Locate the eight connection points on the drive shaft. See Figure 83.



BM071791

Figure 83. Drive shaft connection points

5. Inspect connection points:
 - Look for grease escaping. See Figure 84.
 - Look for rust colored dust or residue. See Figure 85.



BM071792

Figure 84. Grease leaking

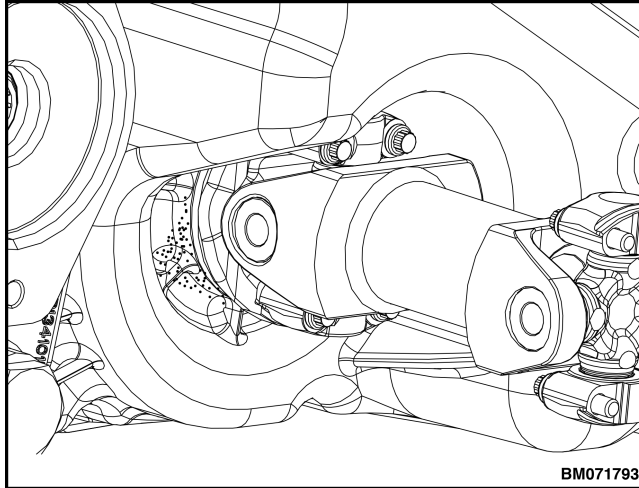
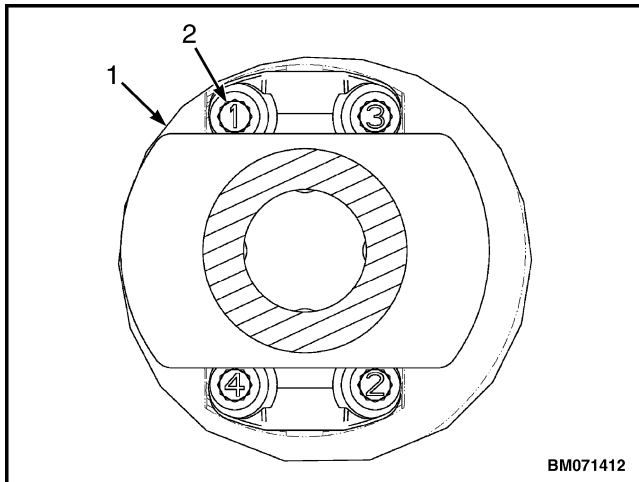


Figure 85. Dust residue

6. Tighten the drive shaft in the following sequence. See Figure 86. Torque capscrews to 32 to 36 N·m (23.6 to 26.6 lbf ft).

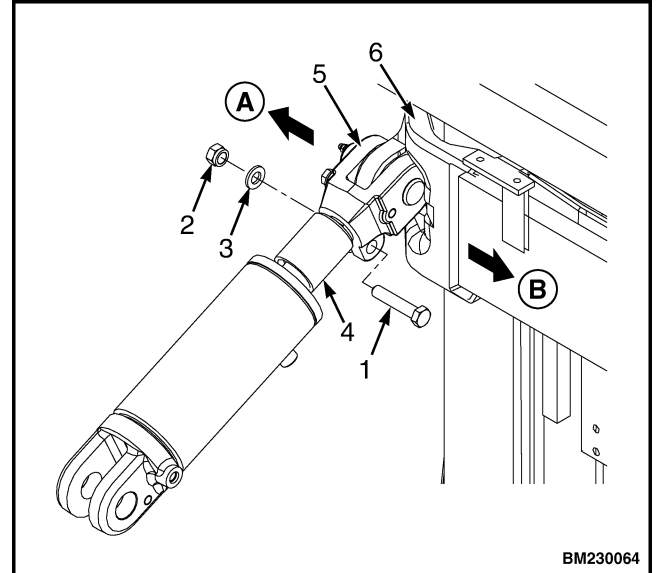


1. DRIVE SHAFT
2. CAPSCREW

Figure 86. Drive shaft torque sequence

TILT CYLINDER MOUNTING HARDWARE INSPECTION

1. Locate the capscrew (item 1, Figure 87) that secures the rod end of the tilt cylinder to the end mount (item 5).



- A. OUTBOARD SIDE
- B. INBOARD SIDE

1. CAPSCREW
2. NUT
3. WASHER
4. ROD END
5. MAST END MOUNT

Figure 87. Tilt cylinder mounting

2. Check the torque on the capscrew to confirm it is 90 N·m (66 lbf ft). Tighten if necessary.

EVERY 500 HOURS OR THREE MONTHS PERIODIC MAINTENANCE (PM) PROCEDURES 202001-111

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.

1. Turn the engine **OFF** and disconnect the negative and positive terminals of the battery.
2. Use a damp cloth to clean the case of the battery. If terminals are corroded, clean terminals with a wire brush. Connect the negative and positive cables to their respective terminals.
3. Connect the negative and positive cables to their respective terminals.

YANMAR LPG AND BI-FUEL ENGINE OIL AND OIL FILTER

**WARNING**

Engine lubricating oil may be hot and can cause burns. Use caution while working with hot engine oil. Failure to comply could result in death or serious injury.

Always wear eye protection when working with engine oil. Failure to comply could result in serious injury.

NOTE: Only use the engine oil specified. Other oils may affect warranty coverage, cause internal engine components to seize and/or shorten engine life.

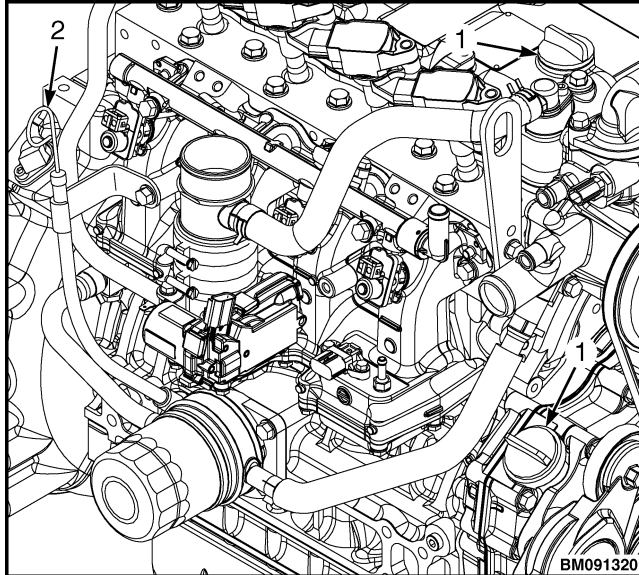
Prevent dirt and debris from contaminating the engine lubricating oil. Carefully clean the exterior of the oil cap and the surrounding area before removing the cap/dipstick assembly.

Do not mix different types of engine lubricating oil. This may negatively affect the lubricating properties of the engine lubricating oil.

Do not overfill. Overfilling may result in white exhaust smoke, engine overspeed or internal damage.

1. Make sure the engine is level.
2. Start the engine and bring it up to operating temperature.

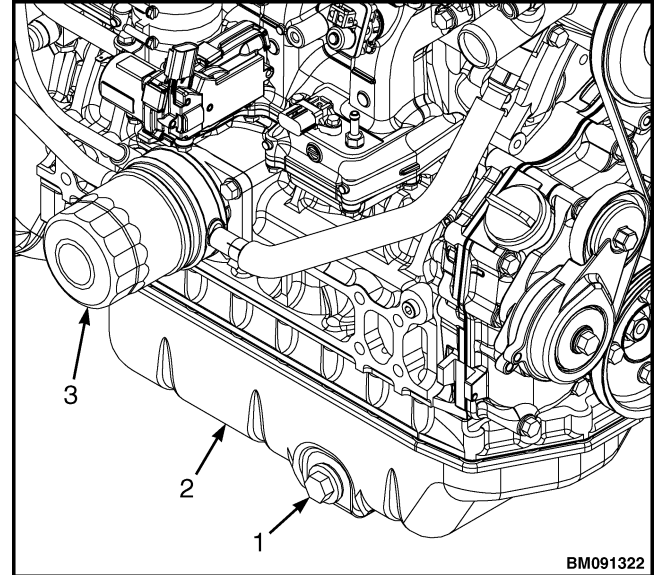
3. Turn the engine **OFF**.
4. Loosen the oil fill cap to vent the engine crankcase and allow the engine lubricating oil to drain more easily. See Figure 88.
5. Place a container with a capacity greater than 7.4 liter (7.8 qt) under the oil pan.
6. Remove the drain plug on the oil pan to drain the engine lubricating oil into the container. See Figure 89.
7. After all engine lubricating oil has been drained from the engine, reinstall the drain plug back into the oil pan. Torque to 53.9 to 63.7 N•m (39.8 to 47.0 lbf ft).
8. Use a filter wrench and turn the engine lubricating oil filter counterclockwise to remove. Discard the engine lubricating oil filter. See Figure 89.
9. Apply clean oil to the gasket of the new filter. Insert the new filter.
10. Turn the filter by hand until the gasket contacts the mounting surface. See Figure 89. Then use the filter wrench to tighten. Torque to 19.6 to 23.5 N•m (14 to 17 lbf ft).
11. Fill with engine oil as specified in the Every 500 hours or Three Months periodic maintenance (PM) schedule, until full mark is reached on the dipstick. See Figure 88.



1. ENGINE OIL FILL CAPS
2. ENGINE OIL DIPSTICK

Figure 88. Yanmar 2.2L LPG and Bi-Fuel Engine oil fill

12. Start the engine.
13. Run the engine until the engine oil reaches operating temperature.
14. Inspect the area around the oil filter for leaks. Shut the engine off and check the oil dipstick again. Add more engine oil if necessary.
15. Reinstall the oil fill cap. If any engine lubricating oil is spilled, clean it with a clean cloth.



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

Figure 89. Yanmar 2.2L LPG and Bi-Fuel Engine oil change

YANMAR DIESEL ENGINE OIL AND OIL FILTER



WARNING

Engine lubricating oil may be hot and can cause burns. Use caution while working with hot engine oil. Failure to comply could result in death or serious injury.



WARNING

Always wear eye protection when working with engine oil. Failure to comply could result in serious injury.

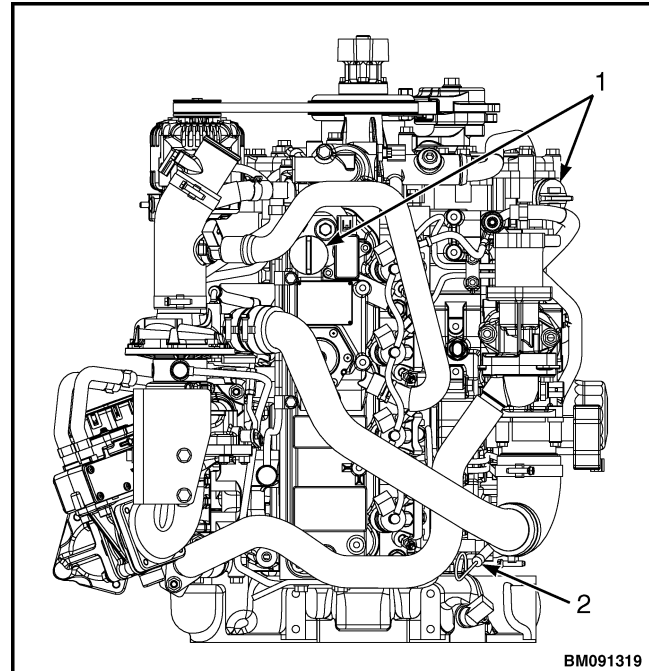
NOTE: Only use the engine oil specified. Other oils may affect warranty coverage, cause internal engine components to seize and/or shorten engine life.

Prevent dirt and debris from contaminating the engine lubricating oil. Carefully clean the exterior of the oil cap and the surrounding area before removing the cap/dipstick assembly.

Do not mix different types of engine lubricating oil. This may negatively affect the lubricating properties of the engine lubricating oil.

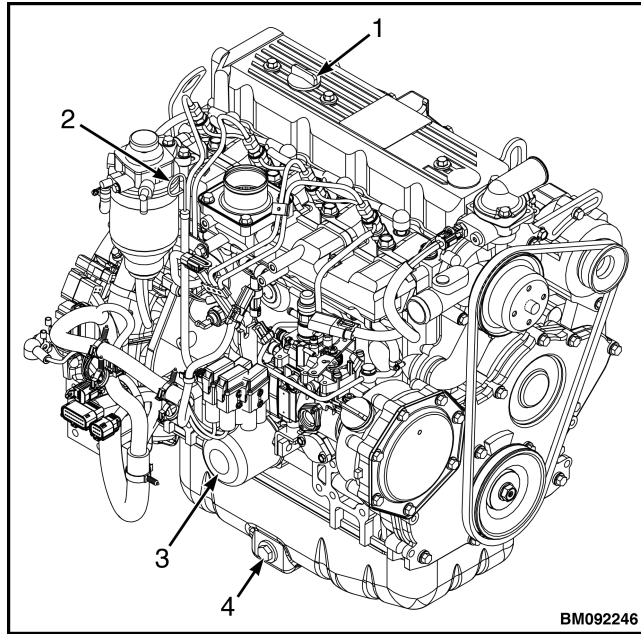
Do not overfill. Overfilling may result in white exhaust smoke, engine overspeed or internal damage.

1. Make sure the engine is level.
2. Start the engine and bring it up to operating temperature.
3. Turn the engine **OFF**.
4. Loosen the oil fill cap to vent the engine crankcase and allow the engine lubricating oil to drain more easily.
5. Place a container with a capacity greater than 7.4 liter (7.8 qt) under the oil pan.
6. Remove the drain plug on the oil pan to drain the engine lubricating oil into the container.
7. After all engine lubricating oil has been drained from the engine, reinstall the drain plug back into the oil pan. Torque to 53.9 to 63.7 N·m (39.8 to 47.0 lbf ft).
8. Use a filter wrench and turn the engine lubricating oil filter counterclockwise to remove. Discard the engine lubricating oil filter.
9. Apply clean oil to the gasket of the new filter. Insert the new filter.
10. Turn the filter by hand until the gasket contacts the mounting surface. Then use the filter wrench to tighten. Torque to 19.6 to 23.5 N·m (14 to 17 lbf ft).
11. Fill with engine oil as specified in the First 150 hours or Six weeks periodic maintenance (PM) schedule, until full mark is reached on the dipstick. See Figure 90 or Figure 91.



1. ENGINE OIL FILL CAP
2. ENGINE OIL DIPSTICK

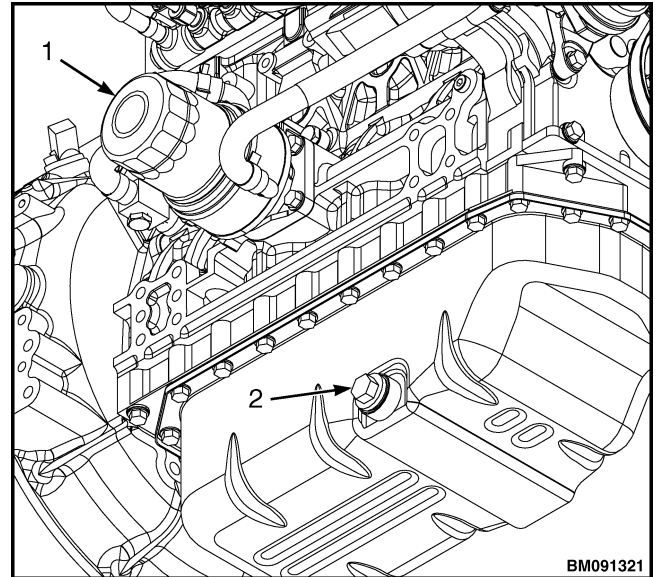
Figure 90. Engine oil fill (Yanmar 2.1L diesel engine)



1. ENGINE OIL FILL CAP
2. ENGINE OIL DIPSTICK
3. OIL FILTER
4. DRAIN PLUG

Figure 91. Engine oil fill (Yanmar 3.0L or 3.3L diesel engine)

12. Start the engine.
13. Run the engine until the engine oil reaches operating temperature.
14. Inspect the area around the oil filter for leaks. Shut the engine off and check the oil dipstick again. Add more engine oil if necessary.
15. Reinstall the oil fill cap. If any engine lubricating oil is spilled, clean it with a clean cloth.



1. OIL FILTER
2. DRAIN PLUG

Figure 92. Engine oil change (Yanmar 2.1L diesel)

CLEAN DEBRIS FROM RADIATOR CORE AND OIL COOLER

1. Turn the engine **OFF**.
2. Check the radiator core for debris and remove any material causing the radiator core to be plugged or restricted.



CAUTION

DO NOT use pressurized water, wire brush, or compressed air greater than 193 kPa (28 psi) to clean the radiator fins. Radiator fins can be damaged easily.

3. Clean with compressed air, set to a maximum output of 193 kPa (28 psi). Blow any debris from the core, fan shroud, and oil cooler.

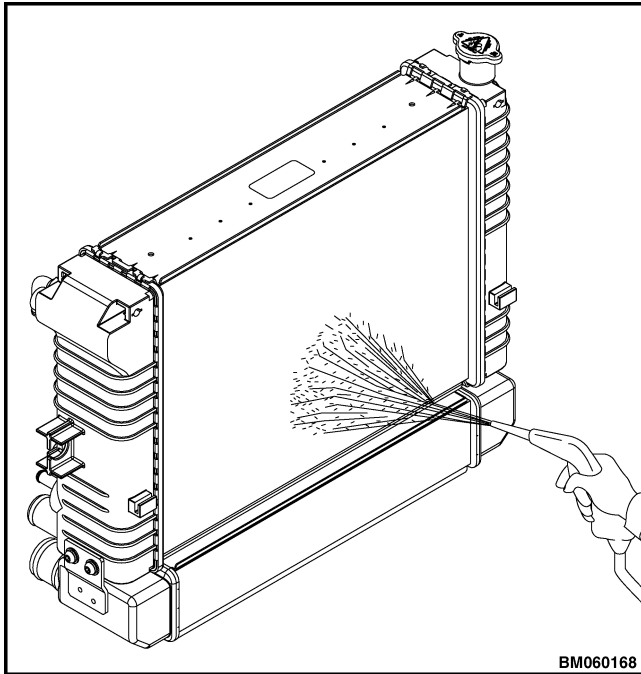
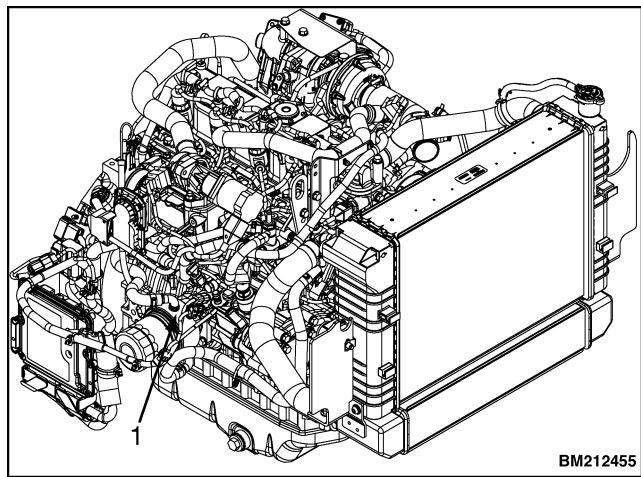


Figure 93. Clean radiator



1. OIL COOLER

Figure 94. Clean oil cooler

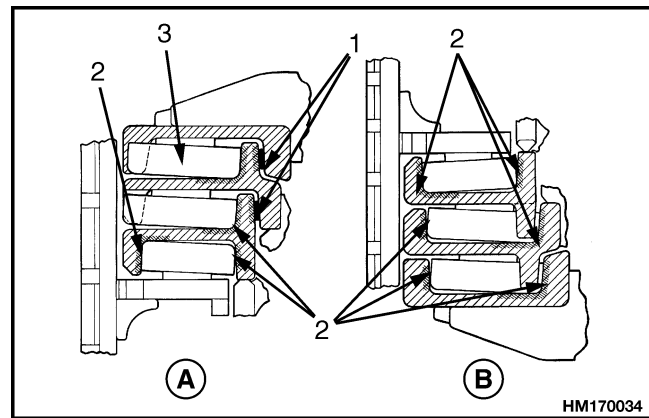
MAST LUBRICATION

WARNING

When working on or near the mast, see **Safety Procedures When Working Near Mast in Front End 4000SRM2303**.

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

1. Lubricate all sliding surfaces and load roller surfaces along the full length of the channels as shown in Figure 95.

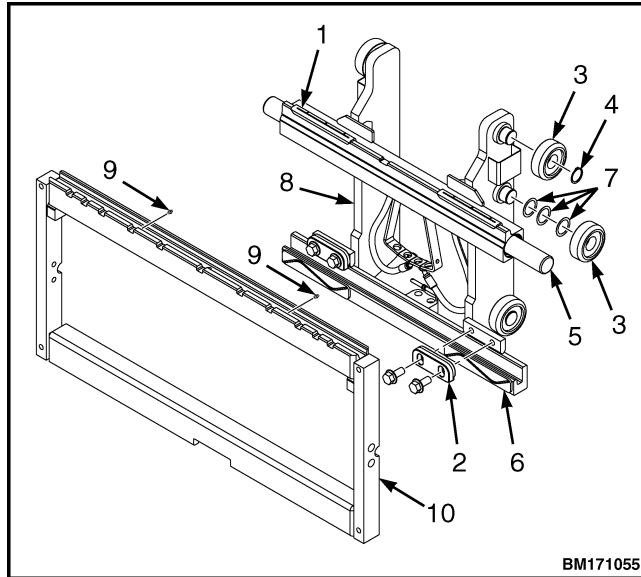


- A. UPPER LOAD ROLLERS
- B. LOWER LOAD ROLLERS

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

Figure 95. Mast Lubrication

2. If a sideshift carriage is installed, lubricate sliding surfaces at grease fittings with multipurpose grease shown in the Every 500 hours or Three Months periodic maintenance (PM) schedule. See Figure 96.



