

SAFETY.CAT.COM™

MAINTENANCE INTERVALS

Operation and Maintenance
Manual Excerpt



Operation and Maintenance Manual

980H Wheel Loader

A8J1-Up (980H)
JMS1-Up (980H)
KZL1-Up (980H)
MHG1-Up (980H)

i04876432

Maintenance Interval Schedule

SMCS Code: 7000

Ensure that all safety information, warnings, and instructions are read and understood before any operation or any maintenance procedures are performed.

The user is responsible for the performance of maintenance. All adjustments, the use of proper lubricants, fluids, filters, and the replacement of components due to normal wear and aging are included. Failure to adhere to proper maintenance intervals and procedures may result in diminished performance of the product and/or accelerated wear of components.

Use mileage, fuel consumption, service hours, or calendar time, WHICH EVER OCCURS FIRST, in order to determine the maintenance intervals. Products that operate in severe operating conditions may require more frequent maintenance. Refer to the maintenance procedure for any other exceptions that may change the maintenance intervals.

Note: The aftertreatment system can be expected to function properly for the useful life of the engine (emissions durability period), as defined by regulation. All prescribed maintenance requirements must be followed.

Note: Before each consecutive interval is performed, all maintenance from the previous interval must be performed.

Note: If Cat HYDO Advanced hydraulic oils are used, the hydraulic oil change interval is extended substantially. S-O-S services may extend the oil change even longer. Consult your Cat dealer for details.

The following guidelines should be followed if the service hours are not met:

Items listed between 10 and 100 service hours should be performed at least every 3 months.

Items listed between 250 and 500 service hours should be performed at least every 6 months.

Items listed between 1000 service hours and 2500 service hours should be performed at least every year.

When Required

Automatic Lubrication Grease Tank - Fill	121
Battery or Battery Cable - Inspect/Replace	124
Bucket Cutting Edges - Inspect/Replace	126

Bucket Hinge and Lift Arm Clearance Shims - Inspect/Adjust/Replace	127
Bucket Tips - Inspect/Replace	129
Bucket Wear Plates - Inspect/Replace	132
Camera - Clean	132
Circuit Breakers - Reset	134
Engine Air Filter Primary Element - Clean/Replace	144
Engine Air Filter Secondary Element - Replace ..	146
Ether Starting Aid Cylinder - Replace	153
Fuel System - Prime	154
Fuel Tank Breaker Relief Valve - Replace	157
Fuses - Replace	159
High Intensity Discharge Lamp (HID) - Replace ..	160
Oil Filter - Inspect	167
Pallet Fork - Inspect	168
Radiator Core - Clean	171
Ride Control Accumulator - Check	173
Secondary Steering - Test	175
Window Washer Reservoir - Fill	180
Window Wiper - Inspect/Replace	180

Every 10 Service Hours or Daily

Backup Alarm - Test	122
Cooling System Coolant Level - Check	137
Engine Air Filter Service Indicator - Inspect	148
Engine Oil Level - Check	149
Fuel System Primary Filter (Water Separator) - Drain	154
Hydraulic System Oil Level - Check	166
Seat Belt - Inspect	174
Transmission Oil Level - Check	179
Windows - Clean	181

Every 50 Service Hours or Weekly

Bucket Lower Pivot Bearings - Lubricate	129
Bucket Upper Pivot Bearings - Lubricate	131
Cab Air Filter - Clean/Replace	132
Fuel Tank Water and Sediment - Drain	158
Hydraulic System Oil Level (Hood Tilt) - Check ..	165
Tire Inflation - Check	177

Every 100 Service Hours or 2 Weeks

Axle Oscillation Bearings - Lubricate	122
Bucket Linkage and Loader Cylinder Bearings - Lubricate	128
Logging Fork Clamp - Lubricate	167
Steering Cylinder Bearings - Lubricate	176

Initial 250 Service Hours

Engine Valve Lash - Check	153
Transmission Oil Filter - Replace	179

Every 250 Service Hours

Drive Shaft Support Bearing - Lubricate	143
Engine Oil Sample - Obtain	150

Every 250 Service Hours or Monthly

Battery - Clean	123
Belt - Inspect/Adjust/Replace	124
Brake Accumulator - Check	125
Braking System - Test	125
Differential and Final Drive Oil Level - Check	141
Drive Shaft Spline (Center) - Lubricate	143
Engine Air Filter Service Indicator - Inspect/Replace	148

Every 250 Service Hours or 3 Months

Engine Crankcase Breather - Clean	149
Engine Oil and Filter - Change	150
Pallet Fork - Lubricate	171
Steering Column Play - Check	175

Initial 500 Hours (for New Systems, Refilled Systems, and Converted Systems)

Cooling System Coolant Sample (Level 2) - Obtain	138
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Every 500 Service Hours

Cooling System Coolant Sample (Level 1) - Obtain	137
Differential and Final Drive Oil Sample - Obtain ..	142
Hydraulic System Oil Sample - Obtain	166
Transmission Oil Sample - Obtain	180

Every 500 Service Hours or 3 Months

Engine Oil and Filter - Change	150
Fuel System Primary Filter (Water Separator) Element - Replace	155
Fuel System Secondary Filter - Replace	156
Fuel Tank Cap and Strainer - Clean	158
Hydraulic System Biodegradable Oil Filter Element - Replace	161
Hydraulic System Oil Filter - Replace	164

Every 1000 Service Hours or 6 Months

Articulation Bearings - Lubricate	121
Battery Hold-Down - Tighten	123
Case Drain Screen (Strainer) (Steering Pump, Hydraulic Fan Pump, Motor) - Clean	133
Rollover Protective Structure (ROPS) - Inspect ..	173
Steering Pilot Oil Screen (Command Control Steering) - Clean/Replace	177
Transmission Oil - Change	177
Transmission Oil Filter - Replace	179

Every 2000 Service Hours or 1 Year

Brake Discs - Check	125
Differential and Final Drive Oil - Change	139
Electronic Unit Injector - Inspect/Adjust	144
Engine Valve Lash - Check	153
Engine Valve Rotators - Inspect	153
Hydraulic System Oil - Change	162

Hydraulic Tank Breaker Relief Valve - Clean	166
Service Brake Wear Indicator - Check	175
Steering Column Spline (Command Control Steering) - Lubricate	176

Every Year

Cooling System Coolant Sample (Level 2) - Obtain	138
Receiver Dryer (Refrigerant) - Replace	172

**Every 3 Years After Date of Installation or
Every 5 Years After Date of Manufacture**

Seat Belt - Replace	174
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Every 6000 Service Hours or 3 Years

Cooling System Coolant Extender (ELC) - Add ..	136
Cooling System Water Temperature Regulator - Replace	138

Every 12 000 Service Hours or 6 Years

Cooling System Coolant (ELC) - Change	134
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i03023062

Articulation Bearings - Lubricate

SMCS Code: 7057-086-BD; 7065-086-BD;
7066-086-BD

WARNING

Crushing Hazard. Insure that the machine ignition switch is in the OFF position and that the parking brake is engaged before entering the articulation area. Failure to do so could result in serious injury or death.

Wipe all fittings before applying grease.

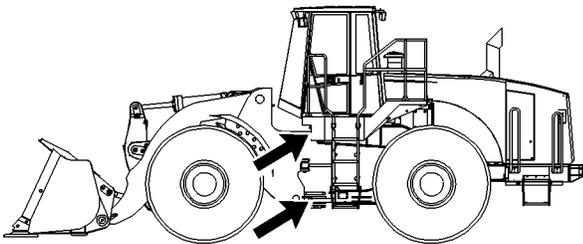


Illustration 134

g00879717

Apply grease to one fitting on the upper pivot bearing and one fitting on the lower pivot bearing.

i03700085

Automatic Lubrication Grease Tank - Fill (If Equipped)

SMCS Code: 7540-544-TNK

The Lincoln Quicklub Lubrication System

Reference: Before any service work is performed on the lubrication system, refer to Special Instructions, REHS1396 or consult your Caterpillar dealer.

WARNING

A pressure hazard is present. Severe personal injury or death can result from removing hoses or fittings that are under pressure. Relieve the pressure in the system before you remove hoses or fittings.

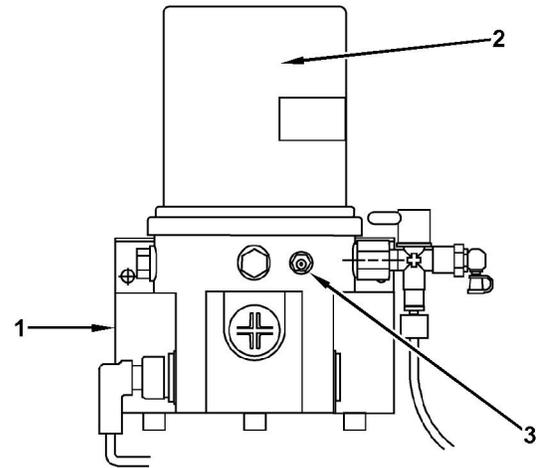


Illustration 135

g01067897

Filling the Reservoir

1. The Lincoln Quicklub pump (1) is located near the rear fender on the right side of the machine.
2. Fill the reservoir (2) through the grease fitting (3). The grease fitting (3) is located at the base of the reservoir (2).

Reference: For the correct type of grease, refer to Operation and Maintenance Manual, "Lubricant Viscosities".

3. Refill the reservoir when the grease reaches the "MIN" mark on the reservoir.
4. Fill the reservoir to the "MAX" mark on the reservoir.

Priming the System

After the reservoir has been filled with the recommended lubricant, loosen the fitting to the supply line. Operate the pump until lubricant flows from the outlet. Then, tighten fitting.

The Automatic TWIN Greasing System

Reference: Refer to System Operation, RENR 6331 for more information on the Automatic TWIN Greasing System.

WARNING

A pressure hazard is present. Severe personal injury or death can result from removing hoses or fittings that are under pressure. Relieve the pressure in the system before you remove hoses or fittings.

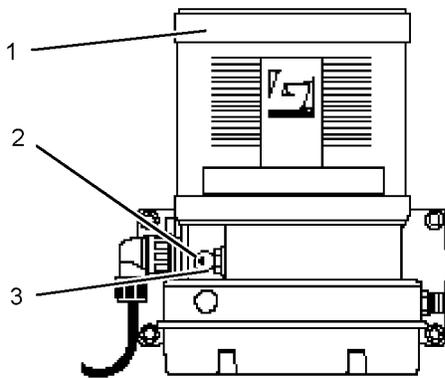


Illustration 136

g01068678

Grease reservoir (1) is located near the rear fender on the right side of the machine.

Filling the Reservoir

1. Remove the dust cap (2) from the grease reservoir (1).
2. Clean the filler tube assembly (3) and the coupling on the filler assembly.
3. Install the filler assembly onto the filler tube assembly (3).
4. Fill the grease reservoir (1) with grease to the maximum level which is indicated on the grease reservoir (1).

Reference: For the correct type of grease, refer to Operation and Maintenance Manual, "Lubricant Viscosities".

5. Remove the filler assembly and install the dust cap (2).

If pumping becomes difficult, the filter behind the coupling of the pump may be clogged. Also check the coupling of the filler pipe. Remove the clogged parts and clean the clogged parts. Clean the filter in the coupling on a regular basis.

Air may be pumped into the reservoir. Air can accumulate under the piston. In order to remove the air, fill the reservoir slightly above the maximum level mark. Air and grease can escape through the overflow passage in the piston guide. Excess air and excess grease will be released from the pump at the overflow passage. The overflow passage is located on the right side of the pump.

i02231817

Axle Oscillation Bearings - Lubricate

SMCS Code: 3268-086-BD; 3278-086-BD

Wipe all fittings before you apply lubricant.

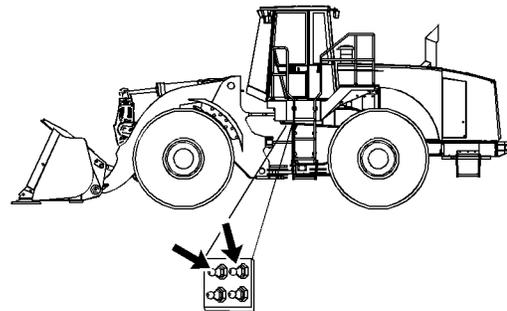


Illustration 137

g01125821

Apply grease to the two remote grease fittings that are located on the left side of the machine near the articulation joint.

i04404608

Backup Alarm - Test (If Equipped)

SMCS Code: 7406-081

The backup alarm is on the rear of the machine.

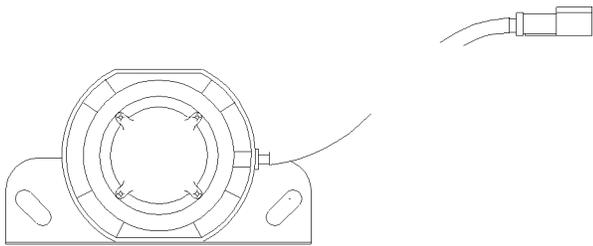


Illustration 138

g01043892

Turn the engine start switch to the ON position in order to perform the test.

Apply the service brake. Place the transmission into REVERSE.

The backup alarm should sound immediately. The backup alarm will continue to sound until the transmission is placed into NEUTRAL or into FORWARD.

i02065247

Battery - Clean

SMCS Code: 1401-070

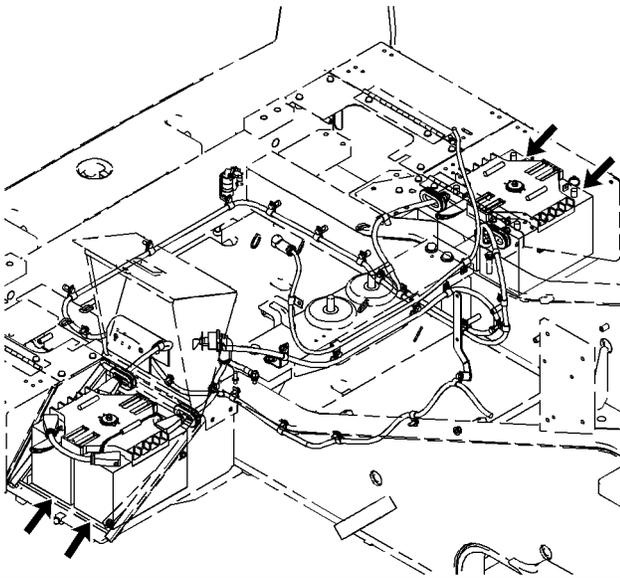


Illustration 139

g01058475

Open the battery compartment on the right rear side of the machine.

Clean the battery terminals and the surfaces of the batteries with a clean cloth. Coat the battery terminals with petroleum jelly. Make sure that the battery cables are installed securely.

Repeat for the battery compartment on the left rear side of the machine.

i02066363

Battery Hold-Down - Tighten

SMCS Code: 7257-527

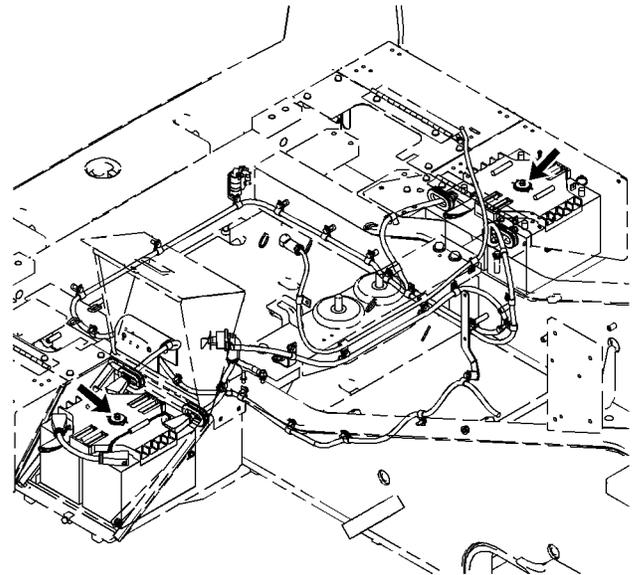


Illustration 140

g01058828

Open the battery compartment on the right rear side of the machine.

Over time, the vibration of an operating machine can cause the battery hold-downs to loosen. To help to prevent loose batteries and the possibility of loose cable connections, tighten the nut on the hold-down to a torque of 14.3 ± 3 N·m (10.5 ± 2.2 lb ft).

Repeat for the battery compartment on the left rear side of the machine.

i03657099

Battery or Battery Cable - Inspect/Replace

SMCS Code: 1401-040; 1401-510; 1402-040; 1402-510

WARNING

Personal injury may occur from failure to properly service the batteries.

Batteries give off flammable fumes that can explode. Electrolyte is an acid and can cause personal injury if it contacts the skin or eyes.

Prevent sparks near the batteries. Sparks could cause vapors to explode. Do not allow jumper cable ends to contact each other or the engine. Improper jumper cable connections can cause an explosion.

Always wear protective glasses when working with batteries.

1. Turn the engine start switch key OFF. Turn all of the switches OFF.
 2. Turn the battery disconnect switch OFF. Remove the key.
 3. Disconnect the negative battery cable from the disconnect switch.
- Note:** Do not allow the disconnected battery cable to contact the disconnect switch.
4. Disconnect the negative battery cable at the battery.
 5. Disconnect the positive battery cable at the battery.
 6. Inspect the battery terminals for corrosion. Inspect the battery cables for wear or damage.
 7. Make any necessary repairs. If necessary, replace the battery cables or the battery.
 8. Connect the positive battery cable at the battery.
 9. Connect the negative battery cable at the battery.
 10. Connect the battery cable at the battery disconnect switch.
 11. Install the key and turn the battery disconnect switch ON.

Recycle the Battery

Always recycle a battery. Never discard a battery.

Always return used batteries to one of the following locations:

- A battery supplier
- An authorized battery collection facility
- Recycling facility

i03700093

Belt - Inspect/Adjust/Replace

SMCS Code: 1397-025; 1397-040; 1397-510

Your machine is equipped with a single serpentine belt. Stop the engine. Open the rear hood. The belt is located at the front of the engine.

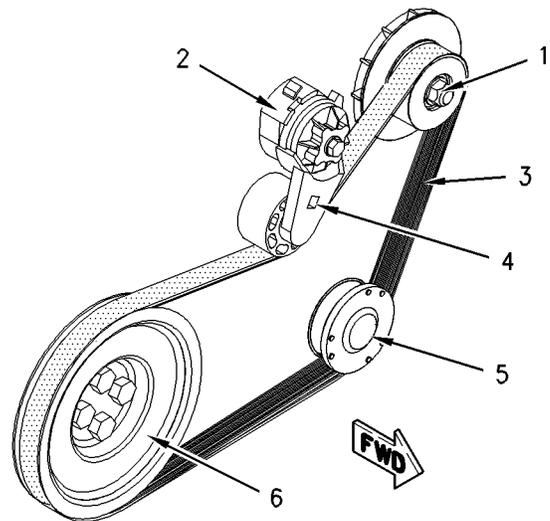


Illustration 141

g00759275

- (1) Alternator
- (2) Tensioner
- (3) Serpentine Belt
- (4) Square Drive Hole
- (5) Compressor
- (6) Drive Pulley

Inspect the condition of the serpentine belt. If the belt is cracked or frayed, replace the belt.

Insert a ratchet with a square drive into the hole (4) of the tensioner. Rotate the tensioner clockwise in order to relieve tension. Remove the belt. Install the new belt correctly, as shown. The tensioner will automatically apply the correct amount of tension to the new belt.

i01709202

i01739721

Brake Accumulator - Check

SMCS Code: 4263-535

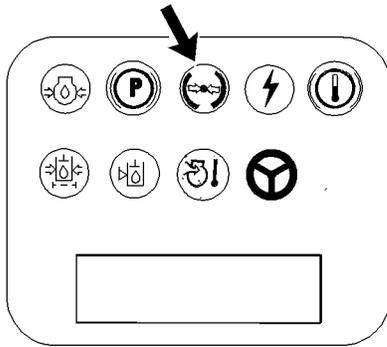


Illustration 142

g00883720

1. Turn the engine start switch to the ON position. The alert indicator for brake oil pressure should come on if the braking system is not at normal operating pressure.
2. Start the engine. Run the engine at half speed for two minutes in order to increase the accumulator pressure. The alert indicator for brake oil pressure should go off.
3. Stop the engine. Apply the service brake pedal and release the service brake pedal until the alert indicator for brake oil pressure comes on. This will decrease the accumulator pressure. A minimum of five applications of the service brake pedal are required.
4. If the alert indicator comes on after less than five applications of the brake, measure the accumulator precharge pressure. An authorized Caterpillar dealer can measure the nitrogen gas pressure in the accumulator. Use only dry nitrogen gas for recharging.

i01732078

Brake Discs - Check

SMCS Code: 4255-535

Reference: For the correct procedure, refer to the Testing and Adjusting Service Manual of the braking system for your machine or consult your Caterpillar dealer.

Braking System - Test

SMCS Code: 4251-081; 4267-081

- Fasten the seat belt before you test the brakes.
- Park the machine on a dry, level surface.
- Check the area around the machine. Make sure that the machine is clear of personnel and clear of obstacles.
- Make sure that the steering frame lock is in the unlocked position.

The following tests are used to determine whether the braking system is functional. These tests are not intended to measure the maximum brake holding effort. The required brake holding effort for sustaining a machine at a specific engine rpm varies from one machine to another machine. The variations include differences in the engine setting, the power train efficiency, the brake holding ability, etc.

Service Brake Holding Ability Test

WARNING

Personal injury can result if the machine moves while testing.

If the machine begins to move during test, reduce the engine speed immediately and engage the parking brake.

1. Start the engine. Raise the implement slightly. Apply the service brake. Release the parking brake.
2. Move the transmission control to THIRD SPEED FORWARD while the service brakes are applied. Make sure that the autoshift control is in the OFF position.
3. Gradually increase the engine speed to high idle. The machine should not move.
4. Reduce the engine speed to low idle. Move the transmission direction control to the NEUTRAL position. Engage the parking brake. Lower the implement to the ground. Stop the engine.

If the machine moved during the test, consult your Caterpillar dealer for a brake inspection. Make any necessary repairs before the machine is returned to operation.

Parking Brake Holding Ability Test

WARNING

Personal injury can result if the machine moves while testing.

If the machine begins to move, reduce the engine speed immediately and apply the service brake pedal.

This test is performed when the parking brake is engaged. If the machine begins to move, compare the engine rpm to the engine rpm of a prior test. This will indicate the amount of system deterioration.

1. Start the engine. Raise the implement slightly. Engage the parking brake.
2. Move the transmission control to THIRD SPEED FORWARD. Make sure that the autoshift control is in the OFF position.

The parking brake indicator light should come on.
3. Gradually increase the engine speed to high idle. The machine should not move.
4. Reduce the engine speed to low idle. Move the transmission direction control to the NEUTRAL position. Lower the implement to the ground. Stop the engine.

If the machine moved during the test, consult your Caterpillar dealer for a brake inspection. Make any necessary repairs before the machine is returned to operation.

i03657238

Bucket Cutting Edges - Inspect/Replace

SMCS Code: 6801-040; 6801-510

WARNING

Personal injury or death can result from bucket falling.

Block the bucket before changing bucket cutting edges.

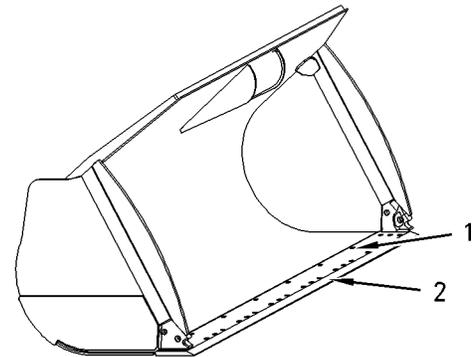


Illustration 143

g00764365

- (1) Bolts for Cutting Edge
(2) Cutting Edge

Check the cutting edges and the end bits for wear and for damage. Use the following procedure to service the cutting edges and the end bits:

1. Raise the bucket and place blocking under the bucket.
2. Lower the bucket onto the blocking. Stop the engine.
3. Remove bolts (1), cutting edge (2) and the end bits.
4. Clean all contact surfaces.
5. If the opposite side of the cutting edge is not worn, use the opposite side of the cutting edge. The end bits are not reversible.

If both sides are worn, install a new cutting edge.
6. Install bolts (1). Tighten the bolts to the specified torque.

Reference: Refer to Specifications, SENR3130, "Ground Engaging Tool (G.E.T.) Fasteners".

7. Start the engine. Raise the bucket and remove the blocking. Lower the bucket to the ground.
8. After a few hours of operation, check the bolts for proper torque.

i04878904

Bucket Wear Plates

WARNING

Personal injury or death can result from the bucket falling.

Block the bucket before changing bucket wear plates.

