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MAINTENANCE INTERVALS

Operation and Maintenance
Manual Excerpt

CATERPILLAR®

CATERPILLAR®

SEBU8031-04
August 2009

Operation and Maintenance Manual

587T Pipelayer

FAT1-Up (587T)

i03487001

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, including all adjustments, the use of proper lubricants, fluids, filters, and the replacement of components due to normal wear and aging. 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.

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

Note: If Cat HYDO Advanced 10 hydraulic oil is used, the hydraulic oil change interval will change. The normal interval of 2000 hours is extended to 3000 hours. S·O·S services may extend the oil change even longer. Consult your Caterpillar dealer for details.

When Required

Every 10 Service Hours or Daily

Every 50 Service Hours or Weekly

Initial 250 Service Hours

Every 250 Service Hours

Every 250 Service Hours or Monthly

Every 250 Service Hours or 3 Months

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

Every 500 Service Hours

Every 500 Service Hours or 3 Months

Every 500 Service Hours or 1 Year

Every 1000 Service Hours

Every 1000 Service Hours or 6 Months

Every 2000 Service Hours

Every 2000 Service Hours or 1 Year

Every Year

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

Every 6000 Service Hours or 3 Years

Every 8000 Service Hours or 3 Years

Every 12 000 Service Hours or 6 Years

i02455837

Air Conditioner Condenser - Clean

SMCS Code: 1805-070

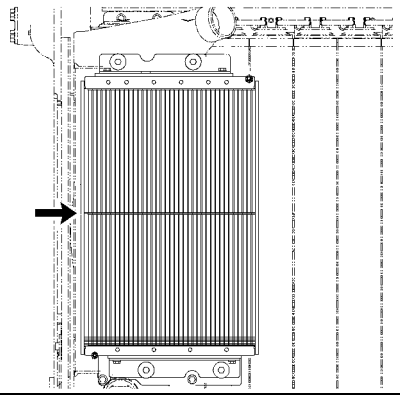

Illustration 136 g01225616

The air conditioner condenser is located behind the radiator.

Open the left engine access door.

Inspect the air conditioner condenser for the following conditions:

- Damaged fins
- Buildup of debris
- Plugged areas

Remove any debris. Clean the condenser with low pressure air or low pressure water.

i02865300

Air Conditioner Condenser - Clean

SMCS Code: 1805-070

NOTICE
If excessively dirty, clean condenser with a brush. To prevent damage or bending of the fins, do not use a stiff brush.

Repair the fins if found defective.

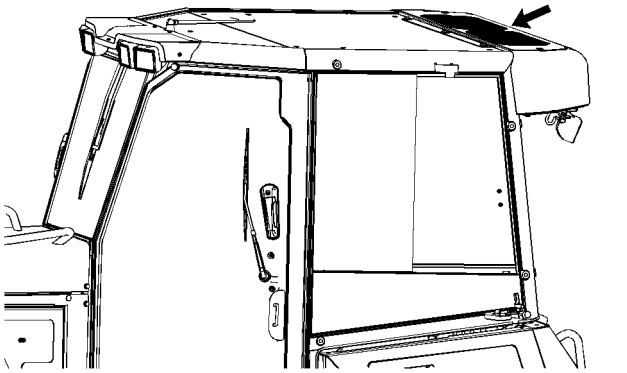

Illustration 137 g01427275

1. Remove the cover for the condenser.
2. Inspect the condenser for debris. Clean the condenser, if necessary.
3. Use clean water to wash all of the dust and dirt from the condenser.
4. Install the cover for the condenser.

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Backup Alarm - Test

SMCS Code: 7406-081

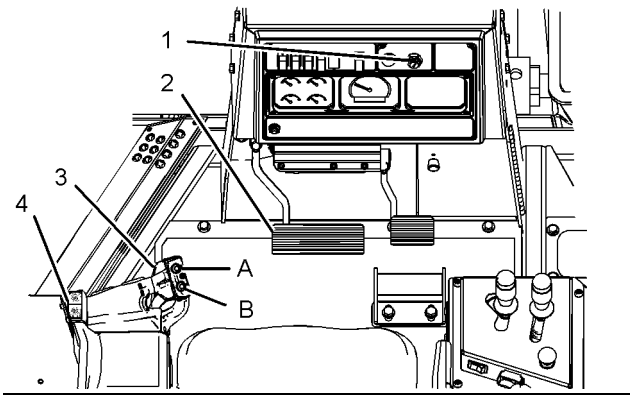


Illustration 138 g01249997

In order to test the alarm for proper functioning, turn engine start switch (1) to the ON position.

Apply service brake (2). Disengage parking brake switch (4). Move transmission direction selector (3) to the REVERSE position.

The backup alarm should start to sound immediately. The alarm alerts the personnel behind the machine that the machine is backing up. The alarm will continue to sound until transmission direction selector (3) is moved to the NEUTRAL position or to the FORWARD position.

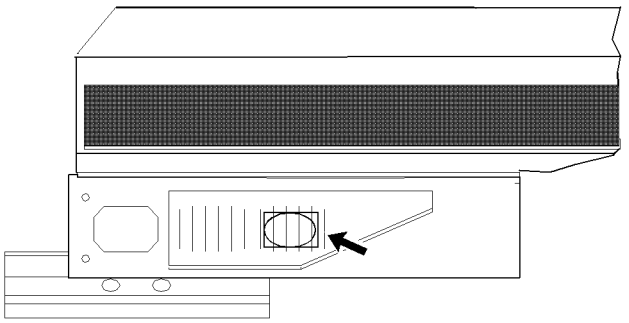


Illustration 139 g01241595
Typical example

The backup alarm is on the rear of the machine. The nonadjustable backup alarm is set at the appropriate sound level when the machine is shipped from the factory.

i02486605

Battery - Inspect

SMCS Code: 1401-040

Tighten the battery retainers on all batteries at every 1000 hour interval.

Perform the following procedures at every 1000 hour interval. Check these areas more often, if necessary.

1. Open the battery access cover. The battery access cover is located on the left side or right side of the machine next to the operator's compartment.
2. Clean the top of the batteries with a clean cloth. Keep the terminals clean and coated with petroleum jelly. Install the terminal covers after you coat the terminals.
3. Close the battery access cover.

i00993589

Battery - Recycle

SMCS Code: 1401-561

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

i01926166

Battery or Battery Cable - Replace

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

1. Turn the engine start switch key to the OFF position. Turn all of the switches to the OFF position.
2. Turn the battery disconnect switch to the OFF position. Remove the key.
3. Disconnect the battery cable at the battery disconnect switch. The battery disconnect switch is connected to the machine frame.
4. Disconnect the negative battery cable at the battery.
5. Make necessary repairs or replace the battery.
6. Connect the negative battery cable at the battery.
7. Connect the battery cable at the battery disconnect switch.
8. Install the key and turn the battery disconnect switch to the ON position.

i03656921

Belt - Inspect/Replace

SMCS Code: 1357-040; 1357-510

Your engine is equipped with a serpentine belt that drives the alternator.

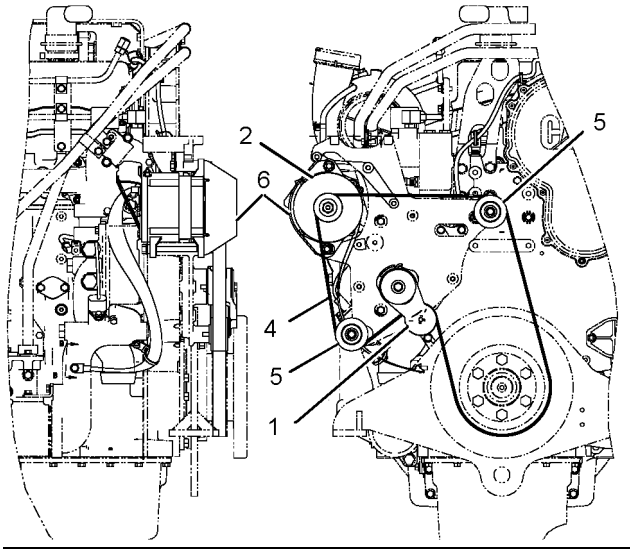
This engine is equipped with a belt tightener that automatically adjusts the belt to the correct tension.

Inspect

1. Park the machine on level ground. Move the transmission control to the NEUTRAL position and engage the parking brake. Shut off the engine.

Note: Before you service the pipelayer, make sure that the counterweight frame is fastened in the retracted position.

2. Turn the battery disconnect switch to the OFF position.
3. Open the access door on the right side of the machine.



g01323939

Illustration 140

Alternator only

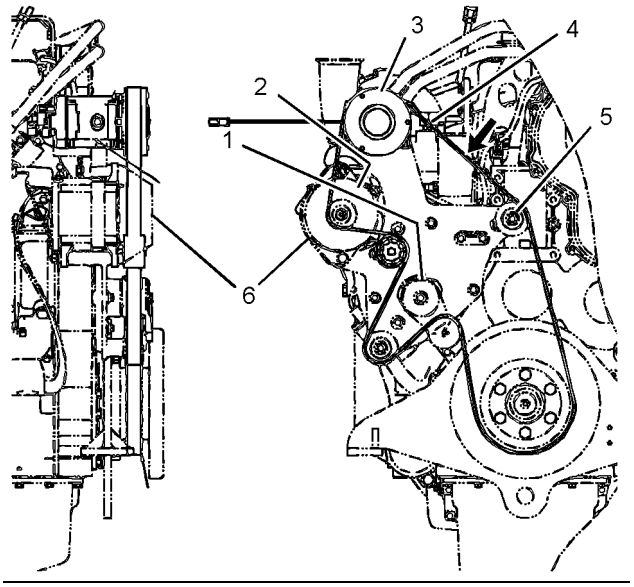


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Illustration 141

A/C Compressor

(1) Belt tensioner
(2) Alternator
(3) Compressor
(4) Serpentine belt
(5) Idler pulley
(6) Alternator guard

4. Inspect the condition of serpentine belt (4). Replace the serpentine belt if excessive wear or cracking has occurred. Wear due to belt slippage indicates that the belt tensioner possibly needs to be replaced.

5. The belt should deflect 14 to 20 mm (.56 to .81 inch) under 110 N (25 lb) of force. Use a 144-0235 Belt Tension Gauge in order to measure the tension.

6. Close the engine access doors.

7. Turn the battery disconnect switch to the ON position.

Replace

Note: If a new belt is installed, check the belt adjustment (drive belt tension) again after 30 minutes of engine operation.

Replace

1. Park the machine on level ground. Move the transmission control to the NEUTRAL position and engage the parking brake. Shut off the engine.

Note: Before you service the pipelayer, make sure that the counterweight frame is fastened in the retracted position.

2. Turn the battery disconnect switch to the OFF position.

3. Open the engine access doors.

4. Turn belt tensioner (1) in order to release the tension from the belt with a square drive.

5. Remove serpentine belt (4).

6. Install the new serpentine belt.

7. Close the engine access doors.

8. Turn the battery disconnect switch to the ON position.

i02640261

Boom Line - Install

SMCS Code: 6301-012-LI

Reference: Service Magazine, “New Boom Upper Sheave Block Improves cable Spooling” 1 June 1999.

⚠ WARNING

Do not operate or work on this equipment unless you have read and understand the instructions and warnings in the Operation and Maintenance Manual. Failure to follow the instructions or heed the warnings could result in injury or death. Contact any Caterpillar dealer for replacement manuals. Proper care is your responsibility.

⚠ WARNING

Do not use a wire rope cable that is kinked, frayed or has worn spots.

Wear gloves when handling the wire rope cable.

NOTICE
Use 9 strand wire rope of right regular lay, pre-formed Bridon Constuctex cable. The wire rope cable should have a minimum breaking strength of 33112 kg (73000 lb).

Table 10

Specifications for Boom Line		
Boom Height	**Cable Size (Diameter)**	**Length**
8534 mm (28 ft)	19.05 mm (.75 inch)	62.5 m (205 ft)

1. Lower the boom to the ground and support the boom.

Note: The loaded force in the winch drum must be neutralized before removing the wire rope from a loaded drum.

Reference: Refer to “Winch Wire Rope - Remove and Install” in this manual for the information in order to safely remove the wire rope from winch drums, if necessary.

2. Remove the anchor for the wire rope from the drum for the boom.

NOTICE
Unroll the wire rope cable from the spool. Never lift the wire rope off the spool in coils.

3. Unroll the new wire rope from the spool.

Note: Weld the wire cable ends in order to prevent fraying.