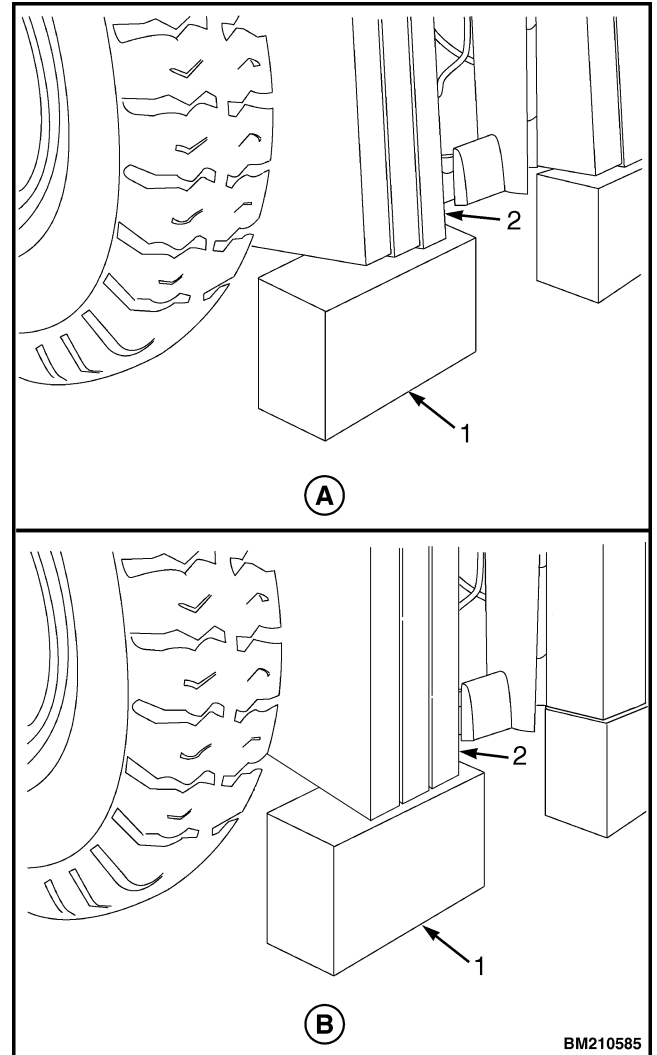
1. UPPER BEARINGS
2. LOWER HOOKS
3. LOAD ROLLER
4. SNAP RING
5. SIDESHIFT CYLINDER
6. LOWER BEARINGS
7. SHIMS
8. INNER CARRIAGE
9. LUBE FITTINGS
10. OUTER FRAME

Figure 96. Sideshift Carriage

MAST PIVOT PINS AND BUSHINGS

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

1. Raise carriage about 61 cm (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 97.
2. Tilt mast fully forward. See Figure 97.

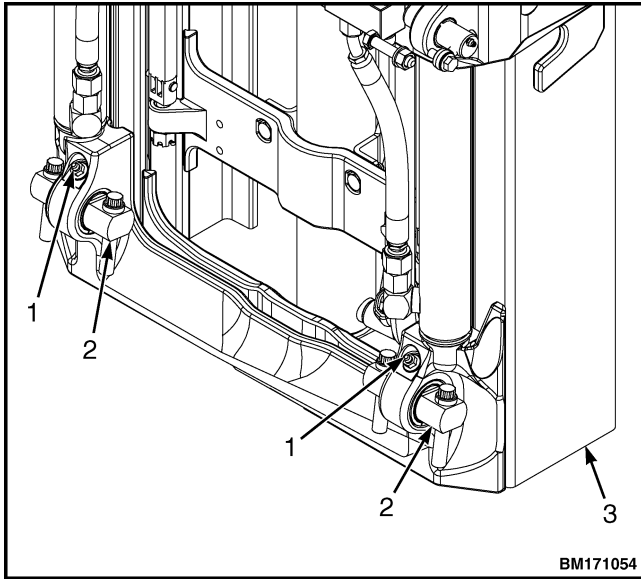


- A. MAST TILTED FULLY BACK
- B. MAST TILTED FORWARD

1. BLOCK
2. MAST

Figure 97. Blocking the Mast

3. Lubricate mast pivot bushings at lubrication fittings on outer mast. See Figure 98. Use multipurpose grease as shown in the Every 500 hours or Three Months periodic maintenance (PM) schedule.



- | | |
|------------------------|---------------|
| 1. LUBRICATION FITTING | 3. OUTER MAST |
| 2. MAST PIVOT BUSHING | |

Figure 98. Pivot pin lubrication

1. Adjust the stroke of the tilt cylinders **WITHOUT** tilt limit spacers as follows:
 - a. Adjust rod ends to 15 mm (0.6 in.) - this can be seen as Dimension 'A' on Figure 99. Measure to the wrench flat, not the rod chamfer.
 - b. Slowly tilt mast backward until one cylinder rod stops.
 - c. On the opposite cylinder, loosen capscrews on rod end.
 - d. Measure the distance from the end of the cylinder to the back end of the rod end. Use a wrench and turn the cylinder rod **IN** until the dimension starts to decrease, then stop.
 - e. Repeat this procedure until both cylinder rods stop at the same position within 0.5 mm (0.02 in.).
 - f. After adjustments are complete, tighten nuts on rod ends to 100 N•m (74 lbf ft).
 - g. Tilt the mast fully backward and measure the tilt angle. See the nameplate for tilt angles. If necessary, adjust both rod ends equally for the correct angle.

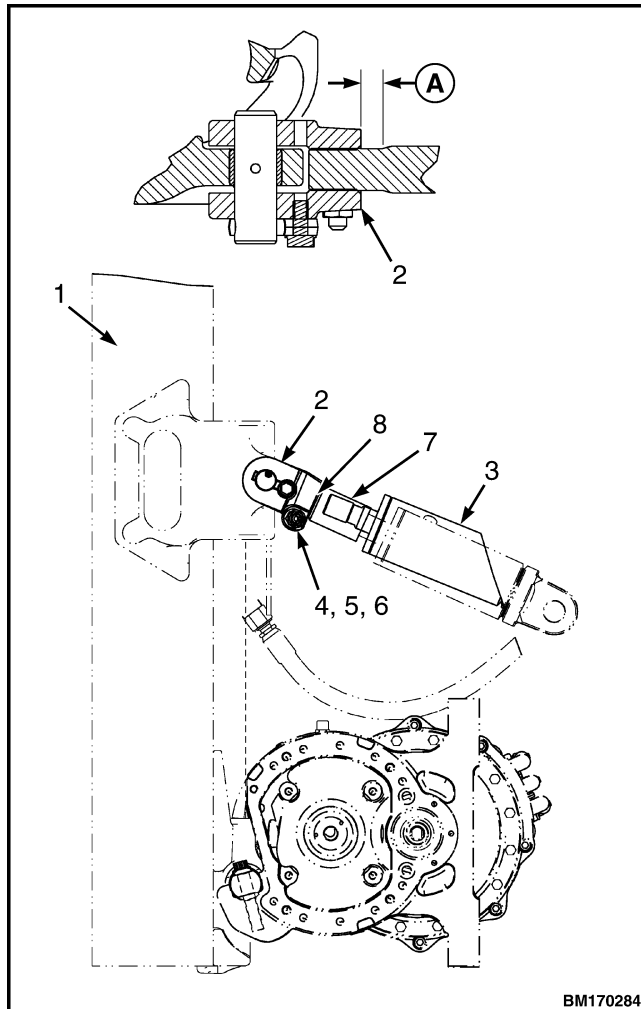
4. Tilt mast fully back. Remove blocks from under the channels.

TILT CYLINDER ADJUSTMENTS

WARNING

When the tilt cylinders have tilt limit spacers, make sure they are installed during installation procedures. Without the tilt limit spacers, the mast can tilt too much and cause an accident or serious injury. Additionally, proper adjustment to the tilt rod ends needs to be checked and torqued correctly. When the tilt rod ends are not torqued to correct specification, this can lead to racking which is a safety issue regarding the mast.

Check tilt cylinder stroke by slowly tilting mast fully forward and backward several times. Both tilt cylinders must stop their stroke at the same time. Adjust rod ends as shown in illustrations below. There must be no twist in mast weldments.



NOTE: DIMENSION A CANNOT EXCEED 20 mm (0.79 in.).

A. DIMENSION A = 15 mm (0.6 in.)

- | | |
|------------------|----------------------|
| 1. MAST | 4. WASHER |
| 2. ROD END | 5. CAPSCREW |
| 3. TILT CYLINDER | 6. NUT |
| | 7. TILT LIMIT SPACER |
| | 8. SHIMS |

Figure 99. Tilt Cylinder Adjustments

2. Adjust the stroke of the tilt cylinders **WITH** tilt limit spacers as follows:
 - a. Adjust rod ends to 15 mm (0.6 in.) - this can be seen as Dimension 'A' on Figure 99. Measure to the wrench flat, not the rod chamfer.
 - b. Slowly tilt mast forward until one cylinder rod stops.

- c. On the opposite cylinder, loosen capscrews on rod end.
- d. Use a wrench and turn the cylinder rod **IN** as necessary.
- e. Repeat this procedure until both cylinder rods stop at the same position within 0.5 mm (0.02 in.).
- f. Slowly tilt mast backward until one rod end just contacts the spacer.
- g. Add shims to fill the gap at the opposite rod end until both rod ends contact the spacers within 0.5 mm (0.02 in.).
- h. After adjustments are complete, tighten nuts on rod ends to 100 N•m (74 lbf ft).
- i. Tilt mast fully backward and measure the tilt angle. See the nameplate for tilt angles. If necessary, add an equal number of shims to both rods for the correct angle.

NOTE: Dimension A cannot exceed 20 mm (0.79 in.).

HEADER HOSE CHECKS

1. As per daily maintenance check, visually inspect:
 - Hoses, including header hoses, and fittings for hydraulic leaks.
 - Hose cover for cuts, cracks or exposed reinforcement.
 - Defective or broken clamping devices or sheaves.
 - Proper tracking during operation.
2. Check for kinked, crushed, flattened or twisted hoses; hard, stiff or charred hose; hose fitting slippage; proper hose tensioning.
 - Kinked, crushed, flattened, or twisted hoses.
 - Hard, stiff, or charred hoses.
 - Hose fitting slippage.
 - Proper hose tensioning.
3. Adjust, repair, or replace all hoses and components as necessary. See Header Hoses, 3-stage full free lift (FFL) (Electronic Powershift Transmission) in **Front End 4000SRM2303**.

LIFT CHAIN LUBRICATION

WARNING

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

WARNING

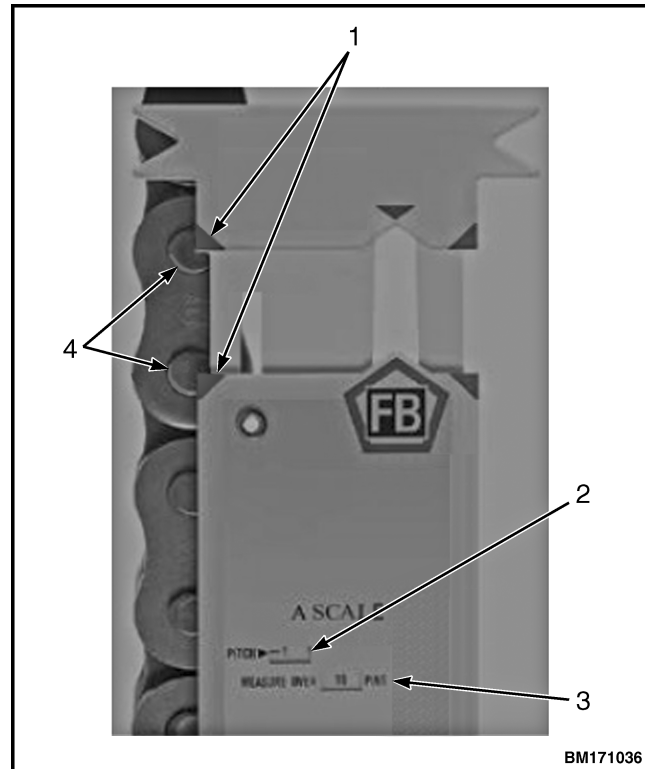
Cleaning solvents can be flammable and toxic and can cause skin irritation. When using cleaning solvents, always follow the recommendations of the manufacturer.

Compressed air can move particles so 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.

Remove the lift chains. Clean the lift chains by soaking them in a solvent that has a petroleum base for at least 30 minutes. Use compressed air, adjusted to a maximum output of 103 kph (15 psi), to completely dry the chains when they are clean.

Lubricate the lift chains by soaking them in 30W engine oil for at least 30 minutes. Remove the chains from the oil. Hang the chains for one hour so excess oil will drain from the chains.

1. 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.
 - a. Locate chain wear gauge (Hyster Part No. 4044579).
 - b. Before using the chain wear gauge, inspect the V-jaws on the top and bottom of the gauge (see items 1 and 2, Figure 101) to make sure they are not bent or damaged. Confirm the gauge is not warped or bent and slides easily. Close the gauge completely and confirm the calibration window reads "OK".
 - c. Use the chain wear gauge to identify the leaf chain pitch, by aligning the two arrows on the edge of the gauge with the two pin centers of one of the OUTER link plates. See Figure 100.



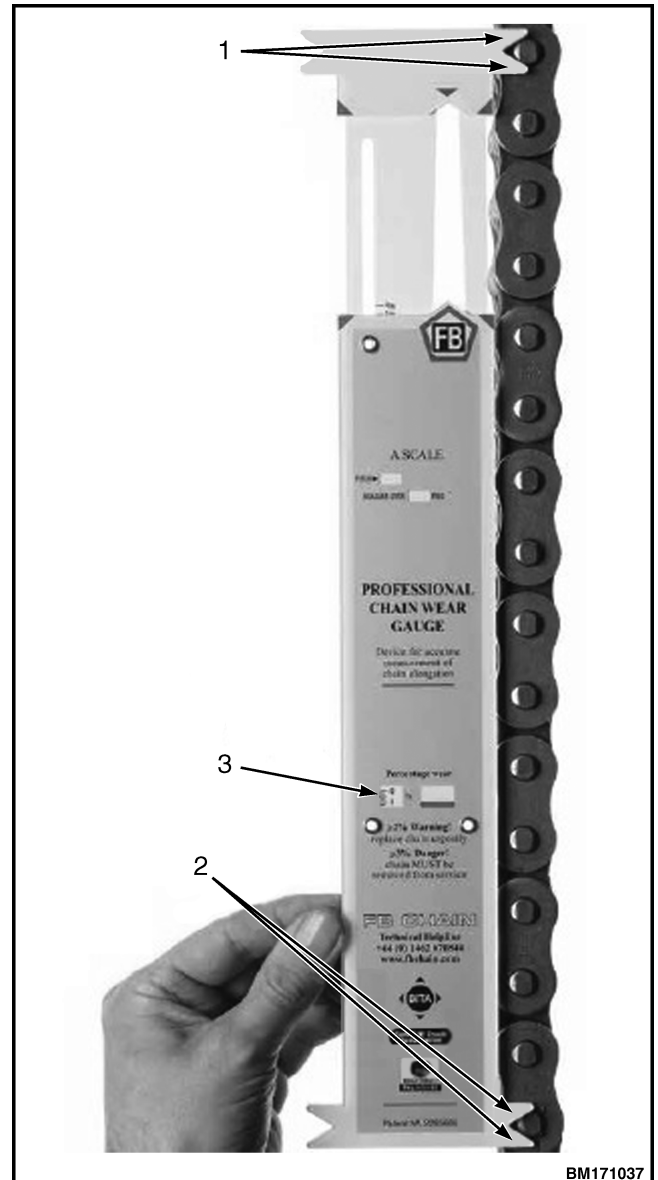
1. ARROWS
2. PITCH WINDOW
3. MEASURE OVER PINS WINDOW
4. PIN CENTER

Figure 100. Measure pitch

- d. The nominal pitch of the leaf chain will appear in the "Pitch" window on the chain wear gauge. See Figure 100.
- e. Select and use the correct side of the gauge relevant to the measured nominal pitch as follows:

A Scale	B Scale
3/8"	1 3/4"
1/2"	2"
5/8"	3/4"
1"	1 1/4"
1 1/2"	2 1/2"
3"	

- f. Once the pitch has been determined, the number of pins that the chain wear is to be measured over will display in the 'Measure over Pins' window. See Figure 100.
- g. Find a portion of the chain that passes over the chain sheave during the first portion of a lift. These links will show maximum wear. Choose three separate locations in this section to perform the measurement.
- h. Make sure the leaf chain is bearing a load and place the top 'V' jaw of the chain wear gauge over the first pin of the selected section. See Figure 101. Extend the slide until the bottom 'V' jaw locates over the selected bottom pin (as previously determined in Step f of this procedure). The percentage of wear will appear in the box in 0.25% ($\frac{1}{4}\%$) increments.



1. TOP V-JAW
2. BOTTOM V-JAW
3. PERCENTAGE OF WEAR

Figure 101. V-jaws



WARNING

Although the chain wear gauge will show wear up to 4%, any leaf chain used for lifting with a measured elongation of 3% or more is dangerous and must be replaced immediately.

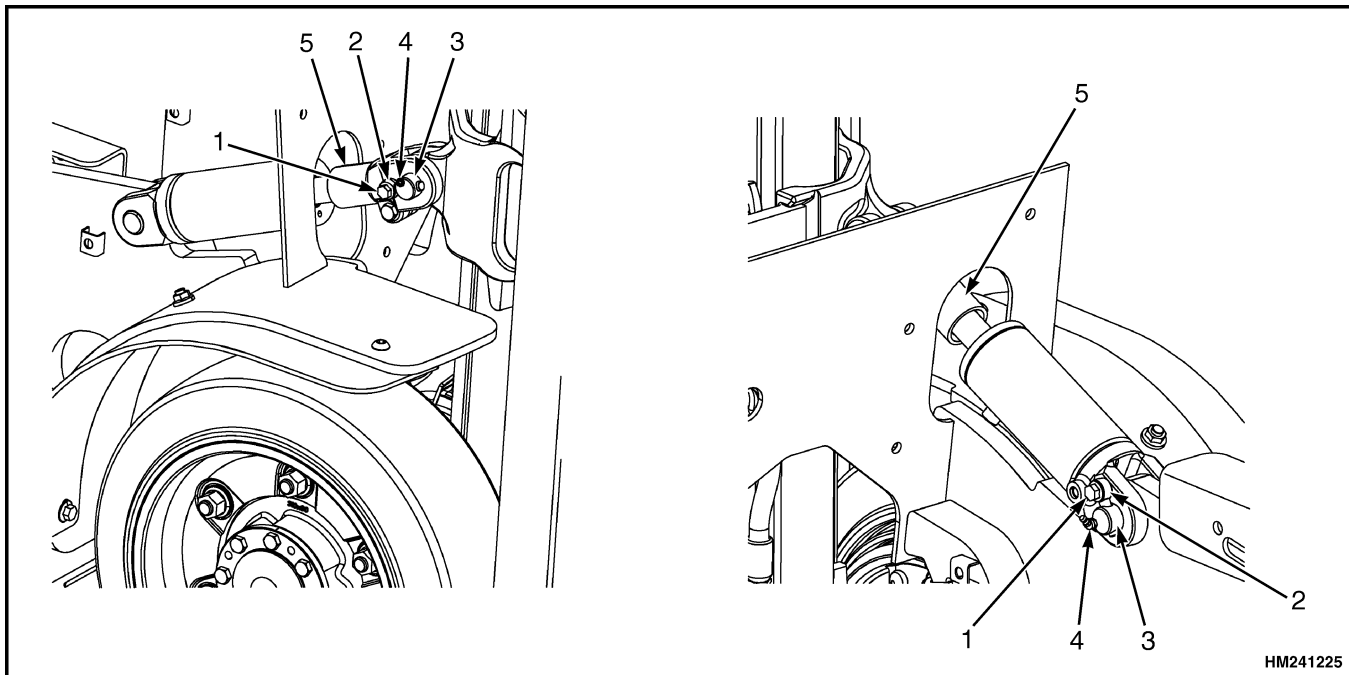
- i. If the chain wear gauge shows a 2% or greater elongation, the red indicator will completely fill the window. This is an indication that the chain requires replacing.

TILT CYLINDER LUBRICATION

NOTE: The floor plate must be removed in order to lubricate the rear tilt cylinder lubrication fittings.

- 1. Remove floor plate to gain access to the tilt cylinders. See Covers repair in **Front End** 4000SRM2303.

- 2. Lubricate the tilt cylinder ends. See Figure 102. Use multipurpose grease shown in Every 500 hours or Three Months periodic maintenance (PM) schedule.
- 3. Add lubrication to the four lubrication fittings. See Figure 102. Use multipurpose grease shown in Every 500 hours or Three Months periodic maintenance (PM) schedule.



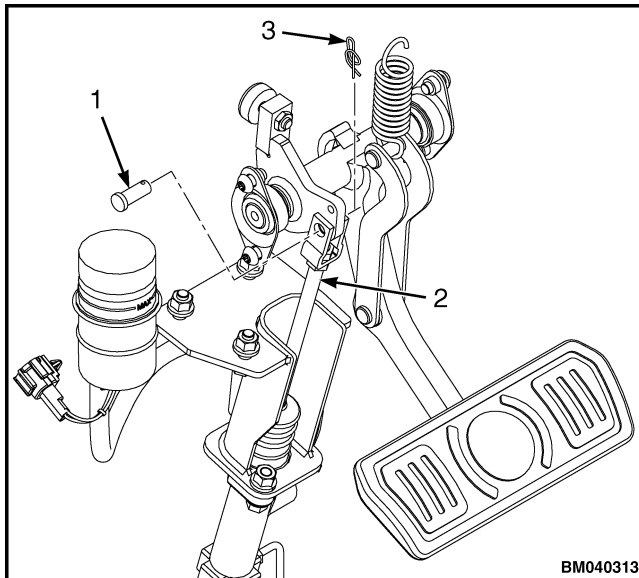
NOTE: HYDRAULIC HOSES ARE SHOWN DISCONNECTED FOR CLARITY.

- | | |
|---------------|------------------------|
| 1. CAPSCREW | 4. LUBRICATION FITTING |
| 2. RETAINER | 5. TILT SPACER |
| 3. ANCHOR PIN | |

Figure 102. Tilt cylinder lubrication

MASTER BRAKE CYLINDER ROD END PIN LUBRICATION

1. Lubricate the master brake cylinder rod end pin, using engine oil as shown in the Every 500 hours or Three Months periodic maintenance (PM) schedule. See Figure 103.