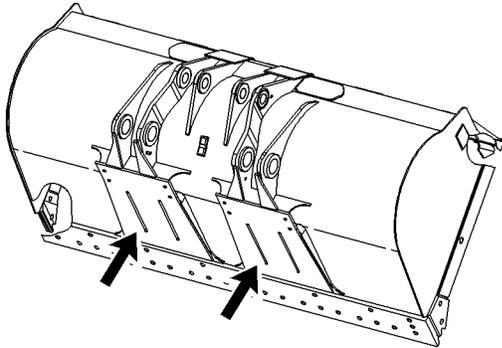


Illustration 144

g00879740

Inspect the wear plates. Replace the wear plates before damage to the bottom of the bucket occurs. Consult your Caterpillar dealer for replacement of wear plates.

Bucket Hinge and Lift Arm Clearance Shims - Inspect/Adjust/Replace

SMCS Code: 6001-025-CLR; 6001-040-CLR;
6001-510-Z4; 6119-025-CLR; 6119-040-CLR;
6119-510-Z4

Inspect the Linkage

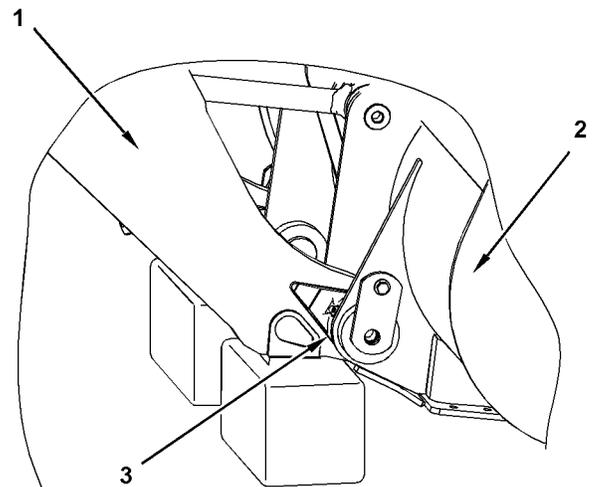


Illustration 145

g03003577

- (1) Lift Arm
- (2) Bucket
- (3) Inspection Points for the Bucket Hinge.

Periodically inspect the bucket linkage. The gap between the bucket and the linkage should not exceed the thinnest shim that is available for the bucket assembly.

1. Lower the lift arm assembly (1) to suitable blocking. Rest the bucket (2) on the ground.
2. Use a gauge to measure the gap at the hinge.
3. If the measurement exceeds the required amount, new shims must be installed.

Installing Shims for the Hinge on the Bucket

Note: Refer to the Disassembly and Assembly Manual, "Bucket - Remove" for the correct procedure for removing the pins in the linkage.

i02231274

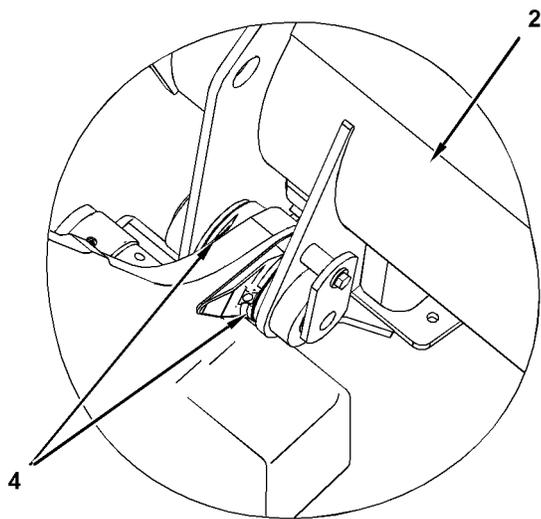


Illustration 146

g01345720

- (2) Bucket
- (4) Install washers on lift arm.

Install washers and pin assembly to the bucket. When possible, use washers on both sides of the lift arm to reduce the gap between the lift arm and the hinges on the bucket.

Note: Refer to the Disassembly and Assembly Manual, "Bucket - Install" for the correct procedure for installing the pins in the linkage.

Bucket Linkage and Loader Cylinder Bearings - Lubricate

SMCS Code: 5102-086-BD; 5104-086-BD;
6107-086-BD

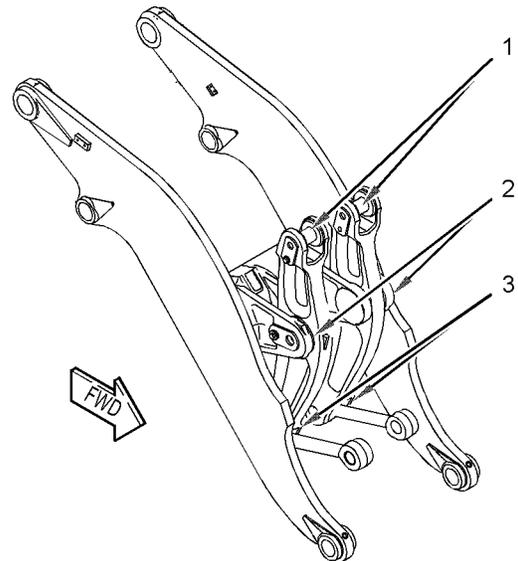


Illustration 147

g01063586

Wipe off all fittings before any lubricant is applied.

Apply lubricant through fitting (1) at the rod end of each tilt cylinder.

Apply lubricant through fitting (2) at the center pivot point of the linkage.

Apply lubricant through fitting (3) at the bottom of the linkage.

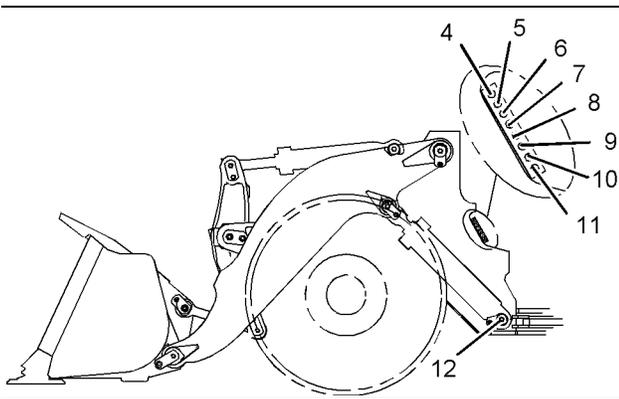


Illustration 148

g01125651

- (4) Rod End of LH Lift Cylinder
- (5) LH Upper Lift Arm Bearing
- (6) Head End of LH Tilt Cylinder
- (7) Head End of RH Tilt Cylinder
- (8) RH Upper Lift Arm Bearing
- (9) Rod End of RH Lift Cylinder
- (10) Rod End of RH Steering Cylinder
- (11) Head End of RH Lift Cylinder
- (12) Head End of LH Lift Cylinder

Apply lubricant through the remote grease fittings for the upper lift arm bearings, the head ends of the tilt cylinders, the rod ends of the lift cylinders, and the head end of the RH lift cylinder.

Apply lubricant through grease fitting (12) for the head end of the LH lift cylinder.

i03700100

Bucket Lower Pivot Bearings - Lubricate

SMCS Code: 6101-086-BD; 6107-086-BD

Wipe all fittings before you apply lubricant.

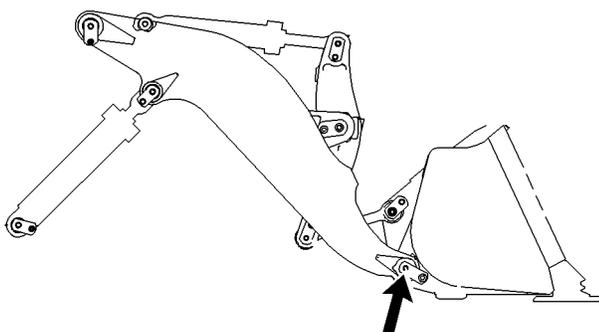


Illustration 149

g01000649

Apply lubricant to each fitting. There are a total of two fittings.

Note: If necessary, the work tool may need to be tilted forward in order to apply lubricant to the lower pivot bearing.

i03657242

Bucket Tips - Inspect/Replace

SMCS Code: 6805-040; 6805-510

WARNING

Personal injury or death can result from the bucket falling.

Block the bucket before changing bucket tips.

Bucket Tips

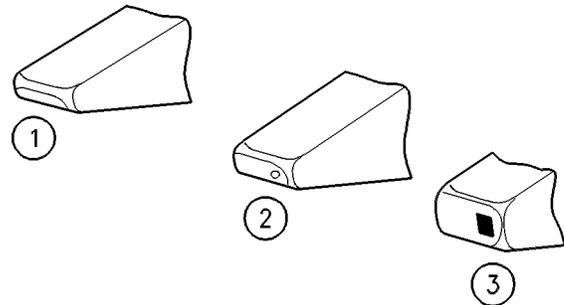


Illustration 150

g00101352

- (1) Usable
- (2) Replace the tip.
- (3) Replace the tip.

Check the bucket tips for wear. If the bucket tip has a hole, replace the bucket tip.

1. Remove the pin from the bucket tip. The pin can be removed by one of the following methods.
 - Use a hammer and a punch from the retainer side of the bucket to drive out the pin.
 - Use a Pin-Master. Follow Step 1.a through Step 1.c for the procedure.

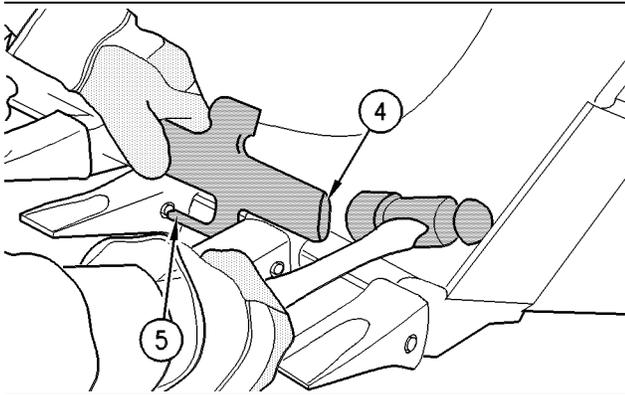


Illustration 151

g00590670

- (4) Back of Pin-Master
- (5) Extractor

- a. Place the Pin-Master on the bucket tooth.
- b. Align extractor (5) with the pin.
- c. Strike the Pin-Master at the back of the tool (4) and remove the pin.

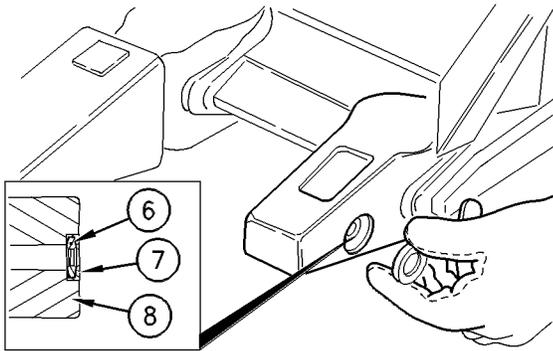


Illustration 152

g00590819

- (6) Retainer
- (7) Retaining washer
- (8) Adapter

2. Clean the adapter and the pin.
3. Fit retainer (6) into retaining washer (7). Install this assembly into the groove that is in the side of adapter (8).

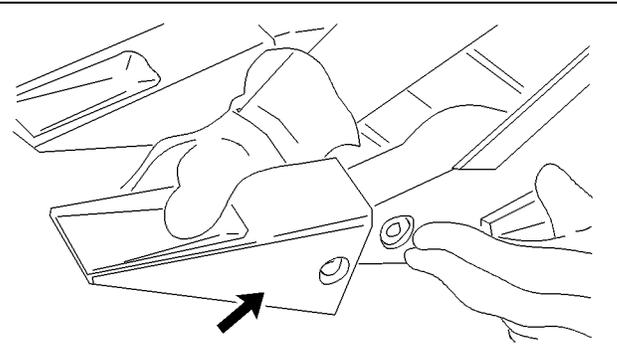


Illustration 153

g00101359

4. Install the new bucket tip onto the adapter.

Note: The bucket tip can be rotated by 180 degrees in order to allow greater penetration or less penetration.

5. Drive the pin through the bucket tip. The pin can be installed by using one of the following methods:

- From the other side of the retainer, drive the pin through the bucket tip, the adapter, and the retainer.
- Use a Pin-Master. Follow Step 5.a through Step 5.e for the procedure.

Note: To correctly install the pin into the retainer, the pin must be driven in from the right side of the tooth. Improper installation of the pin can result in the loss of the bucket tip.

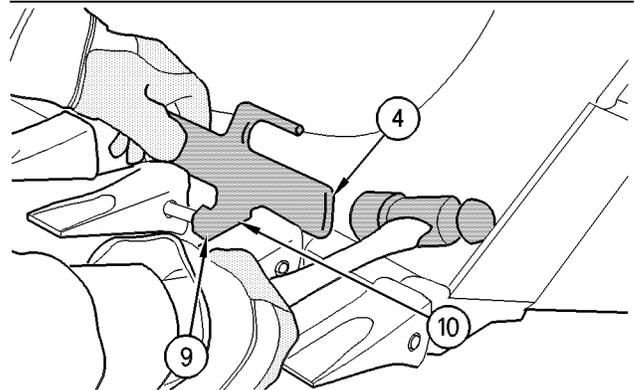


Illustration 154

g00590666

- (4) Back of Pin-Master
- (9) Pin setter
- (10) Pin holder

- a. Insert the pin through the bucket tooth.
- b. Place the Pin-Master over the bucket tooth and locate the pin in the hole of holder (10).

- c. Strike the tool with a hammer at the back of the tool (4) in order to start the pin.
 - d. Slide pin holder (10) away from the pin and rotate the tool slightly in order to align pin setter (9) with the pin.
 - e. Strike the end of the tool until the pin is fully inserted.
6. After you drive the pin, make sure that the retainer fits snugly into the pin groove.

K-Series Tip

Removal

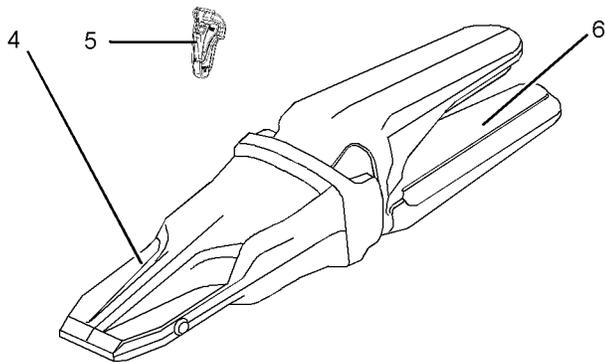


Illustration 155

g01389463

Note: Retainers are often damaged during the removal process. Caterpillar recommends the installation of a new retainer when bucket tips are rotated or replaced.

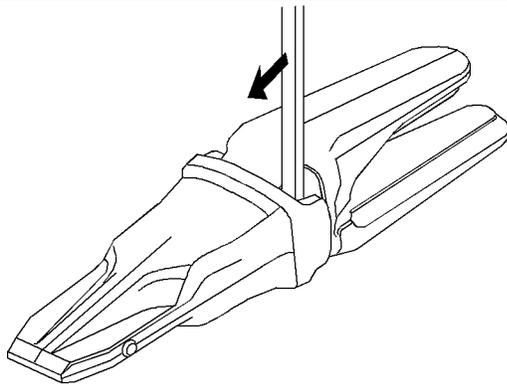


Illustration 156

g01175361

1. Use a pry bar in order to disengage retainer (5).
2. Use the pry bar in order to remove retainer (5) from bucket tip (4).
3. Remove bucket tip (4) from adapter (6) with a slight counterclockwise rotation.

4. Clean adapter (6).

Installation

1. Clean the adapter and the area around the latch, if necessary.
2. Install the new bucket tip onto the adapter with a slight clockwise rotation.

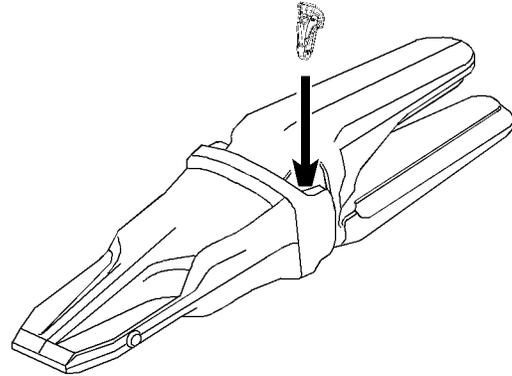


Illustration 157

g01124736

3. Install the retainer. Make sure that the retainer's latch catches under the tip pocket.
4. Make sure that the latch is properly seated by trying to remove the bucket tip.

i01922739

Bucket Upper Pivot Bearings - Lubricate

SMCS Code: 6001-086-BD; 6107-086-BD

Wipe all fittings before you apply lubricant.

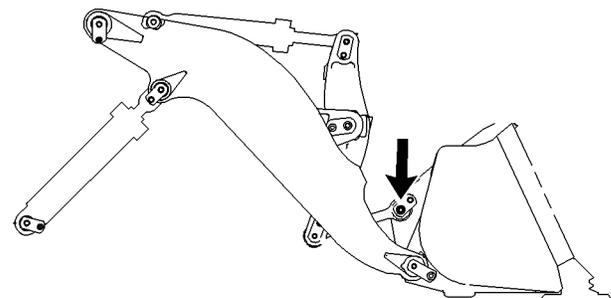


Illustration 158

g01000653

Apply lubricant to each fitting. There are a total of two fittings.

i01709216

Bucket Wear Plates - Inspect/Replace

SMCS Code: 6120-040; 6120-510

WARNING

Personal injury or death can result from the bucket falling.

Block the bucket before changing bucket wear plates.

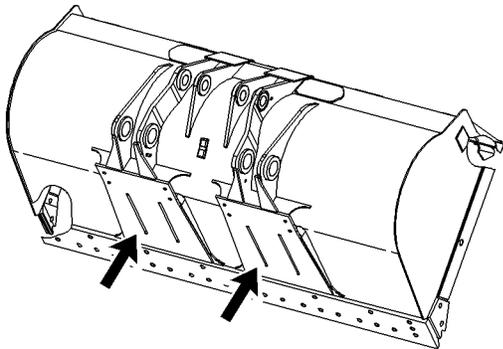


Illustration 159

g00879740

Inspect the wear plates. Replace the wear plates before damage to the bottom of the bucket occurs. Consult your Caterpillar dealer for replacement of wear plates.

i01449996

Cab Air Filter - Clean/Replace

SMCS Code: 7342-070; 7342-510

Note: Clean the cab air filters more often if the machine is being operated in dusty conditions.

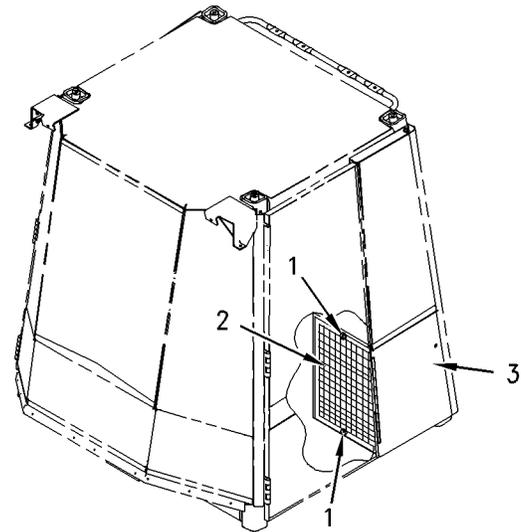


Illustration 160

g00759048

1. Remove the filter cover behind the seat. Two threaded knobs (1) are used in order to remove the cover. Remove the filter element (2).
2. Open the access door (3) on the left side of the cab. Remove the filter element.
3. Clean the filter elements with pressure air or wash the filter elements in warm water with a nonsudsing household detergent.
4. If water and detergent are used to clean the filter elements, rinse the filter elements in clean water and allow the filter elements to air dry thoroughly.

Note: If either filter element is damaged, install a new filter element.

5. Install the filter elements. Install the filter cover and close the access door.

i02816405

Camera - Clean (If Equipped)

SMCS Code: 7348-070

In order to maintain sufficient vision, keep the Work Area Vision System (WAVS) camera lens and the display clean.

Display

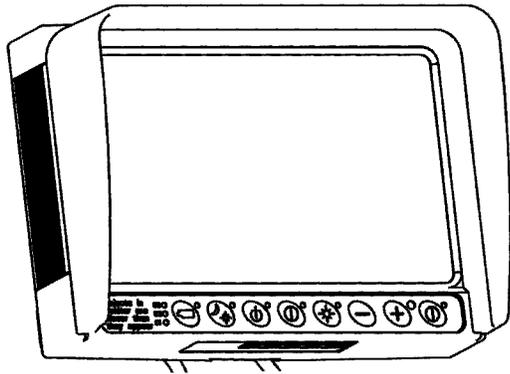


Illustration 161

g01223034

WAVS display

Use a soft, damp cloth in order to clean the display. The display has a soft plastic surface that can be easily damaged by an abrasive material. **The display is not sealed. Do not immerse the display with liquid.**

Camera

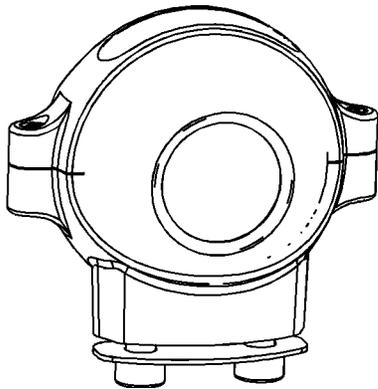


Illustration 162

g01223051

The WAVS camera is located on the rear of the machine in the center of the fan guard.

Use a damp cloth or water spray in order to clean the camera lens. The camera is a sealed unit. The camera is not affected by high pressure spray.

The camera is equipped with an internal heater to help counteract the effects of condensation, snow, or ice.

Note: For more information on WAVS, refer to Operation and Maintenance Manual, SEBU8157, "Work Area Vision System".

i02050852

Case Drain Screen (Strainer) (Steering Pump, Hydraulic Fan Pump, Motor) - Clean

SMCS Code: 4304-070-Z3; 5057-070-Z3

The screen is located in the case drain line near the hydraulic oil tank.

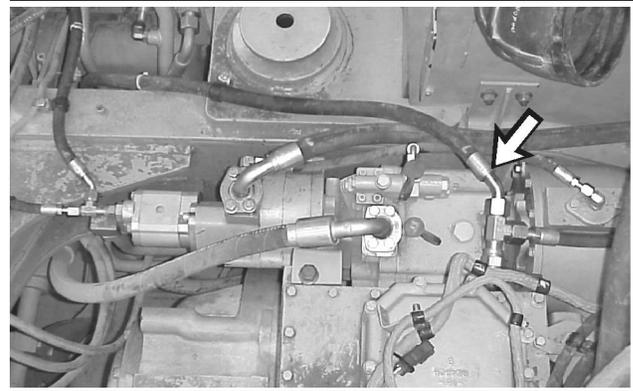


Illustration 163

g00999347

Top view of case drain line for the implement pump

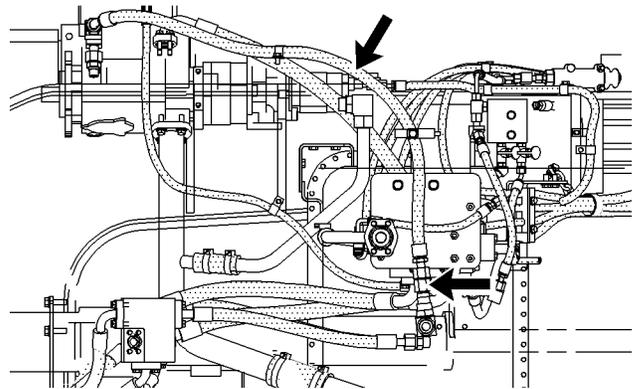


Illustration 164

g00999352

Side view of case drain line

Disconnect the line from the hydraulic oil tank. Remove the screen from the hydraulic line. Wash the screen in a clean nonflammable solvent. Dry the screen by using pressure air. Inspect the screen for damage. Replace the screen, if necessary. Install the screen and connect the hydraulic oil line.

i02050226

Circuit Breakers - Reset

SMCS Code: 1420-529



Circuit Breaker Reset – Depress the button in order to reset the circuit breakers. If the circuit is functioning properly, the button will remain depressed. If the button will not remain depressed, check the appropriate electrical circuit.

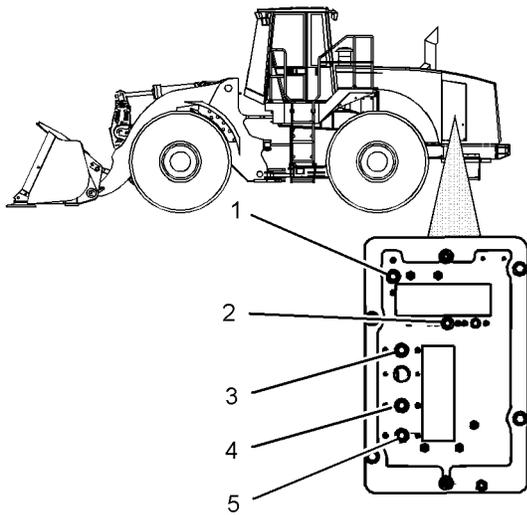


Illustration 165

g01051679

The circuit breakers are located in the engine compartment on the left side of the machine.