4. Install the ferrule of the wire rope to the drum for the boom.

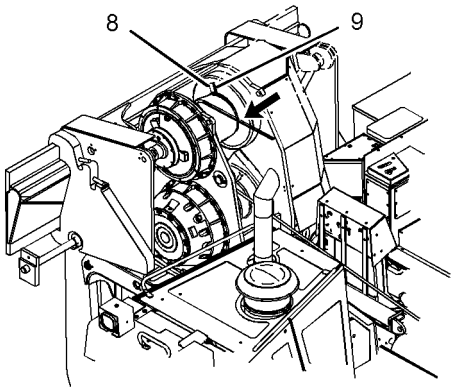


Illustration 142 g01242135

5. Wind one half of the wire cable on the drum. Wind the cable evenly across the drum.

6. Install wire cable end (9) in the drum. To hold the wire cable end in place, install the bolts and cable clamp (8).

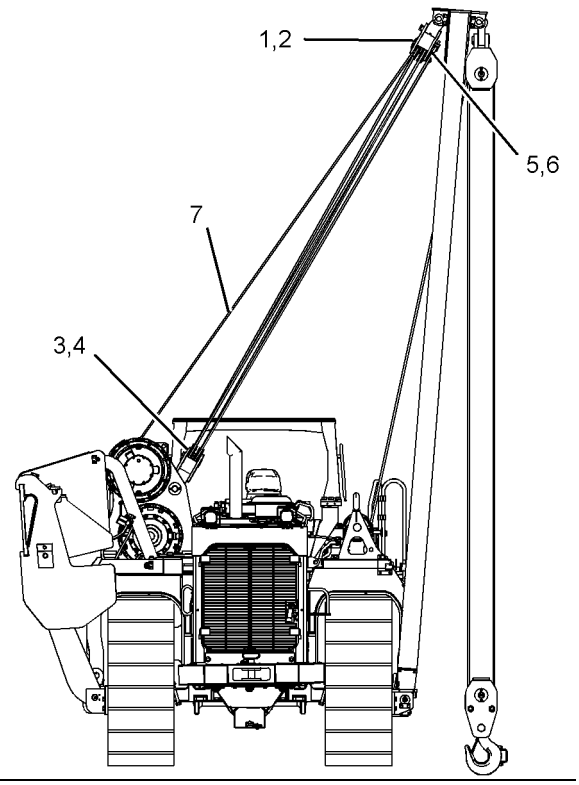


Illustration 143 g01242133

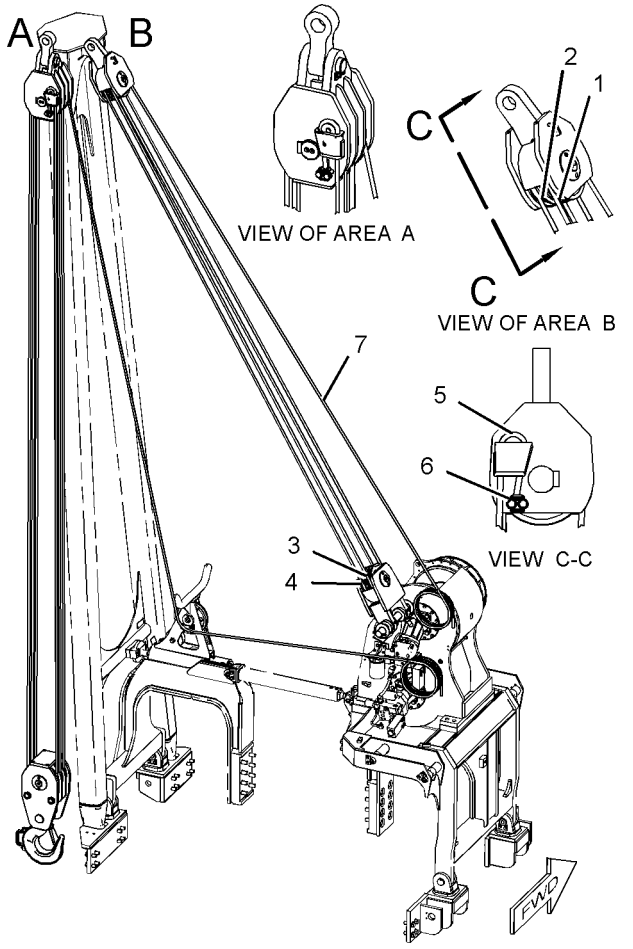


Illustration 144 g01242134

View from the rear of the machine

7. Install wire rope (7) over sheave assembly (1) in the upper sheave block.

Note: Install wire rope (7) over sheave assembly (1) from the front of the machine toward the rear of the machine.

8. Install the wire rope under sheave assembly (3) in the lower sheave block.

9. Install the wire rope over sheave assembly (2) in the upper sheave block.

10. Install the wire rope under sheave assembly (4) in the lower sheave block.

11. Insert the wire rope into the pocket and around wedge (5). Use a mallet to tap wedge (5) and the cable into the pocket.

12. Insert the end of the cable through clamp (6). Tighten the setscrew in the clamp to a torque of 45 ± 7 N·m (33 ± 5 lb ft).

13. Raise the boom.

i02487567

Boom Pivot Pins - Lubricate

SMCS Code: 6301-086-PN

The grease fittings for lubricating the boom pivot pins are located on the left side of the machine. There is one grease fitting for each pin. The grease fittings are located on the end of the pin on the outside face of the boom.

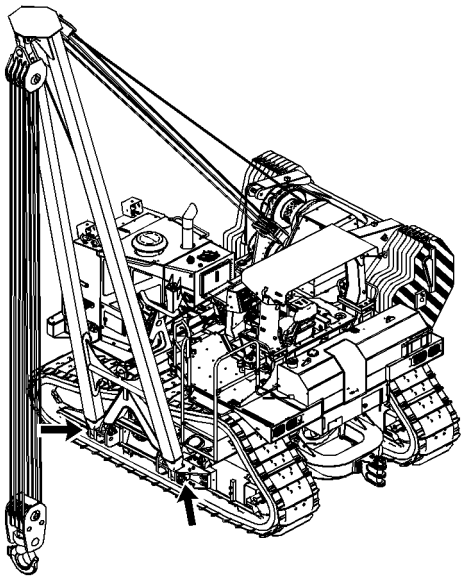


Illustration 145 g01242204

Lubricate the boom pivot pins through the two grease fittings.

i01958206

Braking System - Test

SMCS Code: 4100-081; 4267-081

⚠ WARNING

If the machine moves during the test, reduce the engine speed immediately, and engage the parking brake.

If the machine moved while testing the brakes, consult your Caterpillar dealer for brake inspection and repair. Damaged brakes must be repaired before returning the machine to operation.

Note: The machine can drive through the brakes in first gear.

Make sure that the area around the machine is clear of personnel and clear of obstacles.

Test the brakes on a dry, level surface.

Fasten the seat belt before you test the brakes.

1. Start the engine.
2. Raise all attachments.

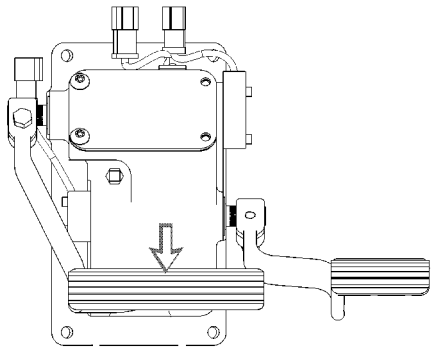


Illustration 146 g01017767

3. Depress the brake pedal.
4. Release the parking brake.
5. While the brake pedal is depressed, move the directional control to the SECOND SPEED FORWARD position.
6. Gradually increase the engine speed to full load speed. The machine should not move.
7. Move the directional control to the NEUTRAL position.
8. Reduce the engine speed to LOW IDLE. Engage the parking brake. Lower all attachments to the ground. Apply a slight down pressure. Stop the engine.

NOTICE
If the machine moved while testing the brakes, contact your Caterpillar dealer. Have the dealer inspect and, if necessary, repair the service brake before returning the machine to operation.

i02455960

Cab Filter (Fresh Air) - Clean/Inspect/Replace

SMCS Code: 7342-510; 7342-571

if equipped:

Note: Clean the filters more often in dusty conditions.

1. Remove the filter cover and the filter element. The filter cover is inside the cab to the left of the operator seat.
2. The filter element can be cleaned by using pressure air. Use a maximum air pressure of 205 kPa (30 psi). Direct the air from the clean side to the dirty side.
3. Look through the filter toward a bright light. Inspect the element for damage. Inspect the gaskets for damage. Replace damaged filters.
4. Install the filter element.

i02489152

Cooling System Coolant (ELC) - Change

SMCS Code: 1395-044

For information about adding an extender to your cooling system, see the Topic “Cooling System Coolant Extender (ELC) - Add” in this manual or consult your Caterpillar dealer.

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.

To Drain the Cooling System

The filler cap is located inside the access door on the top of the radiator guard.

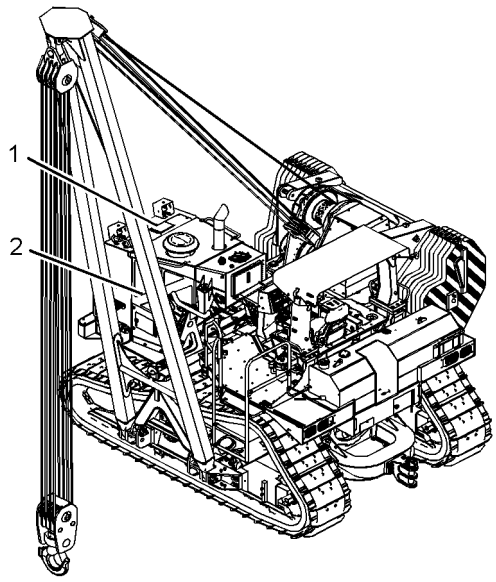


Illustration 147 g01243263

⚠ WARNING

Personal injury can result from hot coolant, steam and alkali.

At operating temperature, engine coolant is hot and under pressure. The radiator and all lines to heaters or the engine contain hot coolant or steam. Any contact can cause severe burns.

Remove filler cap slowly to relieve pressure only when engine is stopped and radiator cap is cool enough to touch with your bare hand.

Cooling System Conditioner contains alkali. Avoid contact with skin and eyes.

1. Slowly loosen filler cap (1) in order to relieve system pressure. Remove the filler cap.

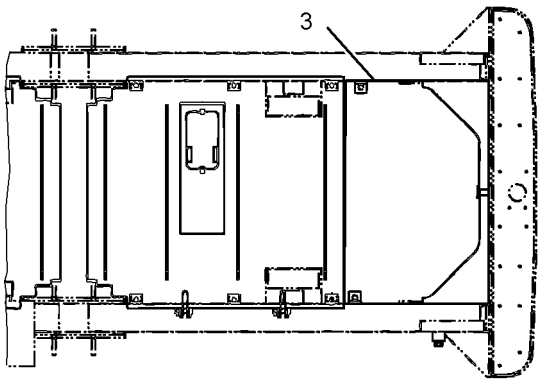


Illustration 148 g01243455
Top view

2. The two drain valves for coolant are located under the radiator and the front bottom end of the engine. Remove front bottom guard (3) in order to drain the coolant.

3. Direct the drain hoses into suitable containers.

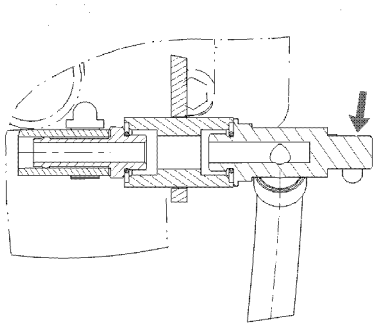


Illustration 149 g01017961

4. Open the drain valves. Allow the coolant to drain into a suitable container.

5. Flush the system with water. Flush the system until the draining water is clear.

Note: If the cooling system is already using ELC, cleaning agents are not required to be used at the specified coolant change interval. Cleaning agents are only required if the system has been contaminated by the addition of some other type of coolant or by cooling system damage. Clean water is the only cleaning agent that is required when ELC is drained from the cooling system.

Note: If you change to an ELC from another type of coolant, use a Caterpillar cleaning agent to flush the cooling system. After you drain the cooling system, thoroughly flush the cooling system with clean water. **All of the cleaning agent must be removed from the cooling system.**.

6. Close the drain valves and install the plug.

7. Replace front bottom guard (3).

8. Add the ELC solution. See the following topics in this publication:

   - Capacities (Refill)

Note: Caterpillar antifreeze contains additive. If you are using Caterpillar antifreeze, do not add the supplemental coolant additive at this time. Also, do not change the supplemental coolant additive element at this time.

9. Start the engine. Run the engine without the filler cap until the thermostat opens and the coolant level stabilizes.

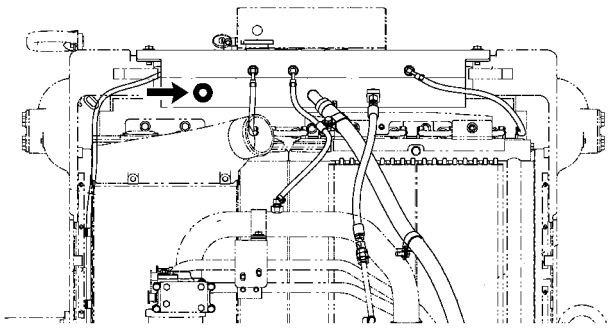


Illustration 150 g01239290

10. Open left engine access door (2). Look into the sight glass. Maintain the coolant level above the height of the sight glass at minimum. No air should be visible in the sight glass. Add coolant to the filler tube, if necessary.

11. If the gasket is damaged, replace filler cap (1). Install the filler cap.

12. Stop the engine.

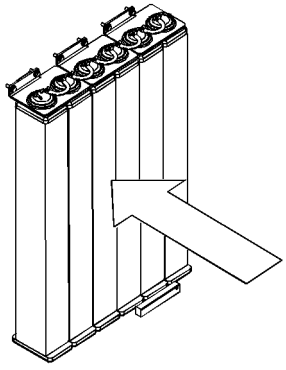


Illustration 151 g01117259

13. Clean the radiator cores with compressed air. You may need to use water in order to remove debris.

14. Close the engine access door.

For additional information about the cooling system coolant, see Operation and Maintenance Manual, SEBU6250, “Caterpillar Machine Fluids Recommendations”, “Cat Extended Life Coolant (ELC)” or consult your Caterpillar dealer.

i03499306

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1395-538

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.

Table 11

“Cat ELC Extender” and the Cooling System Capacity	
Cooling System Capacity	Recommended Amount of “Cat ELC Extender”
75 L (19.8 US gal)	1.5 L (52 fl oz)
84 L to 114 L (22 to 30 US gal)	2.15 L (72 fl oz)

When a Caterpillar Extended Life Coolant (ELC) is used, an extender must be added to the cooling system. See the Operation and Maintenance Manual, “Maintenance Interval Schedule” for the proper service interval. The amount of extender is determined by the cooling system capacity.

For additional information about adding an extender, see Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” or consult your Caterpillar dealer.

Extended Life Coolant (ELC) Extender

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

⚠ WARNING

Personal injury can result from hot coolant, steam and alkali.

At operating temperature, engine coolant is hot and under pressure. The radiator and all lines to heaters or the engine contain hot coolant or steam. Any contact can cause severe burns.

Remove filler cap slowly to relieve pressure only when engine is stopped and radiator cap is cool enough to touch with your bare hand.

Cooling System Conditioner contains alkali. Avoid contact with skin and eyes.

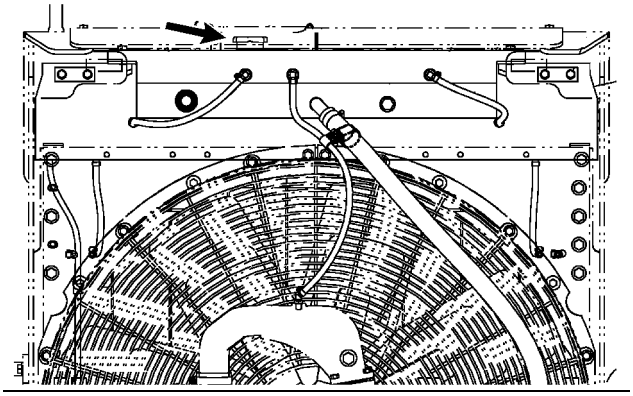


Illustration 152 g01835526

1. The filler cap is located inside the access door on the top, left side of the radiator guard. Loosen the radiator cap slowly in order to relieve pressure. Remove the radiator cap.