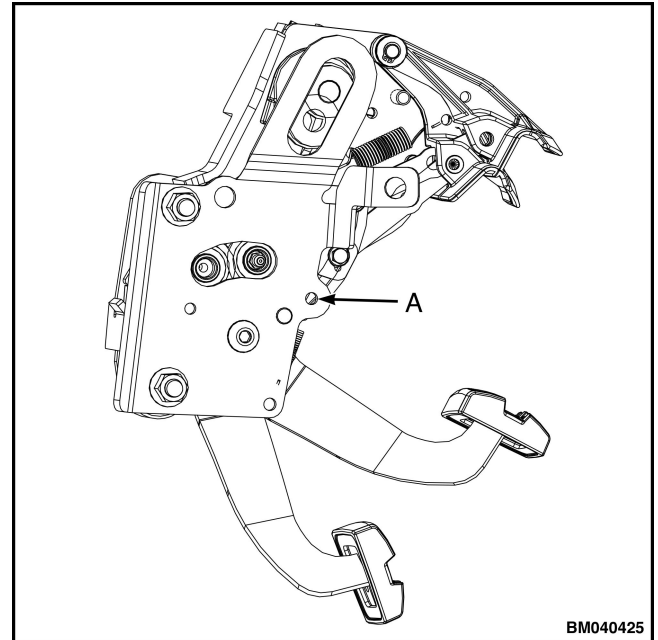
1. ROD END PIN
2. COTTER PIN (LOCKING)

Figure 103. Master brake cylinder rod end pin lubrication (dry brake)

MANUAL HYDRAULIC CONTROL LEVERS

Levers and linkage

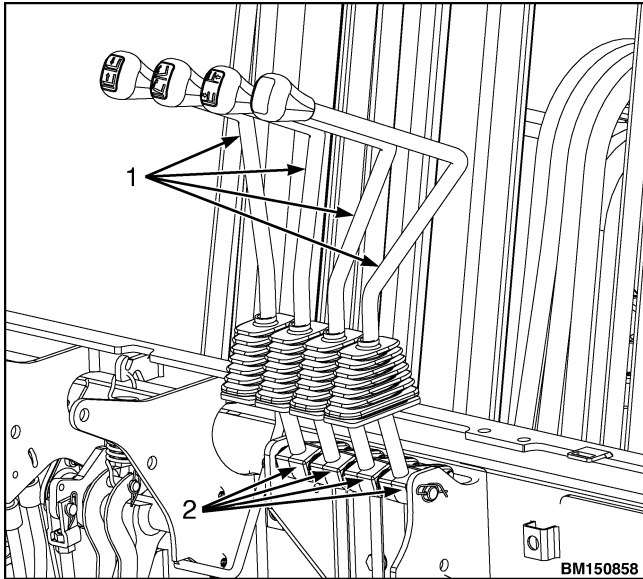
1. Lockout the park brake before removing the kick panel.



- A. LOCKOUT

Figure 104. Park brake lockout

2. Remove the dash panel and kick panel. See Covers repair in **Frame and Main Components** 8000SRM2306.
3. Locate the manual hydraulic levers. See Figure 105.



NOTE: 4 FUNCTION HYDRAULIC VALVE SHOWN. OTHER HYDRAULIC VALVES ARE SIMILAR.

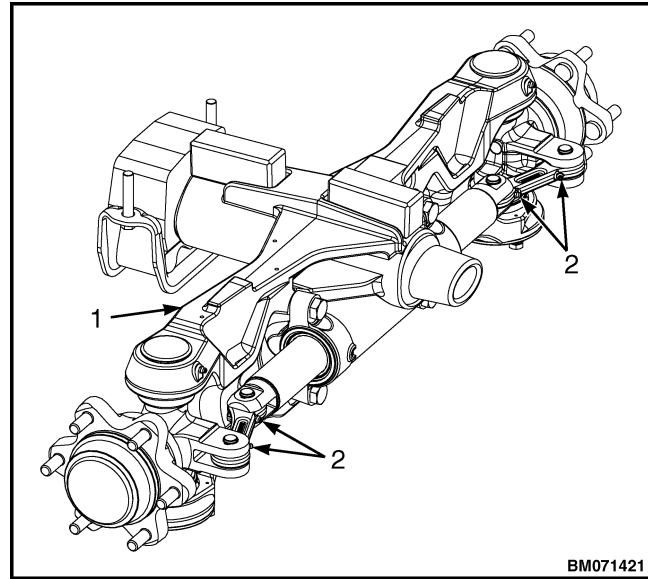
1. LEVERS
2. LINKAGE

Figure 105. Manual hydraulic levers and linkage

4. Use silicone spray lubricant (328388) and spray the entire surface of each control lever.
5. Locate the manual hydraulic levers. See Figure 105.
6. Use silicone spray lubricant (328388) and spray the linkage.

STEER AXLE TIE ROD LUBRICATION

1. Locate the four lubrication fittings (two on each tie rod). See Figure 106.
2. Apply multipurpose grease to the lubrication fittings. See Every 500 hours or Three Months periodic maintenance (PM) schedule for specification.



1. AXLE
2. LUBRICATION FITTING

Figure 106. Tie rod lubrication

PARK BRAKE

Make sure service brakes are adjusted and the operation of the automatic adjuster mechanism is correct before park brake is adjusted.

Lift trucks with a MONOTROL® pedal. The 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 park brake is applied.

NOTE: Make sure park brake is disengaged before making adjustment.

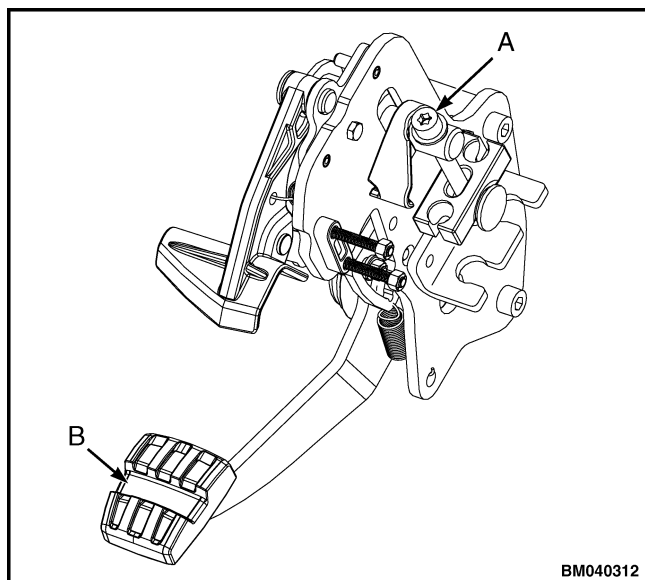
1. Confirm the truck is on a level surface, with the engine off and transmission in neutral.
2. Use a T-40 torx driver to adjust the park brake cable tension bolt (A, Figure 107) until a peak force applied to the pedal is required to fully engage the park brake pedal. See Table 12 for peak force.

NOTE: DO NOT HIT THE PEDAL OVERTRAVEL STOP WHEN TAKING THIS MEASUREMENT.

Table 12. Peak Pedal Force

Capacity	Peak Force
1.0T - 2.5T	247 - 257 N (55.5 - 57.8 lbf ft)
2.7T - 3.0T	301 - 311 N (67.7 - 70 lbf ft)
3.5T	348 - 365 N (78.2 - 82.1 lbf ft)

- Actuate the park brake a minimum of three additional times before verifying the final adjustment setting.
- Adjustment procedure will allow burnished brakes to hold the truck with rated load on 15% grade.



- A. CABLE TENSION ADJUSTMENT BOLT
B. PEDAL

Figure 107. Park brake adjustment

BRAKE PEDAL LINKAGE

- Remove the dash panel, kick panel, floormat and floor plate. See Covers repair in **Frame and Main Components** 8000SRM2306.
- Locate the brake pedal linkage. See Figure 108.

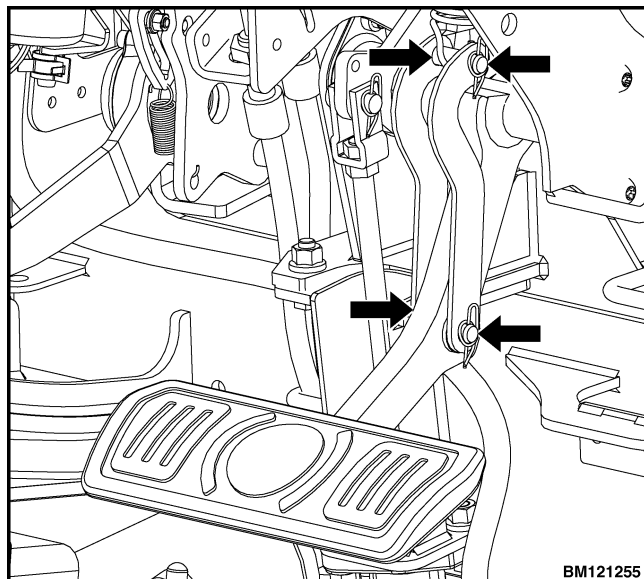
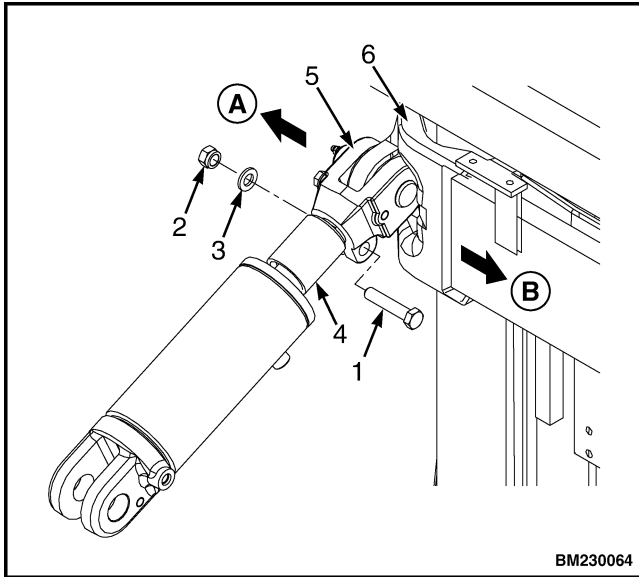


Figure 108. Brake pedal linkage

- Use silicone spray lubricant (328388) and spray all parts of the brake pedal linkage.

TILT CYLINDER MOUNTING HARDWARE INSPECTION

- Locate the capscrew (item 1, Figure 109) that secures the rod end of the tilt cylinder to the end mount (item 5).



- A. OUTBOARD SIDE
- B. INBOARD SIDE

- 1. CAPSCREW
- 2. NUT
- 3. WASHER
- 4. ROD END
- 5. MAST END MOUNT

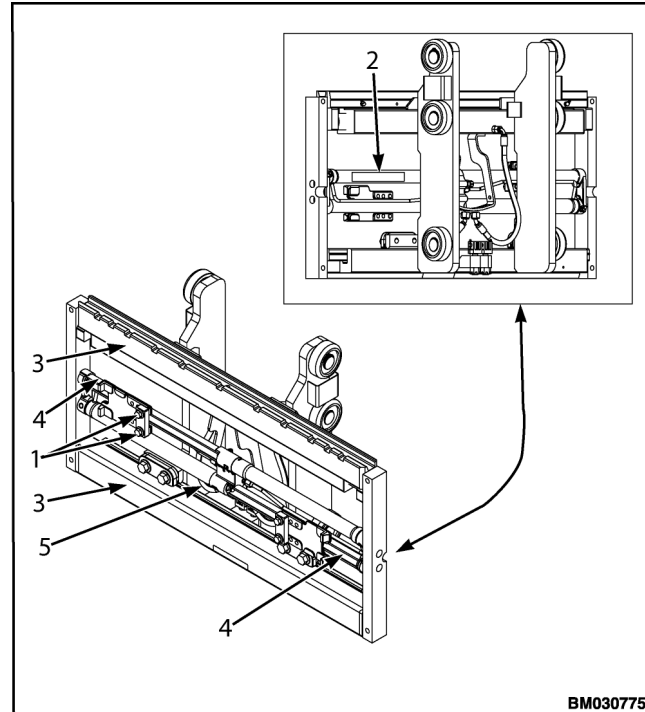
Figure 109. Tilt cylinder mounting

- 2. Check the torque on the cap screw to confirm it is 90 N·m (66 lbf ft). Tighten if necessary.

ISS FORK POSITIONER (BOLZONI OPTION) CHECKS

Reference Figure 110 below, while performing the following checks:

- Check for damage to the hydraulic hoses (item 5) and connections.
- Check the tightness of the fork locking screws (item 1).
- Check the presence and legibility of the identification plate (item 2).
- Apply grease or lubricant to fork positioner guide tubes (item 4). See Every 500 hours or Three Months periodic maintenance (PM) schedule for lubrication specifications.
- Apply grease to the fork sliding surfaces (item 3). See Every 500 hours or Three Months periodic maintenance (PM) schedule for lubrication specifications.



- 1. FORK LOCKING SCREWS
- 2. IDENTIFICATION PLATE
- 3. FORK SLIDING SURFACES
- 4. GUIDE TUBES
- 5. HYDRAULIC HOSE

Figure 110. Fork positioner checks

EVERY 1000 HOURS OR SIX MONTHS PERIODIC MAINTENANCE (PM) PROCEDURES 202001-112

YANMAR 2.2L LPG AND BI-FUEL ENGINE OIL AND OIL FILTER



WARNING

Engine lubricating oil may be hot and can cause burns. Use caution while working with hot engine oil. Failure to comply could result in death or serious injury.

Always wear eye protection when working with engine oil. Failure to comply could result in serious injury.

NOTE: Only use the engine oil specified. Other oils may affect warranty coverage, cause internal engine components to seize and/or shorten engine life.

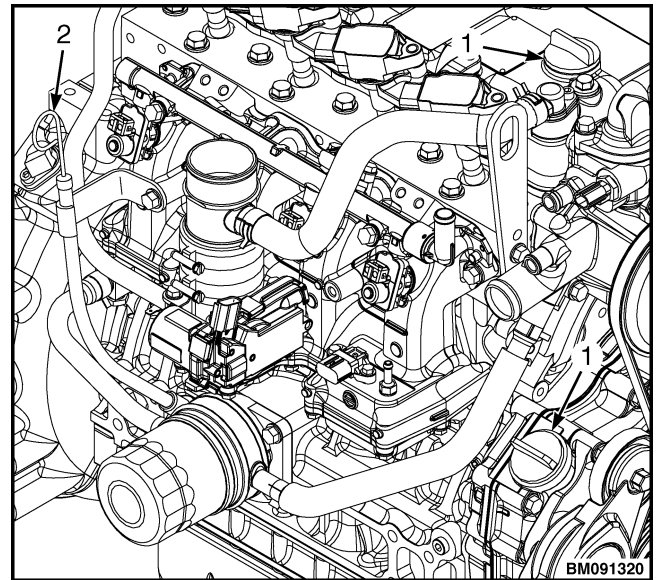
Prevent dirt and debris from contaminating the engine lubricating oil. Carefully clean the exterior of the oil cap and the surrounding area before removing the cap/dipstick assembly.

Do not mix different types of engine lubricating oil. This may negatively affect the lubricating properties of the engine lubricating oil.

Do not overfill. Overfilling may result in white exhaust smoke, engine overspeed or internal damage.

1. Make sure the engine is level.
2. Start the engine and bring it up to operating temperature.
3. Turn the engine **OFF**.
4. Loosen the oil fill cap to vent the engine crankcase and allow the engine lubricating oil to drain more easily. See Figure 111.
5. Place a container with a capacity greater than 7.4 liter (7.8 qt) under the oil pan.
6. Remove the drain plug on the oil pan to drain the engine lubricating oil into the container. See Figure 112.
7. After all engine lubricating oil has been drained from the engine, reinstall the drain plug back into the oil pan. Torque to 53.9 to 63.7 N·m (39.8 to 47.0 lbf ft).
8. Use a filter wrench and turn the engine lubricating oil filter counterclockwise to remove. Discard the engine lubricating oil filter. See Figure 112.
9. Apply clean oil to the gasket of the new filter. Insert the new filter.
10. Turn the filter by hand until the gasket contacts the mounting surface. See Figure 112. Then use the filter wrench to tighten. Torque to 19.6 to 23.5 N·m (14 to 17 lbf ft).

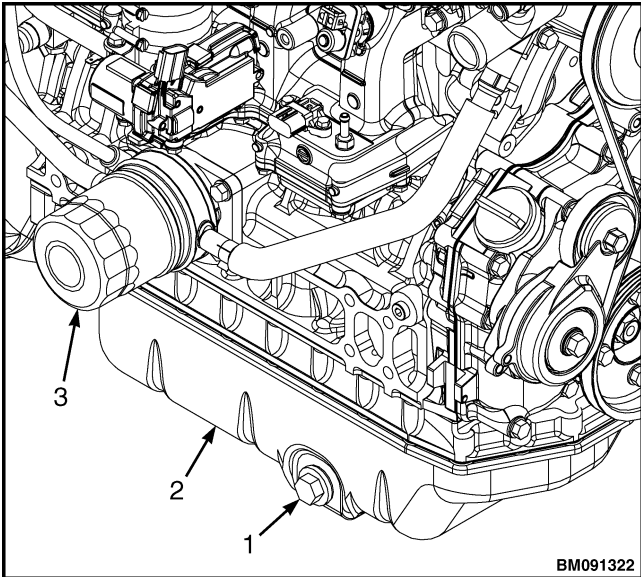
11. Fill with engine oil as specified in the Every 1000 hours or Six Months periodic maintenance (PM) schedule, until full mark is reached on the dipstick. See Figure 111.



1. ENGINE OIL FILL CAPS
2. ENGINE OIL DIPSTICK

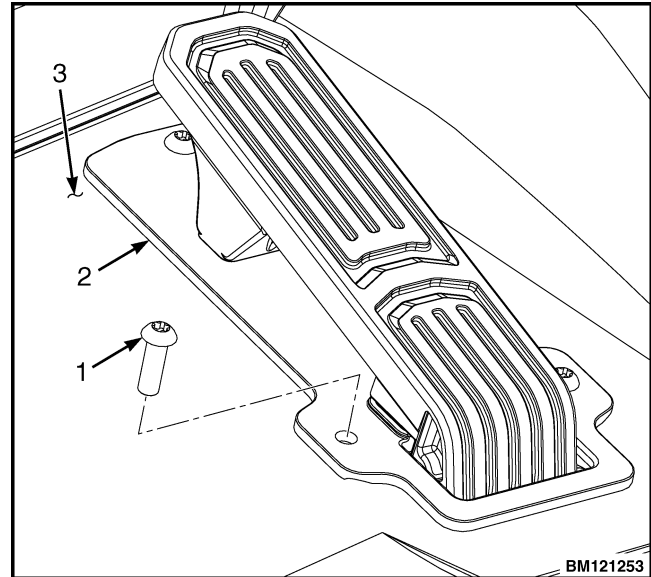
Figure 111. Yanmar LPG and Bi-Fuel Engine oil fill

12. Start the engine.
13. Run the engine until the engine oil reaches operating temperature.
14. Inspect the area around the oil filter for leaks. Shut the engine off and check the oil dipstick again. Add more engine oil if necessary.
15. Reinstall the oil fill cap. If any engine lubricating oil is spilled, clean it with a clean cloth.



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

Figure 112. Yanmar LPG and Bi-Fuel Engine oil change



1. CAPSCREW
2. ACCELERATOR PEDAL COVER PLATE
3. FLOORMAT

Figure 113. Accelerator pedal

PEDALS

1. Locate the accelerator pedal. Remove the three cap screws that retain the accelerator pedal cover. See Figure 113.

2. Use silicone spray lubricant (328388) and spray all parts of the accelerator pedal linkage. See Figure 114.

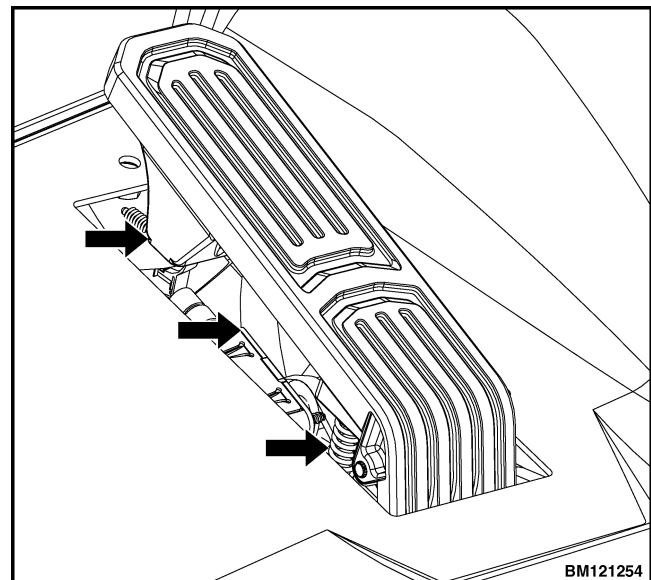


Figure 114. Accelerator pedal linkage

3. Remove the dash panel, kick panel, floormat and floor plate. See Covers repair in **Frame and Main Components 8000SRM2306**.