Engine Shutdown (1) – 50 amp



Electrical Circuits in Cab (2) – 20 amp



Tilt Hood Actuator (3) – 60 amp



Main Circuit (4) – 80 amp



Alternator (5) – 105 amp

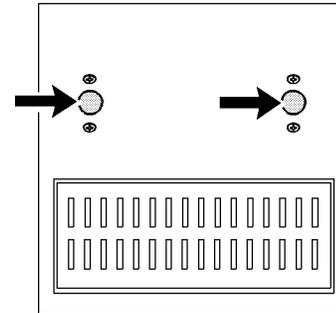


Illustration 166

g00879750

Two circuit breakers are also located in the cab behind the operator seat. These breakers are both 15 amperes.

i01709233

Cooling System Coolant (ELC) - Change

SMCS Code: 1350-044-NL

WARNING

Pressurized system: Hot coolant can cause serious burn. To open cap, stop engine, wait until radiator is cool. Then loosen cap slowly to relieve the pressure.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

NOTICE

Topping off or mixing Cat ELC with other products that do not meet Caterpillar EC-1 specifications reduces the effectiveness of the coolant and shortens coolant service life.

Use only Caterpillar products or commercial products that have passed the Caterpillar EC-1 specification for pre-mixed or concentrate coolants. Use only Extender with Cat ELC.

Failure to follow these recommendations can result in shortened cooling system component life.

Reference: For information about adding Extender to your cooling system, refer to Operation and Maintenance Manual, "Cooling System Coolant Extender (ELC) - Add" or consult your Caterpillar dealer.

If an Extended Life Coolant was previously used, flush the cooling system with clean water. No other cleaning agents are required. Use the following procedure to change the Extended Life Coolant.

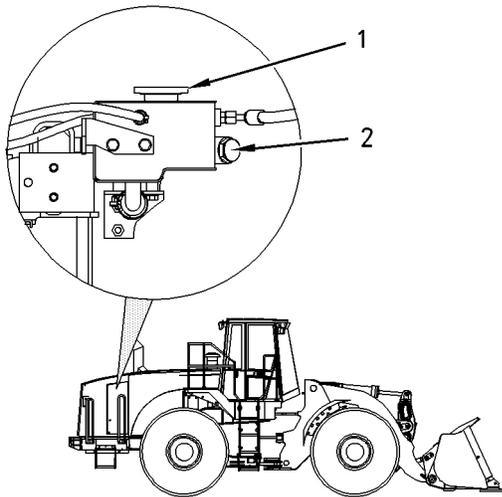


Illustration 167

g00759585

The cooling system pressure cap is located under the engine hood at the rear of the machine.

1. Open the engine hood.
2. Slowly loosen the cooling system pressure cap (1) in order to relieve system pressure. Remove the cooling system pressure cap.

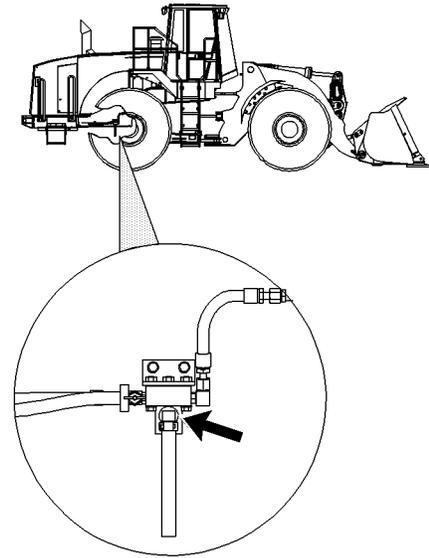


Illustration 168

g00879754

3. Open the drain valve. The drain valve is located near the rear axle of the machine. Allow the coolant to drain into a suitable container.
4. Flush the cooling system with clean water until the draining water is clean. Close the drain valve.
5. Replace the water temperature regulator.

Reference: Refer to Operation and Maintenance Manual, "Cooling System Water Temperature Regulator - Replace" for the correct procedure.

6. Add the Extended Life Coolant.

Reference: Refer to Operation and Maintenance Manual, "Capacities (Refill)" for the refill capacity of the cooling system.

7. Start the engine. Run the engine without the cooling system pressure cap until the water temperature regulator opens and the coolant level stabilizes.
8. Maintain the coolant level in sight gauge (2) on the upper right side of the radiator tank.
9. Install the cooling system pressure cap. Close the engine hood.

i01920332

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352-544-NL

WARNING

Pressurized system: Hot coolant can cause serious burn. To open cap, stop engine, wait until radiator is cool. Then loosen cap slowly to relieve the pressure.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

NOTICE

Topping off or mixing Cat ELC with other products that do not meet Caterpillar EC-1 specifications reduces the effectiveness of the coolant and shortens coolant service life.

Use only Caterpillar products or commercial products that have passed the Caterpillar EC-1 specification for pre-mixed or concentrate coolants. Use only Extender with Cat ELC.

Failure to follow these recommendations can result in shortened cooling system component life.

When a Caterpillar Extended Life Coolant (ELC) is used, an Extender must be added to the cooling system.

Use a 8T-5296 Coolant Test Kit to check the concentration of the coolant.

Reference: For additional information about adding Extender, refer to Operation and Maintenance Manual, SEBU6250, "Caterpillar Machine Fluids Recommendations" or consult your Caterpillar dealer.

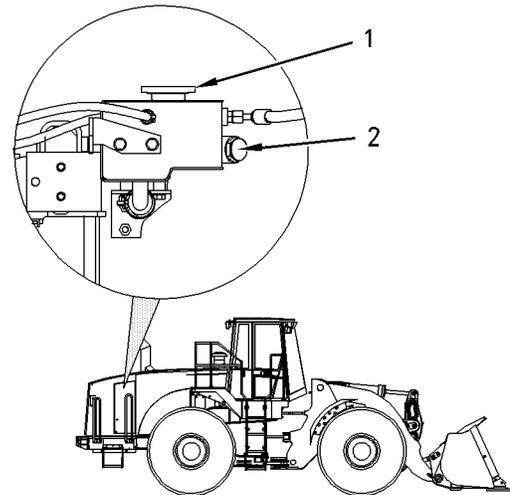


Illustration 169

g00759585

The cooling system pressure cap is located under the engine hood at the rear of the machine.

1. Open the engine hood.
2. Slowly loosen cooling system pressure cap (1) in order to relieve any system pressure. Remove the cooling system pressure cap.

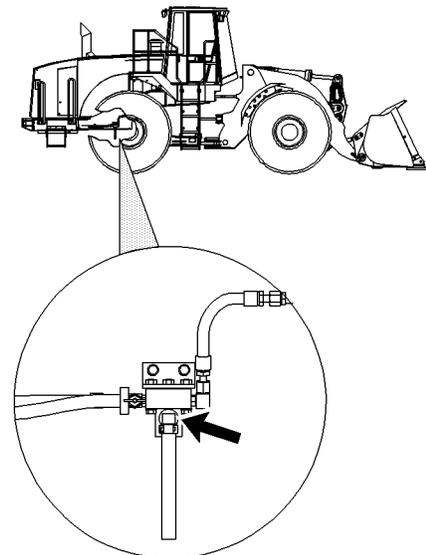


Illustration 170

g00879755

3. If necessary, drain enough coolant from the radiator in order to allow the addition of Extender to the cooling system. The cooling system drain valve is located on the lower left side of the radiator.
4. Add the Extender to the cooling system.

Reference: Refer to Operation and Maintenance Manual, "Capacities (Refill)" for the correct amount.

- Maintain the coolant level in sight gauge (2) on the upper right side of the radiator.
- Install the cooling system pressure cap. Close the engine hood.

i02561075

Cooling System Coolant Level - Check

SMCS Code: 1350-535-FLV

WARNING

Pressurized system: Hot coolant can cause serious burn. To open cap, stop engine, wait until radiator is cool. Then loosen cap slowly to relieve the pressure.

- Open the engine hood.

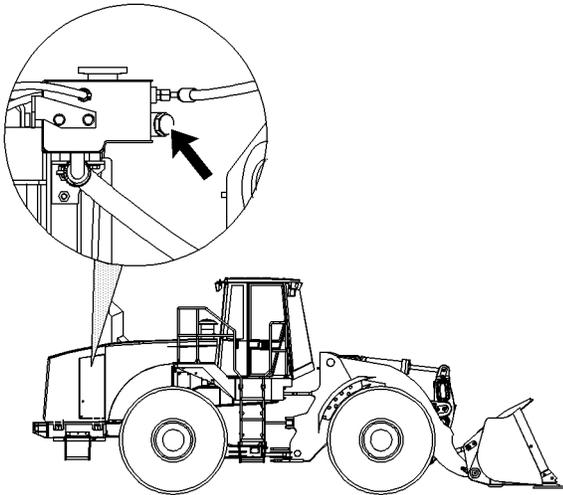


Illustration 171

g00879763

- Maintain the coolant level in the sight gauge when the cooling system is cool. If you need to add coolant daily, check the cooling system for leaks.
- Inspect the radiator core for debris. Clean the radiator core, if necessary.

- If the coolant level is low, slowly remove cooling system pressure cap in order to relieve system pressure. Add coolant in order to maintain the coolant level in the sight gauge. Add the coolant until the coolant level reaches the bottom of the filler neck.
- Inspect the cooling system pressure cap and the cap seal for damage. Replace the cap seal, if necessary. Clean the cooling system pressure cap.
- Install the cooling system pressure cap. Close the engine hood.

i03697922

Cooling System Coolant Sample (Level 1) - Obtain

SMCS Code: 1350-008; 1395-008; 7542

NOTICE

Always use a designated pump for oil sampling, and use a separate designated pump for coolant sampling. Using the same pump for both types of samples may contaminate the samples that are being drawn. This contaminate may cause a false analysis and an incorrect interpretation that could lead to concerns by both dealers and customers.

Note: Level 1 results may indicate a need for Level 2 Analysis.

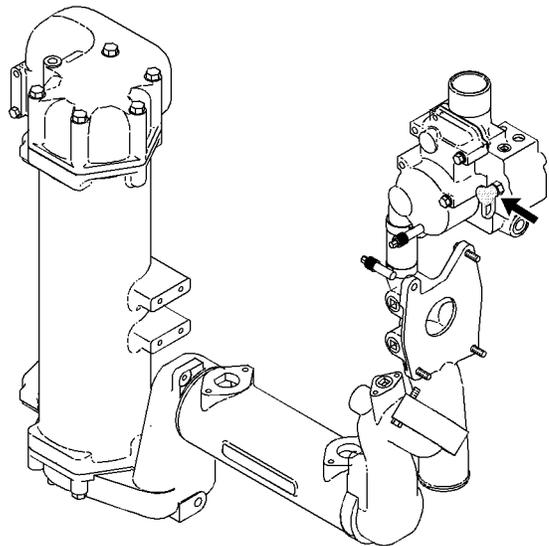


Illustration 172

g01058055

The sampling valve for the cooling system is located on the left side of the engine compartment near the water temperature regulator.

Obtain the sample of the coolant as close as possible to the recommended sampling interval. In order to receive the full effect of S·O·S analysis, you must establish a consistent trend of data. In order to establish a pertinent history of data, perform consistent samplings that are evenly spaced. Supplies for collecting samples can be obtained from your Caterpillar dealer.

Use the following guidelines for proper sampling of the coolant:

- Complete the information on the label for the sampling bottle before you begin to take the samples.
- Keep the unused sampling bottles stored in plastic bags.
- Obtain coolant samples directly from the coolant sample port. You should not obtain the samples from any other location.
- Keep the lids on empty sampling bottles until you are ready to collect the sample.
- Place the sample in the mailing tube immediately after obtaining the sample in order to avoid contamination.
- Never collect samples from expansion bottles.
- Never collect samples from the drain for a system.

Submit the sample for Level 1 analysis.

For additional information about coolant analysis, see Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" or consult your Caterpillar dealer.

i02196476

Cooling System Coolant Sample (Level 2) - Obtain

SMCS Code: 1350-008; 1395-008; 7542

NOTICE

Always use a designated pump for oil sampling, and use a separate designated pump for coolant sampling. Using the same pump for both types of samples may contaminate the samples that are being drawn. This contaminate may cause a false analysis and an incorrect interpretation that could lead to concerns by both dealers and customers.

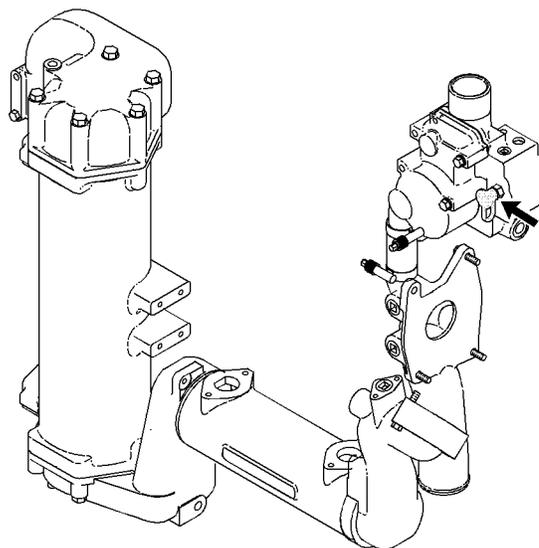


Illustration 173

g01058055

The sampling valve for the cooling system is located on the left side of the engine compartment near the water temperature regulator.

Obtain the sample of the coolant as close as possible to the recommended sampling interval. Supplies for collecting samples can be obtained from your Caterpillar dealer.

Refer to Operation and Maintenance Manual, "Cooling System Coolant Sample (Level 1) - Obtain" for the guidelines for proper sampling of the coolant.

Submit the sample for Level 2 analysis.

For additional information about coolant analysis, see Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" or consult your Caterpillar dealer.

i02225150

Cooling System Water Temperature Regulator - Replace

SMCS Code: 1355-510; 1393-010

WARNING

Pressurized system: Hot coolant can cause serious burn. To open cap, stop engine, wait until radiator is cool. Then loosen cap slowly to relieve the pressure.

NOTICE

Failure to replace the engine's thermostat on a regularly scheduled basis could cause severe engine damage.

NOTICE

Caterpillar engines incorporate a shunt design cooling system and require operating the engine with a thermostat installed.

If the thermostat is installed wrong, it will cause the engine to overheat. Inspect gaskets before assembly and replace if worn or damaged.

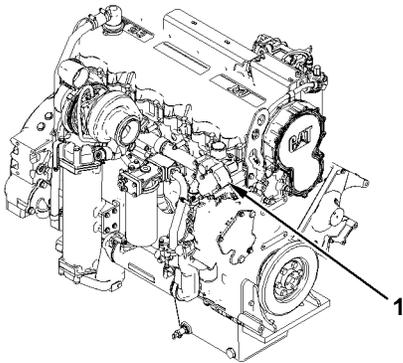


Illustration 174

g01030547

Replace water temperature regulator (1) in order to reduce the chance of problems with the cooling system.

Replace the water temperature regulator and the seals while the cooling system is completely drained or while the coolant is drained to a level below the water temperature regulator housing.

Note: If you are only replacing the water temperature regulator, drain the coolant to a level that is below the water temperature regulator housing.

Reference: For the correct procedure for replacing the water temperature regulator, refer to the Disassembly and Assembly manual for your machine's engine.

i02775845

Differential and Final Drive Oil - Change

SMCS Code: 3278-044; 4050-044

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Front Differential and Front Final Drives

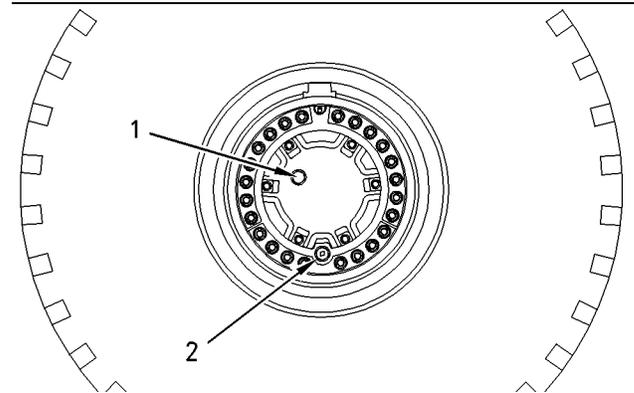


Illustration 175

g00760167

1. Position the front wheels so that final drive drain plugs (2) are facing downward. Remove the final drive drain plugs and allow the oil to drain into a suitable container. Clean the drain plugs and install the drain plugs.

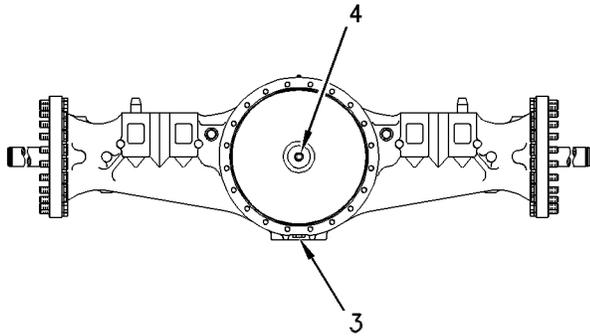


Illustration 176
Rear view

g00864014

2. Remove front differential drain plug (3) and allow the oil to drain into a suitable container. Clean the drain plug and install the drain plug.
3. Remove front differential filler plug (4). Fill the front differential to the bottom of the filler plug opening.

Reference: For the correct amount of oil, refer to Operation and Maintenance Manual, "Capacities (Refill)".

4. Clean the filler plug and install the filler plug.
5. Position each front wheel so that front final drive filler plugs (1) are flush with the centerline of each front wheel. Remove the front final drive filler plugs.
6. Fill the front final drives to the bottom of the filler plug opening.

Reference: For the correct amount of oil, refer to Operation and Maintenance Manual, "Capacities (Refill)".

Note: If the specified amount of oil will not fit in the front final drives, install the filler plugs and operate the machine on level ground for a few minutes. This will equalize the oil level in the front differential and in the front final drives. Then, add the remaining oil.

7. Clean the filler plugs and install the filler plugs.

Note: If your machine is equipped with the axle oil cooler, there are 2 magnetic filters that need to be cleaned. If your machine is not equipped with the axle oil cooler, skip the next step.

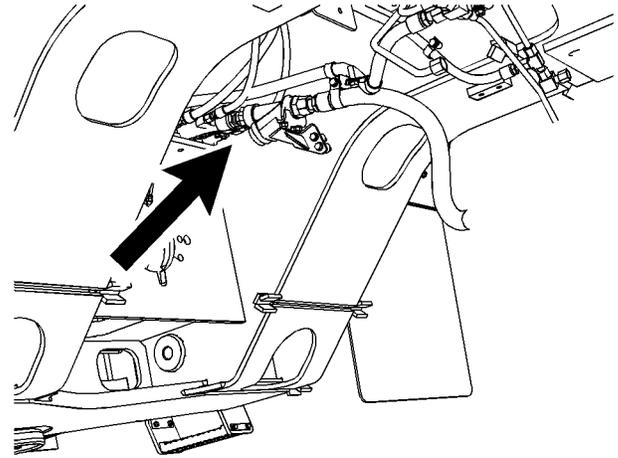


Illustration 177
Front Magnetic Oil Filter

g01387238

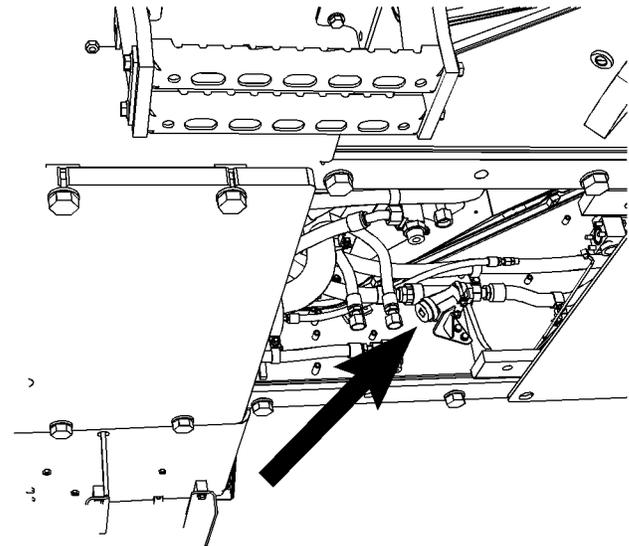


Illustration 178
Rear Magnetic Oil Filter

g01387239

8. Remove the magnetic plug on the front filter. Clean the magnetic plug with a clean nonflammable solvent. Install the magnetic plug. Repeat the process for the rear magnetic filter.
9. Operate the machine for a few minutes and recheck the oil level. The oil level should reach the bottom of the filler plug opening.

If the oil level is higher than the filler plug opening, do not allow the oil to drain to the level of the filler plug opening.

Rear Differential and Rear Final Drives

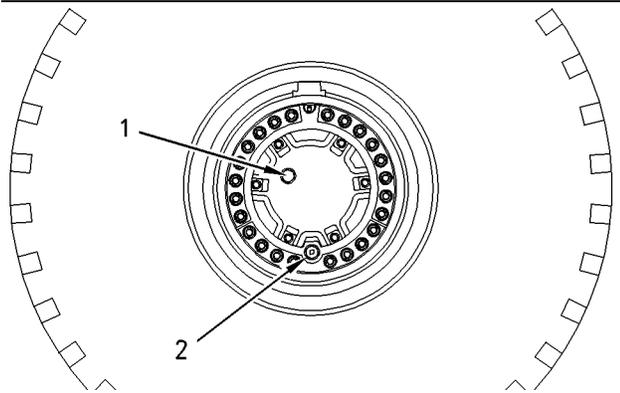


Illustration 179

g00760167

1. Position the rear wheels so that final drive drain plugs (2) are facing downward. Remove the final drive drain plugs and allow the oil to drain into a suitable container. Clean the drain plugs and install the drain plugs.

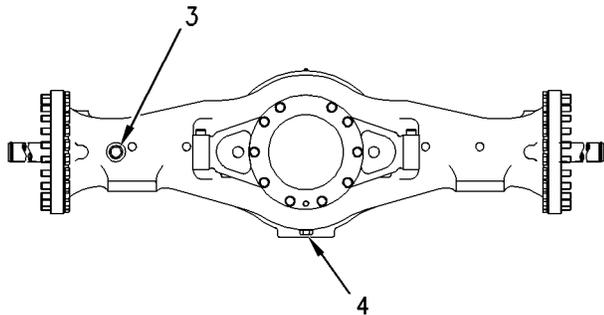


Illustration 180

g00864019

Front view

2. Remove rear differential drain plug (4) and allow the oil to drain into a suitable container. Clean the drain plug and install the drain plug.
3. Remove rear differential filler plug (3). Fill the rear differential to the bottom of the filler plug opening.

Reference: For the correct amount of oil, refer to Operation and Maintenance Manual, "Capacities (Refill)".

4. Clean the filler plug and install the filler plug.
5. Position each rear wheel so that rear final drive filler plugs (1) are flush with the centerline of each rear wheel. Remove the rear final drive filler plugs.
6. Fill the rear final drives to the bottom of the filler plug opening.

Reference: For the correct amount of oil, refer to Operation and Maintenance Manual, "Capacities (Refill)".

Note: If the specified amount of oil will not fit in the rear final drives, install the filler plugs and operate the machine on level ground for a few minutes. This will equalize the oil level in the rear differential and in the rear final drives. Then, add the remaining oil.

7. Clean the filler plugs and install the filler plugs.
8. Operate the machine for a few minutes and recheck the oil level. The oil level should reach the bottom of the filler plug opening.

If the oil level is higher than the filler plug opening, do not allow the oil to drain to the level of the filler plug opening.

i01453263

Differential and Final Drive Oil Level - Check

SMCS Code: 3278-535-FLV; 4050-535-FLV

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Wipe the surfaces around any openings before you check the oil or before you add oil.

Differentials

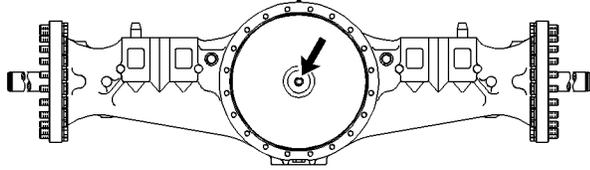


Illustration 181
Front Differential Filler Plug

g00535224

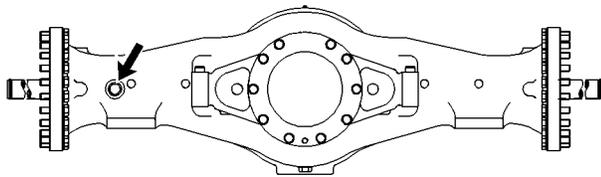


Illustration 182
Rear Differential Filler Plug

g00535225

1. Remove the differential filler plug.
2. Check the oil level. The oil should be level with the bottom of the filler opening. Add oil, if necessary.
3. Clean the differential filler plug and install the differential filler plug.
4. Repeat the procedure for the remaining differential.