2. It may be necessary to drain some coolant from the radiator so that Extender can be added to the cooling system.

Note: Always discard drained fluids according to local regulations.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the machine. 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 in Caterpillar machines.

Dispose of all fluids according to local regulations and mandates.

3. Add 2.15 L (72 oz) of Extender to the cooling system for the 583T Pipelayer.

4. Add 1.5 L (52 oz) of Extender to the cooling system for the 587T Pipelayer or the 587R Pipelayer.

5. Start the engine. Run the engine without the filler cap until the thermostat opens and the coolant level stabilizes. Check for leaks.

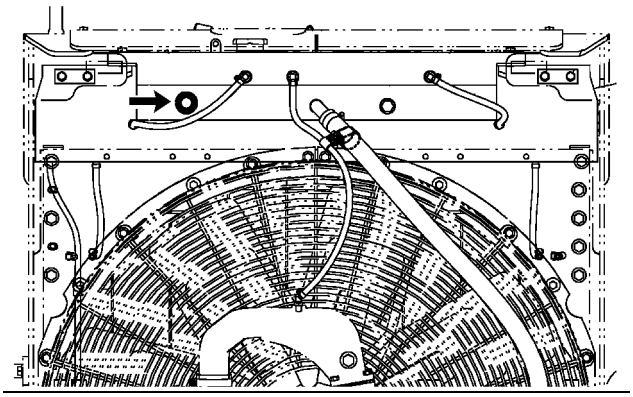


Illustration 153 g01243042

6. Open the left engine access door. Look into the sight glass. Maintain the coolant level above the height of the sight glass at minimum. No air should be visible in the sight glass. Add coolant to the filler tube, if necessary.

7. Replace the radiator cap if the cap gasket is damaged. Install the radiator cap.

8. Stop the engine.

i02488942

Cooling System Coolant Level - Check

SMCS Code: 1353-535-FLV; 1395-535-FLV

The cooling system pressure cap is under the access cover on the top, left side for the radiator guard.

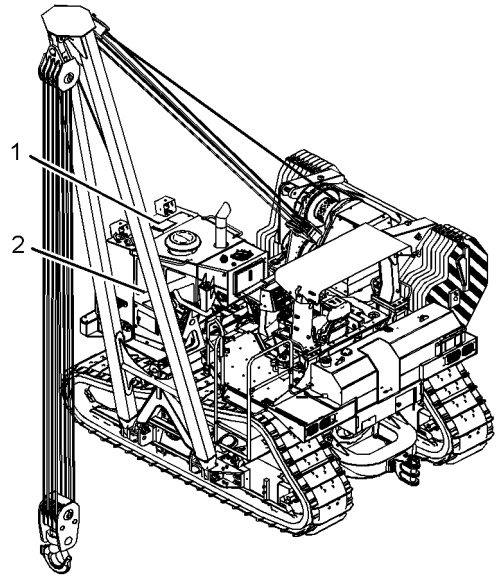


Illustration 154 g01242972

1. Open radiator access door (1). Remove the cooling system pressure cap slowly in order to relieve the pressure.

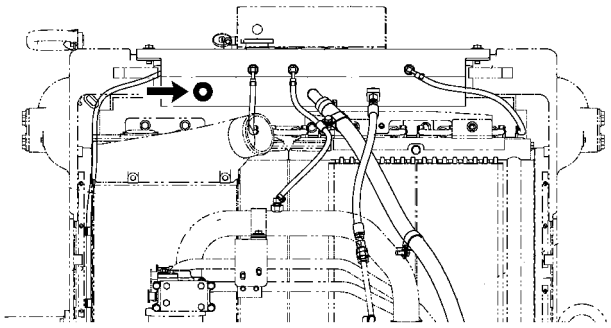


Illustration 155 g01239290

2. Open left engine access door (2). Look into the sight glass. Maintain the coolant level above the height of the sight glass at minimum. No air should be visible in the sight glass. If it is necessary to add coolant daily, check the system for leaks.

3. Install the cooling system pressure cap. Close the radiator access door.

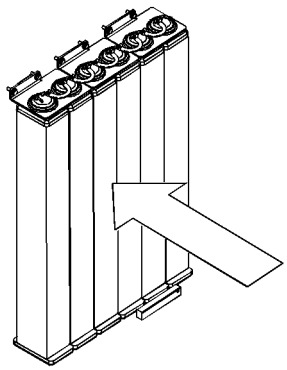


Illustration 156 g01117259

4. Inspect the radiator core for debris. clean the radiator core, if necessary.

Use compressed air, high pressure water, or steam to remove dust and debris from the radiator core. However, the use of compressed air is preferred.

5. Close the engine access door.

i02111226

Cooling System Coolant Sample (Level 1) - Obtain

SMCS Code: 1350-008; 1395-008; 1395-554; 7542-008; 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.

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.

Level 1 Analysis

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.

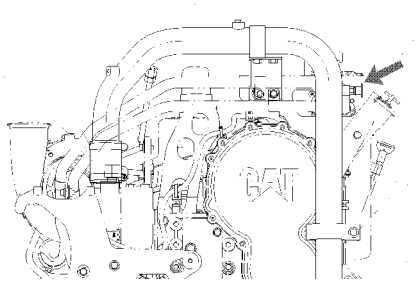
Dispose of all fluids according to local regulations and mandates.

Testing the coolant can be done at your Caterpillar dealer. Caterpillar S·O·S Coolant Analysis is the best way to monitor the condition of your coolant and your cooling system. S·O·S Coolant Analysis is a program that is based on periodic samples.

Perform a Coolant Analysis (Level 1) at 500 hours for systems that contain extended life coolant (ELC).

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 shipping sleeve 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.



g01017880
Illustration 157
Front view

1. Park the machine on a hard, level surface. Set the engine at low idle speed.
2. Open the left engine compartment. Remove the protective cap from the sampling valve.
3. Obtain a sample. For additional information about coolant analysis, see Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” or consult your Caterpillar dealer.
4. Replace the protective cap. Close the left side engine compartment.

Submit the sample for Level 1 analysis.

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

Level 2 is a comprehensive analysis which should be performed annually. See Operation and Maintenance Manual, “Cooling System Coolant Sample (Level 2) - Obtain” for more information.

i03571752

Cooling System Coolant Sample (Level 2) - Obtain

SMCS Code: 1350-008; 1395-008; 1395-554; 7542

Level 2 Analysis

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.

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.

Testing the coolant can be done at your Caterpillar dealer. Caterpillar S·O·S Coolant Analysis is the best way to monitor the condition of your coolant and your cooling system. S·O·S Coolant Analysis is a program that is based on periodic samples. See Operation and Maintenance Manual, SEBU6250, “Cooling System Specifications”, “General Coolant Information” for more information.

Perform a Coolant Analysis (Level 2) at initial 500 hours for systems that contain extended life coolant (ELC). Perform the analysis yearly after the initial 500 hours.

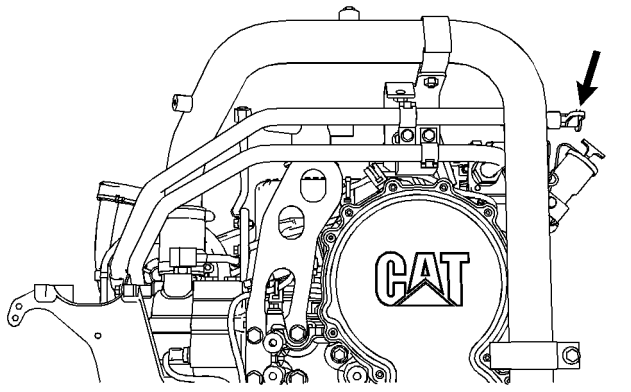


Illustration 158 g01755673

1. Park the machine on a hard, level surface. Set the engine at low idle speed.
2. Open the left side engine compartment. Remove the protective cap from the sampling valve.
3. Obtain a sample. For additional information about coolant analysis, see Operation and Maintenance Manual, SEBU6250, “Cooling System Specifications”, “General Coolant Information” or consult your Caterpillar dealer.
4. Replace the protective cap. Close the left side engine compartment.

Submit the sample for Level 2 analysis.

i02428547

Cooling System Water Temperature Regulator - Clean/Replace

SMCS Code: 1355-070; 1355-510; 1393

Replace the thermostat on a regular basis in order to reduce the chance of unscheduled downtime and of problems with the cooling system.

A new thermostat should be installed after the cooling system has been cleaned. Install the thermostat while the cooling system is completely drained or while the cooling system coolant is drained to a level that is below the thermostat housing.

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

Note: If you are only installing a new thermostat, drain the cooling system coolant to a level that is below the thermostat housing.

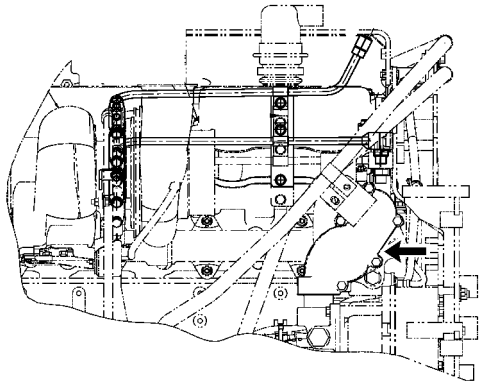


Illustration 159 g01213654

Right side engine

1. Loosen the hose clamp and remove the hose from the elbow. Disconnect the hose assembly from the thermostat housing assembly.

2. Remove the bolts from the elbow. Remove the elbow and the thermostat housing assembly.

3. Remove the gasket, the thermostat, and the seal from the thermostat housing.

NOTICE
A used thermostat can be installed if the thermostat conforms to test specifications, and the thermostat is not damaged. Do not install a used thermostat that has excessive buildup or deposits.

NOTICE
Since Caterpillar engines incorporate a shunt design cooling system, it is mandatory to always operate the engine with a thermostat.

Depending on load, failure to operate with a thermostat could result in either an overheating or an overcooling condition.

NOTICE
If the thermostat is installed incorrectly, it will cause the engine to overheat.

4. Install a new seal in the thermostat housing. Install a new thermostat and a new gasket. Install the thermostat housing on the engine cylinder head.

5. Install the elbow and the hose. Tighten the hose clamp.

i02420077

Counterweight Cylinder Bearings - Lubricate

SMCS Code: 5400; 5409-086-BD, CD

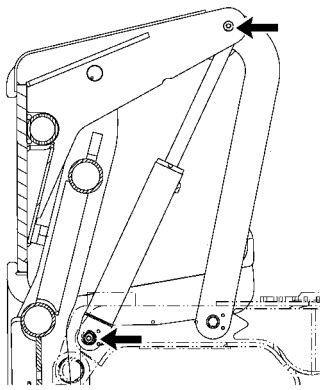


Illustration 160 g01209311

There are two counterweight cylinders. The rod ends of the counterweight cylinders are mounted on the counterweight hinge pins.

Lubricate the counterweight cylinder bearings through the grease fittings that are at both ends of the counterweight cylinders.

i02420319

Counterweight Hinge Pins - Lubricate

SMCS Code: 5400-086-PN; 5409

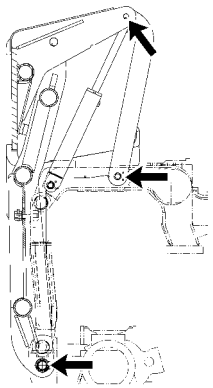


Illustration 161 g01209329

Lubricate the counterweight hinge pins through the grease fittings. The rod ends of the counterweight lift cylinders are mounted on the uppermost counterweight hinge pins.

i02229305

Engine Air Filter Primary Element - Clean/Replace

SMCS Code: 1051-070-PY; 1051-510-PY; 1054-070-PY; 1054-510-PY

NOTICE
Service the primary filter element only when the alert indicator for the intake air filter is flashing. Do not open the filter compartment unless it is time for service. Opening the filter compartment can cause dirt to get into the clean side of the filter housing.

NOTICE
Extremely short air filter life can result if the precleaner system malfunctions. If air filter life is drastically reduced from typical for the operating conditions, consult your Caterpillar Dealer. The exhaust system dust ejector for the strata tube precleaner must pull a minimum vacuum of 508 mm (20 inch) of water.

NOTICE
Service the engine air filters with the engine stopped. Engine damage could result.

NOTICE
Always leave the secondary filter element in place while you clean the primary element, or while you clean the air cleaner housing.

NOTICE
Do not use the filter for longer than one year.

1. Open the engine compartment's access door, if equipped.

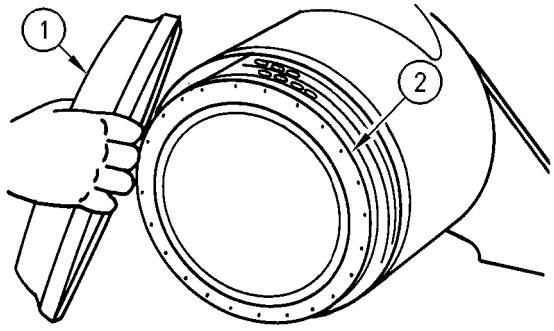


Illustration 162 g00470852

2. Remove the air cleaner cover (1). Pull out in order to remove the element.

3. Remove the primary filter element (2) from the air cleaner housing.

4. Mark the secondary filter element in order to show that the primary filter element has been serviced. The secondary filter element should be replaced when the primary filter element is serviced for the third time. Refer to Operation and Maintenance Manual, “Engine Air Filter Secondary element - Replace”.

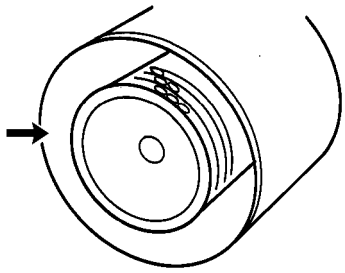


Illustration 163 g00470857

5. Clean the inside of the air cleaner housing. Keep the secondary filter element in place while you clean the housing.

6. If the primary filter element has not been cleaned six times, inspect the primary filter element. If the primary filter element has been cleaned six times, replace the primary filter element. Proceed to Step 9.