4. Locate the brake pedal linkage. See Figure 115.

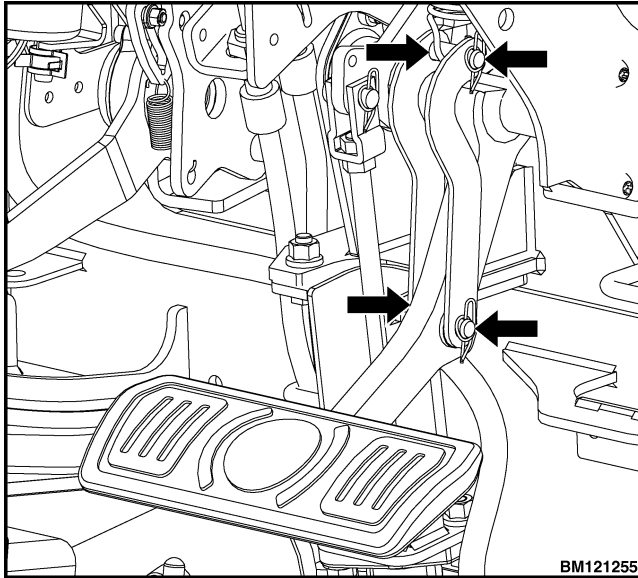


Figure 115. Brake pedal linkage

5. Use silicone spray lubricant (328388) and spray all parts of the brake pedal linkage.

HOOD

Hinges

1. Locate the hood hinges. See Figure 116.

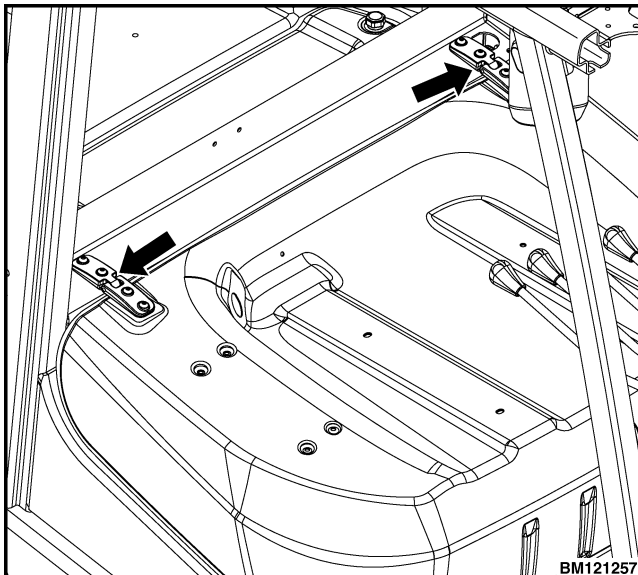


Figure 116. Hood hinges

2. Use silicone spray lubricant (328388) and spray each hood hinge. Open the hood and spray the inside of the hood hinges.

Hood latch

1. Open the hood and locate the inside of the hood latch. See Figure 117.

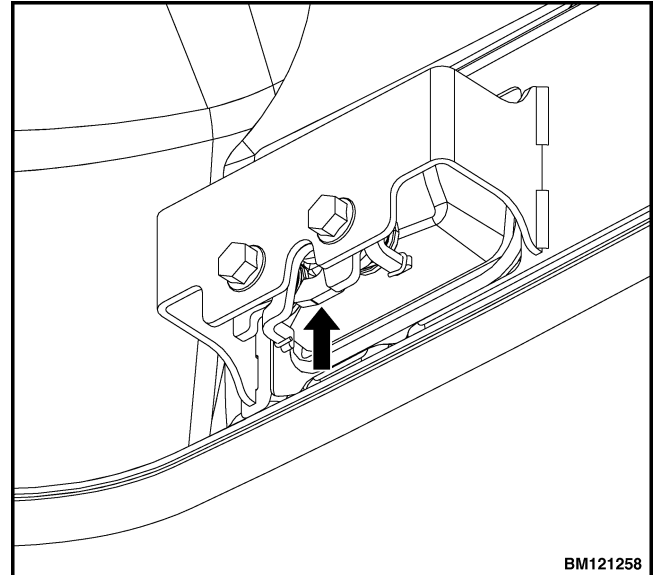


Figure 117. Hood latch

2. Use silicone spray lubricant (328388) and spray the inside of the hood latch.

LPG VAPORIZER AND FUEL FILTER

Drain LPG vaporizer



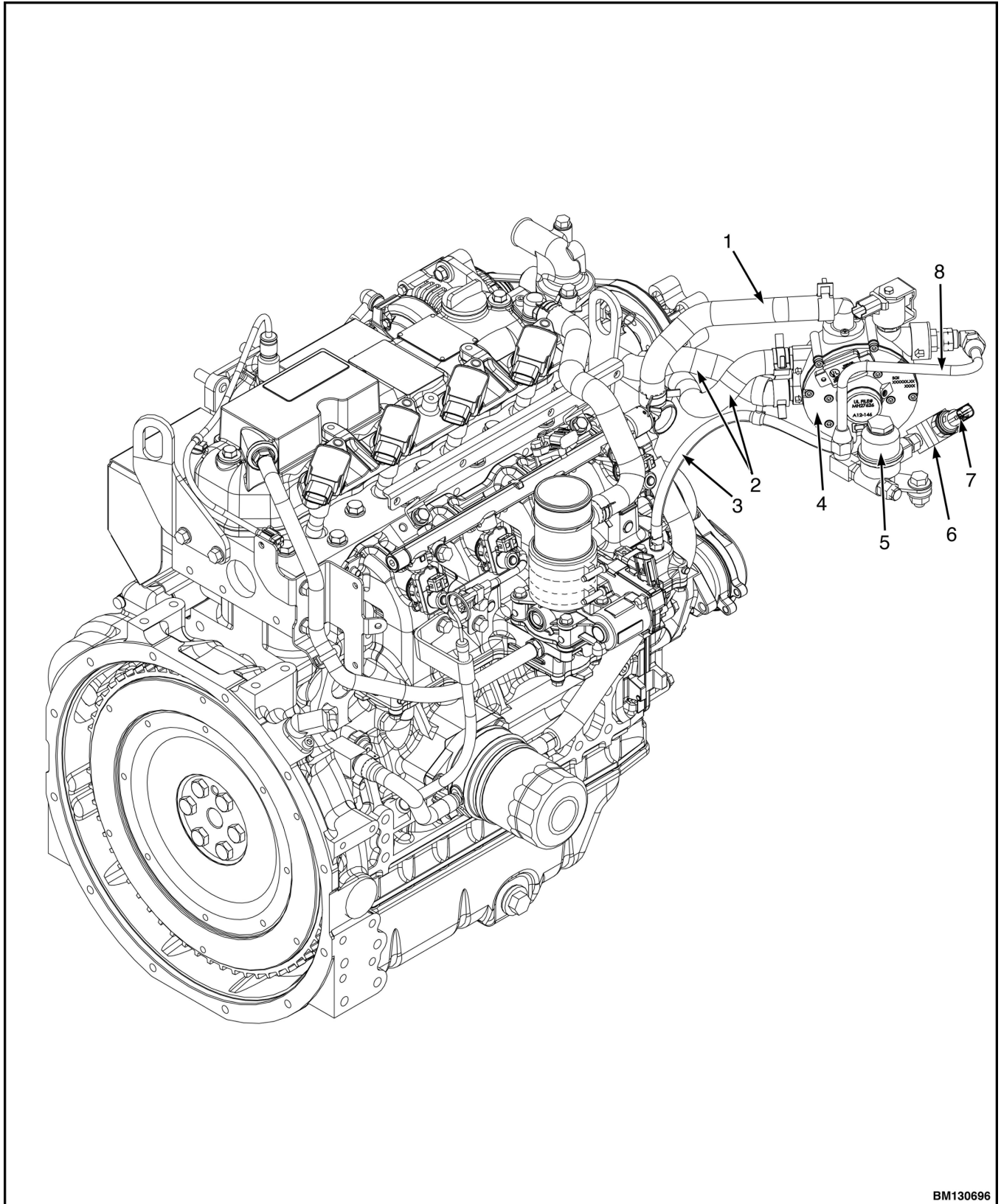
WARNING

LPG can cause an explosion. DO NOT cause sparks or permit flammable material near the LPG system. LPG fuel system can be disconnected indoors only if the lift truck is at least 8 m (26 ft) from any open flame, motor vehicles, electrical equipment, or ignition source.

Close the shutoff valve on the LPG tank before any part of the engine fuel system is disconnected. Run the engine until the fuel in the system is used and the engine stops.

If the engine will not run, close the shutoff valve on the LPG tank. Loosen the fitting on the supply hose from the LPG tank where it enters the filter unit. Permit the pressure in the fuel system to decrease slowly. Fuel leaving the fitting removes heat. Use a cloth to protect your hands from the cold fitting.

1. Close the shutoff valve on the LPG tank and run lift truck until engine stops. Turn the key or keyless switch to the **OFF** position.
2. Raise hood and disconnect negative battery cable.
3. Disconnect LPG fuel vapor hose and two coolant hoses from LPG converter. See Figure 118.
4. Remove LPG lock off fitting from LPG converter.
5. Remove two capscrews from bottom of LPG mounting bracket.
6. Rotate LPG converter 90° so the fuel inlet is pointing down and drain oil from converter into suitable container.
7. Inspect converter and remove any oil or debris from secondary chamber.
8. Install LPG converter and two capscrews on LPG mounting bracket. Tighten capscrews to 10 to 11 N•m (88 to 97 lbf in).
9. Install LPG lock off fitting on LPG converter.
10. Connect coolant hoses and fuel vapor hose as tagged during removal.
11. Connect negative battery cable and close hood.
12. Slowly open the shutoff valve on LPG tank.
13. Start the engine and check for leaks at LPG converter. If leaks are detected, make repairs immediately.
14. Dispose of all drain material in a safe and proper manner.



BM130696

Figure 118. LPG Converter-Filter and Fuel Filter

Legend for Figure 118.

- | | |
|------------------------|---|
| 1. LPG FUEL VAPOR HOSE | 5. FUEL FILTER |
| 2. COOLANT HOSE | 6. VALVE BLOCK |
| 3. FUEL HOSE | 7. SENSOR |
| 4. LPG CONVERTER | 8. TUBE ASSEMBLY - LPG CONVERTER-FILTER |

LPG fuel filter element replace

Remove

WARNING

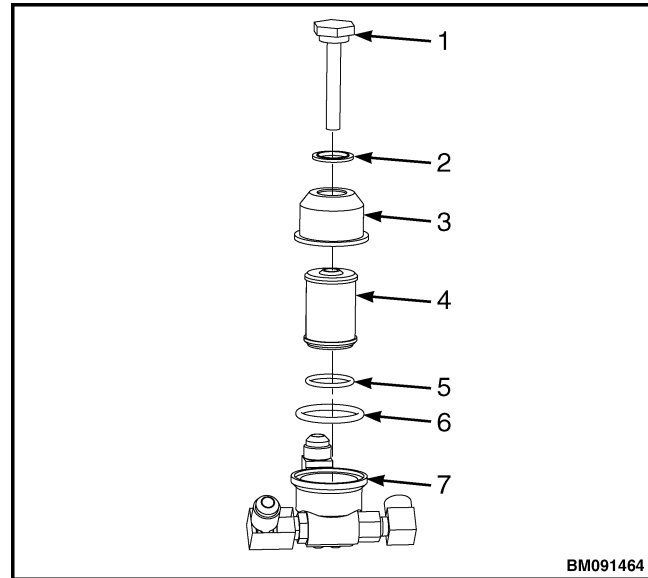
LPG can cause an explosion and serious injury to personnel. DO NOT permit any sparks or open flames in the work area.

1. Close fuel valve on tank. Run engine until it stops.
2. Disconnect negative battery cable.

WARNING

A small amount of fuel may still be present in the fuel line. Use gloves to prevent burns and wear eye protection. If liquid fuel continues to flow from the connections when loosened, check to make sure the manual valve is fully closed.

3. Remove the bolt and seal washer retaining the top section of the fuel filter housing. Discard seal washer. See Figure 119.
4. Remove top section of fuel filter housing.
5. Remove and discard housing O-ring.
6. Remove fuel filter and fuel filter O-ring.



1. BOLT
2. SEAL WASHER
3. FUEL FILTER HOUSING TOP SECTION
4. FUEL FILTER
5. FUEL FILTER O-RING
6. HOUSING O-RING
7. FUEL FILTER HOUSING BOTTOM SECTION

Figure 119. LPG fuel filter

Install

1. Clean and inspect the fuel filter housing for contamination or damage.
2. Install the new fuel filter and fuel filter O-ring. See Figure 119.
3. Install new housing O-ring.
4. Install top section of fuel filter housing.
5. Install bolt and new seal washer. Tighten bolt to 13 N•m (115 lbf in).

NOTE: Opening the fuel valve too quickly can cause the internal excessive flow valve to close, restricting the flow of fuel. If this happens, close the fuel valve, wait a few seconds, and then slowly open the fuel valve again. This will reset the excess fuel valve.

6. Slowly open the fuel valve on tank.
7. Turn the key to the **ON** position and back to the **OFF** position to pressurize the fuel system. Check for leaks.
8. Check for leaks at connections by using soapy solution or electronic leak detector. If leaks are detected, make proper repairs.

ENGINE ELECTRICAL SYSTEM

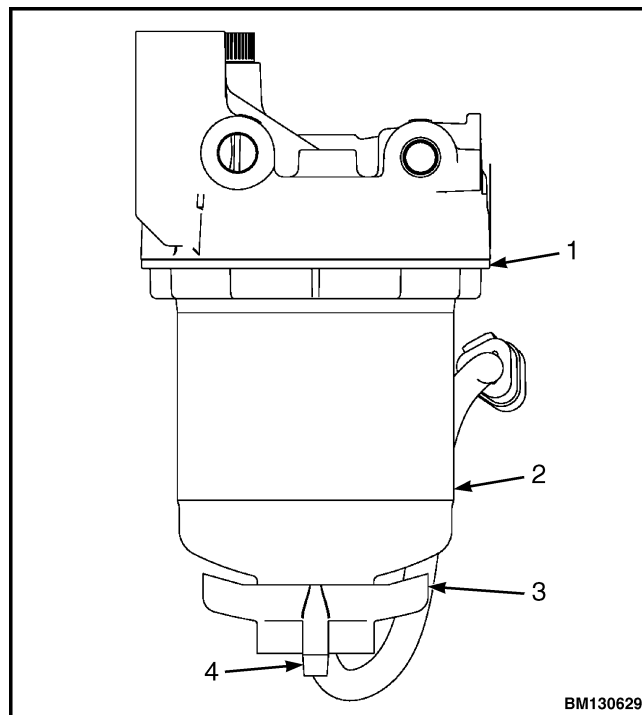
Check connectors

1. Locate the engine wire harness.
2. Check all electrical connectors to confirm connection is tight and wires are intact.

FUEL FILTER/WATER SEPARATOR

Drain water from fuel filter/water separator.
Replace the filter.

- Close the fuel shutoff valve on the fuel tank
- Disconnect fuel filter/water separator electrical connector
- Remove filter from filter head
- Apply 10W-30 oil on sealing surfaces of filter and filter head
- Install new filter onto filter head, tighten filter to 33.9 N·m (25 lbf ft)
- Connect fuel filter/water separator electrical connector
- Open the fuel shutoff valve on the fuel tank



1. FILTER HEAD
2. WATER SEPARATOR (FUEL FILTER)
3. SENSOR (WATER IN FUEL)
4. DRAIN

Figure 120. Fuel filter/water separator

INTAKE AND EXHAUST THROTTLE VALVES, YANMAR 3.0L AND 3.3L ENGINES

The intake and exhaust throttle valves can affect the exhaust gas treatment performance. Inspect the actuation of each valve. Contact your dealer for more information.

VALVE CLEARANCE ADJUSTMENTS, YANMAR 3.0L AND 3.3L ENGINES

NOTE: Make measurements and adjustments while the engine is cold.

NOTE: Valve clearance of both the intake and exhaust valves can be checked with the piston for that cylinder at top dead center (TDC) of the compression stroke. When a piston is at TDC of the compression stroke, both rocker arms will be loose and the cylinder TDC mark on the flywheel will be visible in the timing port of the flywheel housing.

If there is no valve clearance, and the cylinder is at TDC of the compression stroke, extreme wear, or damage to the cylinder head or valves may be possible.

If adjusting each cylinder individually, the cylinder to be adjusted first does not have to be the No. 1 cylinder. Select and adjust the cylinder where the piston is nearest to the TDC after turning. Make adjustment for the remaining cylinders in the order for the firing by turning the crankshaft each time.

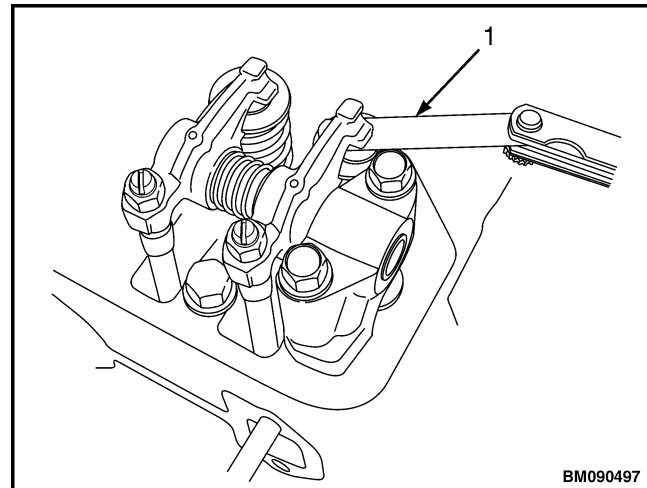
To decrease the number of rotations required to check all cylinders, other cylinders can also be checked is indicated in the chart below:

Cylinder No.	1		2		3		4	
	Intake	Exhaust	Intake	Exhaust	Intake	Exhaust	Intake	Exhaust
No. 1 cylinder at TDC compression	•	•	•			•		
No. 4 cylinder at TDC compression				•	•		•	•

1. Remove cylinder head cover. See **Yanmar Engines 0600SRM2299**.

NOTE: This number one piston position is on the flywheel end of the engine, opposite side of the radiator, and the ignition order is 1 - 3 - 4 - 2 at 180 degree intervals.

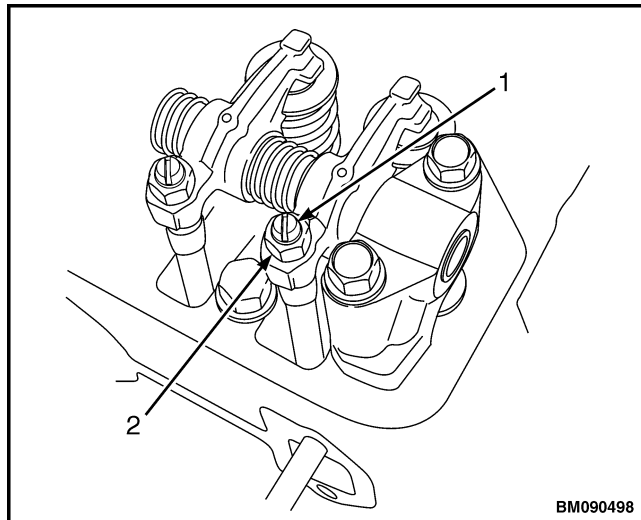
2. Rotate crankshaft clockwise, as seen from the radiator side, to bring the number one piston to top dead center (TDC) while watching the rocker arm motion, timing scale, and top mark position of the crankshaft pulley (position where both the intake and exhaust valves are closed).
3. Insert a feeler gauge between the rocker arm and valve cap. See Figure 121. Record the measured valve clearance.
 - For diesel engine options, the intake and exhaust valve clearance should be between 0.15 to 0.25 mm (0.006-0.010 in.) when cold.



1. FEELER GAUGE

Figure 121. Valve Clearance Measurement

4. If adjustment is needed, loosen the valve adjusting screw lock nut and valve adjusting screw on the rocker arm (see Figure 122) and check the valve for any slope of valve cap, entrance of dirt, or wear.



1. VALVE ADJUSTING SCREW
2. VALVE ADJUSTING SCREW LOCK NUT

Figure 122. Valve Clearance Adjustment

NOTE: Clearance will decrease slightly when the lock nut is tightened. Make the clearance adjustment slightly on the loose side before tightening the lock nut.

5. Insert a feeler gauge between the rocker arm and valve cap and adjust the clearance so there is a slight drag on the feeler gauge when sliding it between the rocker arm and valve cap.
6. Tighten the valve adjusting screw lock nut and recheck the clearance. See Figure 122.
 - For diesel engine options, the intake and exhaust valve clearance should be between 0.15 to 0.25 mm (0.006-0.010 in.) when cold.
7. Apply clean engine oil to the contact surface between the adjusting screw and push rod.
8. Turn the crankshaft 180 degrees and make the measurement and adjustment for the number three cylinder. Then turn the crankshaft 180 degrees and make the measurement and adjustment for the number four cylinder. Then turn the crankshaft 180 degrees and make the measurement and adjustment for the number 2 cylinder.
9. Install the valve cover. See **Yanmar Engines 0600SRM2299**.

TRANSMISSION OIL LEVEL, HYDROSTATIC TRANSMISSION (HST)



WARNING

At operating temperature, the transmission oil is **HOT**. **DO NOT** permit the hot oil to touch the skin. Skin that comes in contact with hot oil may be burned.



CAUTION

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

1. Confirm engine is on a level surface.
2. If engine has been running, turn the engine off. Wait for one minute or longer prior to checking the oil level.

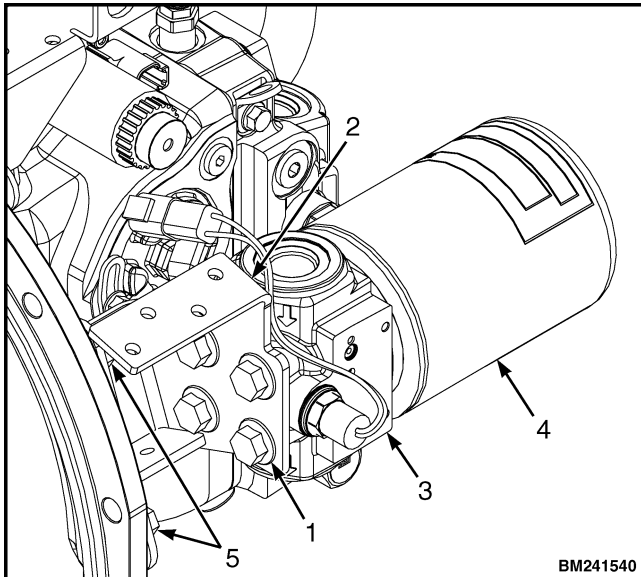
NOTE: The hydrostatic transmission uses hydraulic fluid drawn from the hydraulic tank. There is not a separate process for draining and filling the HST. Drain and fill the hydraulic tank instead.