Final Drives

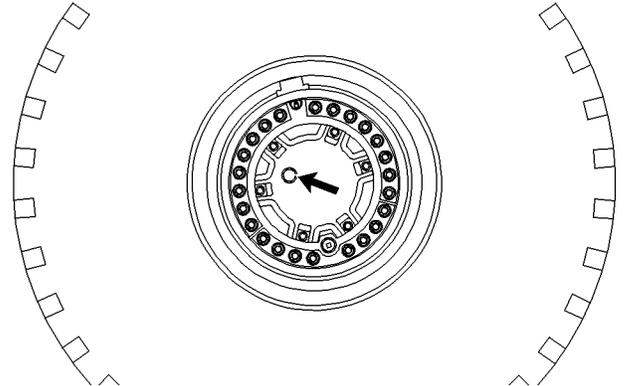


Illustration 183

g00760182

1. Position the wheel so that the final drive filler plug is level with the centerline of the wheel. Remove the final drive filler plug.
2. Check the oil level. The oil should be level with the bottom of the filler opening. Add oil, if necessary.
3. Clean the final drive filler plug and install the final drive filler plug.
4. Repeat the procedure for the remaining final drives.

i01920699

Differential and Final Drive Oil Sample - Obtain

SMCS Code: 3278-008; 4050-008; 4070-008; 7542

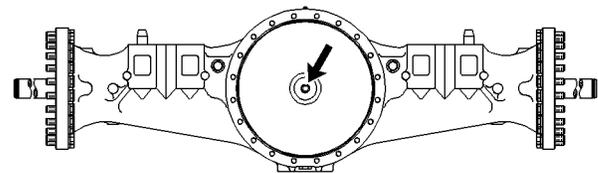


Illustration 184
Front Differential Filler Plug

g00535224

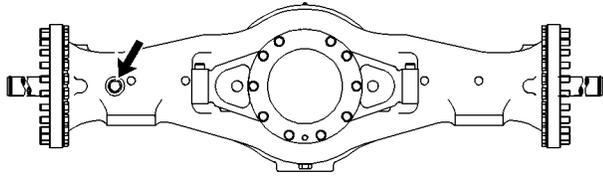


Illustration 185

g00535225

Rear Differential Filler Plug

The axles are not equipped with sampling valves. Obtaining a sample of the differential and final drive oil will require a vacuum pump or an equivalent. Withdraw the fluid through the filler opening on the right side of each axle.

Reference: Refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" for more information about obtaining a fluid sample.

i03657243

Drive Shaft Spline (Center) - Lubricate

SMCS Code: 3253-086-SN

Wipe all of the fittings before you apply grease to the fittings.

NOTICE

To prevent damage to the seal, articulate the machine full right or left, before lubricating the splines.

1. Start the engine. Raise the bucket. Release the parking brake. Articulate the machine to the right or to the left in order to properly lubricate the splined shaft.
2. Lower the bucket to the ground. Engage the parking brake. Stop the engine.

Note: Since the steering frame lock cannot be connected in this case, remove the engine start switch key and turn the battery disconnect switch to the OFF position.

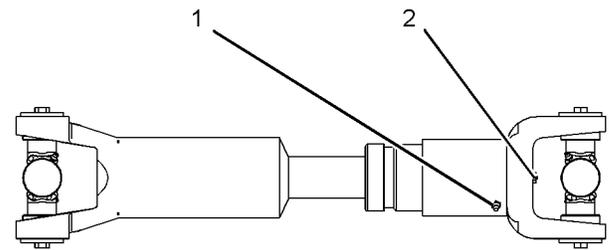


Illustration 186

g01106848

3. Apply grease to the fitting (1). Apply grease until the relief (2) overruns.

Note: 5P-0960 Molybdenum Grease is preferred. 1P-0808 Multipurpose Grease may be used.

4. Start the engine. Raise the bucket. Release the parking brake. Reposition the machine in a straight direction without articulation.
5. Lower the bucket to the ground. Apply a slight down pressure. Engage the parking brake. Stop the engine.

i02407821

Drive Shaft Support Bearing - Lubricate

SMCS Code: 3267-086-BD

WARNING

Crushing Hazard. Insure that the machine ignition switch is in the OFF position and that the parking brake is engaged before entering the articulation area. Failure to do so could result in serious injury or death.

Wipe off the fitting before any lubricant is applied.

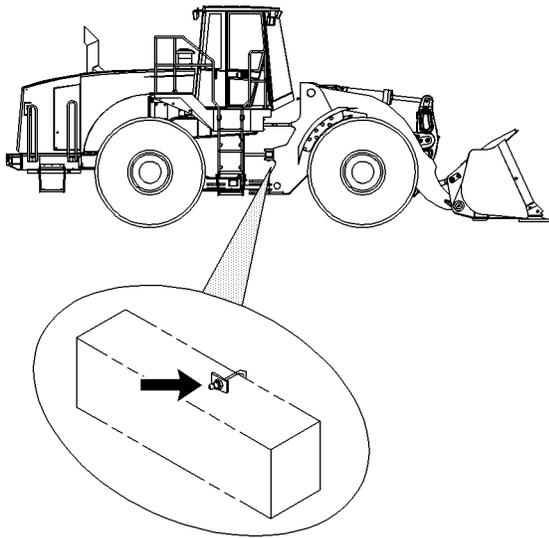


Illustration 187

g00879770

Apply lubricant through one remote fitting on the support in the front loader frame.

i02061807

Electronic Unit Injector - Inspect/Adjust

SMCS Code: 1251-025; 1251-040; 1290-025; 1290-040

WARNING

The Electronic Control module produces high voltage. To prevent personal injury make sure the Electronic Control Module is not powered and the unit injector solenoids are disconnected.

NOTICE

The camshafts must be correctly timed with the crankshaft before an adjustment of the unit injector lash is made. The timing pins must be removed from the camshafts before the crankshaft is turned or damage to the cylinder block will be the result.

The operation of Caterpillar engines with improper adjustments of the electronic unit injector can reduce engine efficiency. This reduced efficiency could result in excessive fuel usage and/or shortened engine component life.

Adjust the electronic unit injector at the same interval as the valve lash adjustment.

Refer to your machine's Service Manual or your Caterpillar dealer for the complete adjustment procedure.

i03649895

Engine Air Filter Primary Element - Clean/Replace

SMCS Code: 1054-070-PY; 1054-510-PY

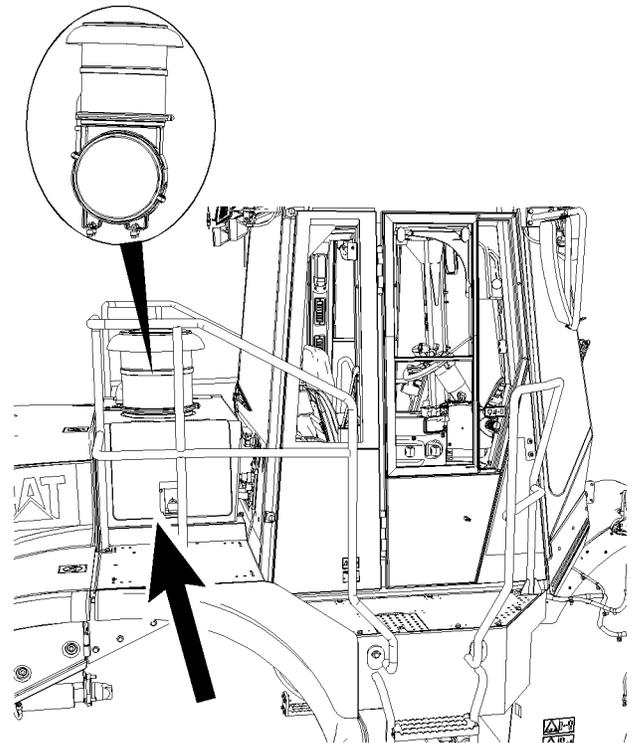


Illustration 188

g01959139

1. Access the air cleaner from the right side of the machine. The air cleaner is located directly under the precleaner. Open the access door.

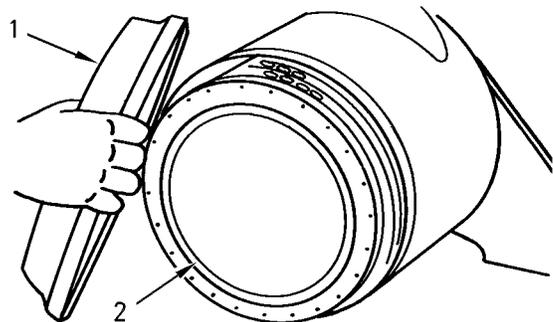


Illustration 189

g00281967

2. Loosen the clips which hold air cleaner housing cover (1). Remove the air cleaner housing cover.
3. Remove primary filter element (2) from the air cleaner housing.

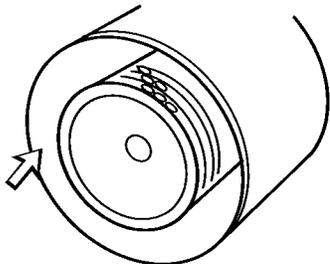


Illustration 190

g00101865

4. Clean the inside of the air cleaner housing.
5. Inspect the primary element. If the pleats, the gaskets, or the seals are damaged, discard the element. Replace the damaged primary element with a clean primary element.
6. Close the engine hood.

Cleaning Primary Air Filter Elements

NOTICE

Caterpillar recommends certified air filter cleaning services that are available at Caterpillar dealers. The Caterpillar cleaning process uses proven procedures to assure consistent quality and sufficient filter life.

Observe the following guidelines if you attempt to clean the filter element:

Do not tap or strike the filter element in order to remove dust.

Do not wash the filter element.

Use low pressure compressed air in order to remove the dust from the filter element. Air pressure must not exceed 207 kPa (30 psi). Direct the air flow up the pleats and down the pleats from the inside of the filter element. Take extreme care in order to avoid damage to the pleats.

Do not use air filters with damaged pleats, gaskets, or seals. Dirt entering the engine will cause damage to engine components.

The primary air filter element can be used up to six times if the element is properly cleaned and inspected. When the primary air filter element is cleaned, check for rips or tears in the filter material. The primary air filter element should be replaced at least one time per year. This replacement should be performed regardless of the number of cleanings.

Visually inspect the primary air filter elements before cleaning. Inspect the air filter elements for damage to the seal, the gaskets, and the outer cover. Discard any damaged air filter elements.

There are two common methods that are used to clean primary air filter elements:

- Pressurized air
- Vacuum cleaning

Pressurized Air

Pressurized air can be used to clean primary air filter elements that have not been cleaned more than two times. Pressurized air will not remove deposits of carbon and oil. Use filtered, dry air with a maximum pressure of 207 kPa (30 psi).

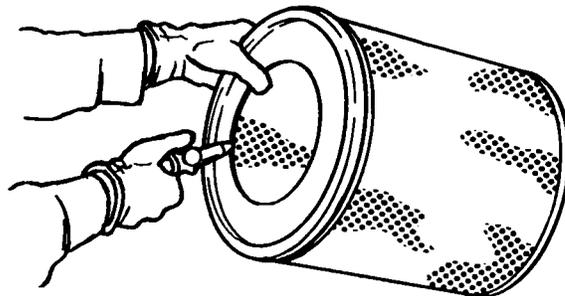


Illustration 191

g00281692

Note: When the primary air filter elements are cleaned, always begin with the clean side (inside) in order to force dirt particles toward the dirty side (outside).

Aim the hose so that the air flows inside the element along the length of the filter in order to help prevent damage to the paper pleats. Do not aim the stream of air directly at the primary air filter element. Dirt could be forced further into the pleats.

Vacuum Cleaning

Vacuum cleaning is another method for cleaning primary air filter elements which require daily cleaning because of a dry, dusty environment. Cleaning with pressurized air is recommended prior to vacuum cleaning. Vacuum cleaning will not remove deposits of carbon and oil.

Inspecting the Primary Air Filter Elements

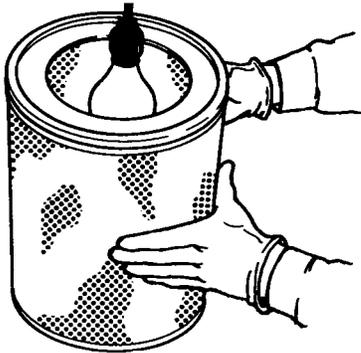


Illustration 192

g00281693

Inspect the clean, dry primary air filter element. Use a 60 watt blue light in a dark room or in a similar facility. Place the blue light in the primary air filter element. Rotate the primary air filter element. Inspect the primary air filter element for tears and/or holes. Inspect the primary air filter element for light that may show through the filter material. If it is necessary in order to confirm the result, compare the primary air filter element to a new primary air filter element that has the same part number.

Do not use a primary air filter element that has any tears and/or holes in the filter material. Do not use a primary air filter element with damaged pleats, gaskets or seals. Discard damaged primary air filter elements.

Storing Primary Air Filter Elements

If a primary air filter element that passes inspection will not be used, the primary air filter element can be stored for future use.

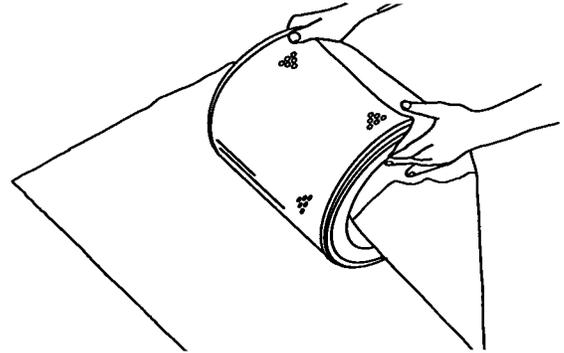


Illustration 193

g00281694

Do not use paint, a waterproof cover, or plastic as a protective covering for storage. An air flow restriction may result. To protect against dirt and damage, wrap the primary air filter elements in Volatile Corrosion Inhibited (VCI) paper.

Place the primary air filter element into a box for storage. For identification, mark the outside of the box and mark the primary air filter element. Include the following information:

- Date of cleaning
- Number of cleanings

Store the box in a dry location.

103649902

Engine Air Filter Secondary Element - Replace

SMCS Code: 1054-510-SE

NOTICE

Always replace the secondary filter element. Never attempt to reuse it by cleaning.

The secondary filter element should be replaced at the time the primary element is serviced for the third time.

The secondary filter element should also be replaced if the yellow piston in the filter element indicator enters the red zone after installation of a clean primary element, or if the exhaust smoke is still black.

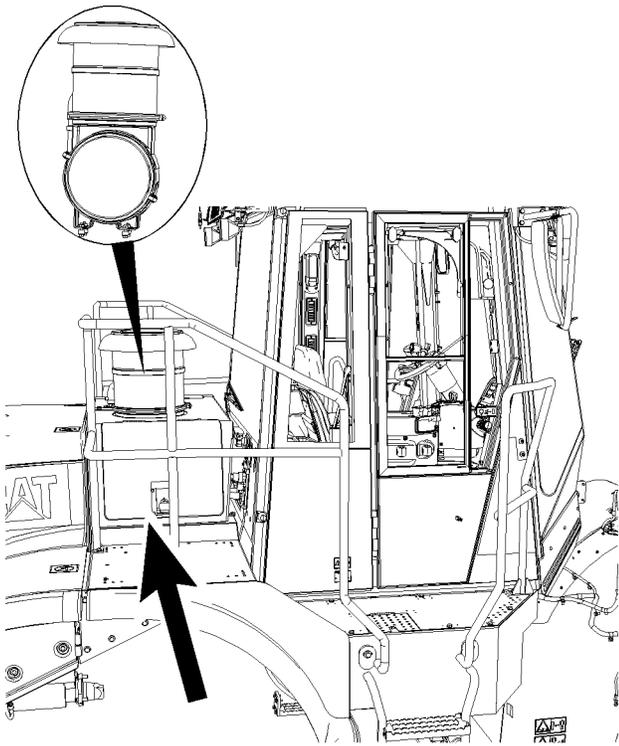


Illustration 194

g01959139

1. Access the air cleaner from the right side of the machine. Open the access door.

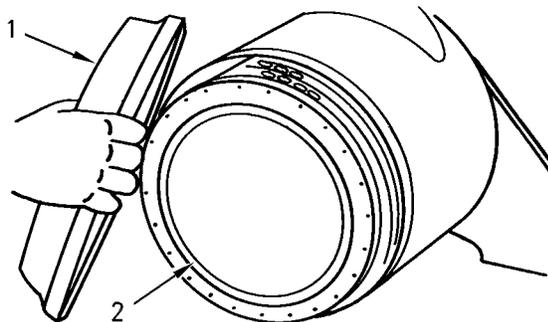


Illustration 195

g00281967

2. Loosen the clips which hold air cleaner housing cover (1). Remove the air cleaner housing cover.
3. Remove primary filter element (2) from the air cleaner housing.

Reference: For the correct procedure, refer to Operation and Maintenance Manual, "Engine Air Filter Primary Element - Clean/Replace".

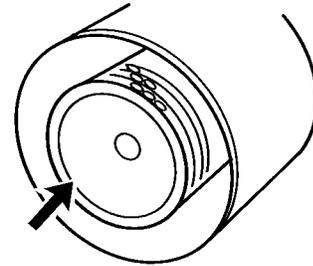


Illustration 196

g00882913

4. Remove the secondary filter element.

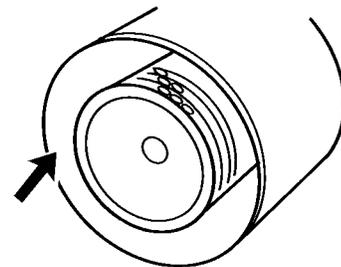


Illustration 197

g00882914

5. Cover the air inlet opening. Clean the inside of the air cleaner housing.
6. Inspect the gasket between the air inlet pipe and the air cleaner housing. Replace the gasket if the gasket is damaged.
7. Uncover the air inlet opening. Install a new secondary filter element.
8. Install the primary filter element and the air cleaner housing cover. Fasten the clips in order to secure the air cleaner housing cover.
9. Close the engine hood.

i01968230

i01968211

Engine Air Filter Service Indicator - Inspect

SMCS Code: 7452-040

Some engines are equipped with a differential gauge for inlet air pressure. The differential gauge for inlet air pressure displays the difference in the pressure that is measured before the air cleaner element and the pressure that is measured after the air cleaner element. As the air cleaner element becomes dirty, the pressure differential rises.

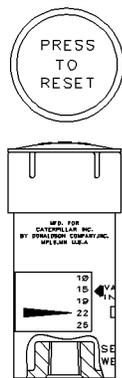


Illustration 198

g01001638

The air filter service indicator is located near the air filter housing.

1. Observe the performance of the air filter service indicator. The air filter element should be cleaned or the air filter element should be replaced when one of the following conditions occur:
 - The yellow diaphragm enters the red zone.
 - The red piston locks in the visible position.
2. If any component damage is present, replace the service indicator.
3. If air leaks are present, replace the service indicator.

Note: When a new service indicator is installed, excessive force may crack the top of the service indicator. Tighten the service indicator to a torque of 2 N·m (18 lb in).

Engine Air Filter Service Indicator - Inspect/Replace

SMCS Code: 7452-040; 7452-510

Some engines are equipped with a differential gauge for inlet air pressure. The differential gauge for inlet air pressure displays the difference in the pressure that is measured before the air cleaner element and the pressure that is measured after the air cleaner element. As the air cleaner element becomes dirty, the pressure differential rises.

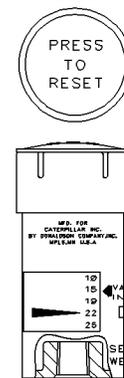


Illustration 199

g01001638

The air filter service indicator is located near the air filter housing.

Inspect

1. Observe the performance of the air filter service indicator. The air filter element should be cleaned or the air filter element should be replaced when one of the following conditions occur:
 - The yellow diaphragm enters the red zone.
 - The red piston locks in the visible position.
2. If any component damage is present, replace the service indicator.
3. If air leaks are present, replace the service indicator.

Test

1. Check for ease of resetting. The service indicator should reset in less than three pushes.
2. Check the movement of the yellow core when the engine is accelerated to the engine rated speed. The yellow core should latch approximately at the greatest vacuum that is attained.

If the service indicator does not reset easily, or if the yellow core does not latch at the greatest vacuum, the service indicator should be replaced. If the new service indicator will not reset, the hole for the service indicator may be plugged.

Replace

Replace the service indicator if the following conditions exist:

- The machine is used in a severely dusty environment.
- The engine is overhauled.
- Major components are replaced.

Note: Replace the service indicator annually regardless of the operating conditions.

Note: When a new service indicator is installed, excessive force may crack the top of the service indicator. Tighten the service indicator to a torque of 2 N·m (18 lb in).

i03091842

Engine Crankcase Breather - Clean

SMCS Code: 1317-070

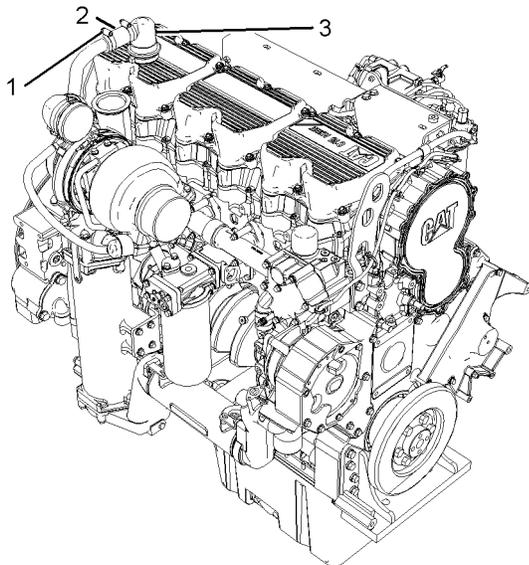


Illustration 200

g01573213

Engine crankcase breather (3) is located on the top of the valve cover.

1. Loosen clamps (1). Remove hose (2) from engine crankcase breather (3).

2. Loosen the hose clamp underneath the breather and remove the breather.
3. Wash the breather in a clean, nonflammable solvent. Inspect the breather and the seal for damage. Replace the seal, if necessary.
4. Use pressure air to dry the breather.
5. Install the seal, engine crankcase breather (3), hose (2) and clamps (1).

i01457076

Engine Oil Level - Check

SMCS Code: 1000-535-FLV

NOTICE

Do not under fill or overfill engine crankcase with oil. Either condition can cause engine damage.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

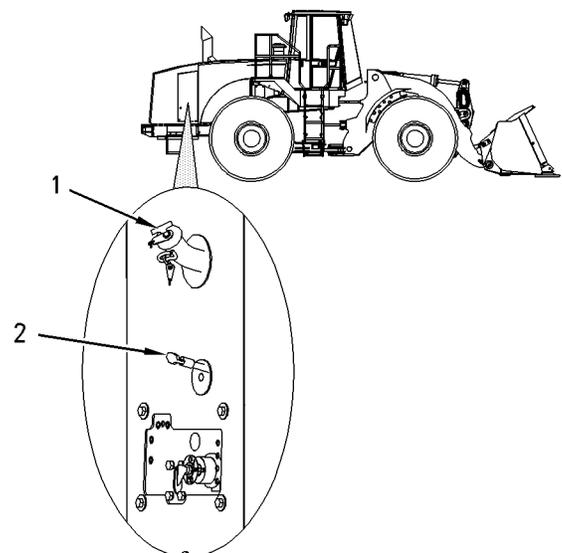


Illustration 201

g00761763

1. Open the engine access door on the right rear side of the machine.
2. Remove engine oil dipstick (2) and wipe the dipstick with a clean cloth. Then, insert the dipstick and remove the dipstick again. This will ensure a more accurate measurement of the engine oil level.
3. While the engine is stopped, check the "ENGINE STOPPED" side of engine oil dipstick (2). Maintain the oil level between the marks on the dipstick.

While the engine is running, check the "ENGINE RUNNING" side of engine oil dipstick (2). Maintain the oil level between the marks on the dipstick.

4. If necessary, remove oil filler plug (1) and add oil through the oil filler tube.
5. Clean the oil filler plug and install the oil filler plug.
6. Close the engine access door.

i03091884

Engine Oil Sample - Obtain

SMCS Code: 1348-008; 7542

WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Operate the machine for a few minutes before you obtain the fluid sample. This will thoroughly mix the fluid for a more accurate sample.