7. Inspect the primary filter element. Inspect the filter element for holes and for tears by looking through the filter element. Look toward a bright light. Inspect the element for damaged gaskets or for dented metal parts. Replace damaged filters. Always crush damaged filter elements. Properly discard the filter elements. If you replace the primary filter element, proceed to step 9.

8. If the primary filter element is not damaged and the element has not been previously cleaned six times, clean the element. The filter element can be cleaned by using pressure air. Use a maximum air pressure of 205 kPa (30 psi). Direct the air from the clean side to the dirty side. In order to show that the filter element has been cleaned, mark the element. The primary filter element can be cleaned up to six times.

NOTICE
Do not clean the filter elements by bumping or tapping them. Do not use filter elements with damaged pleats, gaskets, or seals. Do not wash the filter elements.

9. Push the filter element firmly in order to properly seat the element. Write the date on the element, if the primary element is replaced.

10. Install the air cleaner cover.

11. Close the access door, if equipped.

i01454983

Engine Air Filter Secondary Element - Replace

SMCS Code: 1051-510-SE; 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.

NOTICE
The filter should be kept in service for no longer than one year.

NOTICE
Always leave the secondary filter element in place while you clean the air cleaner housing.

1. Open the engine access door, if equipped.

2. Remove the air cleaner housing cover.

3. Remove the primary filter element. Refer to Operation and Maintenance Manual, “Engine Air Filter Primary Element - Clean/Replace”.

4. Clean the inside of the air cleaner housing.

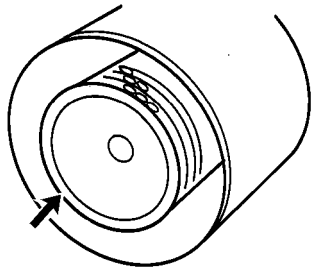


Illustration 164 g00470240

5. Remove the secondary filter element. Pull out in order to remove the element.

6. Install a new secondary filter element. Push the element firmly in order to properly seat the element. Write the date on the element, if the element is replaced.

7. Install the primary filter element and the air cleaner housing cover.

8. Close the engine access door, if equipped.

i02489549

Engine Air Precleaner - Clean

SMCS Code: 1050-070

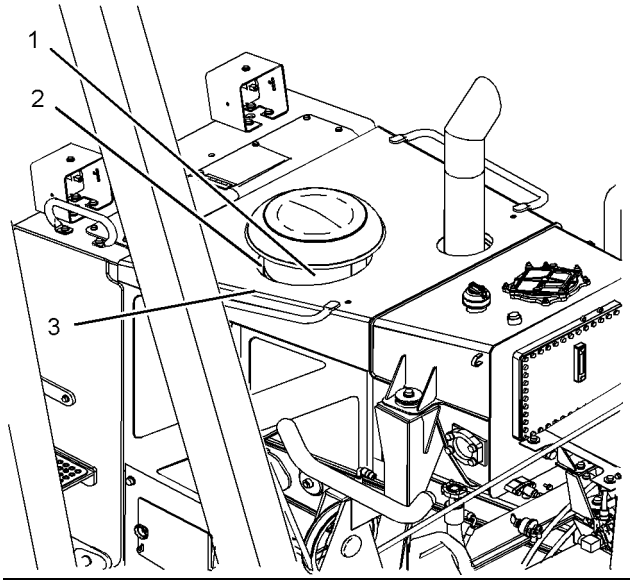


Illustration 165 g01243671

1. Inspect the screen in engine air precleaner (1) that sits above engine hood (3) for dirt accumulation.

2. Loosen retainer (2) and remove the screen.

3. Clean the screen with compressed air or water.

4. Replace the screen.

i02760299

Engine Crankcase Breather - Clean

SMCS Code: 1317-070

1. Stop the engine. Open the left access door.

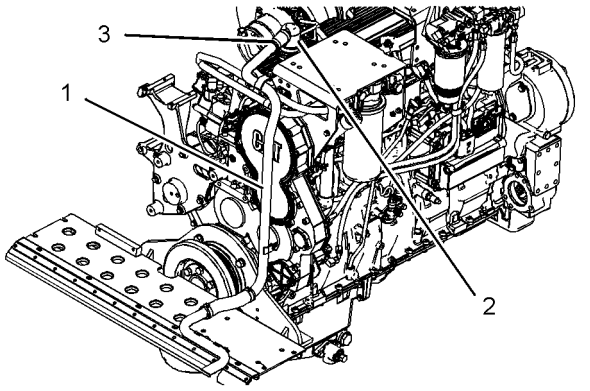


Illustration 166 g01124723

Top view

2. Loosen the hose clamps on the outlet hose from the breather. Remove the hose from the breather assembly.

3. Remove the clamp from the base of the breather assembly.

4. Lift up on the breather assembly, in order to remove the assembly.

5. Check the condition of the cover seal. Replace the cover seal if the cover seal is damaged.

6. Clean the breather in a clean nonflammable solvent.

7. Shake the breather until the breather is dry. You may also use pressure air to dry the breather.

8. Check the condition of the hose. Make sure that the inside of the hose is unobstructed. Replace the hose if the hose is damaged.

9. Install breather assembly (2).

10. Install clamp (3).

11. Install the hose and breather outlet hose clamps (1).

12. Open the doors to the radiator grill. Examine the bottom of the breather. Remove any debris that is clogging the breather tube.

13. Close the doors to the radiator grill.

14. Close the left access door.

i01959267

Engine Oil Level - Check

SMCS Code: 1302-535-FLV; 1326-535-FLV

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

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

1. Open the engine access door (if equipped) on the left side of the machine.

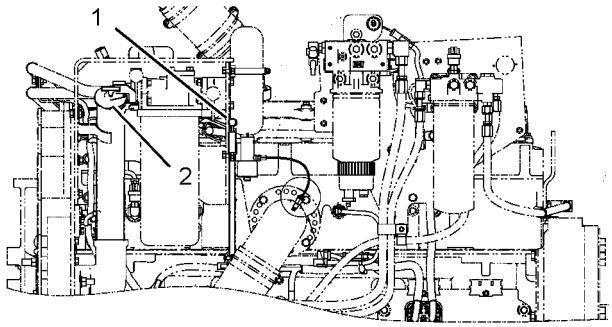


Illustration 167 g01025526

Illustration 168 g00489186

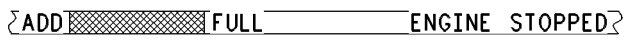


Illustration 169 g00489188

2. Check the “LOW IDLE” side of dipstick (1) while the engine is running. The oil should be at operating temperature. Maintain the oil level between the “ADD” mark and the “FULL” mark. This is the only accurate way to check the oil level.

   Check the “ENGINE STOPPED” side of the dipstick while the engine is stopped. The oil should be cold. Maintain the oil level between the “LOW” mark and the “FULL” mark. This method should be used as reference only, before the engine is started.

Note: When you operate the machine on severe slopes, the oil level in the engine crankcase must be at the “FULL” mark on the “LOW IDLE” side of dipstick (1).

3. Remove oil filler cap (2) and add oil, if necessary.

4. Clean the oil filler cap and install the oil filler cap.

5. Close the engine access door (if equipped).

i03399741

Engine Oil Sample - Obtain

SMCS Code: 1000-008; 7542-008

⚠ 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.

Obtain the sample of the engine oil as close as possible to the recommended sampling interval. The recommended sampling interval is every 250 service hours. In order to receive the full effect of S·O·S oil analysis, you must establish a consistent trend of data. In order to establish a pertinent history of data, perform consistent oil samplings that are evenly spaced.

1. Before you obtain an oil sample, operate the machine until the oil is warm and the oil is well circulated.

2. Open the engine access door (if equipped) on the left side of the machine.

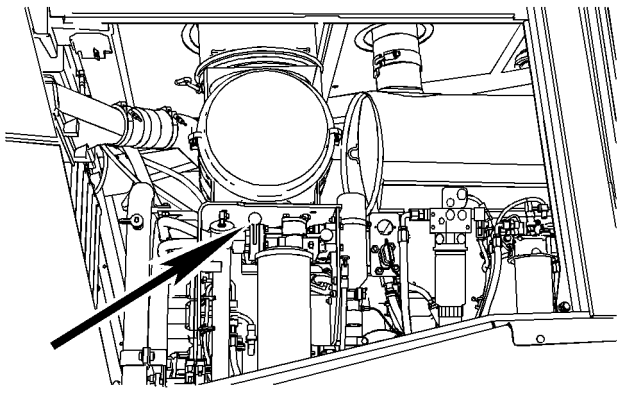


Illustration 170 g01760274

3. Remove the protective cap.

4. Obtain a sample of the engine oil from the engine oil sampling valve. The sampling valve is located in the engine compartment on the left side of the machine. 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.

Note: In order to obtain an oil sample from the engine compartment, it may be necessary to increase the engine's speed. Normally, the oil sample is taken at low idle. If the flow rate is too low, increase engine speed to high idle in order to obtain the oil sample.

5. Replace the protective cap.

6. Close the engine access door (if equipped).

For additional information about oil sampling, see Operation and Maintenance Manual, SEBU6250, “Caterpillar Machine Fluids Recommendations” or consult your Caterpillar dealer.

i02490037

Engine Oil and Filter - Change

SMCS Code: 1308; 1318-510

⚠ 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.

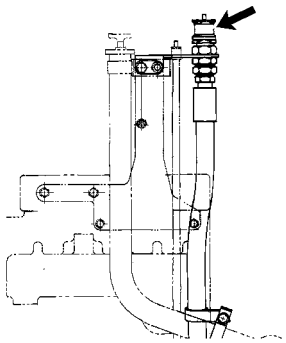


Illustration 171 g00284791

The high speed oil change (if equipped) is located next to the engine oil dipstick.

The high speed oil change requires a 126-7539 nozzle assembly for changing the oil (if equipped).

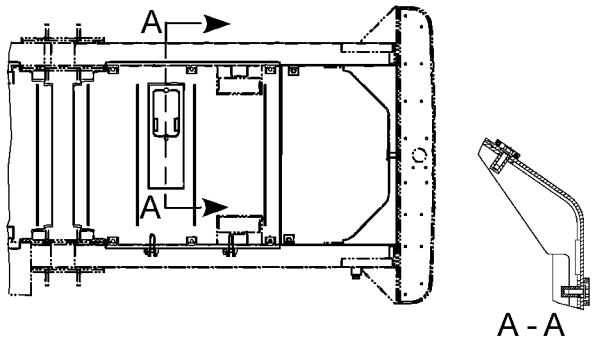


Illustration 172 g01243907

The access cover for the drain is removed.

1. Remove the crankcase drain access cover, which is in the crankcase guard.

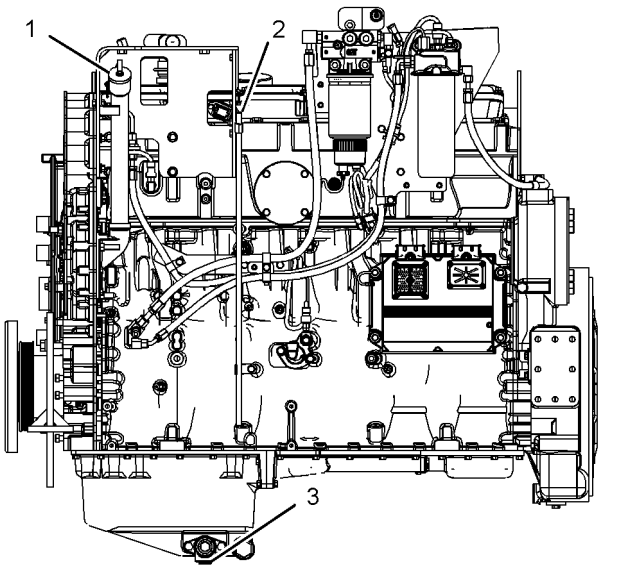


Illustration 173 g01164905

2. Install a 25.4 mm (1.0 inch) pipe into drain valve (3). The pipe should have a 1-11 1/2 NPTF pipe thread.

3. Clamp a hose to the pipe in order to direct the oil into a suitable container.

4. Open the drain valve. Allow the oil to drain into a suitable container.

5. Close the drain valve after all of the oil has drained. Remove the hose and pipe. Install the drain valve access cover.

6. Remove the engine oil filter element. Discard the engine oil filter element properly. Make sure that all of the old filter seal is removed from the filter base.

7. Apply a thin coat of clean oil to the new filter seal. Install the new engine oil filter element by hand. When the seal contacts the filter base, tighten the filter element by an additional turn of 270 degrees. Rotation index marks are on the new filter elements. These rotation index marks are spaced at 90 degree intervals. Use these rotation index marks as a guide for proper tightening.

8. Remove oil filler cap (1). Refer to Illustration 173. Fill the crankcase with new oil. See Operation and Maintenance Manual, “Capacities (Refill)”. Clean the oil filler cap. Install the oil filler cap.

9. Always measure the oil level with oil level dipstick (2) in order to ensure that the correct amount of oil was added.

10. Maintain the oil level between the “ADD” mark and “FULL” mark on the low idle side of the dipstick. Check the oil level with the engine at low idle and at operating temperature.

i02336925

Engine Valve Lash - Check

SMCS Code: 1102; 1209-535

WARNING

To prevent possible injury, do not use the starter motor to turn the flywheel.

Hot engine components can cause burns. Allow additional time for the engine to cool before measuring valve clearance.

WARNING

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

NOTICE
Operation of Caterpillar engines with improper valve adjustments will reduce engine efficiency. This reduced efficiency could result in excessive fuel usage and/or shortened engine component life.

NOTICE
Measure the valve clearance with the engine stopped. To obtain an accurate measurement, allow at least 20 minutes for the valves to cool to engine cylinder head and engine block temperature.

Check the valve bridge before setting the valve lash. Ensure that the valve bridge is seated equally on both valve stems.

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

i02770364

Engine Valve Rotators - Inspect

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.