3. Remove all hydraulic oil from the hydraulic tank. See Every 4000 hours or Two Years periodic maintenance (PM) procedures for procedure.
4. Fill hydraulic tank with oil as specified in the Every 4000 hours or Two Years periodic maintenance (PM) schedule.
5. When correct oil level is reached, operate the system and check for leaks.

TRANSMISSION OIL FILTER (HST)

1. Locate the HST transmission oil filter. See Figure 123.
2. Turn the transmission oil filter counterclockwise to unthread and loosen. Remove the transmission oil filter.
3. Locate new transmission oil filter. See **Parts Manual** for correct part number.
4. Lubricate the transmission oil filter gasket with oil or grease.

5. Thread the new transmission oil filter clockwise to install onto the transmission.

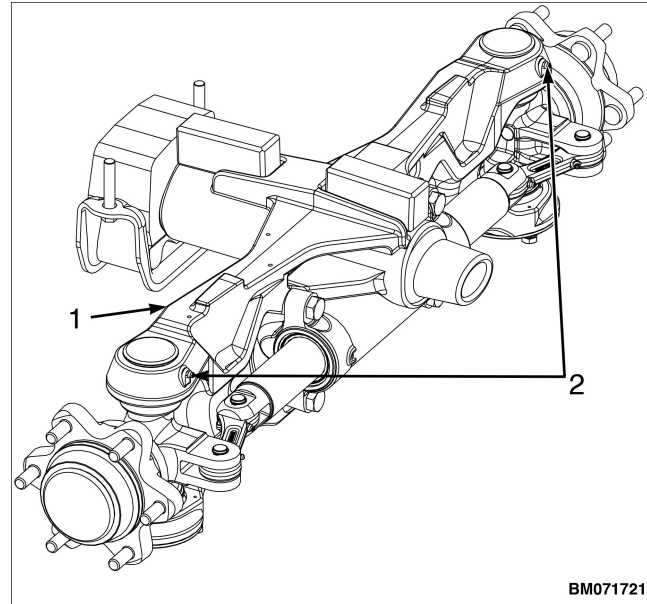


1. CAPSCREW
2. BRACKET
3. FILTER HEAD
4. TRANSMISSION FILTER
5. CAPSCREW

Figure 123. Transmission oil filter

STEER AXLE KING PIN LUBRICATION

1. Locate the two lubrication fittings. See Figure 124.
2. Apply multipurpose grease to the lubrication fittings. See Every 1000 hours or Six Months periodic maintenance (PM) schedule for specification.



1. STEER AXLE
2. LUBE FITTINGS

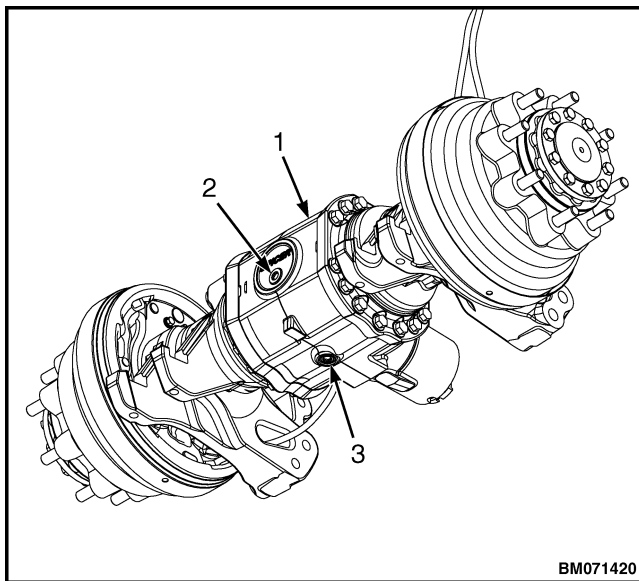
Figure 124. King pin lubrication

DRY BRAKE AXLE DIFFERENTIAL AND DRIVE AXLE OIL

NOTE: The oil level must be between 0 to 10 mm (0 to 0.40 in.) below the bottom edge of fill hole.

1. Place a suitable container with a capacity of at least 6.5 liter (6.9 qt) below the drive axle drain plug.
2. Remove the drive axle drain plug. See Figure 125.
3. Drain all oil from the drive axle.
4. Install the drain plug. Torque to 35 to 50 N • m (25.8 to 36.9 lbf ft).
5. Locate the center section check/fill port (item 2, Figure 125).
6. Remove the plug in the center section check/fill port, and use this port to fill the center section with 80W-90 oil in the amount indicated in the Every 1000 hours or Six Months periodic maintenance (PM) schedule.

7. Install the plug back in the check/fill port and tighten the plug. Torque to 35 to 50 N·m (25.8 to 36.9 lbf ft).



1. DRIVE AXLE
2. CHECK/FILL PLUG
3. DRAIN PLUG

Figure 125. Drive axle fluid drain and fill

WET BRAKE AXLE DIFFERENTIAL (CENTER SECTION) OIL

1. Place a suitable container with a capacity of at least 2 liter (2.1 qt) below the drive axle center section drain plug. See Figure 126.

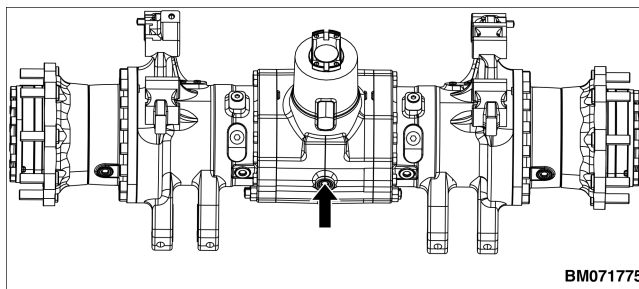
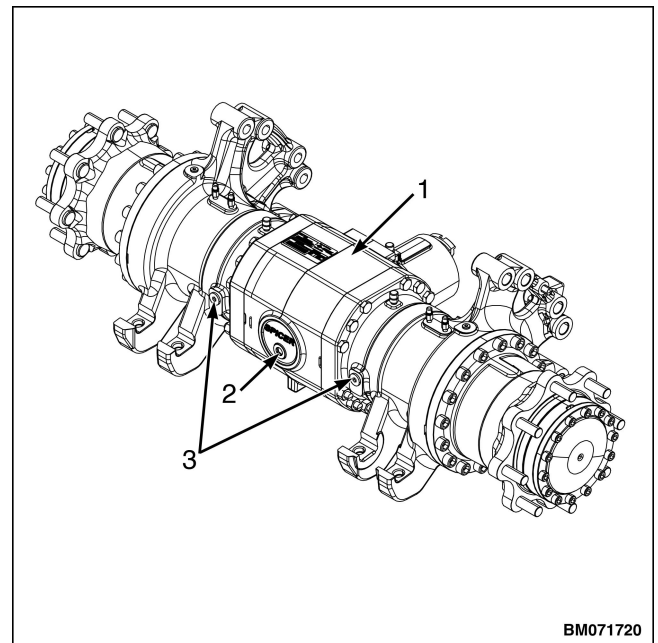


Figure 126. Center section drain plug

2. Remove the center section drain plug and drain all oil from the center section.
3. Place the removed plug back into the port on the center section of the drive axle and tighten. Torque to 35 to 50 N·m (25.8 to 36.9 lbf ft).

4. Locate the center section check/fill port (item 2, Figure 127).
5. Remove the plug in the center section check/fill port, and use this port to fill the center section with 80W-90 oil in the amount indicated in the Every 1000 hours or Six Months periodic maintenance (PM) schedule.
6. Install the plug back in the check/fill port and tighten the plug. Torque to 35 to 50 N·m (25.8 to 36.9 lbf ft).



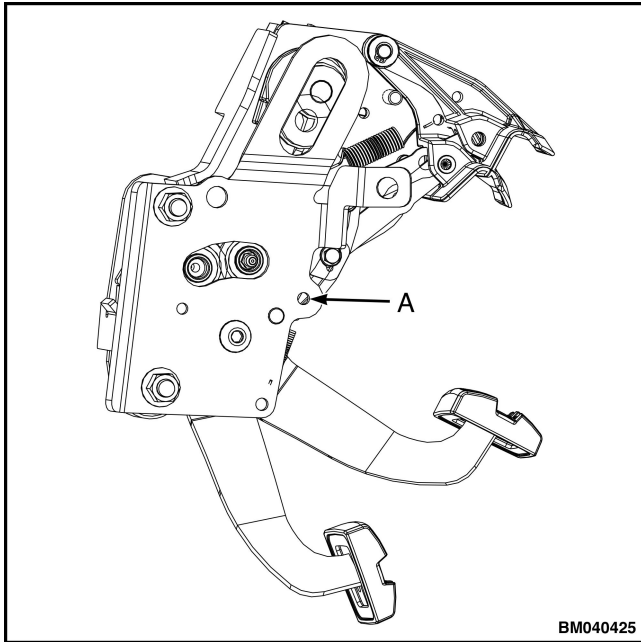
1. WET BRAKE DRIVE AXLE
2. CENTER SECTION CHECK/FILL PLUG
3. WHEEL END OIL CHECK/FILL PLUG

Figure 127. Wet brake axle fluid fill

PARK BRAKE INSPECTION

NOTE: Test the park brake to confirm balanced brake function between LH and RH brakes by checking to ensure the park brake cable bias bar is not binding against the adjuster bolt when the park brake is engaged.

1. Locate the park brake lockout. See Figure 128.



A. LOCKOUT

Figure 128. Park brake lockout

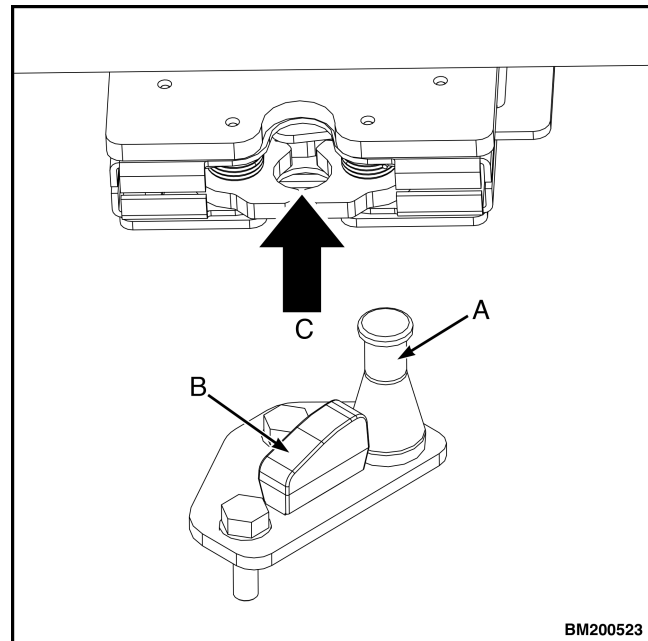
2. Insert a M8x1.25 bolt into the park brake lockout to prevent the park brake from disengaging. See Figure 128.
3. Remove the kick panel. See Covers repair in **Frame and Main Components** 8000SRM2306.
4. Inspect the bias bar for binding against the adjuster bolt when the park brake is engaged and properly adjusted.
5. If necessary, remove the park brake and adjust the cable position at the park brake mount. See in the **Frame and Main Components** 8000SRM2306.

LPG TANK BRACKET LATCH LUBRICATION

For LPG lift trucks featuring a swing-out or swing-out/drop-down tank bracket, it is recommended to apply grease to prevent the tank bracket latch from sticking. Use multipurpose grease (HCE-38 with 2 to 4% Molybdenum Disulfide).

1. Unlatch the swing-out or swing-out/drop-down tank bracket. If the latch is stuck, see LPG tank bracket release.

2. Locate the latch striker (item A, LPG tank bracket latch lubrication) and coat very liberally with grease.



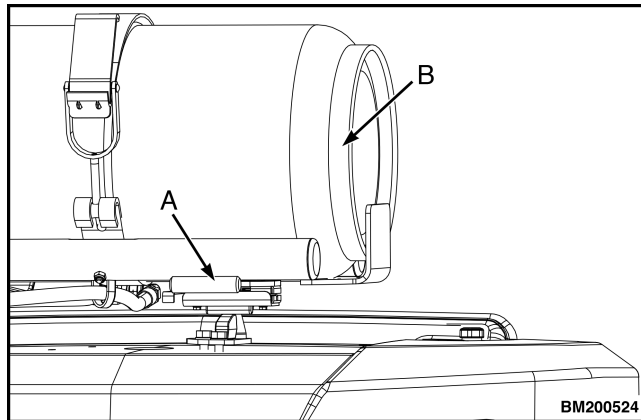
- A. STRIKER
 B. RAMP
 C. LATCH

Figure 129. Latch components

3. Locate the ramp (item B, LPG tank bracket latch lubrication) and coat the surface with grease.
4. Locate the latch and apply grease to the mechanism where the latch contacts the striker (item C, LPG tank bracket latch lubrication).

LPG tank bracket release

1. Place left hand, palm up, on the handle with the thumb on the release button (item A, Figure 130).



- A. TANK BRACKET RELEASE BUTTON
B. LPG TANK

Figure 130. Tank bracket release button

2. Place right hand on the right end/bottom of the LPG tank (item B, Figure 130).

3. Press the release button with your left thumb and pull the right end of the LPG tank.

DRIVE SHAFT INSPECTION

1. Park the truck on a level surface and turn the truck off.
2. Place blocks under the frame of the truck. See How to put a lift truck on blocks.
3. Release the park brake.
 - If your truck features a dry brake axle, pull the park brake lever to release.
 - If your truck features a wet brake axle, use the SAHR pump to bleed hydraulic fluid from the brakes, then release the park brake.
4. Locate the eight connection points on the drive shaft. See Figure 131. Check for excessive play at the connection points.

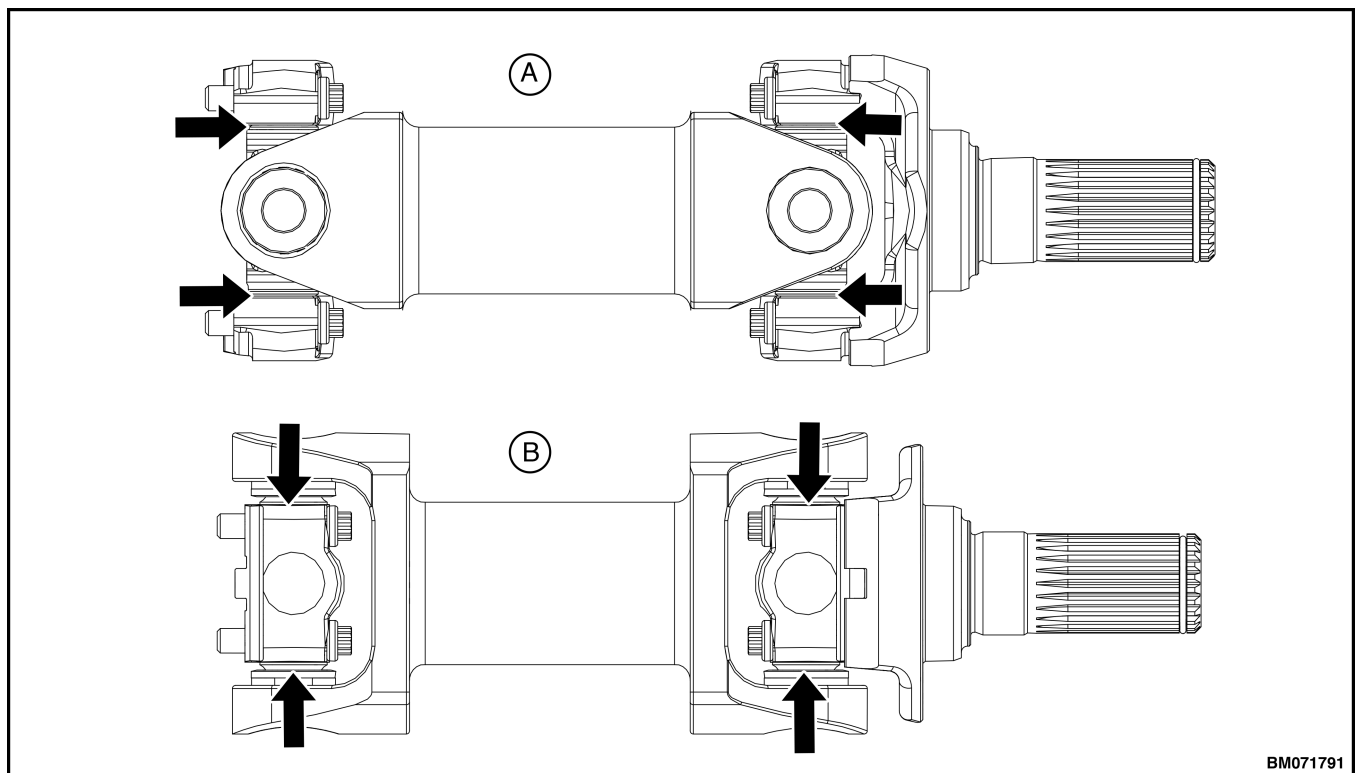


Figure 131. Drive shaft connection points

5. Inspect connection points:
Look for excessive amount of grease escaping. See Figure 132.
- Look for rust colored dust or residue. See Figure 133.

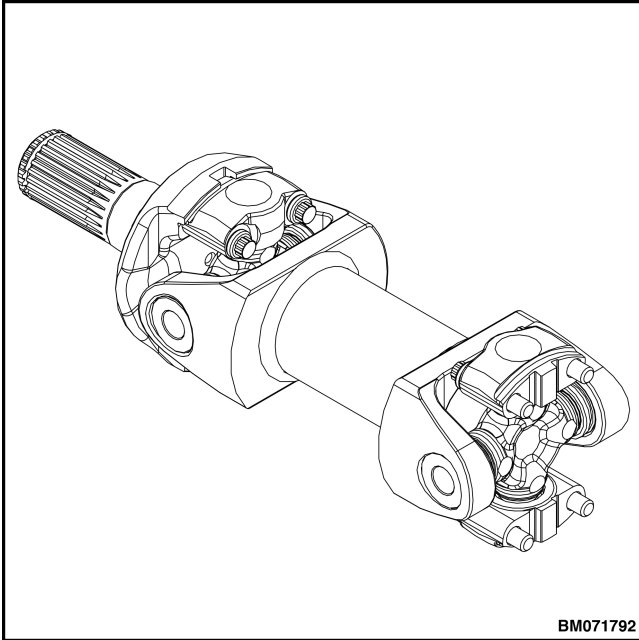


Figure 132. Grease leaking

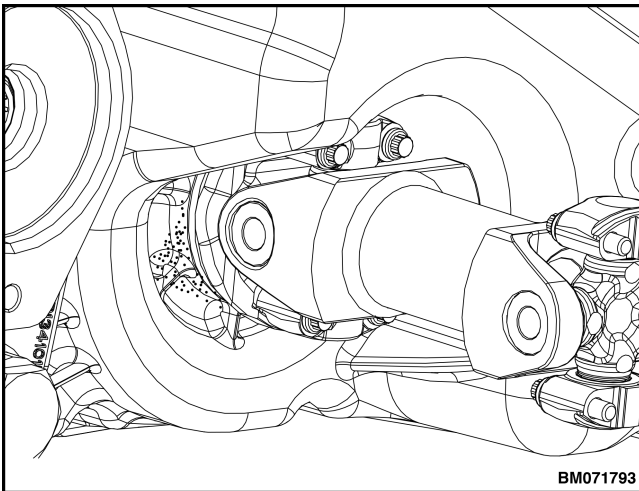
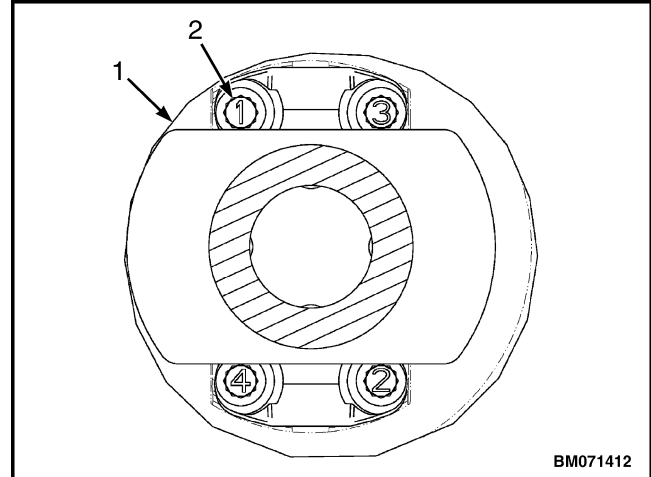


Figure 133. Dust residue

6. Tighten the capscrews on the drive shaft in the following sequence. See Figure 134. Torque to 32 to 36 N·m (23.6 to 26.6 lbf ft).