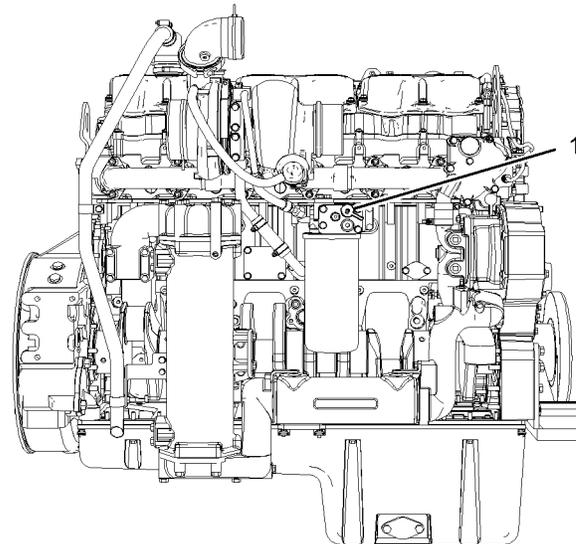


Illustration 202

g01573337

(1) Sampling port for the engine oil

Reference: For more information, refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" and Special Publication, PEHP6001, "How To Take A Good Oil Sample".

i03649984

Engine Oil and Filter - Change

SMCS Code: 1318-510

Selection of the Oil Change Interval

NOTICE

A 500 hour engine oil change interval is available, provided that the operating conditions and recommended multigrade oil types are met. When these requirements are not met, shorten the oil change interval to 250 hours, or use an S·O·S Services oil sampling and analysis program to determine an acceptable oil change interval.

If you select an interval for oil and filter change that is too long, you may damage the engine.

The normal engine oil change interval is listed in this Operation and Maintenance Manual, "Maintenance Interval Schedule".

Abnormally harsh operating cycles or harsh environments can shorten the service life of the engine oil. Arctic temperatures, corrosive environments, or extremely dusty conditions may require a reduction in engine oil change intervals. Also refer to Special Publication, SEBU5898, "Cold Weather Recommendations for All Caterpillar Machines". Poor maintenance of air filters or of fuel filters requires reduced oil change intervals. Consult your Caterpillar dealer for more information if this product will experience abnormally harsh operating cycles or harsh environments.

Adjustment of the Oil Change Interval

Note: Your Caterpillar dealer has additional information on these programs.

Cat oil filters are recommended.

Program A

Verification for an Oil Change Interval of 500 Hours

This program consists of three oil change intervals of 500 hours. Oil sampling and analysis is done at 250 hours and 500 hours for each of the three intervals for a total of six oil samples. The analysis includes oil viscosity and infrared (IR) analysis of the oil. If all of the results are satisfactory, the 500 hour oil change interval is acceptable for the machine in that application. Repeat Program A if you change the application of the machine.

If a sample does not pass the oil analysis, take one of these actions:

- Shorten the oil change interval to 250 hours.
- Proceed to Program B.
- Change to a preferred oil type in the "Lubricant Viscosities for Ambient Temperatures" Table in this Operation and Maintenance Manual

Program B

Optimizing Oil Change Intervals

Begin with a 250 hour oil change interval. The oil change intervals are adjusted by increments. Each increment is an additional 50 hours. Periodic oil sampling and analysis is done during each interval. The analysis includes oil viscosity and infrared (IR) analysis of the oil. Repeat Program B if you change the application of the machine.

If an oil sample does not pass the analysis, shorten the oil change interval, or change to a preferred multigrade oil type in the listing above.

References

Reference: Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations"

Reference: Special Publication, SEBU5898, "Cold Weather Recommendations for All Caterpillar Machines"

Reference: Special Publication, PEDP7035, "Optimizing Oil Change Intervals"

Reference: Special Publication, PEDP7036, "S·O·S Fluid Analysis"

Reference: Special Publication, PEDP7076, "Understanding the S·O·S Oil Analysis Tests"

Procedure for Changing the Engine Oil and the Filter

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

1. Open the access doors that are located on both sides of the machine.

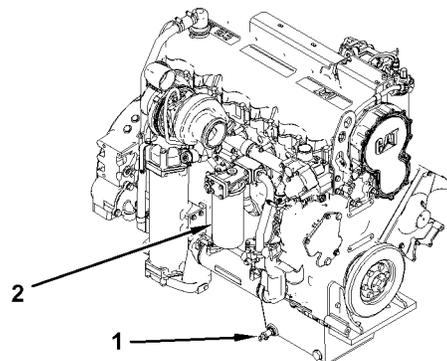


Illustration 203

Earlier machine models
Left side of machine

g01030594

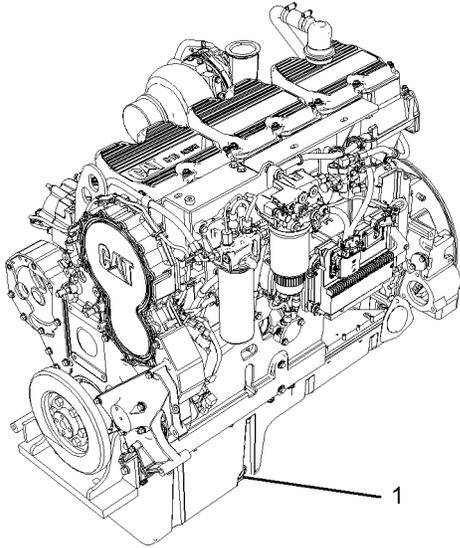


Illustration 204 g01572993
Newer machine models
Location of crankcase drain valve

2. Open the crankcase drain valve (1) on the right side of the machine. Allow the oil to drain into a suitable container. Close the crankcase drain valve.

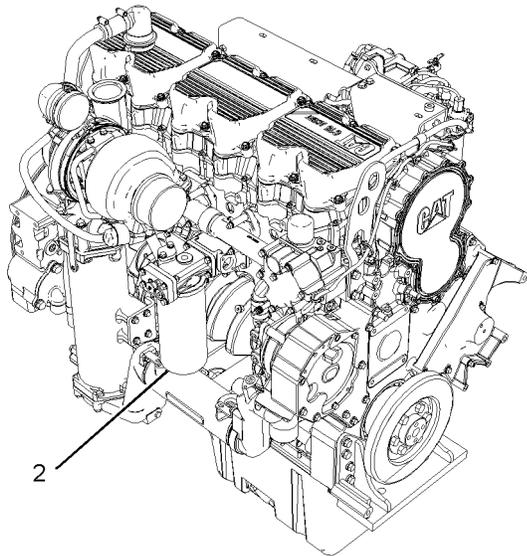


Illustration 205 g01572998

3. Remove the filter element (2) on the left side of the machine with a strap type wrench. Inspect the filter.
4. Clean the filter mounting base with a clean cloth. Make sure that the used filter gasket has been completely removed.

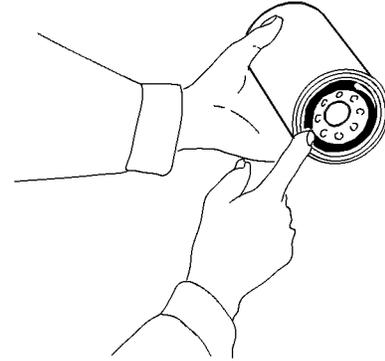


Illustration 206 g00101318

5. Apply a thin coat of clean engine oil to the seal of the new filter.
6. Install the new oil filter elements by hand.

Instructions for the installation of the filters are printed on the side of each Caterpillar spin-on filter. For non-Caterpillar filters, refer to the installation instructions that are provided by the supplier of the filter.

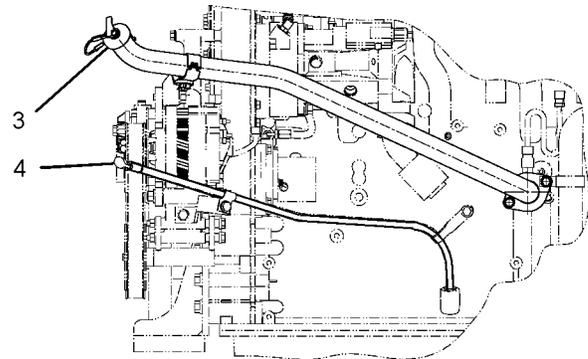


Illustration 207 g01573016

7. Remove engine oil filler cap (3). Fill the crankcase with new oil.

Reference: Refer to Operation and Maintenance Manual, "Capacities (Refill)".

8. Clean engine oil filler cap (3). Install the engine oil filler cap.
9. Start the engine and allow the oil to warm. Check for leaks.
10. Check the engine oil level with engine oil level gauge (4).

Reference: Refer to Operation and Maintenance Manual, "Engine Oil Level - Check" for the correct procedure.

11. Stop the engine. Close the engine access door.

i04538255

Engine Valve Lash - Check

SMCS Code: 1105-535

In order to perform the valve lash adjustment, refer to Systems Operation, Testing and Adjusting, "Engine Valve Lash - Inspect/Adjust".

Note: A qualified mechanic should adjust the engine valve lash because special tools and training are required.

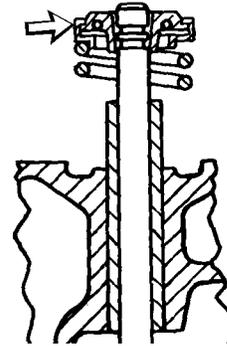


Illustration 209

g00038585

2. Watch the top surface of each valve rotator. Whenever an inlet valve closes or an exhaust valve closes, each valve rotator should turn.
3. If a valve rotator fails to rotate, consult your Caterpillar dealer for service.

Note: Caterpillar recommends replacing valve rotators that are operating improperly. An improperly operating valve rotator will shorten valve life because of accelerated wear on the valves.

Note: If a damaged valve rotator is not replaced, some valve face guttering could result. Metal particles from the valve could fall into the cylinder. This could cause damage to the piston head and to the cylinder head.

i02047267

Ether Starting Aid Cylinder - Replace (If Equipped)

SMCS Code: 1456-510-CD

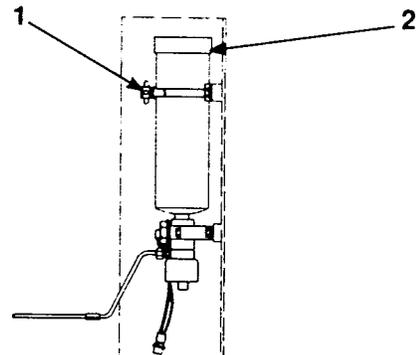


Illustration 210

g00101192

Engine Valve Rotators - Inspect

i02770364

SMCS Code: 1109-040

WARNING

When inspecting the valve rotators, protective glasses or face shield and protective clothing must be worn, to prevent being burned by hot oil or spray.

WARNING

Electrical shock hazard. The electronic unit injector system uses 90-120 volts.

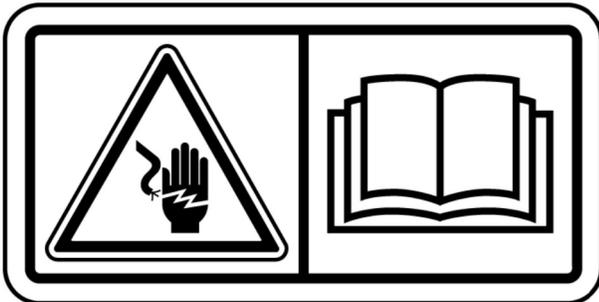


Illustration 208

g01372247

1. Start the engine. Run the engine at low idle.

1. Open the engine hood. The ether starting aid cylinder is mounted in the center of the machine next to the air cleaner.
2. Loosen retaining clamp (1) and unscrew ether starting aid cylinder (2).
3. Remove the gasket. Install the new gasket that is provided with each new ether starting aid cylinder.
4. Install new ether starting aid cylinder (2) hand tight. Tighten retaining clamp (1) securely.
5. Close the engine hood.

i02197564

Fuel System - Prime

SMCS Code: 1250-548

The priming pump is located on the right side of the machine in the engine compartment.

1. Turn the ignition switch to the OFF position.
2. Open the engine access door.

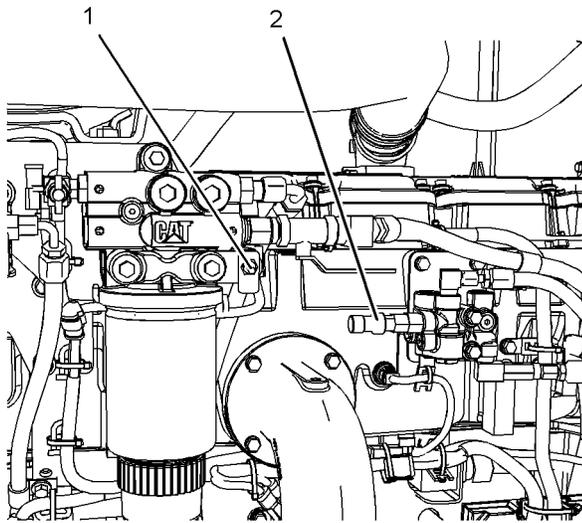


Illustration 211

g01124747

3. Attach a piece of bulk hose to a sampling probe. Install the sampling probe with the piece of bulk hose onto valve assembly (2).

Note: Consult your Caterpillar dealer for the proper tooling or refer to the parts manual for your machine.

4. Position a suitable container under the hose.
5. Turn toggle switch (1) to the ON position. Toggle switch (1) is for the fuel priming pump.

6. Allow the air/fuel mixture to flow into the suitable container until the fuel flows in a steady stream.
7. Turn toggle switch (1) to the OFF position.
8. Remove the sampling probe with the piece of bulk hose from valve assembly (2).
9. Start the engine. The engine should start. The engine should run smoothly.

Failure to tighten fittings could result in fuel leaks.

If the engine does not start or the engine misfires, further priming is necessary.

10. Clean residual fuel from the engine components.
11. Close the engine access door.

i02197567

Fuel System Primary Filter (Water Separator) - Drain

SMCS Code: 1263-543

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

i02197571

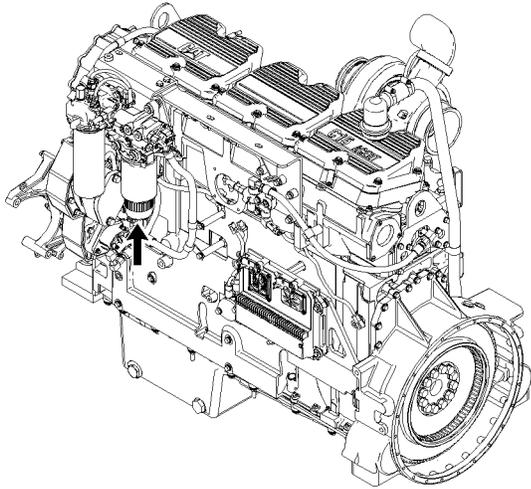


Illustration 212

g01109758

1. Open the engine hood.
2. The fuel filters are located on the right side of the machine in the engine compartment. The water separator bowl is located on the bottom of primary fuel filter. Attach a hose to the bottom of the drain valve in order to catch the fuel. Open the drain valve on the bottom of the water separator bowl. Allow the water and the fuel to drain into a suitable container.

3. Close the drain valve.

Note: The water separator is under suction during normal engine operation. Tighten the drain valve securely in order to prevent air leakage into the fuel system.

4. Close the engine hood.

Fuel System Primary Filter (Water Separator) Element - Replace

SMCS Code: 1263-510-FQ

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

NOTICE

Do not fill fuel filters with fuel before installing them. The fuel will not be filtered and could be contaminated. Contaminated fuel will cause accelerated wear to fuel system parts. The fuel system should be primed prior to starting the engine.

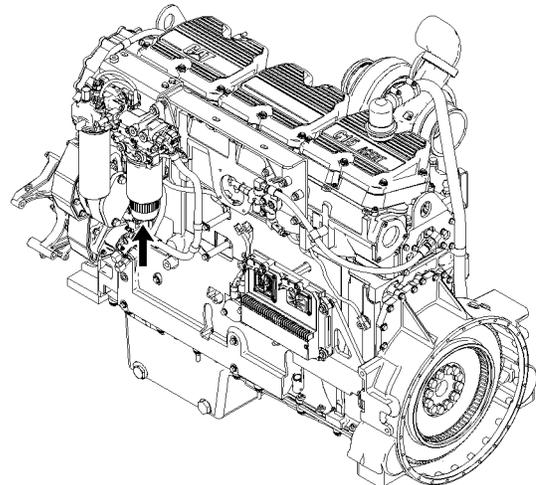


Illustration 213

g01109758

1. The water separator bowl is located on the bottom of the primary fuel filter. Open the drain valve on the water separator bowl. Allow the water and the fuel to drain into a suitable container.

2. Use a strap type wrench to remove the filter from the filter mounting base.
3. Remove the water separator bowl from the filter element. Clean the water separator bowl and the O-ring groove.

Note: The water separator bowl is reusable. Do not discard the water separator bowl.

4. Inspect the O-ring seal in the water separator bowl for damage. Replace the O-ring seal, if necessary.
5. Lubricate the O-ring seal with clean diesel fuel or with engine oil. Place the O-ring seal in the water separator bowl.
6. Install the water separator bowl onto the new filter element by hand. Do not use tools to tighten the water separator bowl.

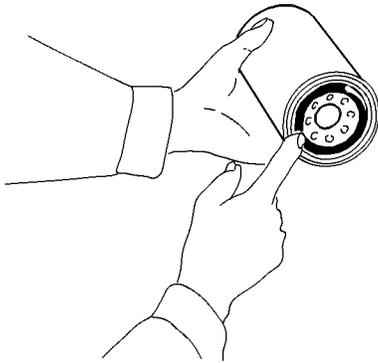


Illustration 214

g00101318

7. Lubricate the gasket of the new filter element with clean diesel fuel. Install a new filter hand tight until the seal of the fuel filter contacts the base. Note the position of the index marks on the filter in relation to a fixed point on the filter base.

Note: There are rotation index marks on the fuel filter that are spaced 90 degrees or 1/4 of a turn away from each other. When you tighten the fuel filter, use the rotation index marks as a guide.

8. Tighten the filter according to the instructions that are printed on the filter. Use the index marks as a guide. For non-Caterpillar filters, use the instructions that are provided with the filter.

Note: You may need to use a Caterpillar strap wrench, or another suitable tool, in order to turn the filter to the amount that is required for final installation. Make sure that the installation tool does not damage the filter.

9. Tighten the drain valve on the water separator bowl.

Note: The water separator element is under suction during normal engine operation. The drain valve must be tightened in order to prevent air leakage into the fuel system.

10. Prime the fuel system in order to fill the filter element with fuel.

Reference: Refer to Operation and Maintenance Manual, "Fuel System Prime" for the correct procedure.

i02197586

Fuel System Secondary Filter - Replace

SMCS Code: 1261-510-SE

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

NOTICE

Do not fill fuel filters with fuel before installing them. The fuel will not be filtered and could be contaminated. Contaminated fuel will cause accelerated wear to fuel system parts. The fuel system should be primed prior to starting the engine.

i04798701

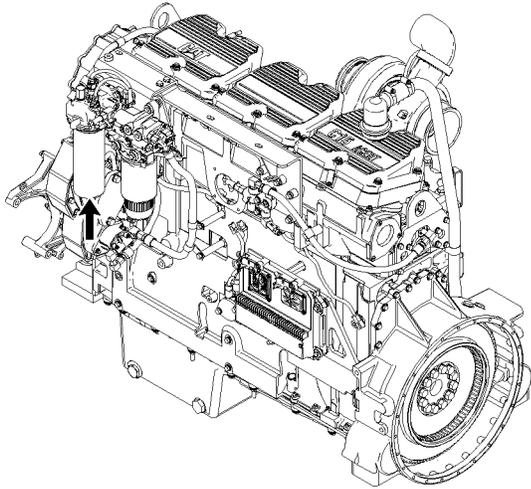


Illustration 215

g01109780

1. Use a strap type wrench to remove the secondary fuel filter. The secondary fuel filter is located on the right side of the machine in the engine compartment. Dispose of the used filter properly.
2. Clean the filter mounting base. Remove all of the used seal from the filter mounting base.
3. Lubricate the seal of the new fuel filter with clean diesel fuel. Install a new secondary fuel filter hand tight until the seal of the secondary fuel filter contacts the base. Note the position of the index marks on the filter in relation to a fixed point on the filter base.

Note: There are rotation index marks on the fuel filter that are spaced 90 degrees or 1/4 of a turn away from each other. When you tighten the fuel filter, use the rotation index marks as a guide.

4. Tighten the filter according to the instructions that are printed on the filter. Use the index marks as a guide. For non-Caterpillar filters, use the instructions that are provided with the filter.

Note: You may need to use a Caterpillar strap wrench, or another suitable tool, in order to turn the filter to the amount that is required for final installation. Make sure that the installation tool does not damage the filter.

5. Prime the fuel filters.

Reference: Refer to Operation and Maintenance Manual, "Fuel System - Prime" for the proper procedure.

Fuel Tank Breaker Relief Valve - Replace (If Equipped)

SMCS Code: 5118-510

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

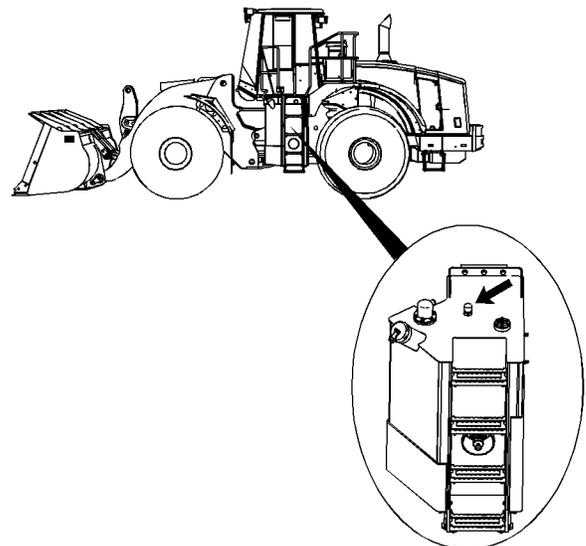


Illustration 216

g01121947

1. Remove the fuel tank breaker relief valve from the top of the fuel tank.
2. Install a new fuel tank breaker relief valve.

i02877628

Fuel Tank Cap and Strainer - Clean

SMCS Code: 1273-070-Z2; 1273-070-STR

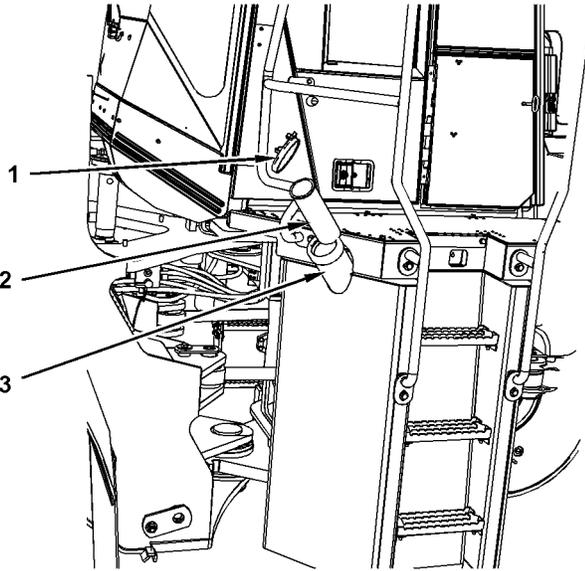


Illustration 217

g01432143

- (1) Cap
- (2) Strainer
- (3) Fuel Tank

The fuel tank is located on the left side of the machine.

1. Remove the fuel tank cap and the strainer from the fuel tank .
2. Inspect the seal for damage. If the seal is damaged, replace the cap.
3. Wash the strainer in a clean, nonflammable solvent.
4. Install the strainer into the filler opening.
5. Install the fuel tank cap.