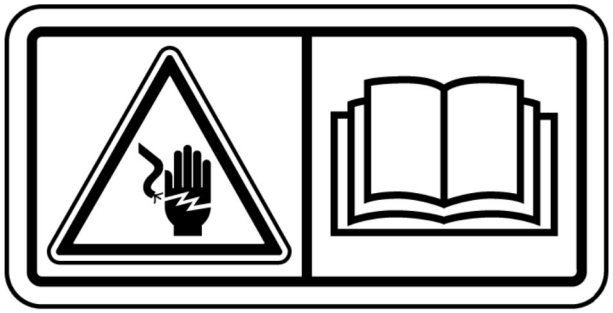


Illustration 174 g01372247

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

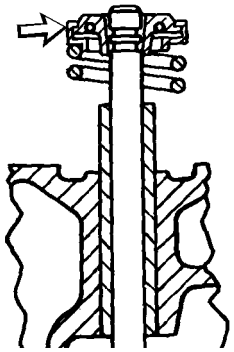


Illustration 175 g00038585

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.

i02490063

Ether Starting Aid Cylinder - Replace

SMCS Code: 1456-510-CD

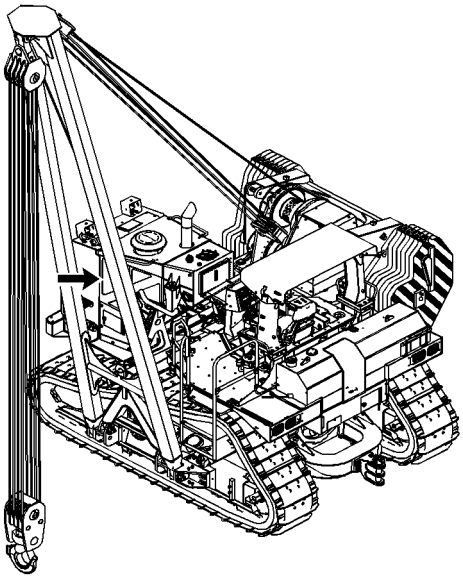


Illustration 176 g01243923

1. Open the left engine compartment.

2. The ether starting aid is located on the left side of the engine beside the air cleaner.

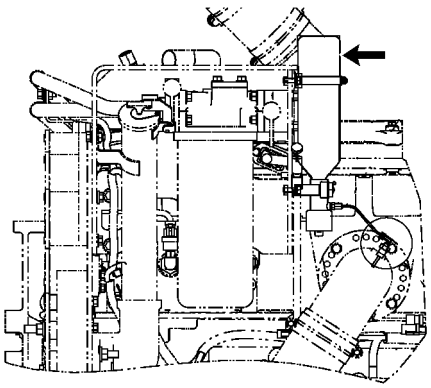


Illustration 177 g01166361

3. Loosen the cylinder retaining clamp. Unscrew and remove the empty ether starting aid cylinder.

4. Remove the used gasket. Install the new gasket that is provided with each new ether starting aid cylinder.

5. Install the new ether starting aid cylinder. Tighten the ether starting aid cylinder by hand. Tighten the cylinder retaining clamp securely.

i02337183

Fairlead Sheave - Lubricate

SMCS Code: 5400-086; 6305-086

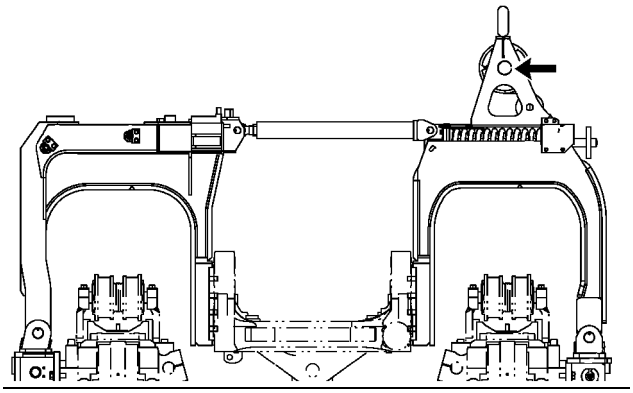


Illustration 178 g01166471

Front view

Lubricate the grease fitting on the pin on the left side frame assembly, as shown.

i01959689

Final Drive Oil - Change

SMCS Code: 4050-044-FLV

⚠ 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 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.

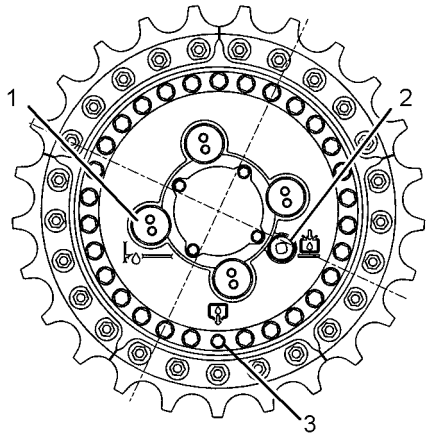


Illustration 179 g01018450

1. Position one final drive so that oil level mark (1) is horizontal. The drain plug (3) will point downward.

2. Remove oil filler plug (2).

3. Remove drain plug (3). Allow the oil to drain into a suitable container.

4. Inspect the drain plug seal. Replace the drain plug seal if the drain plug seal is damaged.

5. Clean the drain plug and install the drain plug.

6. Fill the final drive with oil to the bottom of the filler plug opening. See Operation and Maintenance Manual, “Capacities Refill”.

7. Inspect the condition of the seal of the filler plug. Replace the plug seal if the plug seal is damaged. Wipe the magnet in order to clean the plug. Install the plug.

8. Repeat Step 1 to Step 7 in order to change the oil in the other final drive.

For additional information about final drive oil, see Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” or consult your Caterpillar dealer.

i01959718

Final Drive Oil Level - Check

SMCS Code: 4050-535-FLV

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

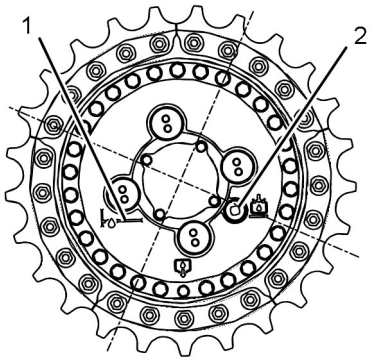


Illustration 180 g01018451

1. Position one final drive so that oil level mark (1) is horizontal with the oil filler plug (2).
2. Remove oil filler plug (2).
3. The oil level should be at the bottom of the filler plug opening. Add oil, if necessary.
4. Wipe the magnet in order to clean the plug.
5. Install oil filler plug (2).
6. Repeat Step 1 to Step 5 in order to check the oil level in the other final drive.

i02229659

Final Drive Oil Sample - Obtain

SMCS Code: 4050-008; 7542-008

⚠ 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 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.

Obtain the sample of final drive oil as close as possible to the recommended sampling interval. The recommended sampling interval is every 500 service hours. In order to receive the full effect of S·O·S oil analysis, you must establish a consistent trend of data. In order to establish a pertinent history of data, perform consistent oil samplings that are evenly spaced.

If the machine is operated under a high load and/or under high temperature conditions, sample all fluids at the 250 hour interval.

1. Run the machine until operating temperature has been reached. The sample must be at operating temperature in order to take an accurate sample.

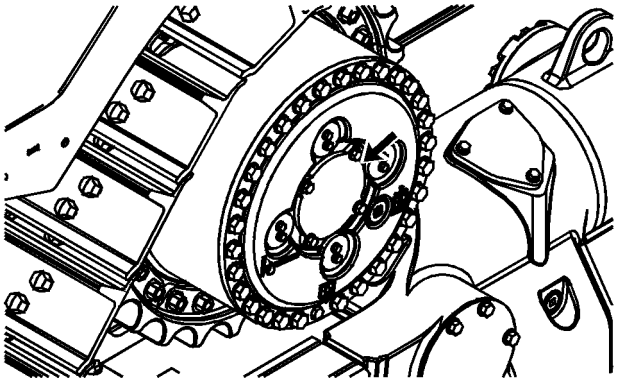


Illustration 181 g01117789

2. Remove the cover plate.

3. Obtain an oil sample. The use of a sampling gun that is inserted into the sump is the preferred method for obtaining a sample.

Note: Do not use the drain stream method to obtain a sample of the final drive oil. A stream of dirty oil from the bottom of the compartment will contaminate the sample. Likewise, never dip an oil sample from an oil container or pour a sample from a used filter.

4. Install the cover plate.

Reference: Refer to, “Lubricant Viscosities” in the Maintenance Section of this manual for the correct fluid for your machine.

Reference: Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”, “S·O·S Oil Analysis” for information that pertains to obtaining a sample of the final drive oil. Refer to Special Publication, PEHP6001, “How To Take A Good Oil Sample” for more information about obtaining a sample of the final drive oil.

i02490098

Fuel System - Prime

SMCS Code: 1258

If the engine does not start, air may be trapped in the fuel lines to the engine. Use the following procedure in order to purge air from the fuel lines.

Electric Fuel Priming Pump

NOTICE
Use a suitable container to catch any fuel that might spill. Clean up any spilled fuel immediately.

The electric fuel priming pump is located in the engine compartment on the left side of the machine.

1. Turn the ignition switch to the “OFF” position.

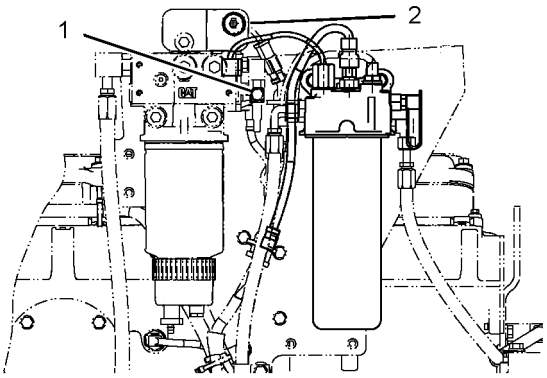


Illustration 182 g01243955

2. Twist valve (1) in order to open the air purge valve.

3. Hold the switch for the electric fuel priming pump (2) in order to be in the ON position. Allow the fuel priming pump to run until fuel without air flows through the air purge valve (1).

4. Release the switch for the fuel priming pump in order to be in the OFF position.

Note: This process will prime the fuel system regardless of the location of the air in the lines.

5. Twist valve (1) in order to close the air purge valve.

6. Hold the switch for the electric fuel priming pump (2) in order to be in the ON position for 20 seconds. This will allow the air to be completely removed from the system.

NOTICE
Do not crank the engine continuously for more than 30 seconds. Allow the starting motor to cool for two minutes before cranking the engine again.

7. Start the engine. If you cannot start the engine, the engine needs more priming. If the engine continues to misfire or to smoke, more priming is necessary. Repeat step 6 if the engine will not start.

Note: The electric fuel priming pump will only operate if the engine start switch key is in the OFF position. Shut off the engine before any additional priming.

8. Run the engine at the LOW IDLE position until the engine runs smoothly.

Note: Do not activate the priming pump while you crank the engine.

Refer to Operation and Maintenance Manual, “Fuel System Secondary Filter - Replace” for information on replacing the filter.

i02490119

Fuel System Secondary Filter - Replace

SMCS Code: 1261-510-SE

⚠ WARNING

Personal injury or death can result from a fire.

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

Clean up all leaked or spilled fuel. Do not smoke while working on the fuel system.

Turn the disconnect switch OFF or disconnect the battery when changing fuel filters.

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.

NOTICE

Do not fill fuel filters with fuel before installing them. Contaminated fuel will cause accelerated wear to fuel system parts.

Before you replace the secondary fuel filter element, replace the primary fuel filter element. See the Topic “Fuel System Water Separator Element - Replace” in this manual.

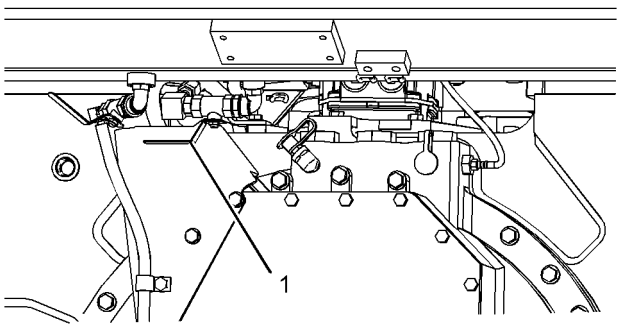


Illustration 183 g01113804

1. Turn the red lever (1) in order to shut off fuel supply.
2. Open the engine access door on the left side of the machine.

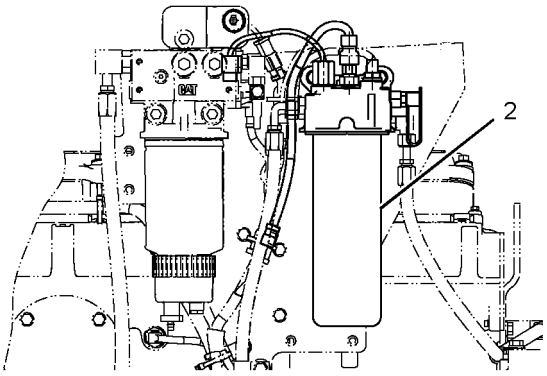


Illustration 184 g01244008

3. Remove the secondary fuel filter (2). Discard the fuel filter properly.
4. Clean the filter base. Make sure that all of the old seal is removed.
5. Install the Fuel Filter. Coat the seal of the new filter with clean diesel fuel.
6. Install the new filter by hand. When the seal contacts the base, tighten the filter according to the instructions on the filter.

   Rotation index marks are positioned on the filter at 90 degree intervals. Use these rotation index marks as a guide when you tighten the filter.
7. Turn lever (1) in order to resume fuel supply.
8. Prime the fuel system. See the Topic “Fuel System - Prime” in this manual.
9. Close the engine access door.

i02334472

Fuel System Water Separator - Drain

SMCS Code: 1263-543

⚠ WARNING

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire. To help prevent possible injury, turn the start switch off when changing fuel filters or water separator elements. Clean up fuel spills immediately.

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 allow dirt to enter the fuel system. Thoroughly clean the area around a fuel system component that will be disconnected. Fit a suitable cover over disconnected fuel system component.

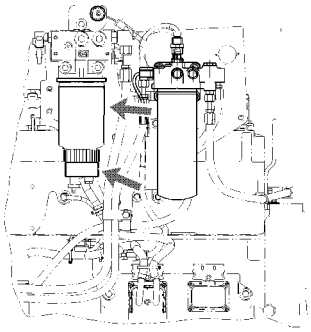


Illustration 185 g01022350

Open the left engine compartment access cover.