1. DRIVE SHAFT
2. CAPSCREW

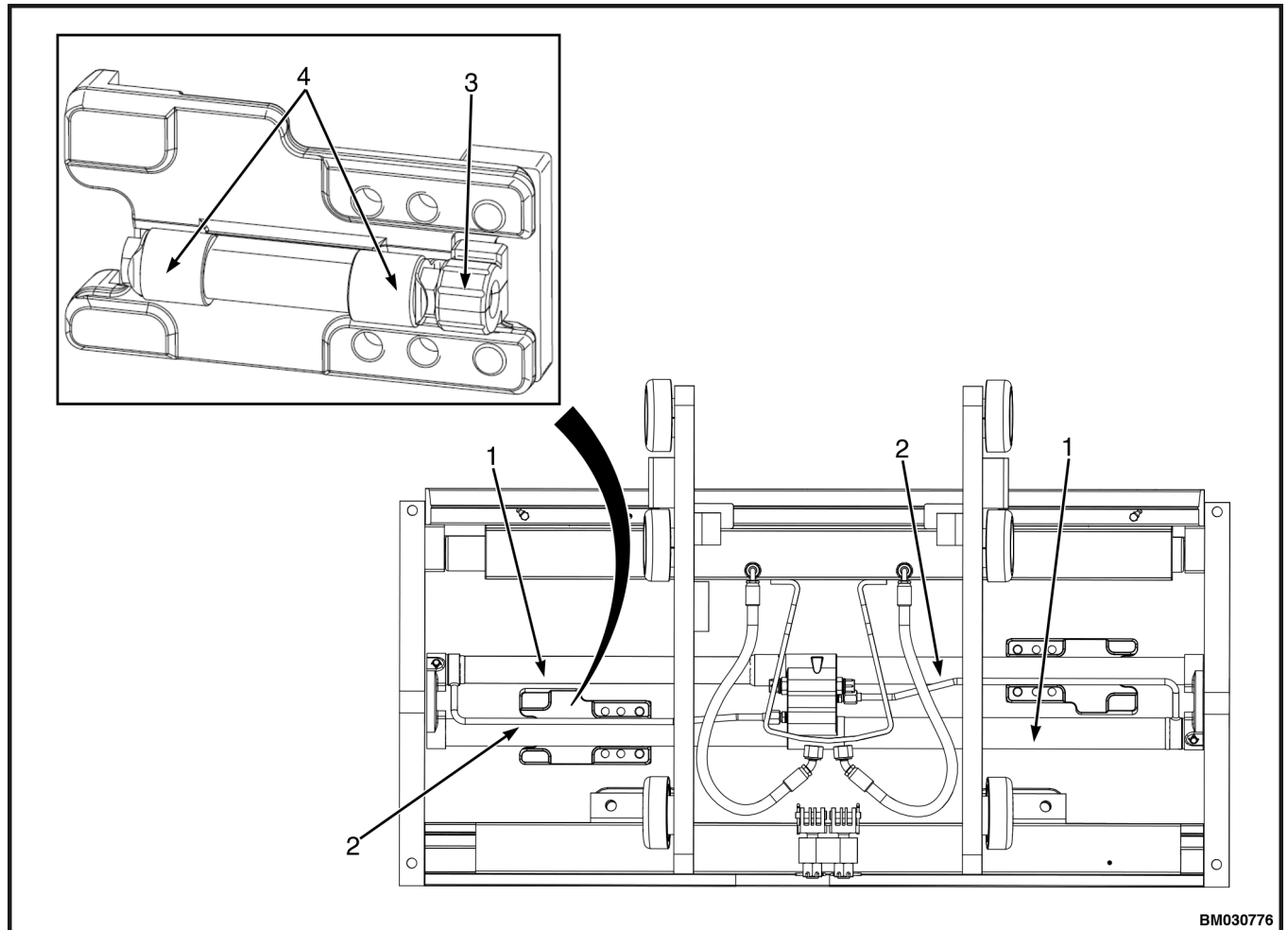
Figure 134. Drive shaft torque sequence

ISS FORK POSITIONER (BOLZONI OPTION) CHECKS

In addition to the following checks, perform all the checks for the ISS fork positioner in Every 500 hours or Three Months periodic maintenance (PM) procedures as well.

Reference Figure 135 below, while performing the following checks:

- Check the surface of the actuators and rods (item 1).
- Check the actuators and rods for leaks (item 1).
- Check the condition and surface coating of the guide tubes (item 2).
- Check the sliding bushings (item 3 and 4) and replace if necessary. See **Front End** service manual.



BM030776

1. ACTUATOR AND ROD
2. GUIDE TUBES

3. SLIDING BUSHINGS
4. SLIDING BUSHING

Figure 135. Fork positioner checks

**EVERY 2000 HOURS OR ONE YEAR
PERIODIC MAINTENANCE (PM)
PROCEDURES
202001-114**

NOTE: Perform the Daily periodic maintenance (PM) task procedures, Every 500 hours or Three Months periodic maintenance (PM) schedule, and Every 1000 hours or Six Months periodic maintenance (PM) schedule prior to performing the procedures in this section.

HYDRAULIC FILTER



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.

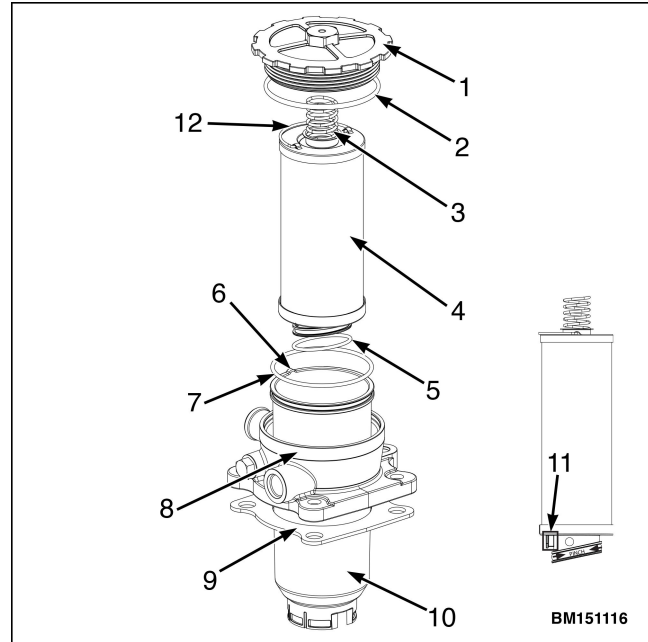
NOTE: Turn lift truck engine **OFF** before replacing the hydraulic oil filter.

1. Confirm the lift truck is on a level surface with the carriage fully lowered.
2. Unscrew and remove the filter cover and bias spring from the filter head. See Figure 136. Remove the O-ring from the cover and discard the O-ring.

NOTE: Locate a container large enough to hold the filter element and allow for final hydraulic oil draining.

NOTE: Note the placement of the filter element and D-ring handle prior to removal to aid in installation.

3. Use the D-ring handle (item 12, Figure 136) on the top of the filter element to remove the filter element (item 4, Figure 136). Place the element in a container and allow to drain. Cover the filter head (item 8, Figure 136) to prevent any foreign material from getting into the hydraulic tank.



1. FILTER COVER
2. COVER O-RING
3. BIAS SPRING
4. FILTER ELEMENT
5. FILTER ELEMENT O-RING
6. ALIGNMENT BUMP
7. BOWL O-RING
8. FILTER HEAD
9. FILTER HEAD GASKET
10. BOWL HOUSING
11. ALIGNMENT TAB
12. D-RING HANDLE

Figure 136. Hydraulic Filter

4. After the filter element has drained, discard the filter element.
5. Inspect the dipstick plug. Replace the O-ring and dipstick plug as necessary. See **Parts Manual**.
6. Lubricate the new bowl O-ring (only if bowl was removed) with clean hydraulic oil and install onto the top of the bowl. See Figure 136.

NOTE: The filter element comes with O-ring installed. A spare O-ring is also supplied with the kit, in the event the O-ring becomes damaged during installation.

7. Locate the new filter element and lubricate the new element O-ring (item 5, Figure 136) with clean hydraulic oil.

8. Install the new filter element into the bowl.
 - Locate the D-ring handle (item 12, Figure 136) on top of the new filter element.
 - Orient the alignment tab (item 11, Figure 136) on the bottom endcap of the filter element with the alignment bump (item 6) on the bowl to ensure proper fit.
 - Once fit is confirmed, press the element uniformly into the bowl until fully seated.
9. Install the bias spring and cover onto the filter head. See Figure 136. Lubricate the cover and torque to 24 to 27 N•m (18 to 20 lbf ft).

**CAUTION**

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

10. Start the truck.
11. Allow the engine to run for 30 seconds. Check for leaks.
12. Stop the engine and check hydraulic oil level. Add oil, if necessary. Use hydraulic oil shown in the Every 2000 hours or One Year periodic maintenance (PM) schedule. To change the hydraulic oil, see Hydraulic Oil, Replace.

HYDRAULIC TANK BREATHER**Inspect**

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

**WARNING**

Compressed air can move particles and make them become airborne, which may cause injury. Make sure the path of the compressed air is away from all personnel. Wear protective goggles or a face shield to prevent eye injury.

**CAUTION**

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

1. Use compressed air to remove any dirt and debris in the frame cavity around the breather. See Figure 137.
2. Turn the engine **OFF**.
3. Inspect the breather to see 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. See Figure 137.
4. If oil or dirt has accumulated in the oil, replace the breather.

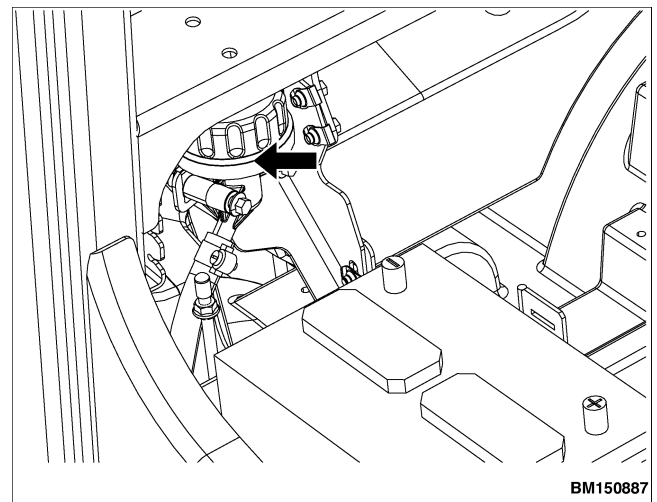


Figure 137. Hydraulic tank breather

AIR CLEANER**WARNING**

Compressed air can move particles and make them become airborne, which may cause injury. Make sure the path of the compressed air is away from all personnel. Wear protective goggles or a face shield to prevent eye injury.

NOTE: The engine performance is adversely affected when the air cleaner is clogged with dust. The air filter must be cleaned regularly.

NOTE: Never operate the engine with the air cleaner element(s) removed. This may allow foreign material to enter the engine and damage it.

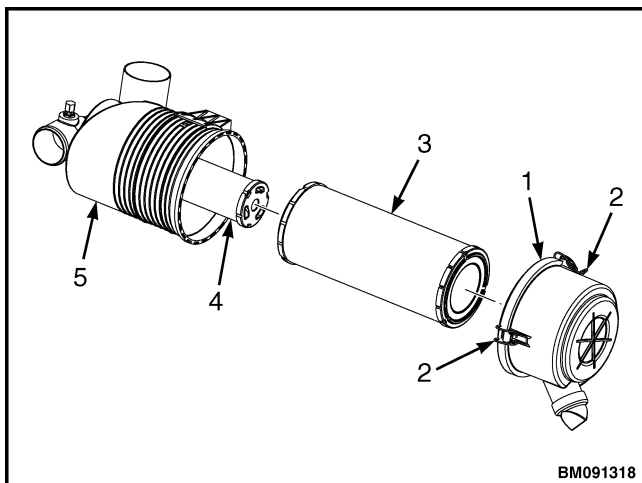
1. Locate the air cleaner.

2. Unlatch and remove the air cleaner cover (item 1, Figure 138).

 **CAUTION**

To reduce the risk of wear and damage to engine components, **DO NOT** remove the inner element when cleaning or replacing the outer element.

3. Remove the primary filter element (item 3, Figure 138).
4. Inspect the safety filter element (item 4, Figure 138) and replace if damaged.
5. Locate new primary and safety filter elements. See **Parts Manual** for correct part number.
6. Insert new safety filter element into the air cleaner case.
7. Insert new primary filter element into the air cleaner case.
8. Install the outer element back into the air cleaner case.
9. Reinstall the air cleaner cover, by aligning the arrow on the cover with the arrow on the air cleaner case. Latch the cover to the case.



1. AIR CLEANER COVER
2. LATCHES
3. PRIMARY FILTER ELEMENT
4. SAFETY FILTER ELEMENT
5. AIR CLEANER CASE

Figure 138. Air cleaner

TRANSMISSION OIL DRAIN AND FILL (POWERSHIFT)

 **WARNING**

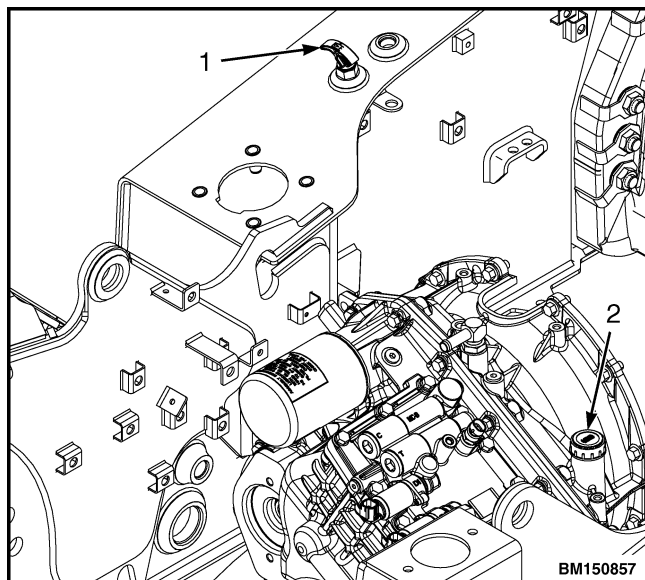
At operating temperature, the transmission oil is **HOT**. **DO NOT** permit the hot oil to touch the skin. Skin that comes in contact with hot oil may be burned.

 **CAUTION**

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

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

1. If engine has been running, turn the engine off. Wait for one minute or longer prior to checking the oil level.
2. Drain transmission oil from the transmission. See Electronic Powershift transmission removal and replacement in **Drive Train** 0900SRM2301.
3. Add oil to the transmission at the dipstick tube, filling to the correct level as indicated on the dipstick. Use correct oil as shown in the Every 500 hours or Three Months periodic maintenance (PM) schedule. **DO NOT** overfill.



1. HYDRAULIC OIL DIPSTICK 2. TRANSMISSION OIL DIPSTICK

Figure 139. Transmission and hydraulic oil check

TRANSMISSION OIL LEVEL, HYDROSTATIC TRANSMISSION (HST)



WARNING

At operating temperature, the transmission oil is HOT. DO NOT permit the hot oil to touch the skin. Skin that comes in contact with hot oil may be burned.



CAUTION

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

1. Confirm engine is on a level surface.
2. If engine has been running, turn the engine off. Wait for one minute or longer prior to checking the oil level.

NOTE: The hydrostatic transmission uses hydraulic fluid drawn from the hydraulic tank. There is not a separate process for draining and filling the HST. Drain and fill the hydraulic tank instead.

3. Remove all hydraulic oil from the hydraulic tank. See Every 4000 hours or Two Years periodic maintenance (PM) procedures for procedure.
4. Fill hydraulic tank with oil as specified in the Every 4000 hours or Two Years periodic maintenance (PM) schedule.
5. When correct oil level is reached, operate the system and check for leaks.

TRANSMISSION OIL FILTER (POWERSHIFT)

1. Locate the transmission oil filter. See Figure 140.
2. Turn the transmission oil filter counterclockwise to unthread and loosen. Remove the transmission oil filter.
3. Locate new transmission oil filter. See **Parts Manual** for correct part number.
4. Lubricate the transmission oil filter gasket with oil or grease.
5. Thread the new transmission oil filter clockwise to install onto the transmission.
6. Turn the transmission oil filter clockwise until the gasket touches the transmission housing. Then tighten $\frac{1}{2}$ turn to $\frac{3}{4}$ turn.

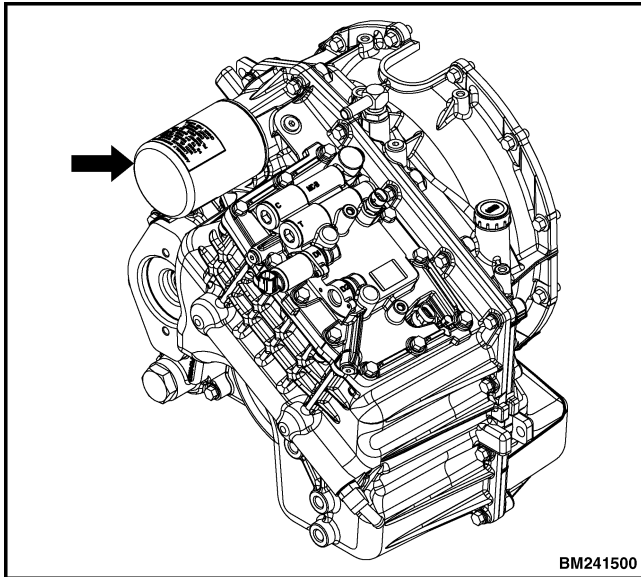
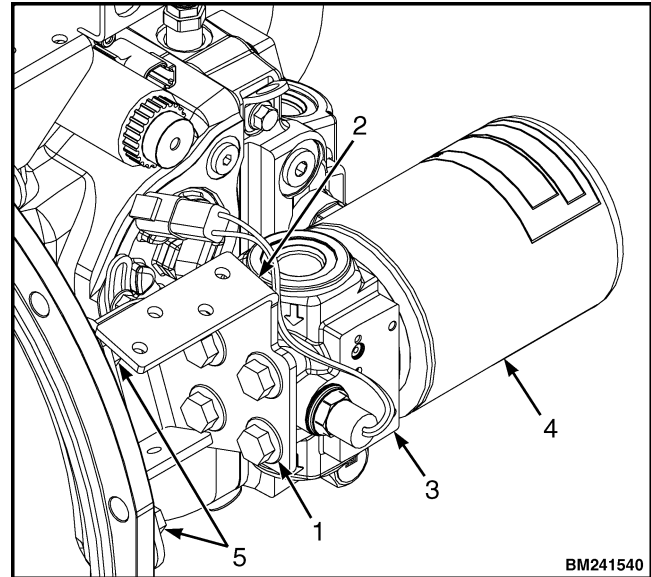


Figure 140. Transmission oil filter

TRANSMISSION OIL FILTER (HST)

1. Locate the HST transmission oil filter. See Figure 141.
2. Turn the transmission oil filter counterclockwise to unthread and loosen. Remove the transmission oil filter.
3. Locate new transmission oil filter. See **Parts Manual** for correct part number.
4. Lubricate the transmission oil filter gasket with oil or grease.
5. Thread the new transmission oil filter clockwise to install onto the transmission.



1. CAPSCREW
2. BRACKET
3. FILTER HEAD
4. TRANSMISSION FILTER
5. CAPSCREW

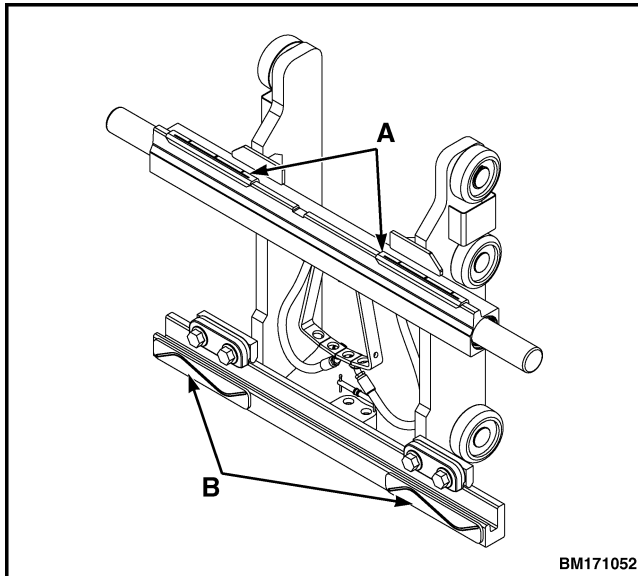
Figure 141. Transmission oil filter

INTEGRAL SIDESHIFT CARRIAGE

Check bearings

1. Lower carriage completely and remove forks. See Fork removal and replacement in **Front End** 4000SRM2303.
2. Remove the backrest and the lower mounting hooks from sideshift carriage. See Carriage repair, 3-stage full free lift in **Front End** 4000SRM2303.
3. Use a lifting device of at least 63 kg (139 lb) to lift the outer frame away from the carriage.
4. Locate the upper and lower bearings. See Figure 142.
5. Clean bearing areas. Inspect sideshift bearings for wear as follows:
 - a. If either upper bearing is worn to less than 2.5 mm (0.1 in.) thickness, replace both upper bearings by driving upper bearings out of carriage bar.

- b. If either lower bearing is worn to less than 2.5 mm (0.1 in.) thickness, replace both lower bearings by prying lower bearings from lower carriage bar.

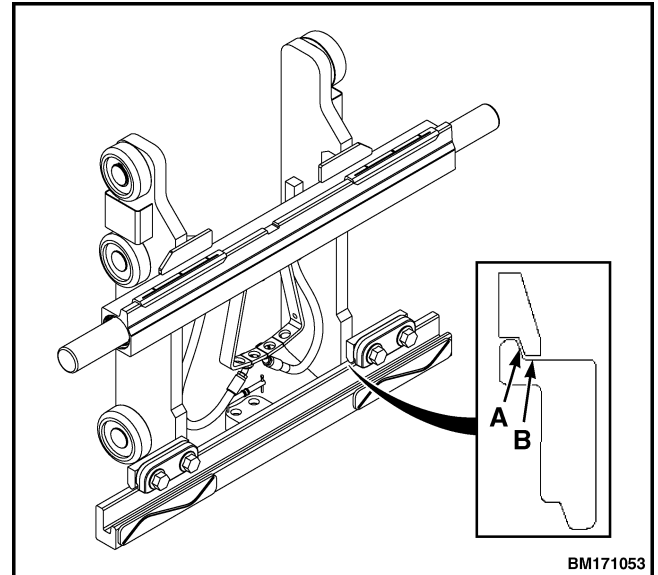


- A. UPPER BEARINGS
B. LOWER BEARINGS

Figure 142. Upper and lower bearings

Check lower mounting hooks

1. Inspect lower mounting hooks for wear. See Figure 143.
2. Replace hooks if they are worn beyond wear limit. See Carriage repair, 3-stage full free lift in **Front End 4000SRM2303**.



- A. WEAR LIMIT - 0.76 MM (0.03 IN.) MINIMUM AND 1.52 MM (0.06 IN.) MAXIMUM.
B. CLEARANCE ADJUSTMENT - 0.76 MM (0.03 IN.) MINIMUM AND 1.52 MM (0.06 IN.) MAXIMUM.