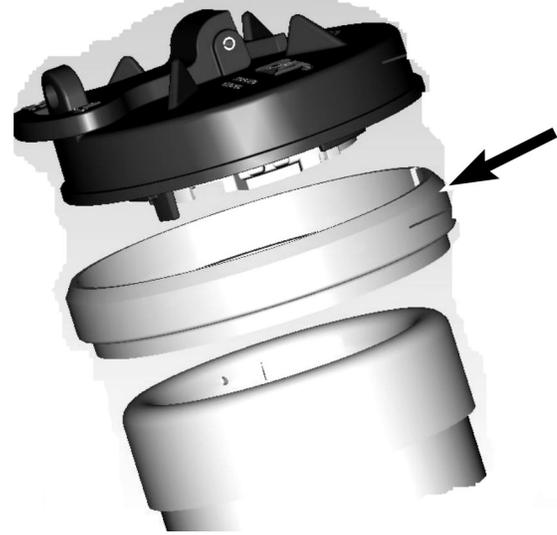


Illustration 218

g01431287

6. Inspect the fuel cap boot(if equipped). If the fuel cap boot is damaged, replace the fuel cap boot. If your machine does not have a fuel cap boot, contact your Caterpillar dealer for information about the fuel cap boot.
7. Wash the fuel cap boot in a clean, nonflammable solvent.
8. Install the fuel cap boot and the fuel tank cap.

i01455356

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543-M&S

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

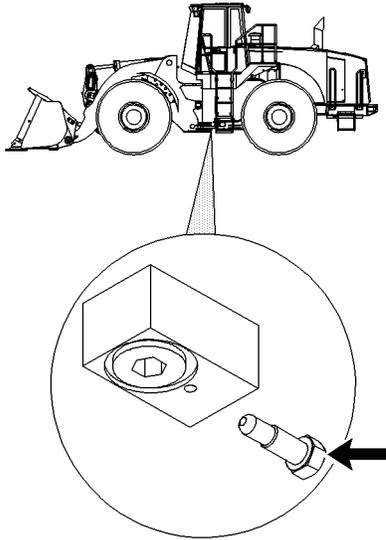


Illustration 219

g00761041

The fuel tank drain valve is located at the left side of the machine under the fuel tank.

1. Open the fuel tank drain valve. Allow the water and sediment to drain into a suitable container.
2. Close the fuel tank drain valve.

i02283060

Fuses - Replace

SMCS Code: 1417-510

NOTICE

Replace fuses with the same type and size only. Otherwise, electrical damage can result.

If it is necessary to replace fuses frequently, an electrical problem may exist. Contact your Caterpillar dealer.



Fuses – The fuses protect the electrical system from a circuit that has been overloaded. Change a fuse if the element separates. If the element of a new fuse separates, check the circuit. Repair the circuit, if necessary.

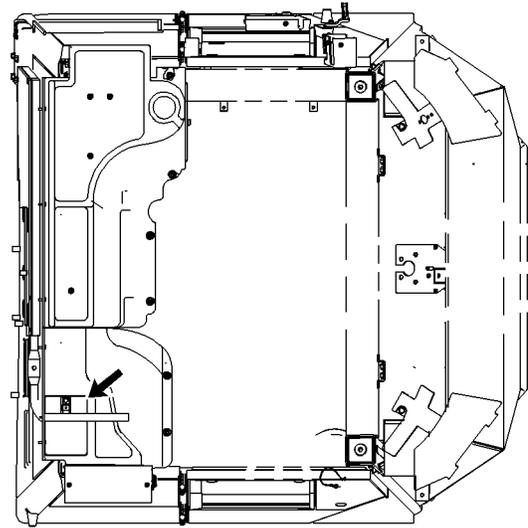


Illustration 220

g01000750

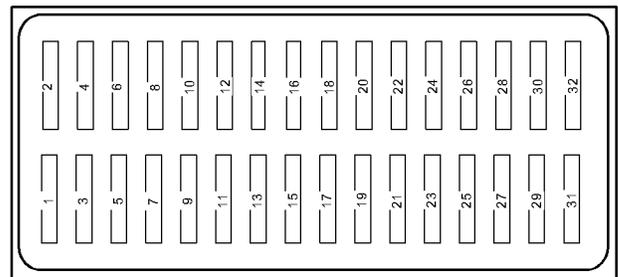


Illustration 221

g01078009

The fuses are located in the cab on the right side of the operator seat.

- | | |
|---|------------|
| (1) HVAC Blower | 20 Amperes |
| (2) Neutralizer Override Switch | 10 Amperes |
| (3) Axle Oil Cooler and Switched Autolube Power | 10 Amperes |
| (4) Autodig Audible Alert | 10 Amperes |
| (5) Rear Cab Floodlights | 15 Amperes |
| (6) Air Seat and Heated Seat | 15 Amperes |
| (7) Switched Autolube Power | 10 Amperes |
| (8) Engine ECM Switched Power | 10 Amperes |
| (9) Front Cab Floodlights | 15 Amperes |
| (10) Beacon and Heated Mirrors | 10 Amperes |

i02245859

(11) Turn Signal Flasher, Front Flood Relays, and Rear Flood Relays	10 Amperes
(12) Machine Security System and Product Link	10 Amperes
(13) LH Indicator Display and RH Indicator Display	10 Amperes
(14) Tilt Position Sensor and Lift Position Sensor	10 Amperes
(15) Transmission ECM and LH Brake Pedal Sensor	10 Amperes
(16) Implement ECM and Lever Sensors	10 Amperes
(17) EMS, Quad Gauge, Speedometer, Tachometer, and Backlights	10 Amperes
(18) Wiper and Washer for the Front and the Rear Windows	10 Amperes
(19) Payload Control System (PCS)	10 Amperes
(20) Voltage Converters and 24V Radio	10 Amperes
(21) Center Indicator Display	10 Amperes
(22) Engine ECM Unswitched Power	15 Amperes
(23) Product Link	15 Amperes
(24) Voltage Converter Memory (Attachment)	10 Amperes
(25) ECAP and Unswitched Autolube Power	15 Amperes
(26) LH Tail and Clearance Lights	10 Amperes
(27) Hood Actuator	10 Amperes
(28) Stop Lamps	10 Amperes
(29) Horn	10 Amperes
(30) Voltage Converter Memory (Standard)	10 Amperes
(31) Key Start Switch and Machine Security System	10 Amperes
(32) Dome Lamps	10 Amperes

High Intensity Discharge Lamp (HID) - Replace (If Equipped)

SMCS Code: 1434-510

WARNING

HID lamps operate at very high voltages. To avoid electrical shock and personal injury, disconnect power before servicing HID lamps.

WARNING

HID bulbs become very hot during operation. Before servicing, remove power from lamp for at least five minutes to ensure lamp is cool.

NOTICE

Although HID bulb materials may change over time, HID bulbs produced at the time of the printing of this manual contain mercury. When disposing of this component, or any waste that contains mercury, please use caution and comply with any applicable laws.

1. Remove the electrical power from the high intensity discharge lamp (HID). The electrical power must be removed from the HID lamp for at least five minutes, in order to ensure that the bulb is cool.
2. Disassemble the housing for the HID lamp in order to have access to the bulb.
3. Remove the bulb from the HID lamp.
4. Install the replacement bulb in the HID lamp.

Note: On some HID lamps, the bulb is an integral part of the lens assembly. The bulb is not removed separately from the lens assembly. Replace the entire lens assembly on these HID lamps.

Note: In order to avoid failure to the bulb that is premature, avoid touching the bulb's surface with your bare hands. Clean any fingerprints from the bulb with alcohol prior to operation.

5. Reassemble the housing for the HID lamp. Ensure that any printing on the lens is oriented correctly with respect to the HID lamp's mounting position on the machine.

6. Reattach the electrical power to the HID lamp.
7. Check the HID lamp for proper operation.

Note: Consult your Caterpillar dealer for additional information on HID lamps.

i04004021

Hydraulic System Biodegradable Oil Filter Element - Replace

SMCS Code: 5068-510

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

1. Stop the engine.
2. Drain the hydraulic oil.

Reference: For the correct procedure, refer to Operation and Maintenance Manual, "Hydraulic System Oil - Change".

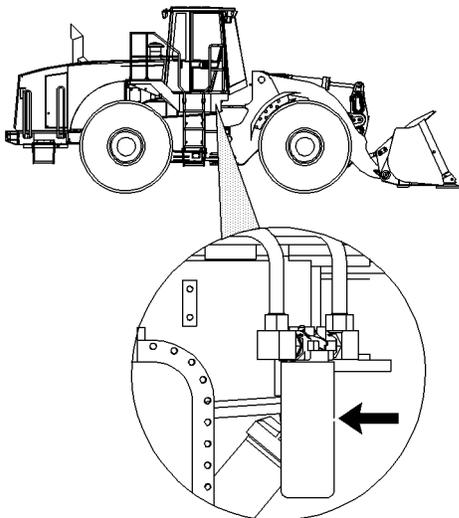


Illustration 222

g00761222

3. The hydraulic oil filter is located on the right side of the machine in front of the hydraulic oil tank. Use a strap type wrench to remove the filter element. Dispose of the used filter element properly.
4. Clean the filter mounting base. Make sure that all of the used gasket is removed from the filter mounting base.

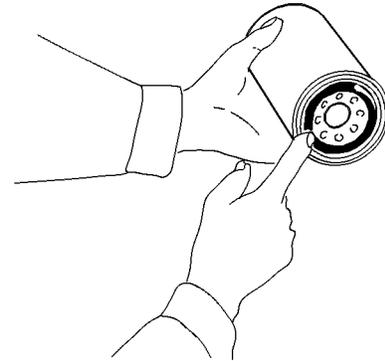


Illustration 223

g00101318

5. Apply a thin coat of hydraulic oil to the seal on the new filter.
6. Install the new oil filter elements by hand.

Instructions for the installation of the filters are printed on the side of each Caterpillar spin-on filter. For non-Caterpillar filters, refer to the installation instructions that are provided by the supplier of the filter.

7. Fill the hydraulic tank with clean oil.

Reference: For the correct type of oil and for the correct amount of oil, refer to Operation and Maintenance Manual, "Lubricant Viscosities and Refill Capacities".

8. Start the engine and run the engine at low idle. Inspect the hydraulic system for leaks.
9. Check the hydraulic oil level.

Reference: For the correct procedure, refer to Operation and Maintenance Manual, "Hydraulic System Oil Level - Check".

i03267620

Hydraulic System Oil - Change

SMCS Code: 5056-044

Selection of the Oil Change Interval

Your machine may be able to use a 4000 hour interval for the hydraulic oil. The hydraulic oil is in the system that is not integral to the service brakes, the clutches, the final drives, or the differentials. The standard change interval is 2000 hours. The oil should be monitored during intervals of 500 hours. The extended 4000 hour interval can be used if the following criteria are met.

HYDO Advanced 10

Cat HYDO Advanced 10 is the preferred oil for use in most Caterpillar machine hydraulic and hydrostatic transmission systems when ambient temperature is between -20°C (-4°F) and 40°C (104°F). Cat HYDO Advanced 10 has an SAE viscosity grade of 10W. **Cat HYDO Advanced 10 has a 50% increase in the standard oil drain interval** (up to 3000 hours) for machine hydraulic systems over second and third choice oils when you follow the maintenance interval schedule for oil filter changes and for oil sampling that is stated in the Operation and Maintenance Manual. 6000 hour oil drain intervals are possible when using S-O-S Services oil analysis. When you switch to Cat HYDO Advanced 10, cross contamination with the previous oil should be kept to less than 10%. Consult your Cat dealer for details about the benefits from the improved performance designed into Cat HYDO Advanced 10.

Oil Filters

Caterpillar oil filters are recommended. The interval for changing the oil filter should be 500 hours.

Oil

The 6000 hour interval for changing the oil is specific to HYDO Advance 10.

The 4000 hour interval for changing the oil is for the following oil types.

- Caterpillar Hydraulic Oil (HYDO)
- Caterpillar Transmission and Drive Train Oil (TDTO)
- Caterpillar TDTO-TMS
- Caterpillar Diesel Engine Oil

- Caterpillar Biodegradable Hydraulic Oils (HEES)
- Caterpillar Multipurpose Tractor Oil (MTO)
- Heavy-duty diesel engine oils with a minimum zinc content of 900 ppm

If Caterpillar oils cannot be used, use heavy-duty oils with the following classification: Caterpillar ECF-1, API CG-4, API CF, and TO-4. These oils must have a minimum zinc additive of 0.09 percent (900 ppm).

Note: Industrial hydraulic oils are not recommended in Caterpillar hydraulic systems.

Monitoring the Condition of the Oil

The oil should be monitored during intervals of 500 hours. Caterpillar's standard SOS Fluids Analysis or an equivalent oil sampling program should be used.

The current guidelines for cleanliness of the oil should be observed. Refer to "Measured Data".

If an oil sampling program is not available, the standard 2000 oil change interval should be used.

Measured Data

The following information should be monitored through sampling of the oil:

- Significant changes in wear metals should be monitored. These metals include iron, copper, chromium, lead, aluminum, and tin.
- Significant changes in the following additives should be monitored: zinc, calcium, magnesium, and phosphorus.
- Contaminants should not be present. These contaminants include fuel and antifreeze. Water content should be .5 percent or less.
- The silicon level should not exceed 15 parts per million for new oil. The particle counts should be monitored.
- The recommended level of cleanliness for Caterpillar machines that are operated in the field is ISO 18/15 or cleaner. The cleanliness should be monitored by particle count analysis. The levels of contamination should not exceed the normal by more than two ISO codes. Action should be taken in order to determine the cause of the contamination. The system should be returned to the original levels of contamination.
- There should not be significant changes in sodium, silicon, copper, and potassium.

- The allowable level of oxidation is 40 percent (0.12 Abs units).
- The kinematic viscosity of 100 °C (212 °F) oil should not exceed a change of more than 2 cSt from new oil.

Procedure for Changing the Hydraulic Oil

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Operate the machine for a few minutes in order to warm the hydraulic oil.

Park the machine on level ground. Lower the bucket to the ground and apply slight downward pressure. Engage the parking brake and stop the engine.

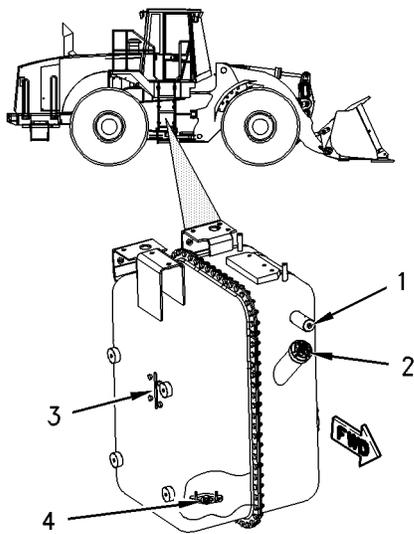


Illustration 224

g00761267

The hydraulic tank is located on the right side of the machine. Press hydraulic tank breaker relief valve (1) in order to relieve any tank pressure.

1. Remove hydraulic tank filler cap (2) and the filler strainer. Wash the filler cap and the strainer in a clean, nonflammable solvent. Install the strainer.
2. Inspect the gasket on the filler cap for damage. Replace the gasket, if necessary.
3. Remove the drain plug (4) from the bottom of the hydraulic tank. Wash the drain plug in a clean, nonflammable solvent.
4. Install a 6B-3156 Pipe Nipple with a hose in order to unseat the internal drain valve. Allow the hydraulic oil to drain into a suitable container.

NOTICE

Never start the engine while the hydraulic oil tank is being drained or while the hydraulic oil tank is empty. Excessive wear and damage to the hydraulic components can occur.

5. Remove the pipe nipple in order to close the drain valve. Install the drain plug.
6. Replace the hydraulic oil filter.

Reference: Refer to Operation and Maintenance Manual, "Hydraulic System Oil Filter - Replace" for the correct procedure.

7. Fill the hydraulic tank with clean oil. Make sure that the oil level is at the "FULL" mark on the sight gauge (3). Install the filler cap.

Reference: Refer to Operation and Maintenance Manual, "Lubricant Viscosities and Refill Capacities" for the correct type of oil and for the correct amount of oil.

8. Start the engine and run the engine for at least ten seconds. Then, stop the engine and add hydraulic oil to the tank until the oil level is at the "FULL" mark on the sight gauge. Install the filler cap.
9. Start the engine and run the engine at low idle. Cycle the implements so that all hydraulic systems are filled with oil. Articulate the machine from left to right in order to fill the steering system with oil.

Note: If the alert indicator for a low oil level comes on, stop the engine and immediately add oil to the hydraulic tank. The oil level should not be below the suction ports in the hydraulic tank while the engine is running.

Note: If the pump is difficult to prime, in order to aid pump priming, refer to Illustration 225 and 226. Install the 5P-3415 Adapter (1) after removing the fitting (2) on the end of the 5P-2413 Air Regulator (3). The hydraulic tank breaker relief valve (4) is removed and the air regulator (3) is installed in order to regulate air pressure. Air pressure of less than 10 psi can be applied in order to aid pump priming.

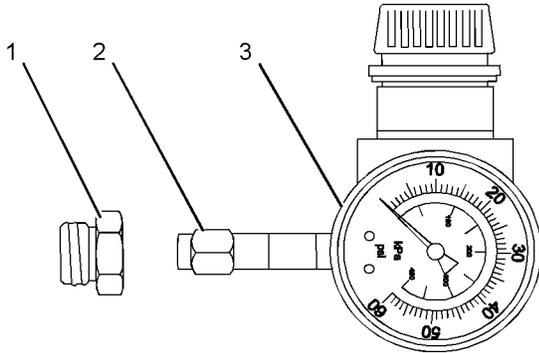


Illustration 225

g01662555

- (1) Adapter
- (2) Fitting
- (3) Air Regulator

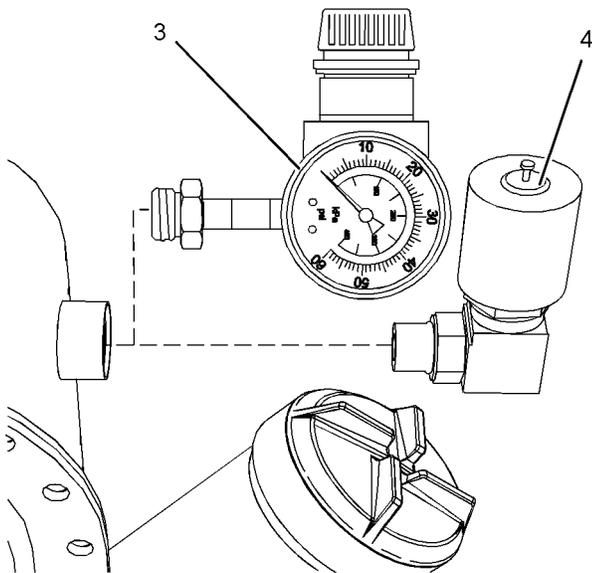


Illustration 226

g01660894

- (4) Hydraulic Tank Breaker Relief Valve

10. Add hydraulic oil to the tank until the oil level is at the "FULL" mark on the sight gauge.

11. Stop the engine. Top off the hydraulic tank so that the oil level is at the "FULL" mark on the sight gauge. Install the filler cap.

Note: The oil must be free of air bubbles. If air bubbles are present in the hydraulic oil, air is entering the hydraulic system. Inspect the hydraulic suction line and the hose clamps.

12. If necessary, tighten any loose clamps or any loose connections. Replace any damaged hoses.

i04004038

Hydraulic System Oil Filter - Replace

SMCS Code: 5068-510

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

1. Stop the engine.
2. Drain the hydraulic oil.

Reference: For the correct procedure, refer to Operation and Maintenance Manual, "Hydraulic System Oil - Change".

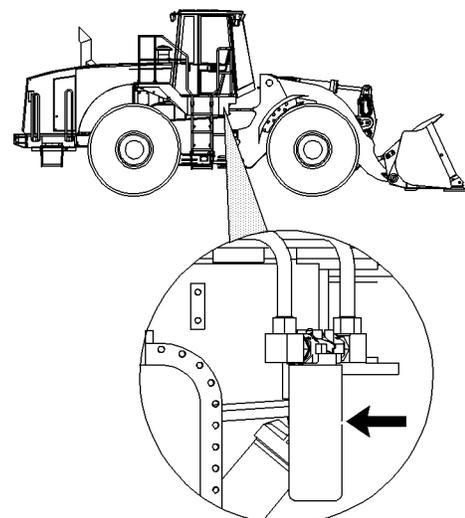


Illustration 227

g00761222

3. The hydraulic oil filter is located on the right side of the machine in front of the hydraulic oil tank. Use a strap type wrench to remove the filter element. Dispose of the used filter element properly.
4. Clean the filter mounting base. Make sure that all of the used gasket is removed from the filter mounting base.

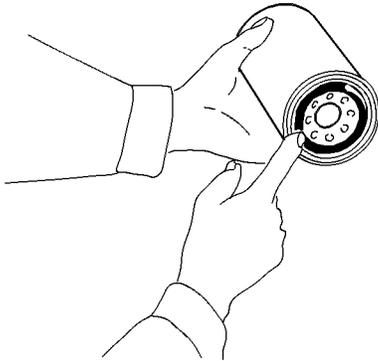


Illustration 228

g00101318

5. Apply a thin coat of hydraulic oil to the seal on the new filter.
6. Install the new oil filter elements by hand.

Instructions for the installation of the filters are printed on the side of each Caterpillar spin-on filter. For non-Caterpillar filters, refer to the installation instructions that are provided by the supplier of the filter.
7. Fill the hydraulic tank with clean oil.

Reference: For the correct type of oil and for the correct amount of oil, refer to Operation and Maintenance Manual, "Lubricant Viscosities and Refill Capacities".

8. Start the engine and run the engine at low idle. Inspect the hydraulic system for leaks.
9. Check the hydraulic oil level.

Reference: For the correct procedure, refer to Operation and Maintenance Manual, "Hydraulic System Oil Level - Check".

i02085957

Hydraulic System Oil Level (Hood Tilt) - Check

SMCS Code: 5050-535-HK

1. Lift the rear access cover on the left side of the machine.

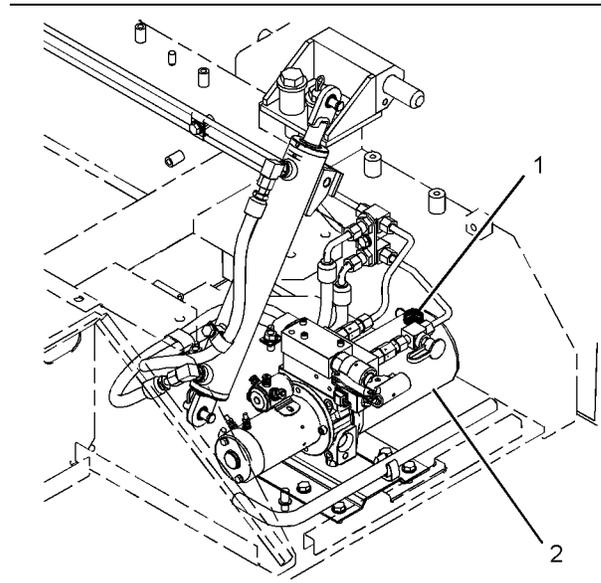


Illustration 229

g01063820

2. Observe the level of oil in tank (2). The oil level should be about 2.54 cm (1.0 inch) from the top of the tank.
3. If necessary, remove filler cap (1) and add oil through the top of the tank. Refer to Operation and Maintenance Manual, "Lubricant Viscosities".
4. Clean the filler cap and install the filler cap.
5. Close the rear access cover.

i02214455

Hydraulic System Oil Level - Check

SMCS Code: 5056-535-FLV

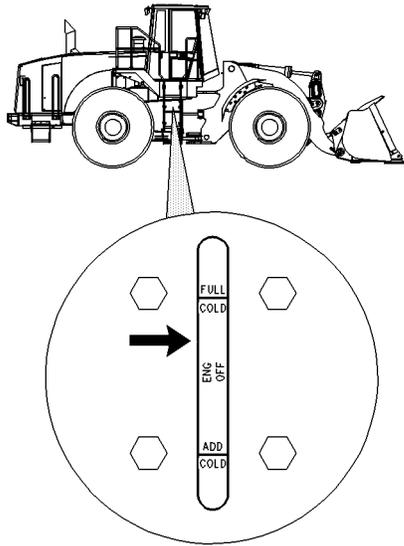


Illustration 230

g00761333

The hydraulic oil tank is located on the right side of the machine.

The lift arms must be lowered with the bucket flat in order to check the hydraulic oil. Check the hydraulic oil level while the engine is stopped. Maintain the oil level above the "ADD COLD" mark on the sight gauge.