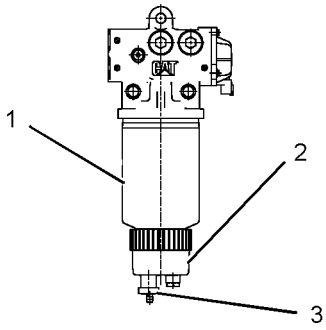


Illustration 186 g01165356

(1) Element
(2) Bowl
(3) Drain

Bowl (2) should be monitored daily for signs of water. If water is present, drain the water from the bowl.

1. Open drain (3). The drain is a self-ventilated drain. Catch the draining water in a suitable container. Dispose of the water properly.

2. Close drain (3).

NOTICE

The water separator is under suction during normal engine operation. Ensure that the drain valve is tightened securely to help prevent air from entering the fuel system.

i02334259

Fuel System Water Separator Element - Replace

SMCS Code: 1263-510-FQ

⚠ WARNING

Personal injury or death can result from a fire.

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

Clean up all leaked or spilled fuel. Do not smoke while working on the fuel system.

Turn the disconnect switch OFF or disconnect the battery when changing fuel filters.

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 filter with fuel before installing the fuel filter. Contaminated fuel causes accelerated wear to fuel system parts.

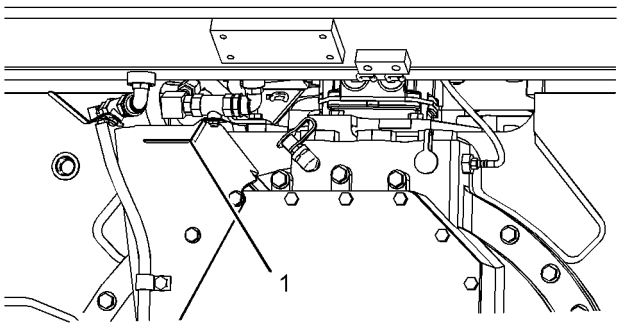


Illustration 187 g01113804

1. Turn the red lever (1) in order to shut off fuel supply.

2. Open the engine access door on the left side of the machine.

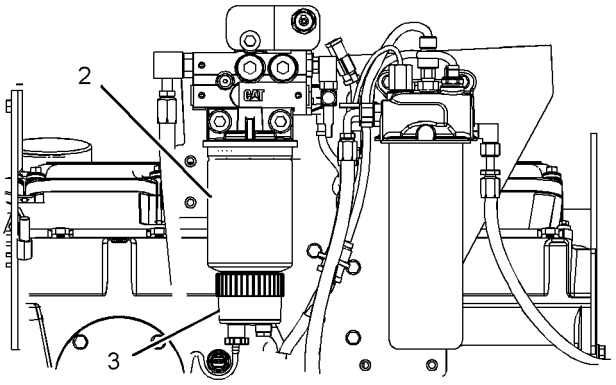


Illustration 188 g01165278

3. Drain water separator bowl (3) into a suitable container and remove the bowl from the bottom of the filter element. Clean the water separator bowl and inspect the seal. If the seal is worn or damaged, install a new seal.

4. Remove filter element (2). Properly discard the filter element.

5. Clean the filter base. Be sure that all of the old seal is removed.

6. Coat the seal of the new filter element with clean diesel fuel.

7. Install the new filter element hand tight until the seal of the 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 filter that are spaced 90 degrees or 1/4 of a turn away from each other. When you tighten the filter, use the rotation index marks as a guide.

Note: 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.

8. Coat the seal of the water separator bowl with clean diesel fuel. Install the water separator bowl to the filter element.

9. Turn the red lever (1) in order to resume the fuel supply.

10. Prime the fuel system. See the Topic “Fuel System - Prime” in this manual.

11. Start the engine and run the engine. Check filter (2) and water separator bowl (3) for leaks.

12. Close the engine access door.

i02490140

Fuel Tank Cap and Strainer - Clean

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

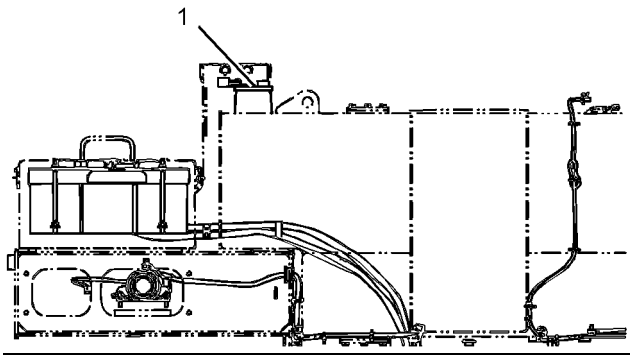


Illustration 189 g01244029

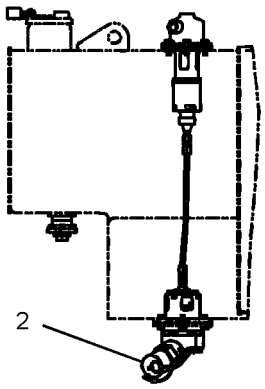


Illustration 190 g01244141

The fuel tank is located on the rear of the machine. The filler cap (1) is on the left side of the machine next to the ROPS.

Only vented fuel caps have filters. Machines without fast fill fuel adapter (2) require a vented fuel cap.

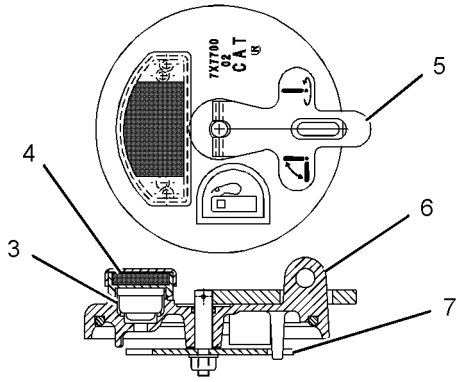


Illustration 191 g01110732

1. Lift lever (5) in order to remove the fuel tank filler cap. Turn the lever counterclockwise until the lever stops. Lift the cap straight up in order to remove the cap.
2. Remove the fuel strainer from the filler neck.
3. In order to replace the filter assembly, remove two screws that secure filter assembly (4) to the fuel cap. Remove filter assembly (4), valve (3), and the gaskets.
4. Wash the cap and the strainer in a clean, nonflammable solvent.
5. Inspect the tank cap seal. If the seal is damaged, replace the seal.
6. Replace the filter assembly, the valve, the gaskets, and the screws. Use a 9X-2205 Cap Filter Kit.
7. Install the strainer.
8. Install the fuel cap. Rotate the fuel cap clockwise until three tabs (7) drop into the slots in the adapter. Rotate lever (5) clockwise until the lever stops. Lower lever (5) over locking tab (6).

Fast Fill Fuel Adapter (If Equipped)

See illustration 190.

Machines that are equipped with fast fill fuel adapter (2) have identical fuel caps (1) as systems without a fast fill fuel adapter. Use the same procedure for changing the filter in the two systems.

i02490289

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 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.

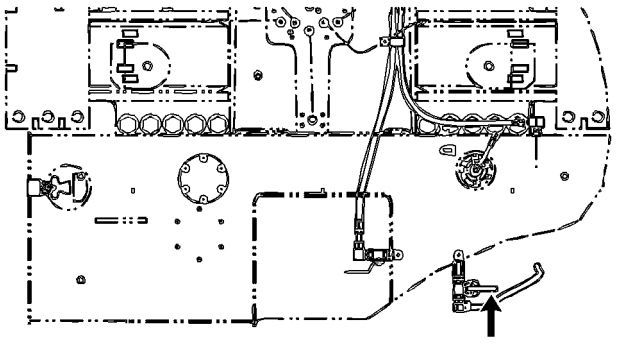


Illustration 192 g01244163

Top cutaway view of drain

The drain valve is under the fuel tank at the rear of the machine.

1. Open the drain valve with the yellow handle. Allow the water and the sediment to drain into a suitable container.

2. Close the drain valve.

i02490375

Fuses and Circuit Breakers - Replace/Reset

SMCS Code: 1417-510; 1420-529; 1420

Fuses – Fuses protect the electrical system from damage that is caused by overloaded electrical circuits. Replace a fuse if the element separates. If the fuse of a particular electrical system requires frequent replacement, check the electrical circuit. Repair the electrical circuit, if necessary.

NOTICE
Always replace fuses with the same type and capacity fuse that was removed. Otherwise, electrical damage could result.

NOTICE
If it is necessary to replace fuses frequently, an electrical problem may exist.

Contact your Caterpillar dealer.

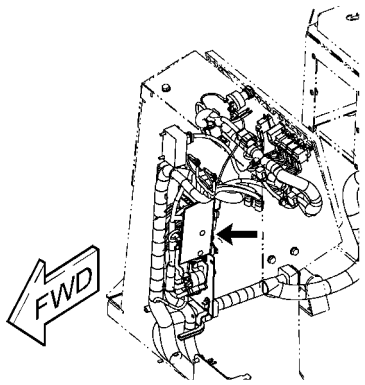


Illustration 193 g01165977

Side view

Open the cover for access to the circuit breakers and the fuses. This is inside the operator station on the right side of the dash panel above the floorplate.

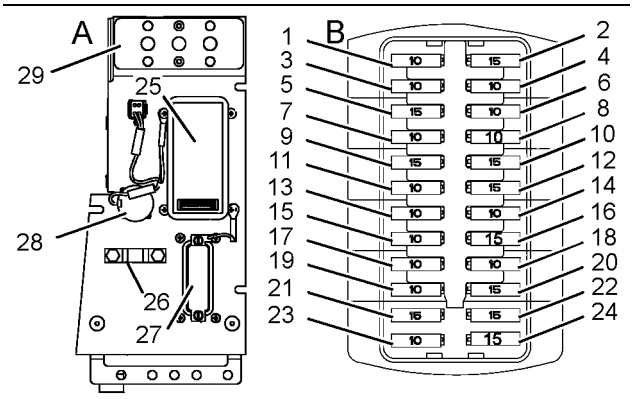


Illustration 194 g01244202

(A) Open fuse box
(B) Open fuse panel

Fuse listing:

Monitoring Panel (1) – 10 Amp

24 Volt Switched Power (2) – 15 Amp

Spare (3) – 10 Amp

Solenoid (4) – 10 Amp

Rear floodlights (5) – 15 Amp

Console and Raise/Lower (6) – 10 Amp

Power train ECM (7) – 10 Amp

Boom and Floodlights (8) – 10 Amp

Auxiliary circuit (9) – 15 Amp

AETA control (10) – 15 Amp

Accessories (11) – 10 Amp

Auxiliary circuit (12) – 15 Amp

Steering supply and motor (13) (Fuse) – 10 Amp

Spare (14) – 10 Amp

Spare (15) – 10 Amp

Auxiliary circuit (16) – 15 Amp

Unswitched power (Horn)(17) – 10 Amp

Auxiliary Power (VIDS)(18) – 10 Amp

Secondary brake (19) – 10 Amp

“CAES” and “METS” (20) – 15 Amp

Front Floodlights (21) – 15 Amp

Engine ECM (22) – 15 Amp

Keyswitch (23) – 10 Amp

Auxiliary circuit (24) – 15 Amp

Cover (25) – Fuse panel

Fuse (26) – 125 Amp

Fuse cover (27) – Plastic

Starting/Charging Analyzer (28) (Plug) – 70-pin Connector

Reset buttons(29) – Breakers

i02337636

Hook and Wire Cable - Inspect

SMCS Code: 7000

Inspect the Hook

Inspect the hook frequently. The inspections should include observation of the hook during operation of the hook. A designated person determines if the conditions that are found during the inspections constitute a hazard. The designated person will determine if a more detailed inspection is required.

- Inspect the hook for any distortion such as bends in the hook or twists in the hook.
- Inspect the hook for any wear.
- Inspect the hook for cracks, nicks, or gouges.
- If a latch is provided, inspect the latch. Make sure that the latch engages properly. Inspect the latch for any damage. Make sure that the latch is not malfunctioning.
- Inspect the hook assembly and the means for securing the hook assembly.

For additional information on the proper maintenance and on the proper inspection of hooks, refer to “American National Standard Institute ANSI/ASME B30.1”.

Inspect the Wire Cable

Make a visual inspection of all running cables that are in continuous use. Make the inspection of the running cables on a daily basis before the machine is placed in operation. Inspect all of the cables on a monthly basis.

All inspections shall be performed by a designated person. Keep a dated report of the condition of the cable on file in a location that is available to designated personnel. Perform a close inspection of the sections of the cable that are normally hidden during the visual inspection and the maintenance inspection. (This includes the sections of the cable that pass over the sheaves.) These points are the sections of the cable that are most likely to fail.

Note any deterioration that results in a notable loss of the original strength. (See the conditions that are described below.) Determine if further use of the cable will constitute a hazard.

Inspect the cable on a daily basis for the following conditions:

- Inspect the cable for a reduction in the diameter of the cable below the nominal diameter. A loss of support in the cored wire of the cable may be caused by internal corrosion, external corrosion, or wear of the outside wires.
- Inspect the cable for broken outside wires. Check for the degree of distribution of the broken outside wires. Check for the concentration of outside broken wires
- Inspect the cable for worn outside wires.
- Inspect the cable for corroded wires and for broken wires at the connection on the wire cable end.
- Inspect the cable end for connections that are corroded, cracked, bent, worn, or improperly installed.
- Inspect the cable for sections that are crushed or kinked and for any loose wire strands.

Excessive wear or broken wires may occur in sections of the cable that are in contact with saddles, equalizer sheaves, or other sheaves. Excessive wear or broken wires can also occur when travel of the cable is limited. Take care to inspect the ropes at these locations.

When a machine is shutdown for a month or more, inspect all of the cables thoroughly. When a side boom machine has been in storage for a month or more, inspect all of the cables thoroughly. The inspection should be completed before the machine is returned to operation.

The inspection should be for all types of deterioration. The inspection should be performed by an designated person or by an authorized person. The authorized person's approval is required for further use of the cable.

A dated report on the condition of the cable should be kept on file.

Take care in the inspection of cable that is resistant to rotation.

Any new poured socket or any socket that is swaged shall be tested for proof of strength. Test the cable to the lift capacity of the side boom machine or to the manufacturer's recommendation.

Never give the cable a rating that is greater than 50 percent of the wire rope's nominal strength or of the structural strand's nominal strength.

Note: For additional information on the proper maintenance and on inspection of the cable, refer to “American National Standards Institute ANSI/ASME B30.14”.

i03487800

Hook Load Line - Install

SMCS Code: 5417-012

⚠ WARNING

Do not operate or work on this equipment unless you have read and understand the instructions and warnings in the Operation and Maintenance Manual. Failure to follow the instructions or heed the warnings could result in injury or death. Contact any Caterpillar dealer for replacement manuals. Proper care is your responsibility.