Figure 143. Lower mounting hooks

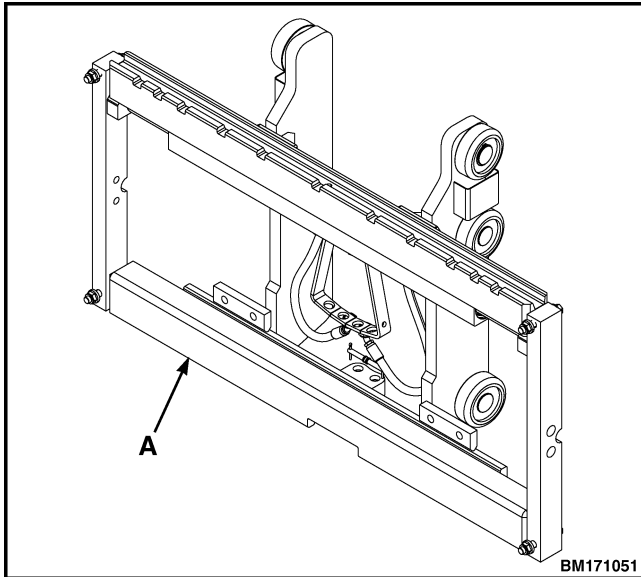
INTEGRAL SIDESHIFT CARRIAGE

Remove bearings

1. Lower the carriage completely and remove the forks. See Fork removal and replacement in **Front End 4000SRM2303**.

NOTE: The load backrest is heavy and must be removed with a lifting device.

2. Remove the load backrest and the lower mounting hooks from sideshift carriage. See Carriage repair, 3-stage full free lift in **Front End 4000SRM2303**.
3. Use a lifting device of at least 63 kg (139 lb) to lift the outer frame away from the carriage.



A. OUTER FRAME

Figure 144. Outer frame

4. Locate the upper and lower bearings. See Figure 142.
5. Replace both upper bearings by driving upper bearings out of carriage bar. Replace both lower bearings by prying lower bearings from lower carriage bar.

BRAKE FLUID CHANGE (MASTER CYLINDER)



WARNING

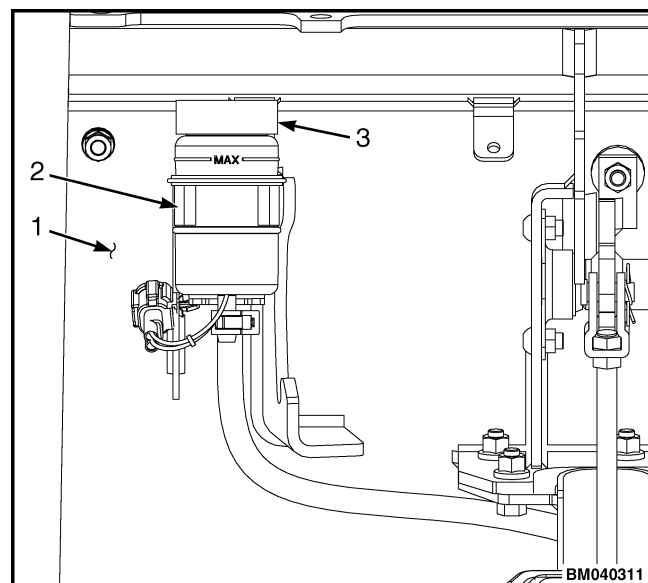
Small amounts of water in the brake system can cause reduced braking performance if the water reaches the wheel cylinder areas. **DO NOT** allow water entry. Ensure that the sealed reservoir lid is correctly replaced.

On lift trucks with wet brake drive axles, only use oil from sealed container in the master cylinder.

On lift trucks with dry brake drive axles, only use SAE J-1703 (DOT 3) brake fluid in the master cylinder.

1. Remove the dashboard from the cowl. See Covers repair in **Frame and Main Components** 8000SRM2306.

2. Remove the brake fluid reservoir from the bracket in the cowl. See Figure 145.
3. Place a suitable container under the brake fluid reservoir.
4. Remove the brake oil reservoir cover and cylindrical block drain plug.
5. Pour the fluid into a suitable container with a 0.25 liter (0.53 pt) minimum capacity. Install the cylindrical block drain plug.
6. Refill reservoir with clean oil from a sealed container and install the cover back on the reservoir. See Every 2000 hours or One Year periodic maintenance (PM) procedures for correct specification.
7. Install the reservoir into the bracket on the cowl. Reinstall the dashboard.



1. COWL
2. BRACKET
3. BRAKE FLUID RESERVOIR

Figure 145. Brake fluid change

SERVICE BRAKES (DRY BRAKE DRIVE AXLE)

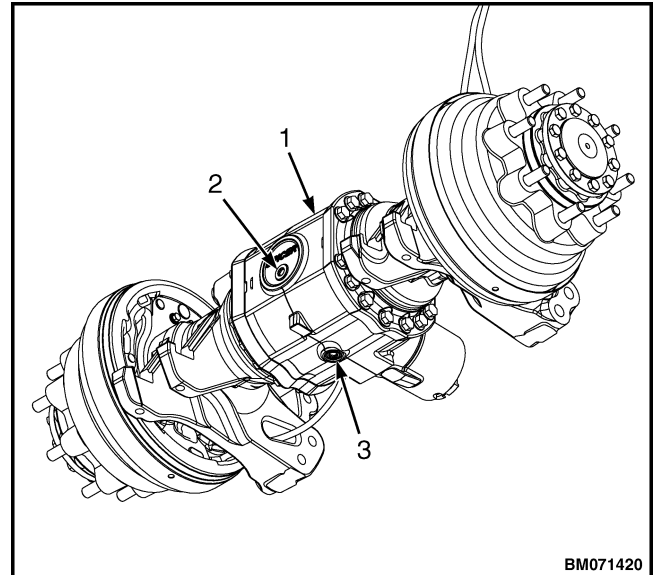
Check thickness

1. Inspect brake lining and components of the brake assembly for wear or damage. The minimum acceptable brake lining thickness is 1.0 mm (.040 in.).
2. If brake linings are worn thinner than the specification, replace the brake linings. See Dry brake hydraulics repair for the removal and installation procedures of the drive wheels and brake drums.
3. If the brake linings or brake shoes are worn or damaged, they must be replaced. Brake shoes must be replaced in complete sets. See Dry brake hydraulics repair for procedure.
4. Inspect brake drums for cracks or damage. Replace any damaged parts.

DRY BRAKE AXLE DIFFERENTIAL AND DRIVE AXLE OIL

The differential and drive axle use the same oil supply. The oil level must be between 0 to 10 mm (0 to 0.40 in.) below the bottom edge of fill hole.

1. Place a suitable container with a capacity of at least 6.5 liter (6.9 qt) below the drive axle drain plug.
2. Remove the drive axle drain plug (item 3, Figure 146).
3. Drain all oil from the drive axle.
4. Install the drain plug. Torque to 35 to 50 N·m (25.8 to 36.9 lbf ft).
5. Locate the center section check/fill port (item 2, Figure 146).
6. Remove the plug in the center section check/fill port, and use this port to fill the center section with 80W-90 oil in the amount indicated in the 1000 hour periodic maintenance (PM) schedule.



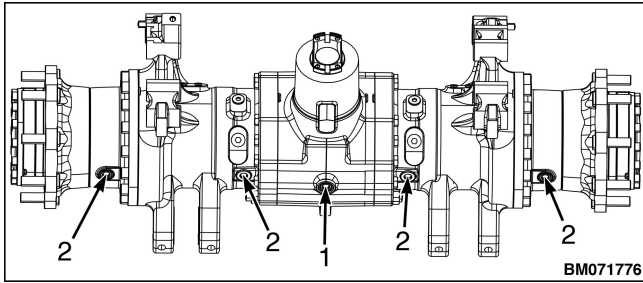
1. DRIVE AXLE
2. CHECK/FILL PLUG
3. DRAIN PLUG

Figure 146. Drive axle fluid drain and fill

WET BRAKE AXLE DIFFERENTIAL (CENTER SECTION) AND WHEEL END OIL

NOTE: For the wet brake drive axle, the oil drain and fill procedures for the drive axle differential (center section) and drive axle wheel ends may be performed in concert with each other. The steps below describe the procedure for draining and filling oil in both the center section (which occurs at initial 150 hours and again every 1,000 hours) and the wet brake axle wheel ends (occurs at initial 150 hours and again every 2,000 hours in alignment with transmission oil and filter service). If the center section oil has already been drained as part of the 1,000 hour scheduled maintenance, skip to Step 8.

1. Place a suitable container with a capacity of at least 9 liter (9.5 qt) below the drive axle drain plugs.
2. Remove the drain plug from the center section of the drive axle (item 1, Figure 147).



1. CENTER SECTION DRAIN PLUG
2. WHEEL END DRAIN PLUG

Figure 147. Drive axle drain ports

3. Drain all oil from the center section.
4. Place the removed plug back into the port on the center section of the drive axle. Torque to 35 to 50 N·m (25.8 to 36.9 lbf ft).
5. Locate the center section check/fill port (item 2, Figure 148).
6. Remove the plug in the center section check/fill port, and use this port to fill the center section with 80W-90 oil in the amount indicated in the Every 2000 hours or One Year periodic maintenance (PM) schedule.
7. Install the plug back in the check/fill port and tighten the plug. Torque to 35 to 50 N·m (25.8 to 36.9 lbf ft).
8. Remove the wheel end drain plugs from the drive axle (item 2, Figure 147).
 - Drain all oil.
 - Reinstall plugs and tighten. Torque to 35 to 50 N·m (25.8 to 36.9 lbf ft).
9. Fill the wheel ends of the drive axle with transmission oil by performing one of the following procedures:

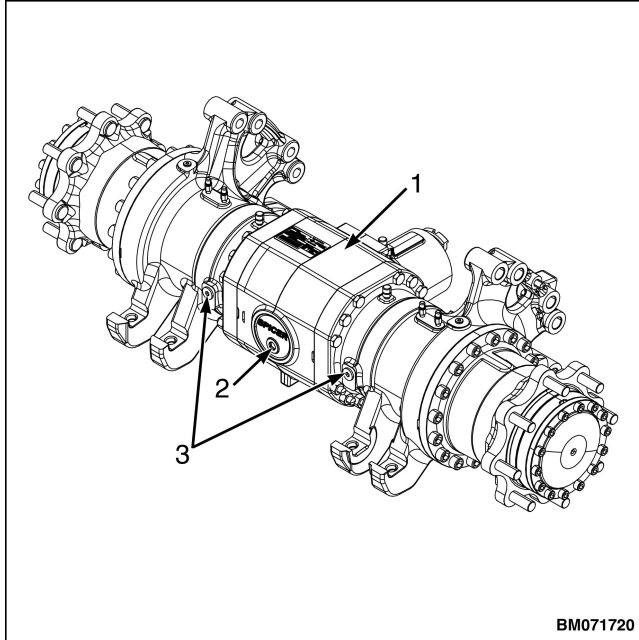
Fill transmission

- a. Confirm the truck is off and transmission oil fill lines are connected to the drive axle and all plugs are in place.
- b. Add oil to the transmission.
 - For Powershift transmission, see Transmission oil drain and fill (Powershift).

- For Hydrostatic transmission, see Transmission oil level, Hydrostatic transmission (HST).
- c. Start the truck and allow the transmission oil to cycle through the system and fill the drive axle.
 - d. Turn the truck off and wait one minute or longer for transmission oil to cool.
 - e. Check transmission oil level again. If oil level is low, repeat Item a. through Item e. until oil level on dipstick reads FULL.

Fill drive axle and transmission

- a. Confirm the truck is off and transmission oil fill lines are connected to the drive axle and all plugs are in place.
 - b. Remove the two plugs that cover the wheel end oil check/fill ports. There is one located on each side of the drive axle center section. See item 3, Figure 148.
 - c. Fill each port with about 1.5 liter (50 oz) of transmission oil (each wheel end holds roughly 2 liter (68 oz) of oil).
 - d. Install the plugs back in the wheel end oil check/fill ports and tighten each plug. Torque to 35 to 50 N·m (25.8 to 36.9 lbf ft).
 - e. To fill the remainder of the drive axle, add oil to the transmission.
 - For Powershift transmission, see Transmission oil drain and fill (Powershift).
 - For Hydrostatic transmission, see Transmission oil level, Hydrostatic transmission (HST).
 - f. Start the truck and allow the transmission oil to cycle through the system and fill the drive axle.
 - g. Turn the truck off and wait one minute or longer for transmission oil to cool.
 - h. Check transmission oil level again. If oil level is low, repeat Item e. through Item h. until oil level on dipstick reads FULL.
10. Loosen the wheel end check/fill plugs. Oil should leak at threads.
 - If oil is present at the threads, tighten plugs.
 - If no oil escapes from threads, check for restriction or obstruction.



1. WET BRAKE DRIVE AXLE
2. CENTER SECTION CHECK/FILL PLUG
3. WHEEL END OIL CHECK/FILL PLUG

Figure 148. Wet Brake Axle Fluid Fill

EGR COOLER

The EGR cooler must be cleaned periodically (every 2000 hours). The exhaust gas passage and cooling water transit portion are subject to carbon deposits. These carbon deposits gradually deteriorate the cooling of recirculated gas, resulting in higher gas temperatures and a lowering of effective circulation amount (EGR ratio).

To remove deposited carbon from the gas passage, use compressed air (0.19 MPa (2 kg/cm²) or lower). Then dip the gas passage in carbon cleaner, kerosene or other liquid used for removing carbon. Let dry, then clean again with compressed air.

To clean the engine coolant transit portion, soak it in a solution of descaling detergent.

EGR PIPE AND OTHER CONNECTING ELBOWS

The exhaust gas passage is subject to carbon deposits when used over time. To remove deposited carbon from the gas passage, use compressed air (0.19 MPa (2 kg/cm²) or lower). If the exhaust gas passage is heavily fouled, dip it in carbon cleaner, kerosene or other liquid used for removing carbon. Let dry, then clean again with compressed air.

NOTE: Follow all guidelines from the EPA or other government agencies regarding the proper disposal of hazardous materials such as engine oil, diesel fuel and engine coolant. Consult local authorities or chemical recycling facility.

DRY BRAKE DRIVE AXLE WHEEL BEARING

Lubricate the wheel bearings in the hubs of the dry brake drive axle with multipurpose grease as specified in Every 2000 hours or One Year periodic maintenance (PM) schedule.

STEER AXLE WHEEL BEARING

Lubricate the wheel bearings in the hubs of the steer wheels with multipurpose grease as specified in Every 2000 hours or One Year periodic maintenance (PM) schedule.

EVERY 3000 HOURS OR EIGHTEEN MONTHS PERIODIC MAINTENANCE (PM) PROCEDURES 202001-113

INTAKE AND EXHAUST THROTTLE VALVES, YANMAR 2.1L DIESEL AND 2.2L LPG OR BI-FUEL ENGINES

The intake and exhaust throttle valves can affect the exhaust gas treatment performance. Inspect the actuation of each valve. Contact your dealer for more information.

VALVE CLEARANCE ADJUSTMENTS, YANMAR 2.1L DIESEL AND 2.2L LPG OR BI-FUEL ENGINES

NOTE: Make measurements and adjustments while the engine is cold.

NOTE: Valve clearance of both the intake and exhaust valves can be checked with the piston for that cylinder at top dead center (TDC) of the compression stroke. When a piston is at TDC of the compression stroke, both rocker arms will be loose and the cylinder TDC mark on the flywheel will be visible in the timing port of the flywheel housing.

If there is no valve clearance, and the cylinder is at TDC of the compression stroke, extreme wear, or damage to the cylinder head or valves may be possible.

If adjusting each cylinder individually, the cylinder to be adjusted first does not have to be the No. 1 cylinder. Select and adjust the cylinder where the piston is nearest to the TDC after turning. Make adjustment for the remaining cylinders in the order of the firing by turning the crankshaft each time.

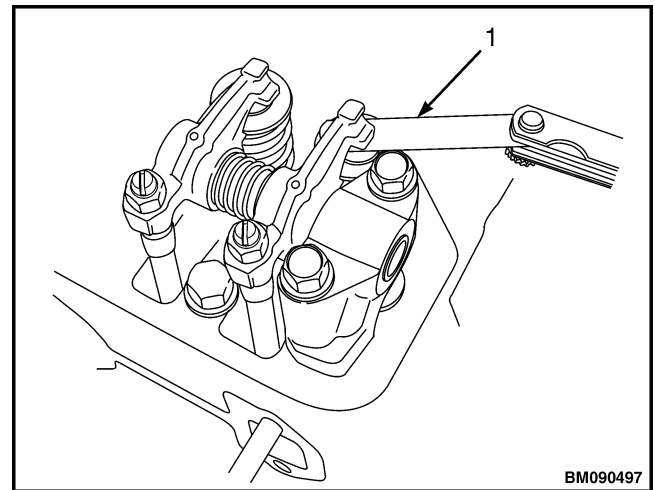
To decrease the number of rotations required to check all cylinders, other cylinders can also be checked as indicated in the chart below:

Cylinder No.	1		2		3		4	
	Intake	Exhaust	Intake	Exhaust	Intake	Exhaust	Intake	Exhaust
No. 1 cylinder at TDC compression	•	•	•			•		
No. 4 cylinder at TDC compression				•	•		•	•

1. Remove cylinder head cover. See **Yanmar Engines** 0600SRM2299.

NOTE: The number one piston position is on the flywheel end of the engine, opposite side of the radiator, and the ignition order is 1 - 3 - 4 - 2 at 180 degree intervals.

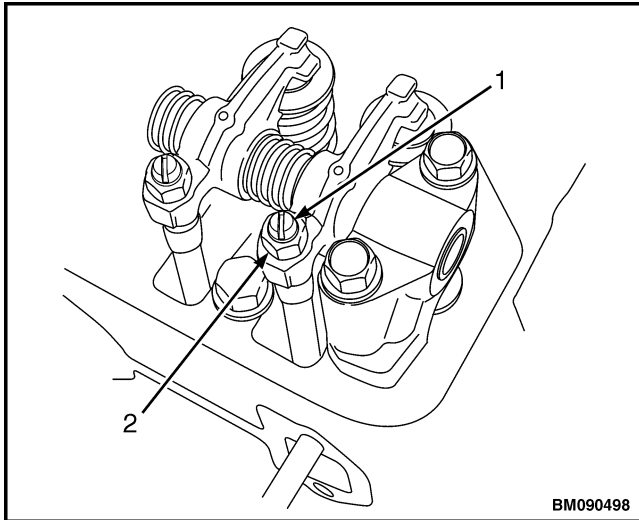
2. Rotate crankshaft clockwise, as seen from the radiator side, to bring the number one piston to top dead center (TDC) while watching the rocker arm motion, timing scale, and top mark position of the crankshaft pulley (position where both the intake and exhaust valves are closed).
3. Insert a feeler gauge between the rocker arm and valve cap. See Figure 149. Record the measured valve clearance.
 - For diesel engine options, the intake and exhaust valve clearance should be between 0.15 to 0.25 mm (0.006 to 0.010 in.) when cold.
 - For LPG engine options, the intake valve clearance should be between 0.25 to 0.35 mm (0.010 to 0.014 in.) when cold. The exhaust valve clearance should be between 0.35 to 0.45 mm (0.014 to 0.018 in.).



1. FEELER GAUGE

Figure 149. Valve Clearance Measurement

4. If adjustment is needed, loosen the valve adjusting screw lock nut and valve adjusting screw on the rocker arm (see Figure 150) and check the valve for any slope of valve cap, entrance of dirt, or wear.



1. VALVE ADJUSTING SCREW
2. VALVE ADJUSTING SCREW LOCK NUT

Figure 150. Valve Clearance Adjustment

NOTE: Clearance will decrease slightly when the lock nut is tightened. Make the clearance adjustment slightly on the loose side before tightening the lock nut.

5. Insert a feeler gauge between the rocker arm and valve cap and adjust the clearance so there is a slight drag on the feeler gauge when sliding it between the rocker arm and valve cap.
6. Tighten the valve adjusting screw lock nut and recheck the clearance. See Figure 150.
 - For diesel engine options, the intake and exhaust valve clearance should be between 0.15 to 0.25 mm (0.006 to 0.010 in.) when cold.
 - For LPG or bi-fuel engine options, the intake valve clearance should be between 0.25 to 0.35 mm (0.010 to 0.014 in.) when cold. The exhaust valve clearance should be between 0.35 to 0.45 mm (0.014 to 0.018 in.).
7. Apply clean engine oil to the contact surface between the adjusting screw and push rod.
8. Turn the crankshaft 180 degrees and make the measurement and adjustment for the number three cylinder. Then turn the crankshaft 180 degrees and make the measurement and adjustment for the number four cylinder. Then

turn the crankshaft 180 degrees and make the measurement and adjustment for the number 2 cylinder.

9. Install the valve cover. See **Yanmar Engines** 0600SRM2299.

**EVERY 4000 HOURS OR TWO YEARS
PERIODIC MAINTENANCE (PM)
PROCEDURES
202001-115**

COOLING SYSTEM

Coolant drain and flush



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.



WARNING

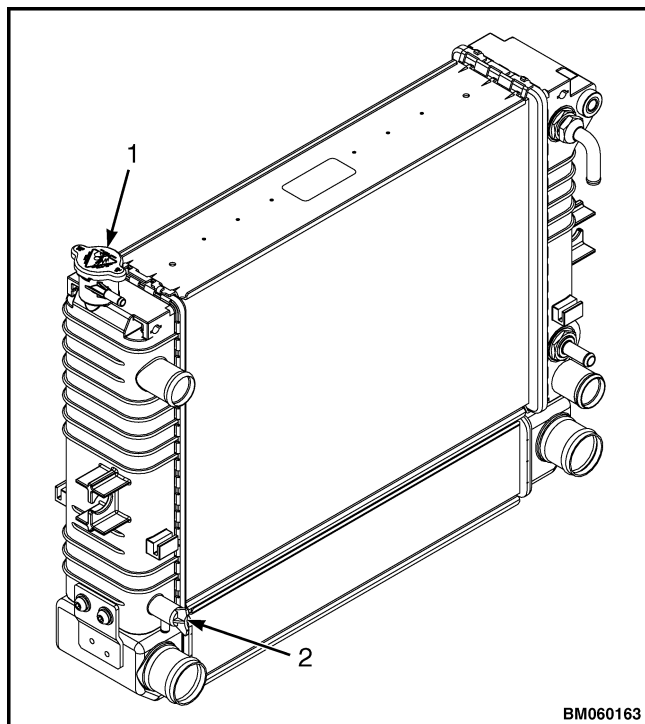
The radiator or other parts of the cooling system may be hot or under pressure and can cause serious injury. Wait 30 minutes for the radiator to cool. Test the radiator by touching with your hand. If the radiator is still hot to the touch, wait another 30 minutes before attempting to check or fix any part of the cooling system.