If necessary, remove the hydraulic oil filler cap and add hydraulic oil.

i01920994

Hydraulic System Oil Sample - Obtain

SMCS Code: 5050-008; 5056-008; 7542

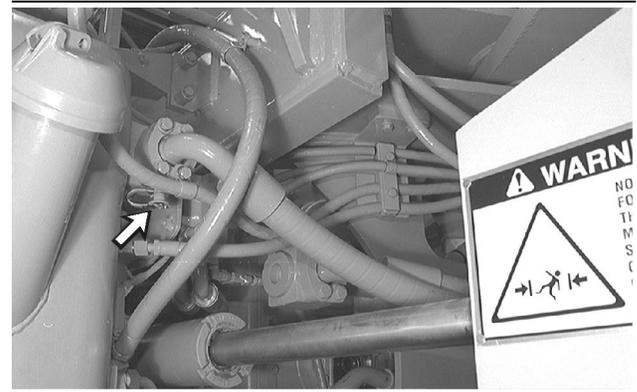


Illustration 231

g00274518

Obtain a sample of the hydraulic oil from the sampling valve. The sampling valve is located toward the front of the hydraulic oil tank on the right side of the machine. Refer to Special Publication, SEBU6250, "S-O-S Oil Analysis" for information that pertains to obtaining a sample of the oil. Refer to Special Publication, PEHP6001, "How To Take A Good Oil Sample" for more information about obtaining a sample of the oil.

i04004058

Hydraulic Tank Breaker Relief Valve - Clean

SMCS Code: 5118-070

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

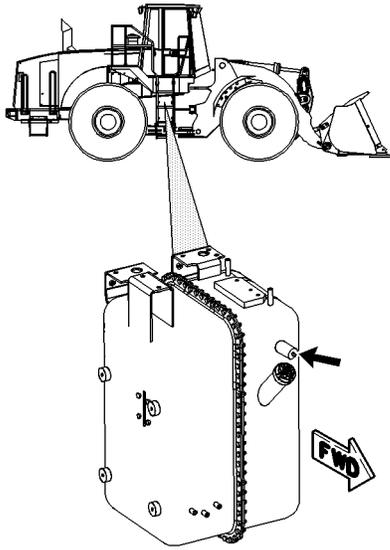


Illustration 232

g00761425

1. Remove the hydraulic tank breaker relief valve from the front of the hydraulic tank.
2. Clean the breaker relief valve in a clean, nonflammable solvent.
3. Dry the breaker relief valve thoroughly by shaking or use compressed air.
4. Install the hydraulic tank breaker relief valve.

i03657276

Logging Fork Clamp - Lubricate (If Equipped)

SMCS Code: 6113-086-BD; 6410-086-BD

Wipe off all fittings before any lubricant is applied.

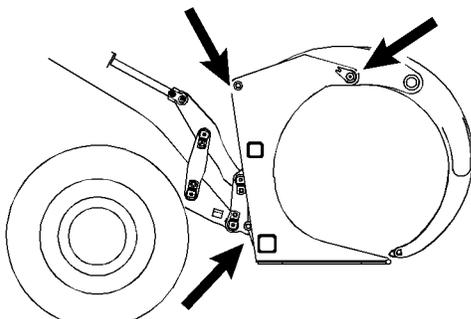


Illustration 233

g01962679

Apply lubricant through three fittings on each side of the logging fork.

There is a total of six fittings.

i02106227

Oil Filter - Inspect

SMCS Code: 1308-507; 3004-507; 3067-507;
5068-507

Inspect a Used Filter for Debris

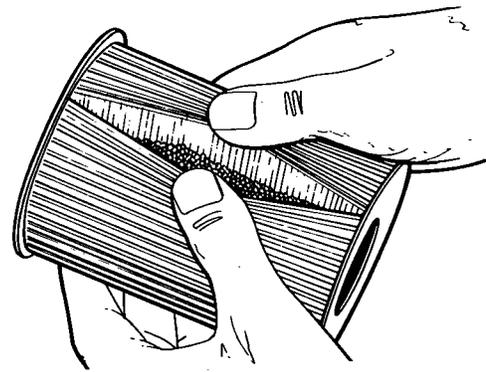


Illustration 234

g00100013

The element is shown with debris.

Use a filter cutter to cut the filter element open. Spread apart the pleats and inspect the element for metal and for other debris. An excessive amount of debris in the filter element can indicate a possible failure.

If metals are found in the filter element, a magnet can be used to differentiate between ferrous metals and nonferrous metals.

Ferrous metals can indicate wear on steel parts and on cast iron parts.

Nonferrous metals can indicate wear on the aluminum parts of the engine such as main bearings, rod bearings, or turbocharger bearings.

Small amounts of debris may be found in the filter element. This could be caused by friction and by normal wear. Consult your Caterpillar dealer in order to arrange for further analysis if an excessive amount of debris is found.

Using an oil filter element that is not recommended by Caterpillar can result in severe engine damage to engine bearings, to the crankshaft, and to other parts. This can result in larger particles in unfiltered oil. The particles could enter the lubricating system and the particles could cause damage.

i04004068

Pallet Fork - Inspect

SMCS Code: 6136-040

Descriptions of the Fork Tine

Parts

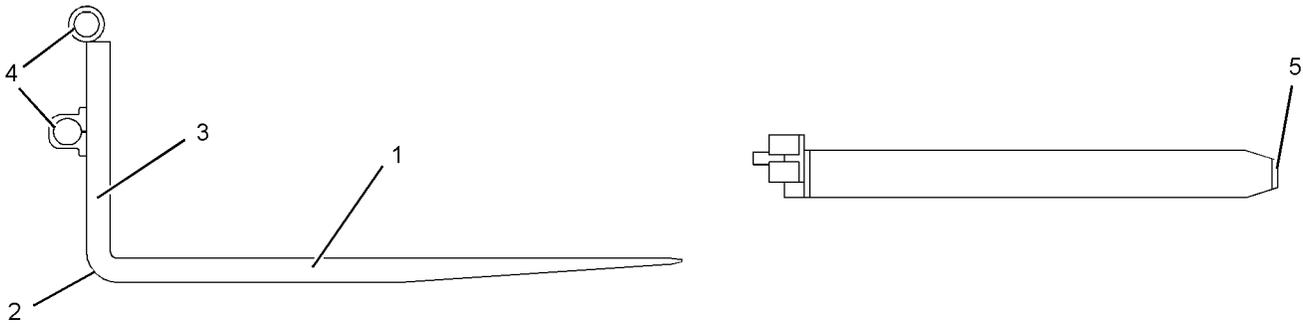


Illustration 235

g01598401

(1) Blade – The horizontal part of the fork tine that supports the load

(2) Heel – The radius on the fork tine that connects the blade to the shank

(3) Shank – The vertical part of the fork tine that has the hooks that support the fork tines attached.

(4) Hook or Hanger – Carriers that mount the fork tines to the carriage

(5) Tip – The free end of the blade

Surfaces

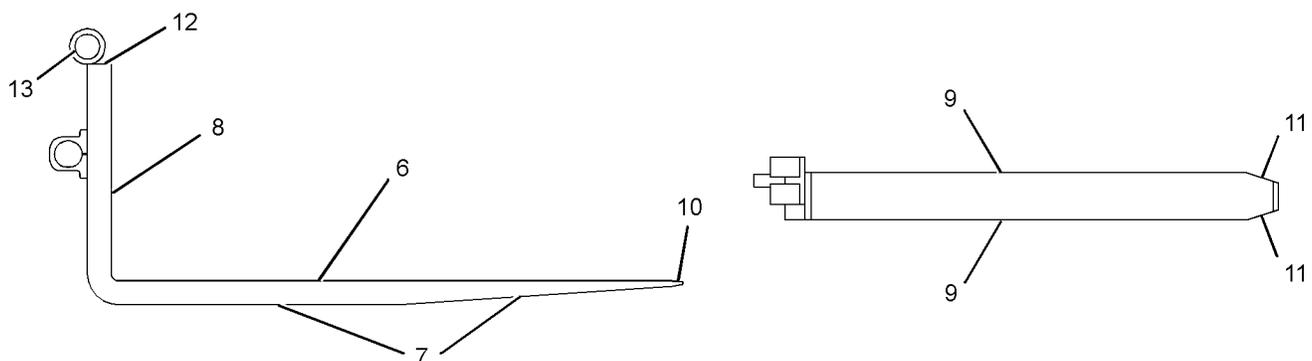


Illustration 236

g01598403

(6) Upper Face of the Blade – The upper surface of the blade that carries the load

(7) Bottom of Heel – The lower surface of the blade that includes the tapers

(8) Front Face of Shank – The distance for the load center is measured from the front face of the shank and the face of the shank contacts the load.

(9) Flanks – The side faces of the blade and the shank.

(10) Blade Bevel – The upper and lower surfaces of the tip on the blade that are tapered for easy insertion of the fork tines

(11) Tip Flanks – The side surfaces of the tip on the blade that are tapered for easy insertion of the fork tines

(12) Top of Shank – The upper surface on the shank

(13) Shaft – The tubes that are mounted on the fork tines for mounting the fork tines to the carriage

Dimensions

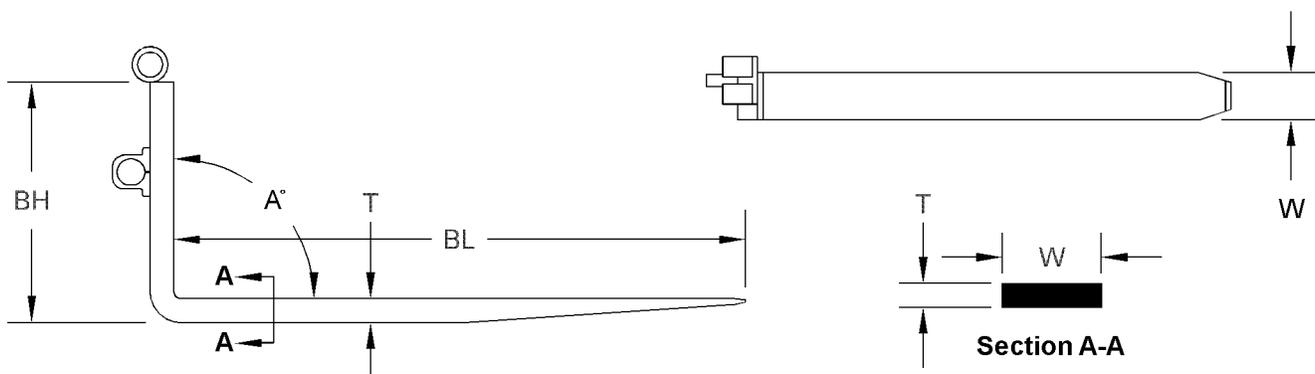


Illustration 237

g01598405

(T) Thickness – The thickness of the blade at the closest point to the heel

(W) Width – The width of the blade at the closest point to the heel

(BH) Back Height – The distance from the bottom of the blade to the top of the shank

(BL) Length – The length of the blade is measured from the front face on the shank to the tip on the blade.

(A) Angle – The angle from the upper surface of the blade to the front face of the shank.

Inspection of the Fork Tines

Check the fork tines daily for any twisting or bending of the fork tines. If any twisting or bending is observed, the fork tines should be changed prior to any lifting operation. If the fork tines are damaged, consult your Cat dealer.

Check the fork tines for wear or for damage. Inspect the welds, the locks, the shafts, and the fork tines for damage. If the components are damaged, consult your Cat dealer. Refer to , "Daily Inspection" for additional information.

Blade Thickness

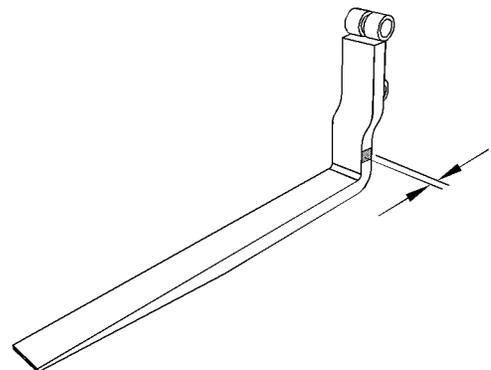


Illustration 238

g01600073

1. Measure the thickness of the shank. Ensure that the measuring device is held square across the shank in order to acquire an accurate measurement.

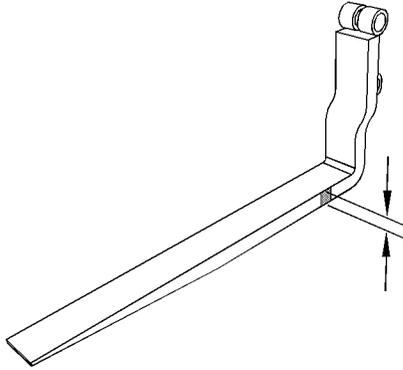


Illustration 239

g01600074

2. Measure the blade of the fork tine near the heel. Ensure that the measuring device is held square across the blade in order to acquire an accurate measurement.
3. Compare the measurement of the blade and the measurement of the shank.
4. If the difference in measurements is less than 10%, the fork tine can remain in service.
5. If the difference in measurements is greater than 10%, the fork tine must be taken out of service. Fork tine wear that is greater than 10%, represents a 20% reduction in the capacity of the fork tine.

Consult your Cat dealer for additional information.

Angle of the Heel

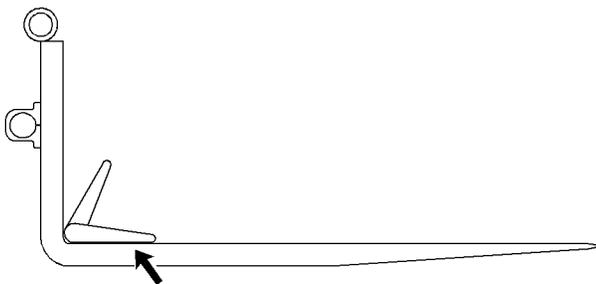


Illustration 240

g01600075

1. Place a measuring device in the top inside area of the heel on top of the blade. Ensure that the measuring device is held flat against the blade in order to acquire an accurate measurement.

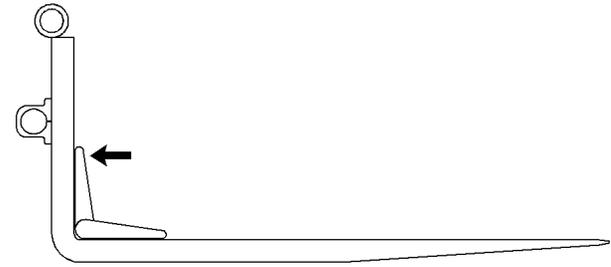


Illustration 241

g01600076

2. Move the upper arm of the measuring device toward the face of the shank. Ensure that the measuring device is held flat against the face of the shank in order to acquire an accurate measurement.
3. Check the angle that was measured with the device for the angle of the heel.
4. If the angle is between 87 degrees and 93 degrees, the fork tine can remain in service.
5. If the angle is less than 87 degrees or greater than 93 degrees, the fork tine must be taken out of service. The fork tines must be inspected for the following conditions:
 - permanent deformation
 - stress cracks
 - other defects

Consult your Cat dealer for additional information.

i03082842

i04039309

Pallet Fork - Lubricate

SMCS Code: 6136-086

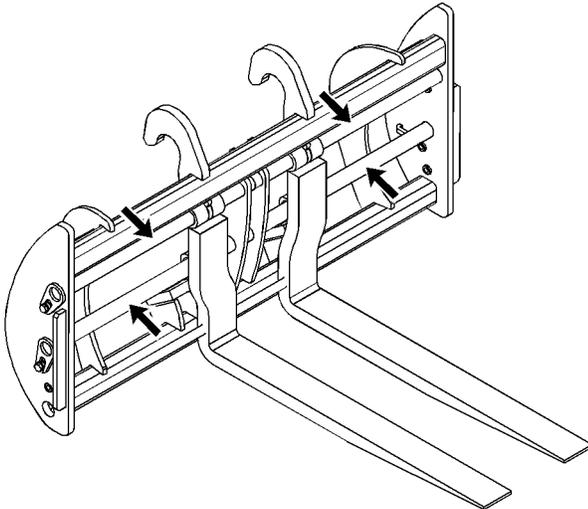


Illustration 242
typical example

g01563105

1. Coat the shafts with grease.

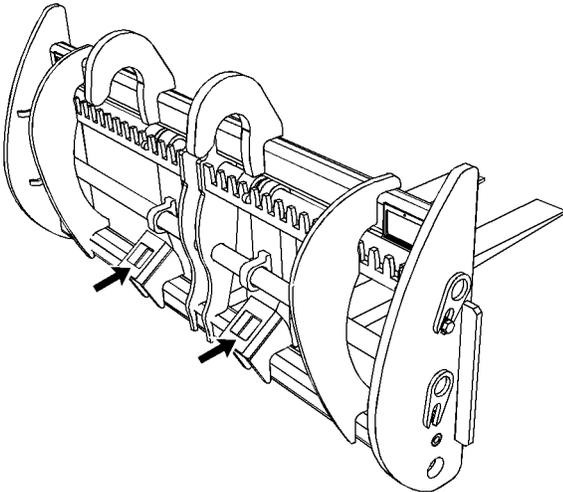


Illustration 243
typical example

g01563115

2. Coat the mounting holes for the quick coupler with grease.

Reference: Refer to Operation and Maintenance Manual, SEBU6250, "Caterpillar Machine Lubricant Recommendations" for information on lubricants.

Radiator Core - Clean

SMCS Code: 1353-070-KO

Ensure that the engine is off before you perform this procedure.

1. Open the radiator grill at the rear of the machine.
2. Swing the hydraulic oil cooler and the air conditioner condenser away from the radiator.

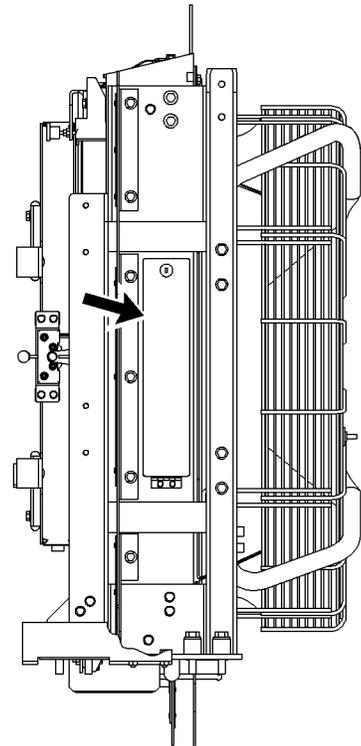


Illustration 244

g01000083

3. Open the side access panels on each side of the radiator.

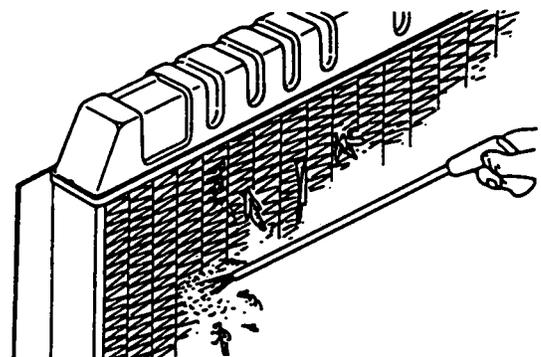


Illustration 245

g00101939

4. You can use compressed air, high-pressure water, or steam to remove dust and other debris from the radiator fins. The maximum air pressure for cleaning purposes must be reduced to 205 kPa (30 psi). The maximum water pressure for cleaning purposes must be below 275 kPa (40 psi). However, the use of compressed air is preferred. Refer to Operation and Maintenance Manual, "General Hazard Information" for Safety information about using pressurized air and water.
5. Swing the hydraulic oil cooler and the air conditioner condenser (if equipped) back into the operating position.
6. Close the radiator grill.

i02894326

Receiver Dryer (Refrigerant) - Replace

SMCS Code: 7322-510

WARNING

Personal injury can result from contact with refrigerant.

Contact with refrigerant can cause frost bite. Keep face and hands away to help prevent injury.

Protective goggles must always be worn when refrigerant lines are opened, even if the gauges indicate the system is empty of refrigerant.

Always use precaution when a fitting is removed. Slowly loosen the fitting. If the system is still under pressure, release it slowly in a well ventilated area.

Personal injury or death can result from inhaling refrigerant through a lit cigarette.

Inhaling air conditioner refrigerant gas through a lit cigarette or other smoking method or inhaling fumes released from a flame contacting air conditioner refrigerant gas, can cause bodily harm or death.

Do not smoke when servicing air conditioners or wherever refrigerant gas may be present.

Use a certified recovery and recycling cart to properly remove the refrigerant from the air conditioning system.

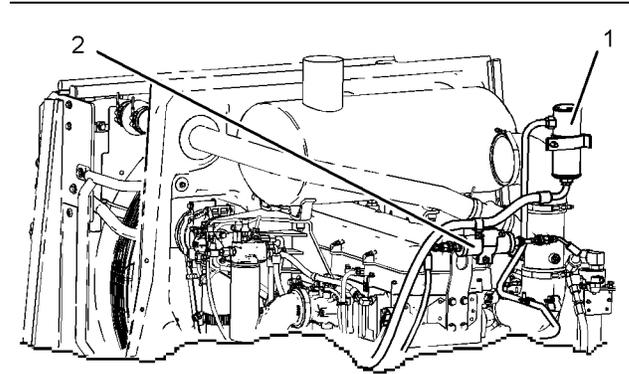


Illustration 246

g01107270

- (1) Refrigerant accumulator
- (2) Refrigerant dryer

Access refrigerant accumulator (1) from the left side of the machine. Access in-line refrigerant dryer (2) from the right side of the machine.

Refer to Service Manual, SENR5664, "Refrigerant Accumulator - Remove and Install" for the replacement procedure of accumulator (1).

Refer to Service Manual, SENR5664, "In-Line Refrigerant Dryer - Remove and Install" for the replacement procedure of refrigerant dryer (2).

Note: When you operate the machine in a climate with high humidity, replace the in-line refrigerant dryer after every 1000 service hours or 6 months.

i01568401

Ride Control Accumulator - Check

SMCS Code: 5077-535-R6

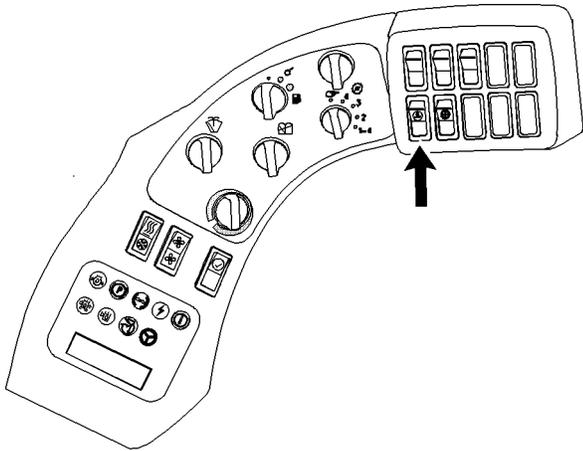


Illustration 247

g00814351

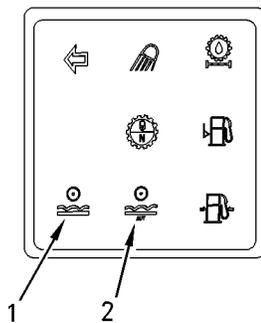


Illustration 248

g00754724

Travel at high speeds over rough terrain causes bucket movement and a swinging motion. The ride control system acts as a shock absorber by dampening forces from the bucket. This helps to stabilize the entire machine.

The ride control switch is located on the switch panel.



Manual Ride Control – Press the bottom of the switch in order to turn on the ride control system at all travel speeds. The indicator (1) for ride control will be illuminated.



Automatic Ride Control – Press the top of the ride control switch in order to activate the automatic ride control system. The ride control system will automatically turn on if the ground speed exceeds 9.6 km/h (6 mph). The ride control system will automatically turn off if the ground speed is less than 9.6 km/h (6 mph) and if the bucket is being operated. The indicator for the automatic ride control (2) will be illuminated. The activation speed for the automatic ride control can be adjusted by a qualified service technician.

Place the switch into the middle position in order to turn off the ride control system completely.

The ride control system should be in the automatic mode or in the off position during loading operations.

i01457460

Rollover Protective Structure (ROPS) - Inspect

SMCS Code: 7323-040; 7325-040

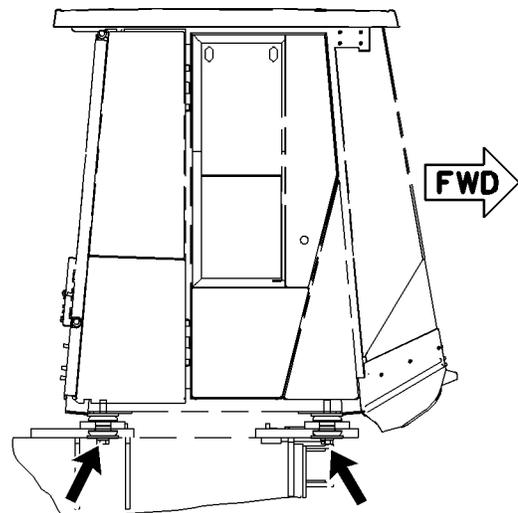


Illustration 249

g00762107

Inspect the ROPS for bolts that are loose or damaged. Use original equipment parts only to replace bolts that are damaged or missing. Tighten the four cab mounting bolts to a torque of 850 ± 100 N·m (629 ± 74 lb ft).

Note: Apply oil to all bolt threads before installation. Failure to apply oil can result in improper bolt torque.

Do not repair the ROPS by welding reinforcement plates to the ROPS. Consult your Caterpillar dealer for repair of cracks in any welds, in any castings, or in any metal section of the ROPS.

i04421974

Seat Belt - Inspect

i04423622

SMCS Code: 7327-040

Always inspect the condition of the seat belt and the condition of the seat belt mounting hardware before you operate the machine. Replace any parts that are damaged or worn before you operate the machine.