⚠ WARNING

Do not use a wire rope cable that is kinked, frayed or has worn spots.

Wear gloves when handling the wire rope cable.

NOTICE
Use 9 strand wire rope of right regular lay. The wire rope cable should have a minimum breaking strength of 33112 kg (73000 lb).

Table 12

Specifications for the Hook Load Line		
Boom Height	**Cable Size (Diameter)**	**Length**
8534 mm (28 ft)	19.05 mm (.75 inch)	124.2 m (407 ft)

1. Lower the boom to the horizontal position. Lower the hook to the ground.

Note: The loaded force in the winch drum must be neutralized before removing the wire rope from a loaded drum.

2. Unwind the wire rope from the load drum of the hook winch.

   Reference: Refer to “Winch Wire Rope - Remove and Install” in this manual for the information in order to safely remove the wire rope from winch drums, if necessary.

3. Disconnect the anchor for the wire rope from the load drum.

4. Remove the wire rope from the sheave blocks.

NOTICE
Unroll the wire rope cable from the spool. Never lift the wire rope off the spool in coils.

5. Unroll the new wire rope from the spool.

Note: Weld the ends of the wire rope in order to prevent fraying.

6. Install the ferrule of the wire rope to the load drum.

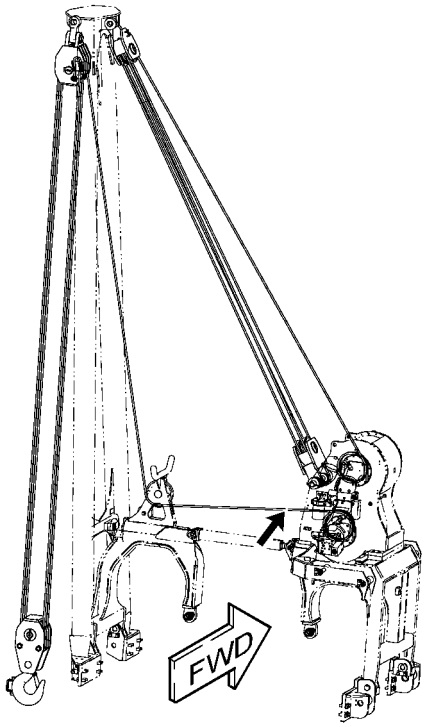


Illustration 195 g01242177

7. Wind one half of the wire rope evenly across the load drum.

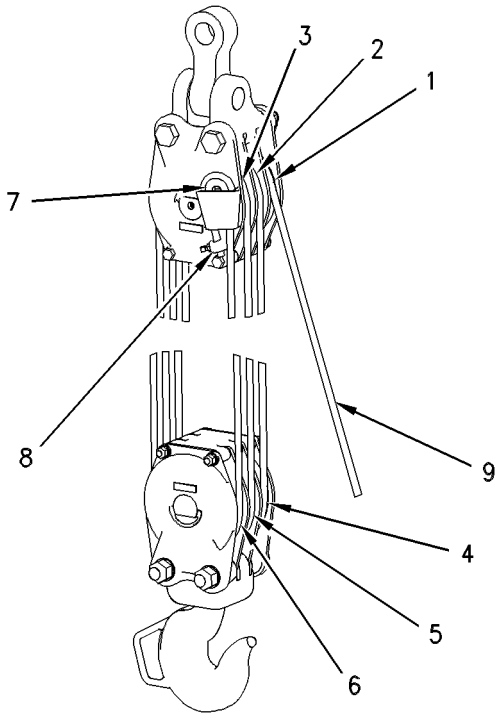


Illustration 196 g00624622

8. Install hook load line (9) from the winch drum onto the sheave blocks. Position the wire rope over upper sheave (1), under lower sheave (4), over upper sheave (2), under lower sheave (5), over upper sheave (3), and under lower sheave (6).

Note: The hook load line should go over upper sheave (1) which is toward the front of the machine. Anchor the wire rope toward the rear of the machine.

9. Insert the wire rope into the pocket and around wedge (7).

10. Insert the wire cable end through clamp (8). Tighten the setscrew in the clamp to a torque of 45 ± 7 N·m (33 ± 5 lb ft).

11. Move the hook control lever to the Raise (slow) position. Operate the control in this position until the wire rope is tight. Lift the lower sheave block off the ground and raise the boom.

i02054663

Horn - Test

SMCS Code: 7402-081

Test the horn on a daily basis. Press downward on the horn button in order to sound the horn. If the horn does not sound, make the necessary repairs before you operate the machine.

i03488182

Hydraulic System Oil - Change

SMCS Code: 5050-044

Interval

Note: If Cat HYDO Advanced 10 hydraulic oil is used, the hydraulic oil change interval will change. The normal interval of 2000 hours is extended to 3000 hours. S·O·S services may extend the oil change even longer. Consult your Caterpillar dealer for details.

Cat HYDO Oil Change Interval

The standard Cat HYDO oil change interval is every 2000 service hours or 1 year.

A 4000 service hour or 2 year maintenance interval for hydraulic oil (change) is available. The extended interval requires S·O·S monitoring of the hydraulic oil. The interval for S·O·S monitoring is every 500 hours. The maintenance interval for the hydraulic oil filter is not changed.

Machines that are used in severe conditions are not included in the 4000 service hour or the 2 year maintenance interval. Machines that are used in severe conditions must use the interval in the Maintenance Interval Schedule.

Cat HYDO Advanced 10 Oil Change Interval

The standard Cat HYDO Advanced 10 oil change interval is every 3000 service hours or 18 months.

A 6000 service hour or 3 year maintenance interval for hydraulic oil (change) is available. The extended interval requires S·O·S monitoring of the hydraulic oil. The interval for S·O·S monitoring is every 500 hours. The maintenance interval for the hydraulic oil filter is not changed.

Machines that are used in severe conditions are not included in the 6000 service hour or the 3 year maintenance interval. Machines that are used in severe conditions must use the interval in the Maintenance Interval Schedule.

Reference: Refer to Operation and Maintenance Manual, “Lubricant Viscosities” for more information on hydraulic oils.

Procedure

Change the Hydraulic System Oil

⚠ WARNING

At operating temperature, the hydraulic tank is hot and under pressure.

Hot oil and components can cause personal injury. Do not allow hot oil or components to contact skin.

Remove the filler cap only when the engine is stopped, and the filler cap is cool enough to touch with your bare hand. Remove the filler cap slowly in order to relieve 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 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 in order to warm the oil.

Park the machine on level ground. Make sure that no one is endangered before raising the boom or raising the hook. Fully retract the counterweight. Engage the parking brake and stop the engine.

Reference: See Operation and Maintenance Manual, “Stopping the Machine” for additional information.

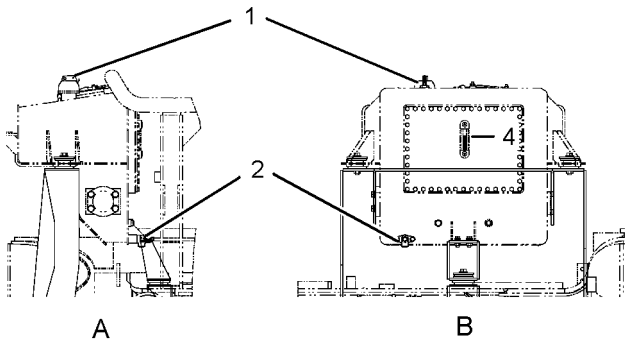


Illustration 197 g01244352

(A) Left side view
(B) Rear view

1. Remove hydraulic tank filler cap (1) slowly in order to relieve any pressure.
2. Wash the filler strainer and the filler cap in a clean nonflammable solvent.
3. Remove oil drain plug (2) that is located on the left bottom of the hydraulic tank. The oil drain plug faces the rear of the machine.
4. Attach a suitable length of hose to a 1/2 inch NPT pipe nipple that has a length of 100 mm (4 inch).
5. Install the pipe nipple into the drain plug opening.

6. In order to tighten the pipe nipple, rotate the pipe nipple clockwise. Open the drain valve and allow the oil to drain into a suitable container.

7. Close the drain valve and remove the pipe nipple.

8. Clean the drain plug and install the drain plug. Tighten the drain plug to a torque of 60 N·m (44 lb ft).

9. Change the hydraulic system filters. Case drain filter (2) is shown. See the Operation and Maintenance Manual, “Hydraulic System Oil Filters - Replace”.

10. Install the filler strainer.

11. See Operation and Maintenance Manual, “Capacities (Refill)” in order to determine the amount of hydraulic oil that is needed to fill the hydraulic oil tank. Fill the hydraulic oil tank.

12. Inspect the filler cap gasket. Replace the gasket if damage or wear is evident.

13. Install the filler cap.

14. Start the engine. Run the engine for a few minutes.

15. Maintain the oil level to the “FULL” mark in sight gauge (4) for the hydraulic tank. Add oil, if necessary.

16. Stop the engine.

For additional information about hydraulic system oil, see Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” or consult your Caterpillar dealer.

Drain the Hook Winch and the Boom Winch

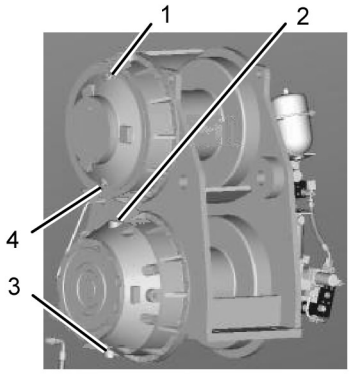


Illustration 198 g01213481

Drain the winches with the engine OFF.

1. Remove oil filler plug (1) on the top winch slowly in order to relieve any pressure.

2. Remove oil drain plug (4) that is located on the right side of the machine on the bottom of the top winch. The oil drain plug faces the front of the machine.

3. Dispose of the oil properly. Install the oil drain plug.

4. Repeat Steps 1 through 3 for oil plugs (2, 3) on the bottom winch.

5. Replace the winch filter, if necessary.

6. Fill the top winch and the bottom winch with hydraulic oil.

Note: See “Lubricant Viscosities” for more information on the hydraulic oils to use in hydraulic winches. See “Capacities (Refill)” in order to determine the amount of hydraulic oil for each of the winches.

7. Install the oil filler plugs. Make sure that the winches are filled enough in order to operate the winches effectively.

Replace the Filters for the Hook and the Boom

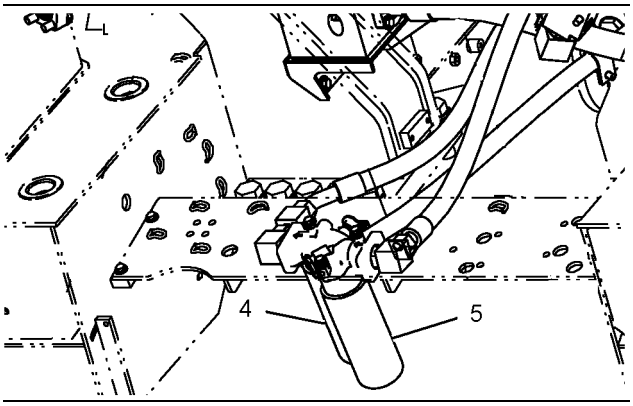


Illustration 199 g01213500

Rear view of machine

Replace the oil filter for hook (4). Replace the oil filter for boom (5). Replace the two filters with the hydraulic filters, if necessary.

i03488001

Hydraulic System Oil Filters - Replace

SMCS Code: 5068-510

⚠ 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.

1. Lower the boom and retract the counterweight. Stop the engine.

   Reference: See Operation and Maintenance Manual, “Stopping the Machine” and “Operator Controls” for additional information.

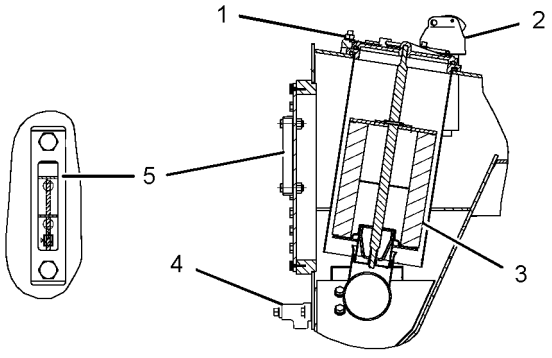


Illustration 200 g01244962

2. On the center platform of the machine, remove hydraulic oil filler cap (2) in order to relieve the tank pressure. Remove the filler strainer.

3. Remove four bolts (1) from the cover in order to remove the hydraulic oil filter.

4. Remove hydraulic oil filter element (3) and properly discard the filter.

5. Clean the strainer, the filter housing, and the oil filler cap in a clean, nonflammable solvent.

6. Inspect the seal for the filter cover. If the cover seal is damaged, install a new seal.

7. Install new hydraulic oil filter element (3).

8. Install the strainer, the cover, and four bolts (1) for the filter housing.

9. Inspect the seal on the filler cap. Replace the seal if the seal is worn or damaged. Install the retainer ring and the cap.

10. Maintain the oil level to the “FULL” mark in sight gauge (5) for the hydraulic oil tank. Add oil, if necessary.

Steering/Hydraulic Filter

Replace the steering/hydraulic filter for the steering system and the implement hydraulic pump.

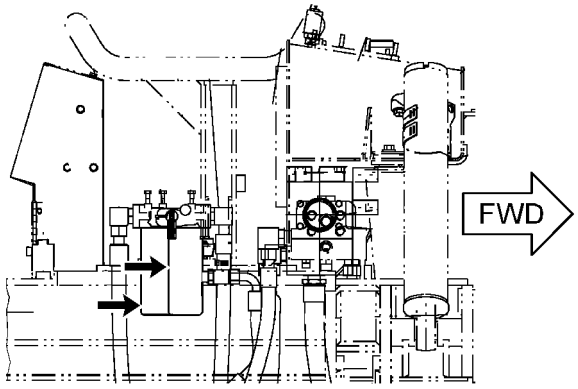


Illustration 201 g01245045

Right side view

Replace both of the filters with the filter in the hydraulic tank.

i02490583

Hydraulic System Oil Level - Check

SMCS Code: 5056-535-FLV; 7479

⚠ WARNING

At operating temperature, the hydraulic tank is hot and under pressure.