CAUTION

Disposal of lubricants and fluids must meet local environmental regulations.

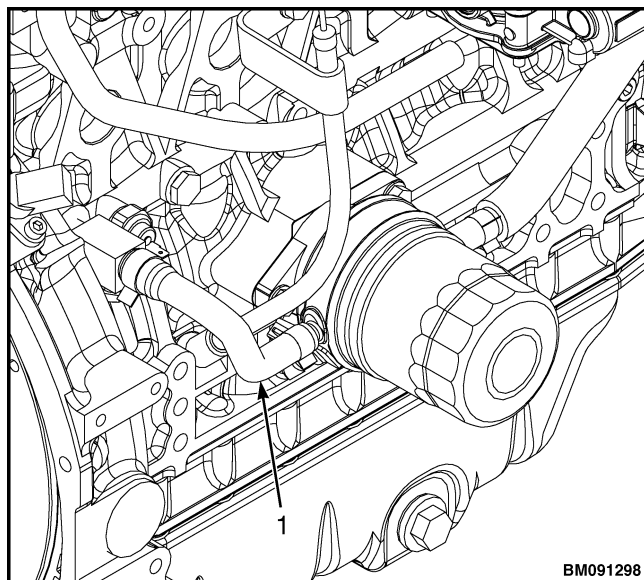
1. Confirm the lift truck is on a level surface with the engine off.
2. Place a container with a minimum capacity of 10.5 liter (11.1 qt) under the drain valve on the radiator. See Figure 151.
3. Attach an 8 mm (0.31 in.) drain hose to the drain valve (2, Figure 151) on the radiator. Turn the handle on the drain valve clockwise to drain the coolant from the cooling system into the container.



1. RADIATOR CAP
2. DRAIN VALVE

Figure 151. Radiator drain and fill

4. Drain the coolant from the engine block, by removing the coolant hose at the oil cooler and allowing the coolant to drain into the container.



1. COOLANT HOSE

Figure 152. Oil cooler

5. Fill the cooling system with clean water. See Radiator repair in **Cooling system** 0700SRM2300 for procedures.
6. Install the radiator cap. Run the engine until the top radiator hose is warm to the touch. Stop the engine and allow engine to cool.
7. Drain all water from radiator. If water is dirty, fill the system with water and repeat this procedure until the water is clean.



CAUTION

Follow the manufacturer's instructions when using a chemical radiator cleaner.

8. If water does not clean the system, use a chemical radiator cleaner.



CAUTION

Follow the manufacturer's instructions when using special equipment to reverse clean the radiator.

9. If radiator or cooling system is very dirty or has a restriction, use reverse cleaning method. This method uses water pressure to force water through radiator in opposite direction of normal flow.

Coolant fill

 **CAUTION**

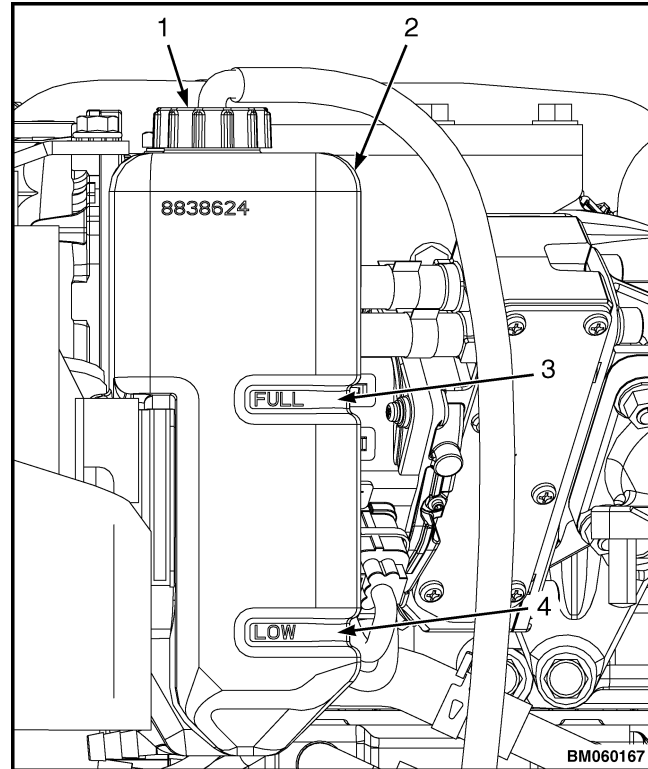
Additives may damage the cooling system. Before using additives, contact your local Hyster dealer. NEVER mix coolant types or brands without draining the cooling system completely first.

 **CAUTION**

Trucks built prior to May 2021 use either a 50% water/50% ethylene-glycol boron free, silicate free, antifreeze/coolant mixture or BASF® Glysantin G40 coolant. These mixtures may be either BLUE, RED (built in Europe), or GREEN (built in U.S.). When replacing the antifreeze/coolant or adding to existing coolant, use this mixture. If a change in coolant type is desired, ensure the system is completely drained and flushed, then fill with Valvoline OEM Advanced 40 Ready Mix. To avoid damage to the cooling system, DO NOT mix different brands or types of coolant.

Trucks built after May 2021 use Valvoline OEM Advanced 40 Ready Mix which is PINK. Valvoline OEM Advanced 40 Ready Mix is NOT compatible with any other coolant and therefore should not be mixed.

1. Close drain valve. Fill cooling system with coolant to keep level between the **ADD** and **FULL** marks on the reservoir with antifreeze/coolant mixture as specified below:
 - a. **For trucks built prior to May 2021**, use a 50% water/50% ethylene-glycol boron free, silicate free mixture. Purchase a pre-diluted 50/50 solution; or mix 50 percent concentrate with 50% distilled or deionized water. The 50/50 mixture will protect cooling system to -37°C (-34.6°F).
 - b. **For trucks built after May 2021**, use Valvoline OEM Advanced 40 Ready Mix. The Ready Mix will protect cooling system to -36°C (-32.8°F).



1. COOLANT RESERVOIR
2. FULL HOT MARK
3. FULL COLD MARK
4. ADD MARK

Figure 153. Coolant reservoir

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. Operating the hydraulic pump without oil will damage the pump.

**CAUTION**

Disposal of lubricants and fluids must meet local environmental regulations.

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

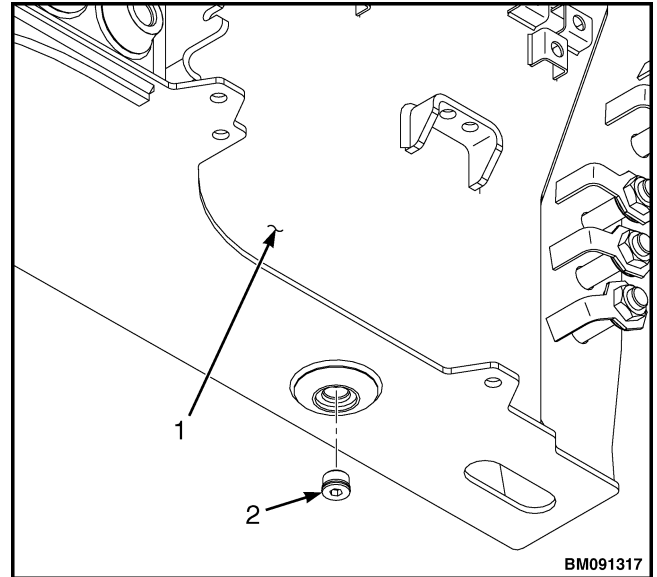
NOTE: Check and clean hydraulic oil strainer screen, every time hydraulic oil is changed.

1. Replace hydraulic oil as described below:
 - a. Locate the drain plug at the bottom of the hydraulic tank. See Figure 154.
 - b. Place a container with a minimum capacity of 41 liter (43.3 qt) under the drain plug.
 - c. Remove the drain plug. See Figure 154.
 - d. When 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 Hydraulic oil tank repair in **Frame and Main Components 8000SRM2306**.
 - e. When 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 Hyster dealer.

2. Fill hydraulic tank with oil as specified in the Every 4000 hours or Two Years periodic maintenance (PM) schedule.
3. When correct oil level is reached, operate the system and check for leaks.

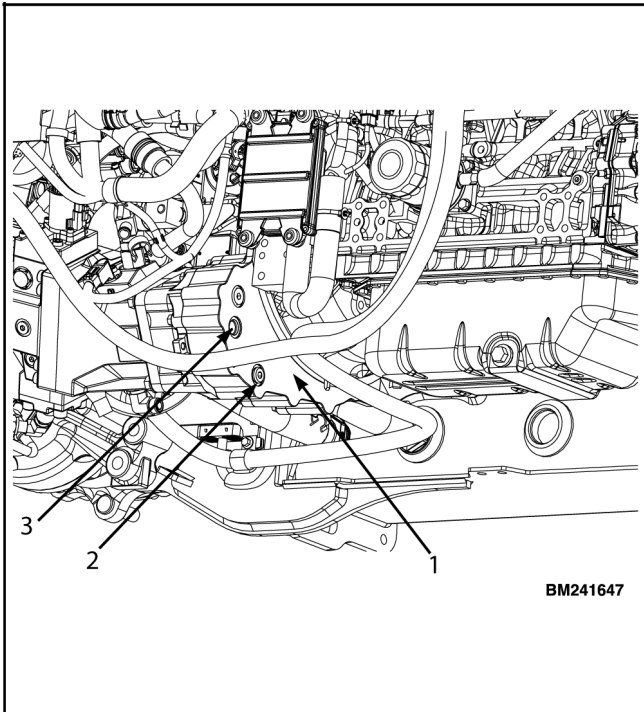


1. HYDRAULIC TANK 2. DRAIN PLUG

Figure 154. Hydraulic oil drain plug

HYDROSTATIC TRANSMISSION CHAIN CASE, DRAIN AND FILL

1. Confirm the truck is parked with the engine level.
2. Locate the magnetic drain plug (item 2, Figure 155) at the bottom of the chain case.
3. Remove the drain plug and drain all fluid from the chain case.
4. Use a pump to add oil to the chain case at the fill port (item 3, Figure 155). See Every 4000 hours or Two Years periodic maintenance (PM) schedule for correct oil specifications.
5. Oil level should be at the the bottom fill port.
6. Replace the removed drain plug with a new drain plug. See **Parts Manual** for correct part number.
7. Torque the new drain plug to 49 to 53 N·m (36.1 to 39.1 lbf ft).



1. CHAIN CASE
2. DRAIN PLUG
3. FILL HOLE

Figure 155. Chain case drain plug

SPARK PLUGS, YANMAR 2.2L LPG OR BI-FUEL ENGINE

1. Remove each spark plug from the engine and replace with new. See **Yanmar Engines** 0600SRM2299.

EVERY 5000 HOURS OR THIRTY MONTHS PERIODIC MAINTENANCE (PM) PROCEDURES 202001-110

V-BELT (DRIVE BELT)

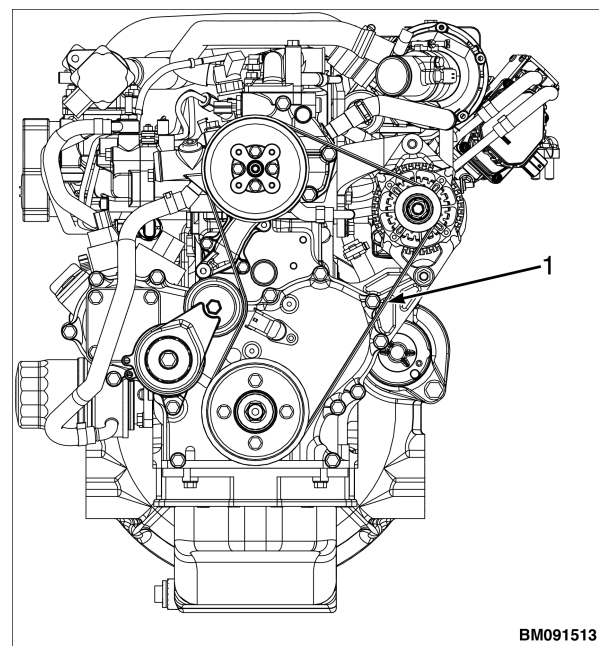
1. Remove the cooling fan V-belt and replace with new. See **Cooling system** 0700SRM2300 for procedure.

Auto tensioner

NOTE: In engines equipped with auto tensioner, the crankshaft pulley, fan pulley and alternator are specialist parts. A standard V-belt cannot be used. Use a ribbed V-belt. See **Parts Manual** for correct part information.

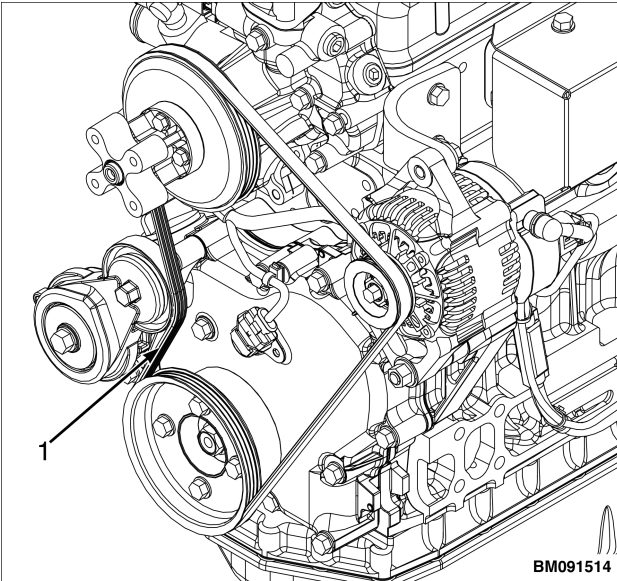
If your engine is equipped with auto tensioner, the V-belt does not need to be adjusted, but must be replaced.

1. Apply a wrench to the hexagonal bolt on the tension pulley shaft, and turn the wrench in the direction of the arrow until the two pin holes align.
2. With the two pin holes aligned, insert the pin to fix the tension pulley shaft in place. With the tension pulley in a free state, remove the belt.
3. Install the new belt. See **Parts Manual** for correct part number.
4. After installing the new belt, apply the wrench to the hexagonal bolt on the tension pulley shaft. Pull on the pulley shaft and remove the belt. Check that the belt is tight.



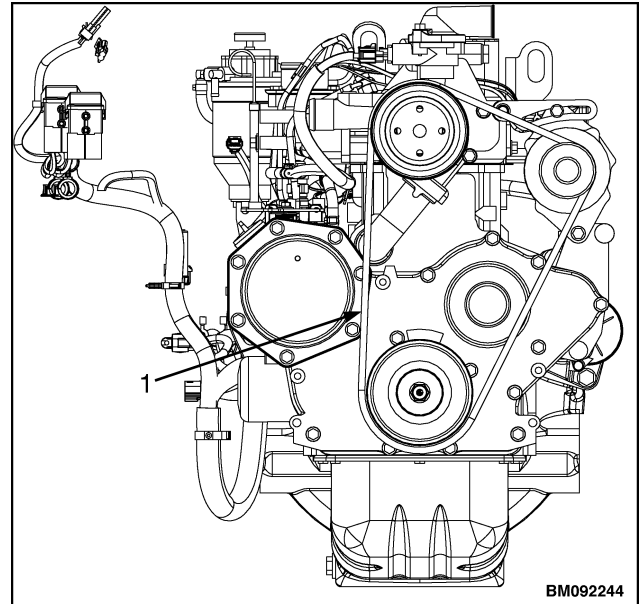
1. V-BELT

Figure 156. V-belt, Yanmar 2.1L Diesel Engine



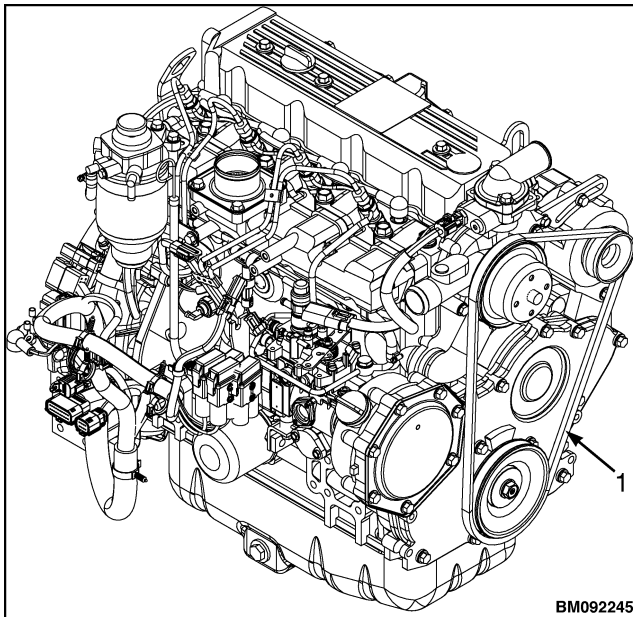
1. V-BELT

Figure 157. V-belt, Yanmar 2.2L LPG and Bi-Fuel Engine



1. V-BELT

Figure 159. V-belt, Yanmar 3.3L Diesel Engine



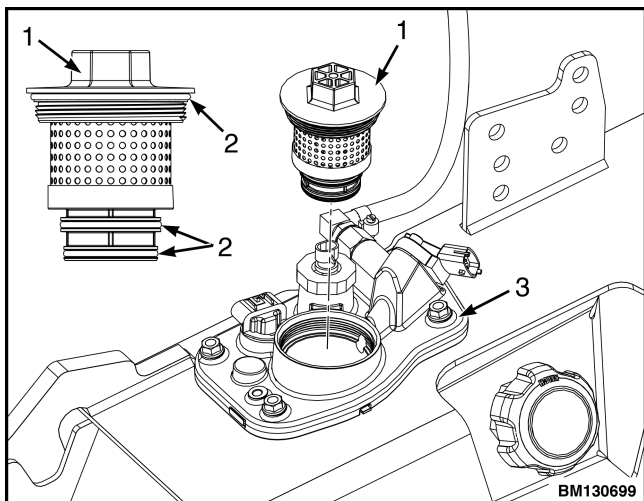
1. V-BELT

Figure 158. V-belt, Yanmar 3.0L Diesel Engine

GASOLINE FUEL FILTER, YANMAR BI-FUEL ENGINE

Remove

1. Raise hood and disconnect negative battery cable.
2. Remove fuel filter from fuel manifold. See Figure 160.



1. FUEL FILTER
2. O-RING
3. FUEL MANIFOLD

Figure 160. Gasoline Fuel Filter

Install

1. Apply dielectric grease to three o-rings of fuel filter.
2. Insert the fuel filter into fuel manifold. Tighten fuel filter to 22 N•m (16.2 lbf ft).
3. Connect negative battery cable and close hood.

EVERY 6000 HOURS OR THREE YEARS PERIODIC MAINTENANCE (PM) PROCEDURES 202001-116

DPF, YANMAR 2.1L DIESEL ENGINE

NOTE: If your engine is equipped with an optional DPF cleaning alarm, clean the DPF when the alarm lamp comes on. If the DPF is not equipped with a cleaning alarm, clean the DPF every 6000 hours of operation.

1. Check and clean the DPF soot filter. Contact service provider for more information.

PCV VALVE, YANMAR 2.2L LPG OR BI-FUEL ENGINE

1. Remove the PCV valve from the engine.
2. Replace with new PCV valve. See Parts Manual for correct part number.
3. Tighten the bolts to retain the new PCV valve. Torque to 40 to 50 N•m (29.5 to 36.9 lbf ft).

AIR CLEANER



WARNING

Compressed air can move particles and make them become airborne, which may cause injury. Make sure the path of the compressed air is away from all personnel. Wear protective goggles or a face shield to prevent eye injury.

NOTE: The engine performance is adversely affected when the air cleaner is clogged with dust. The air filter must be cleaned regularly.

NOTE: Never operate the engine with the air cleaner element(s) removed. This may allow foreign material to enter the engine and damage it.

1. Locate the air cleaner.
2. Unlatch and remove the air cleaner cover (item 1, Figure 161).

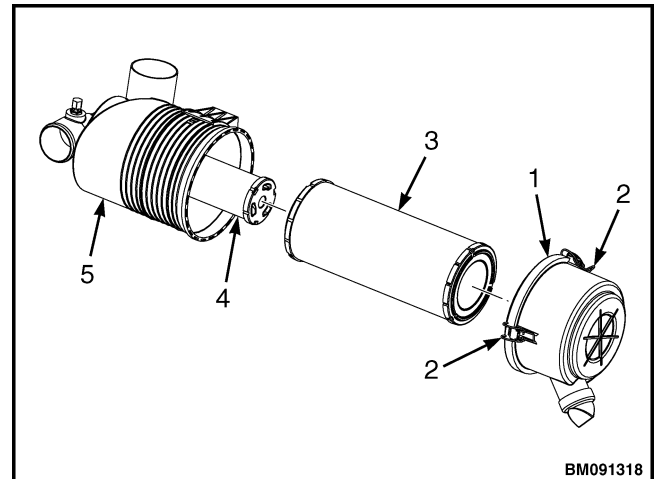


CAUTION

To reduce the risk of wear and damage to engine components, **DO NOT** remove the inner element when cleaning or replacing the outer element.

3. Remove the primary filter element (item 3, Figure 161).
4. Remove the safety filter element (item 4, Figure 161).
5. Locate new safety filter element. See **Parts Manual** for correct part number.

6. Insert new safety filter element into the air cleaner case.
7. Insert primary filter element into the air cleaner case.
8. Install the outer element back into the air cleaner case.
9. Reinstall the air cleaner cover, by aligning the arrow on the cover with the arrow on the air cleaner case. Latch the cover to the case.



1. AIR CLEANER COVER
2. LATCHES
3. PRIMARY FILTER ELEMENT
4. SAFETY FILTER ELEMENT
5. AIR CLEANER CASE

Figure 161. Air cleaner



TECHNICAL PUBLICATIONS