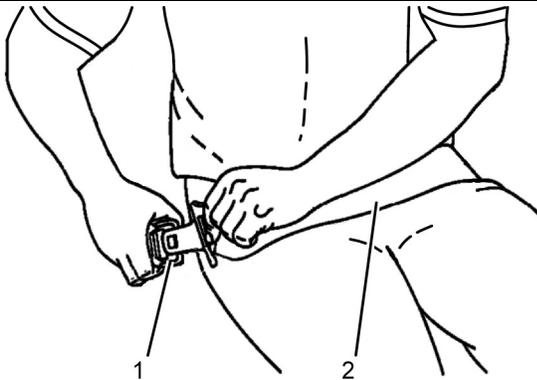


Illustration 250

g02620101

Typical example

Inspect buckle (1) for wear or for damage. If the buckle is worn or damaged, replace the seat belt.

Inspect seat belt (2) for webbing that is worn or frayed. Replace the seat belt if the webbing is worn or frayed.

Inspect all seat belt mounting hardware for wear or for damage. Replace any mounting hardware that is worn or damaged. Make sure that the mounting bolts are tight.

If your machine is equipped with a seat belt extension, also perform this inspection procedure for the seat belt extension.

Contact your Cat dealer for the replacement of the seat belt and the mounting hardware.

Note: The seat belt should be replaced within 3 years of the date of installation. A date of installation label is attached to the seat belt retractor and buckle. If the date of installation label is missing, replace belt within 3 years from the year of manufacture as indicated on belt webbing label, buckle housing, or installation tags (non-retractable belts).

Seat Belt - Replace

SMCS Code: 7327-510

The seat belt should be replaced within 3 years of the date of installation. A date of installation label is attached to the seat belt retractor and buckle. If the date of installation label is missing, replace belt within 3 years from the year of manufacture as indicated on belt webbing label, buckle housing, or installation tags (non-retractable belts).

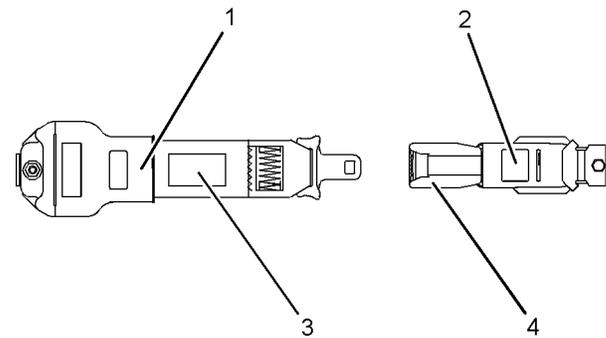


Illustration 251

g01152685

Typical Example

- (1) Date of installation (retractor)
- (2) Date of installation (buckle)
- (3) Year of manufacture (tag) (fully extended Web)
- (4) Year of manufacture (underside) (buckle)

Consult your Cat dealer for the replacement of the seat belt and the mounting hardware.

Determine age of new seat belt before installing on seat. A manufacture label is on belt webbing and imprinted on belt buckle. Do not exceed install by date on label.

Complete seat belt system should be installed with new mounting hardware.

Date of installation labels should be marked and affixed to the seat belt retractor and buckle.

Note: Date of installation labels should be permanently marked by punch (retractable belt) or stamp (non-retractable belt).

If your machine is equipped with a seat belt extension, also perform this replacement procedure for the seat belt extension.

i03694709

i02197967

Secondary Steering - Test

SMCS Code: 4300-081-SE; 4300-081-SST;
4324-081; 4324

WARNING

The service brake must be checked in order to ensure proper operation before you test the supplemental steering system.

Personal injury, death, or property damage could occur if the supplemental steering system is tested and the service brake is not operational.

Test the service brake before you test the supplemental steering system.

Perform the following procedure if your machine is equipped with a ground driven supplemental steering and if the procedure is required by local regulations.

Ensure that there are no hazards in the test area. The test area must be unobstructed and level. Operate the machine in second gear.

Ensure that all air tanks and accumulators are properly charged. Ensure that there is no load in the work tool. Position the machine with the bucket or the work tool in the carry position with the machine in neutral. Release the parking brake. Apply the service brakes and put the engine at low idle. Ensure that the area around the machine is clear of personnel. Shift the transmission to second gear forward and slowly release the service brakes. Moderately increase the engine speed to high idle. Shift the transmission to neutral. Turn the ignition to the OFF position. Allow the machine to coast.

While the machine is in motion, turn the machine to the left and to the right. If the machine responds to the steering input, the supplemental steering system is operating. Stop the machine with the service brakes. Apply the parking brake. The machine can then be returned to normal operation.

If there is no response to the steering input, the supplemental steering system is not operating. Stop the machine immediately. Repair the supplemental steering system before returning the machine to service.

Service Brake Wear Indicator - Check

SMCS Code: 4255-535-IND

Reference: For information about checking the service brake wear indicator, refer to Testing and Adjusting, "Braking System" for the machine that is being serviced or consult your Caterpillar dealer.

i03589859

Steering Column Play - Check

SMCS Code: 4310-535; 4338-535

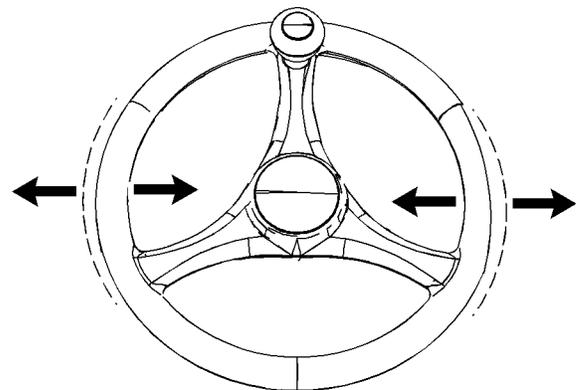


Illustration 252

g01408466

1. Hold the steering wheel with both hands.
2. Try to move the steering wheel from one side to the other side. The maximum allowed movement in the steering column should not exceed 25 mm (1.0 inch). If the value is not within the limit, perform the following steps:

- a. Inspect the pivot joint for loose bolts.
- b. Tighten the bolts if the bolts are loose.

Note: Apply 9S-3263 Thread Lock Compound to the bolts before tightening.

- c. Inspect the pivot joint for excessive wear.
- d. Replace the bushings if there is excessive wear.

WARNING

Failure to perform this inspection and repair may cause loss of steering control, which may result in personal injury or death.

Do not operate the machine until the inspection and repair are completed.

Contact your Caterpillar dealer for any other required service.

i02585698

Steering Column Spline (Command Control Steering) - Lubricate

SMCS Code: 4310-086-SN; 4338-086-SN

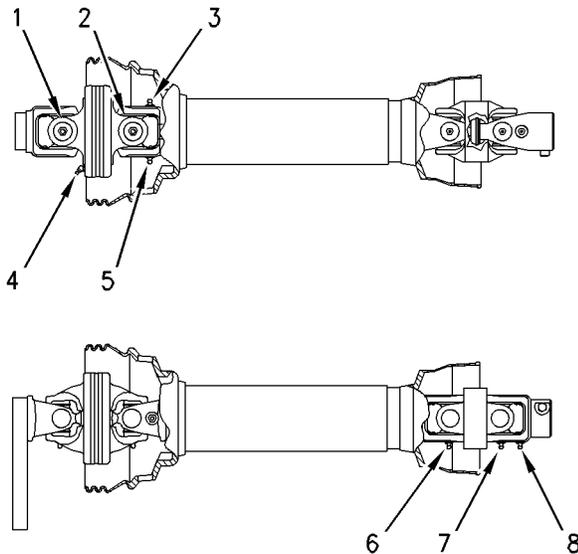


Illustration 253

g00812993

1. Remove the steering shaft from the machine.

Reference: Refer to Disassembly and Assembly Manual for the removal procedure and for the installation procedure.

2. Wipe off all of the fittings before any lubricant is applied.
3. Refer to Operation and Maintenance Manual, "Lubricant Viscosities" for the proper grease to use. Apply the grease through fittings (1), (2), (3), (4), (5), (6), (7), and (8).
4. Install the steering shaft on the machine.

i02231597

Steering Cylinder Bearings - Lubricate

SMCS Code: 4303-086-BD

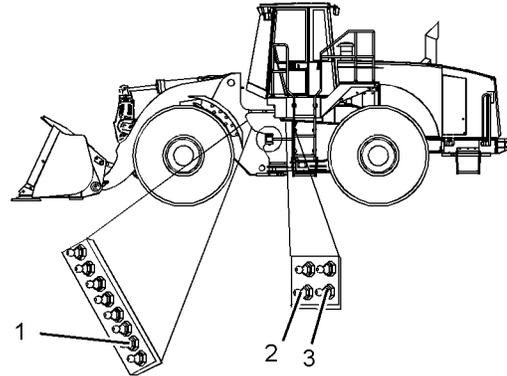


Illustration 254

g01125801

- (1) Rod End of RH Steering Cylinder
- (2) Head End of RH Steering Cylinder
- (3) Head End of LH Steering Cylinder

Wipe all fittings before lubrication.

The head end of the steering cylinders are greased with a remote fitting. Apply lubricant to the two fittings (2) and (3) that are located on the left side of the machine.

The rod end of the right steering cylinder is greased with a remote fitting. Apply grease to the remote grease fitting (1).

The rod end of the left steering cylinder is greased with a standard grease fitting.

There are a total of four fittings.

i01458229

i02305841

Steering Pilot Oil Screen (Command Control Steering) - Clean/Replace

SMCS Code: 4304-070-Z3; 4304-510-Z3

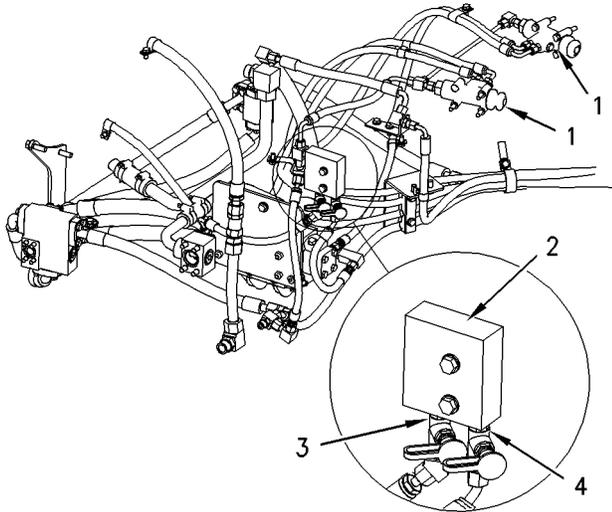


Illustration 255

g00762227

The screen for the pilot oil is located near the articulation joint below the steering neutralizer valves (1).

1. Disconnect the two lines (3) and (4) from the bottom of the screen group (2).
2. Use an allen wrench in order to remove the two screens from the bottom of the screen group.
3. Wash the screens in a clean nonflammable solvent. Dry each screen by using pressure air. Inspect each screen for damage. Replace the screens, if necessary.
4. Install the screens. Install the two lines (3) and (4).

Tire Inflation - Check

SMCS Code: 4203-535-AI

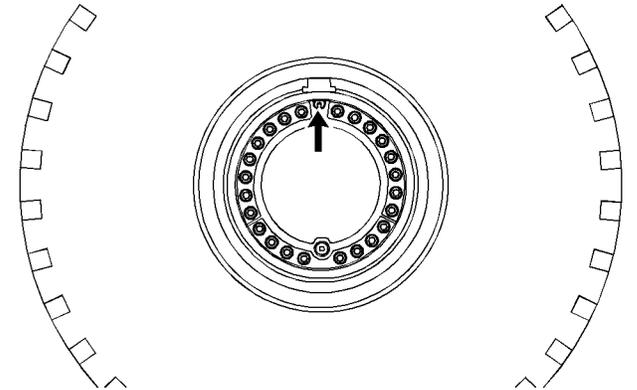


Illustration 256

g01160201

Always obtain proper tire inflation pressures and maintenance recommendations for the tires on your machine from your tire supplier. Measure the tire pressure on each tire.

Inflate the tires with nitrogen , if necessary.

Reference: Refer to the "Tire Inflation Information" section of the Operation and Maintenance Manual for more information.

i04004110

Transmission Oil - Change

SMCS Code: 3030-044

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

1. Operate the machine for a few minutes in order to warm the transmission oil.
2. Park the machine on a level surface. Lower the attachment to the ground and apply slight downward pressure. Engage the parking brake and stop the engine.

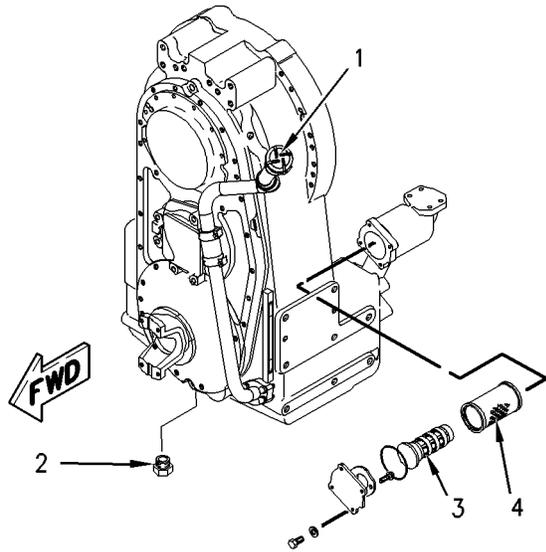


Illustration 257

g00763411

Note: Remove the transmission guard from the bottom of the machine in order to access the magnetic screen assembly.

3. Remove the transmission oil drain plug (2). Allow the transmission oil to drain into a suitable container. Clean the drain plug and install the drain plug.
4. Change the transmission oil filter.
Reference: Refer to Operation and Maintenance Manual, "Transmission Oil Filter - Replace" for the correct procedure.
5. Remove the bolts and the cover from the front left side of the transmission case.
6. Remove magnetic screen tube assembly (3) and suction screen (4) from the housing. Remove three magnets from the magnetic screen tube assembly.
7. Wash the magnetic screen tube assembly and the suction screen in a clean, nonflammable solvent.

NOTICE

Do not drop or rap the magnets against any hard objects. Replace any damaged magnets.

8. Use a cloth, a stiff bristle brush, or pressure air to clean the magnets.
9. Clean the cover and inspect the cover seal. Replace the seal if the seal is damaged.

10. Install three magnets on magnetic screen tube assembly (3). Insert suction screen(4) and magnetic screen tube assembly (3) in the housing.

11. Install the cover and four bolts.

12. Remove transmission oil filler cap (1) on the left side of the machine. Fill the transmission with oil through the transmission oil filler tube.

Reference: Refer to Operation and Maintenance Manual, "Lubricant Viscosities" and Operation and Maintenance Manual, "Capacities (Refill)".

13. Clean the filler cap and install the filler cap.

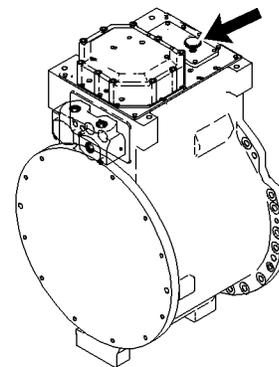


Illustration 258

g00763494

14. Remove the transmission breather from the top of the transmission. Wash the transmission breather in a clean, nonflammable solvent. Allow the transmission breather to dry. Then, install the transmission breather.
15. Start the engine and run the engine at low idle. Apply the service brake. Slowly operate the transmission controls in order to circulate the oil.
16. Move the transmission control to the NEUTRAL position. Engage the parking brake and stop the engine. Inspect the transmission for leaks.
17. Check the transmission oil level.

Reference: Refer to Operation and Maintenance Manual, "Transmission Oil Level - Check".

i04004116

Transmission Oil Filter - Replace

SMCS Code: 3004-510; 3067-510

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

1. Open the engine hood. The transmission oil filter is located on the right side of the machine.

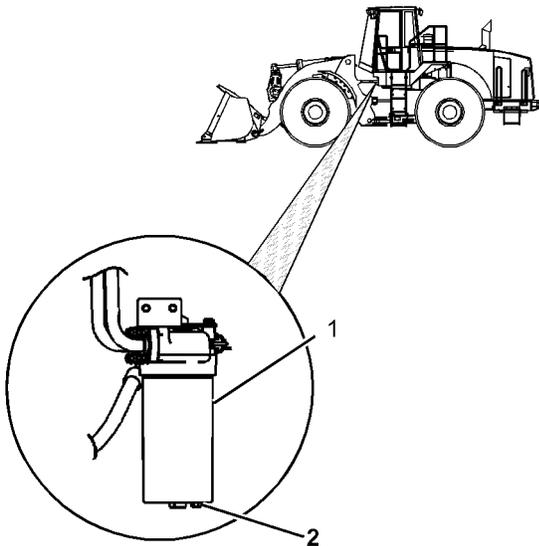


Illustration 259

g01058312

2. Remove plug (2) and allow the oil to drain into a suitable container.
3. Use a strap type wrench in order to remove the transmission filter housing (1).
4. Remove the used transmission oil filter element. Dispose of the used filter element properly.
5. Clean the transmission filter housing in a clean, nonflammable solvent. Clean the filter housing base.

6. Inspect the filter housing seal. Replace the seal if the seal is damaged.
7. Insert a new transmission oil filter element into the transmission filter housing.
8. Install the transmission filter housing into the filter housing base. Tighten the transmission filter housing by hand. Install plug (2).
9. Start the engine. Apply the service brakes.
10. Slowly operate the transmission controls in order to circulate the transmission oil. Return the transmission to NEUTRAL.
11. Engage the parking brake. Inspect the transmission oil filter for leaks.
12. Stop the engine.
13. Check the transmission oil level.

Reference: Refer to Operation and Maintenance Manual, "Transmission Oil Level - Check" for the correct procedure.

i01460230

Transmission Oil Level - Check

SMCS Code: 3030-535-FLV

The sight gauge for the transmission oil is located on the left side of the machine.

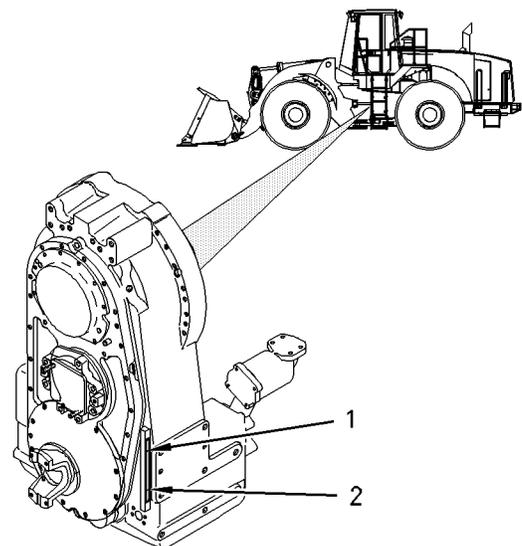


Illustration 260

g00763130

When the engine is off and the transmission oil is cold, maintain the transmission oil level to "FULL" mark (1). When the engine is running at low idle and the transmission oil is warm, maintain the transmission oil level between "FULL" mark (1) and "LOW" mark (2). Add oil, if necessary.

i02065073

Transmission Oil Sample - Obtain

SMCS Code: 3080-008; 7542

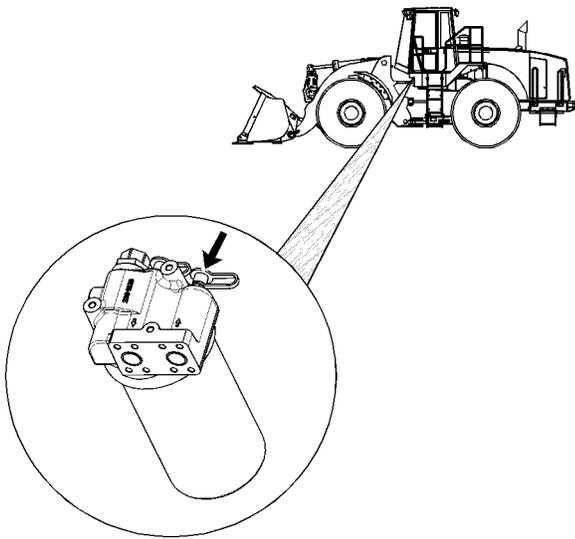


Illustration 261

g01058363

Obtain a sample of the transmission oil from the sampling valve. The sampling valve is located on the top of the transmission oil filter. Refer to Special Publication, SEBU6250, "S-O-S Oil Analysis" for information that pertains to obtaining a sample of the engine oil. Refer to Special Publication, PEHP6001, "How To Take A Good Oil Sample" for more information about obtaining a sample of the engine oil.

i01460367

Window Washer Reservoir - Fill

SMCS Code: 7306-544

NOTICE

When operating in freezing temperatures, use Caterpillar nonfreezing window washer solvent or equivalent. System damage can result from freezing.

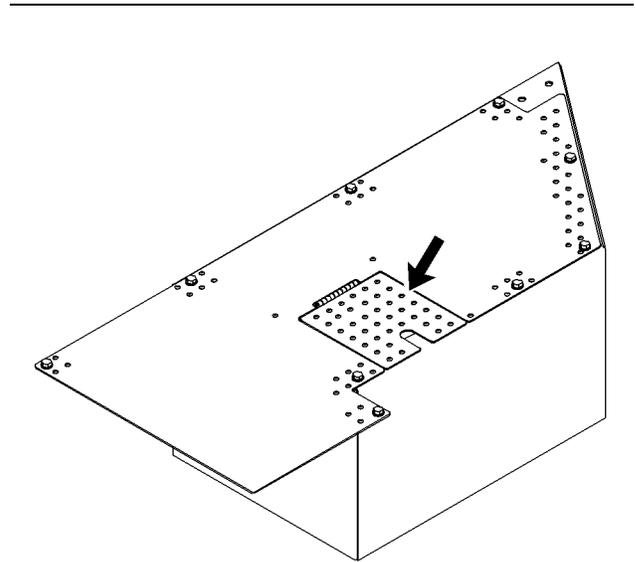


Illustration 262

g00763261



Window Washer Reservoir – The window washer reservoir is located under the access cover on the right cab platform.

Fill the window washer reservoir through the filler opening.

i01460440

Window Wiper - Inspect/Replace

SMCS Code: 7305-040; 7305-510

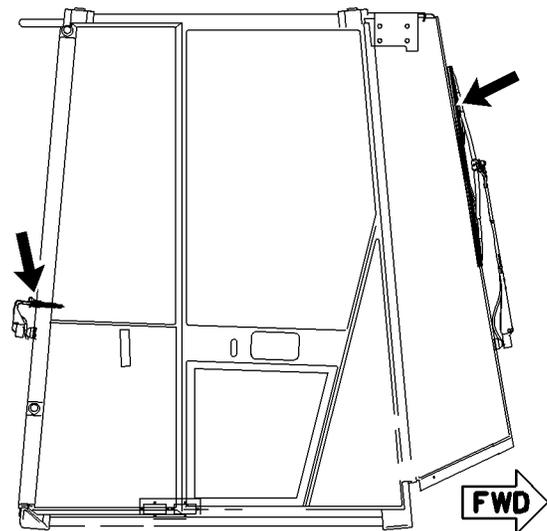


Illustration 263

g00763272

Inspect the condition of the wiper blades. Replace the wiper blades if the wiper blades are worn or damaged. If the wiper blades streak the window, replace the wiper blades.

i04412316

Windows - Clean

SMCS Code: 7310-070

Clean the outside of the windows from the ground, unless handholds are available.

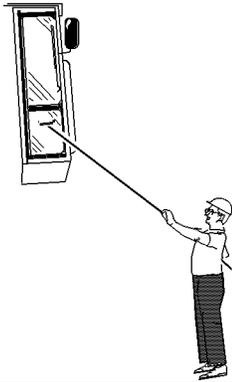


Illustration 264
Typical example

g00566124

Polycarbonate Windows (If equipped)

Wash polycarbonate windows with a mild soap or detergent. Never use a cleaning solvent on polycarbonate windows.

Wash polycarbonate windows with warm water and a soft sponge, or damp cloth. Never use a dry cloth or paper towels on polycarbonate windows.

Rinse the windows with a sufficient amount of clean water.

Cleaning Methods

Commercial Window Cleaner

Apply the cleaner with a soft cloth. Rub the window with moderate pressure until all the dirt is removed. Allow the cleaner to dry. Wipe off the cleaner with a clean soft cloth.

Soap and Water

Use a clean sponge or a soft cloth. Wash the windows with a mild soap or with a mild detergent. Also use plenty of lukewarm water. Rinse the windows thoroughly. Dry the windows with a moist chamois or with a moist cellulose sponge.

Stubborn Dirt and Grease

Wash the windows with a good grade of naphtha, of isopropyl alcohol, or of Butyl Cellosolve. Then, wash the windows with soap and with water.