Hot oil and components can cause personal injury. Do not allow hot oil or components to contact skin.

Remove the filler cap only when the engine is stopped, and the filler cap is cool enough to touch with your bare hand. Remove the filler cap slowly in order to relieve pressure.

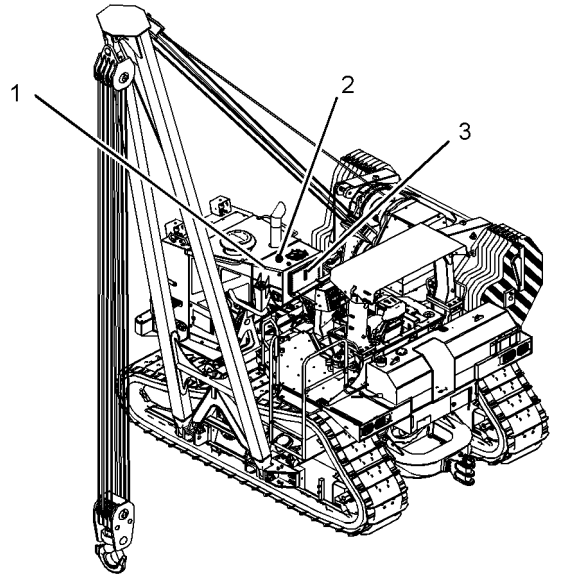


Illustration 202 g01244400

Hydraulic tank (1) is on the center platform of the machine.

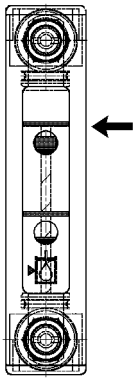


Illustration 203 g01209711

1. Maintain the oil level to the “FULL” mark in sight gauge (3). Check the oil level when the oil is cold. Verify that the oil level is below the “FULL” mark before you remove filler cap (2).
2. If the hydraulic system requires additional hydraulic oil, remove filler cap (2) slowly in order to relieve the pressure. Add oil through the filler tube.
3. Clean the filler cap and install the filler cap.

i02490981

Hydraulic System Oil Sample - Obtain

SMCS Code: 5050-008; 7542-008

⚠ 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.

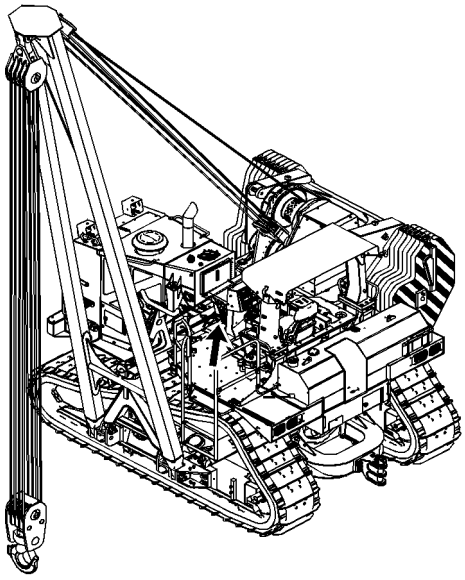


Illustration 204 g01244769

Obtain a sample of the hydraulic oil from the sampling valve. The sampling valve is located on the center platform between the hydraulic tank and the operator console.

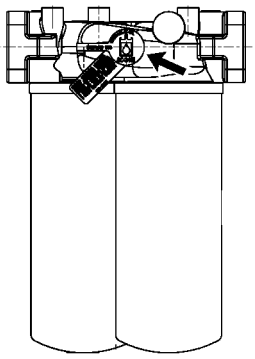


Illustration 205 g01244874

The sampling valve is located on the steering/hydraulic filter. Remove the protective cap from the oil sampling port. 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.

For additional information about hydraulic system oil, see Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” or consult your Caterpillar dealer.

i03475285

Indicators and Gauges - Test

SMCS Code: 7450-081

Before you operate the machine, perform the following checks and make any necessary repairs.

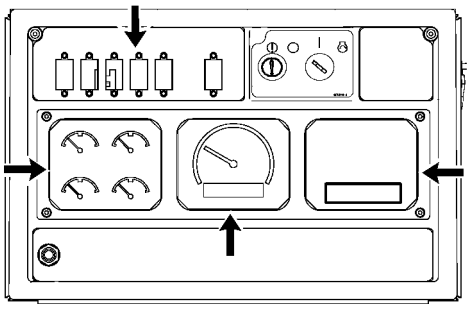


Illustration 206 g01213608

- Check for the following damage: broken lenses on the gauges, broken indicator lights, broken switches, and other broken components in the cab.
- Start the engine.
- Check the monitor panel for proper operation. See Operation and Maintenance Manual, “Monitoring System”.
- Check for oil leaks. Repair any oil leaks around the covers or around the hoses.
- Look for inoperative gauges.
- Turn on all machine lights. Check for proper operation.
- Sound the forward horn.
- Move the machine forward and test the service brakes. If the service brakes malfunction, consult your Caterpillar dealer for repairs.
- Engage the parking brake. Move the machine forward in order to test the parking brake. If the parking brake malfunctions, consult your Caterpillar dealer for repairs.

i02106227

Oil Filter - Inspect

SMCS Code: 1318-507; 3067-507; 5068-507

Inspect a Used Filter for Debris

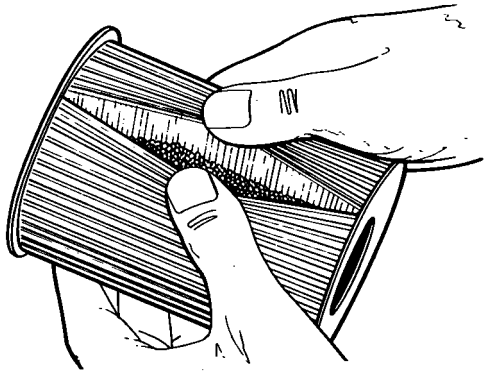


Illustration 207 g00100013

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.

i00058126

Radiator Core - Clean

SMCS Code: 1353-070; 1805; 1810

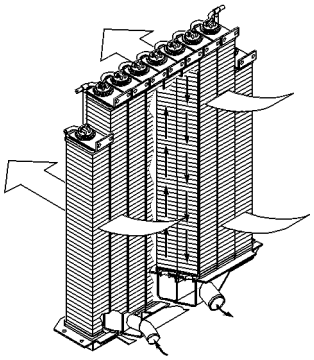


Illustration 208 g00100624

You can use compressed air, high pressure water, or steam to remove dust and other debris from the radiator core. However, the use of compressed air is preferred.

See Special Publication, SEBD0518, “Know Your Cooling System” for the complete procedure for cleaning the radiator core.

i03499636

Radiator Pressure Cap - Clean/Replace

SMCS Code: 1353-070-Z2; 1353-510-Z2

⚠ 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.

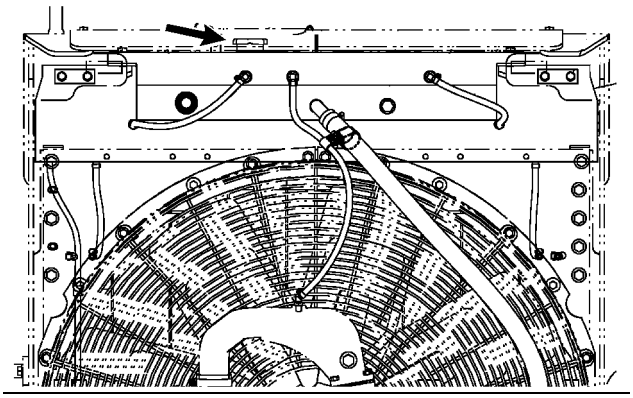


Illustration 209 g01835526

Rear view

1. Open the access cover to the radiator cap on top of the radiator guard. Unlock the cover, if necessary.
2. Slowly remove the radiator cap in order to relieve system pressure.
3. Inspect the radiator cap for damage, for deposits, or for foreign material. Clean the radiator cap with a clean cloth. Replace the radiator cap if the radiator cap is damaged.
4. Install the radiator cap.

i02378585

Recoil Spring Compartment Oil Level - Check

SMCS Code: 4158-535-FLV

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

1. Remove the cover plate for the oil filler.

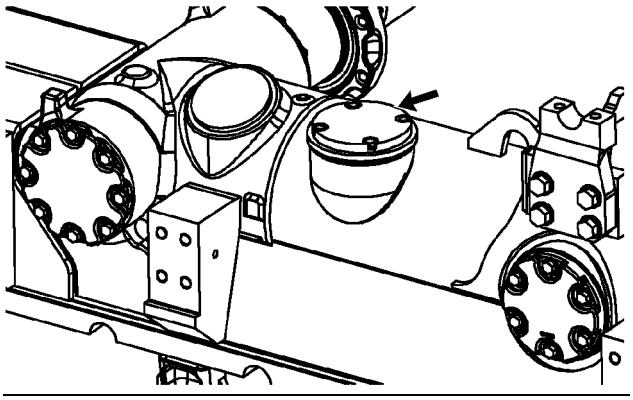


Illustration 210 g01187435

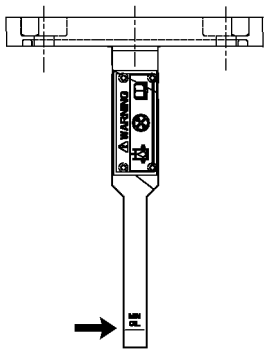


Illustration 211 g01209869

Minimum level

2. Maintain the oil level to the level mark on the dipstick.
3. Install the cover plate.
4. Repeat the procedure for the other recoil compartment.

i03510526

Refrigerant Dryer - 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.

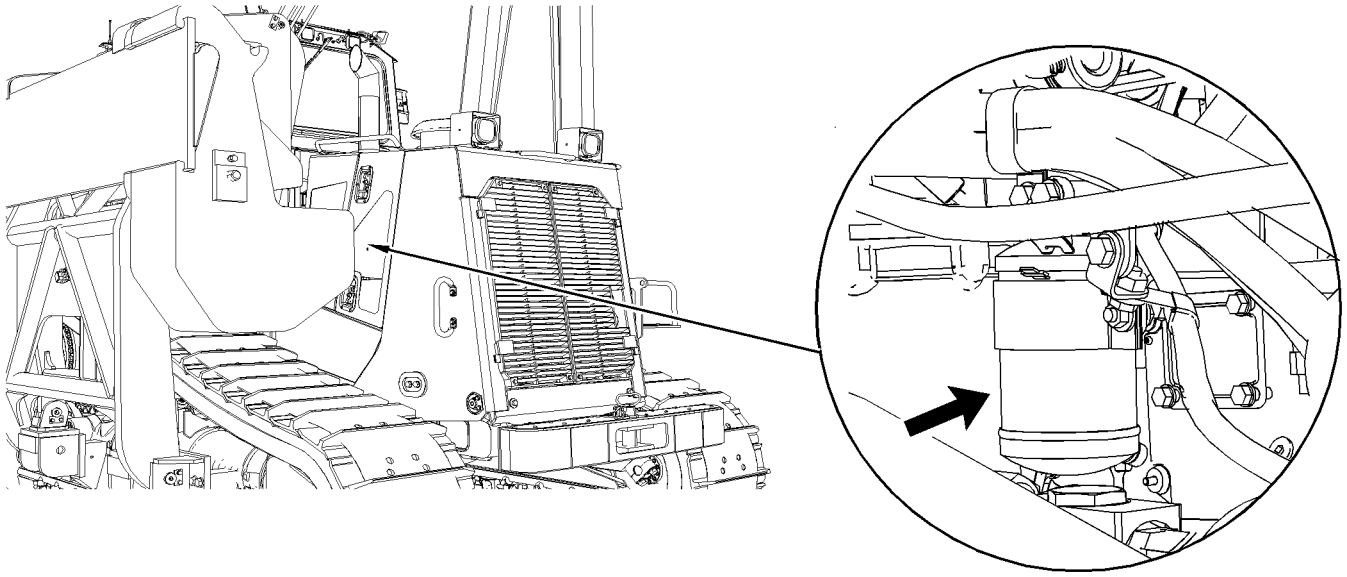


Illustration 212 g01843834

The in-line dryer is located in the engine compartment on the right hand side of the machine.

The in-line dryer is accessible by removing the side panel of the engine compartment.

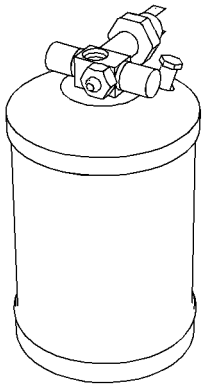


Illustration 213 g01845083

Note: The “R-134a” refrigerant dryer should be replaced annually. Extremely humid operating conditions may require more frequent replacement of the dryer. The dryer should also be replaced if the air conditioning system has been leaking or if the system has been opened for service repair.

Reference: For the correct procedure, refer to Air Conditioning and Heating Service Manual, SENR5664 or the Disassembly and Assembly Manual for your machine.

Note: A qualified mechanic should replace the components of the refrigerant system since special tooling and training are required.

i02490921

Rollover Protective Structure (ROPS) - Inspect

SMCS Code: 7325-040

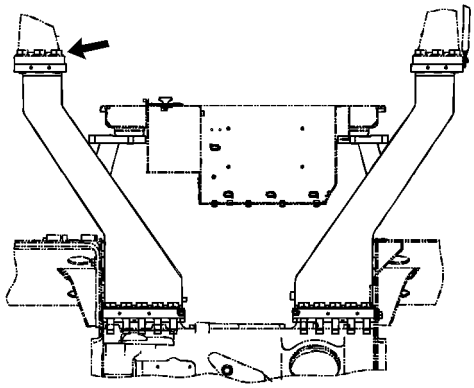


Illustration 214 g01209829

Inspect both sides of the Rollover Protective Structure (ROPS) for bolts that are loose or damaged. Replace any damaged bolts and any missing bolts with original replacement parts only. Tighten the ROPS bolts to a torque of 1800 ± 200 N·m (1325 ± 150 lb ft).

Note: Apply oil to all bolt threads for the ROPS before you install the ROPS bolts.

Do not weld reinforcement plates to the ROPS in order to straighten the ROPS. Do not weld reinforcement plates to the ROPS in order to repair the ROPS.

If the ROPS has any cracks in the welds, in the castings, or in any metal section, consult your Caterpillar dealer for repairs.

i02429589

Seat Belt - Inspect

SMCS Code: 7327-040

Always check 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.

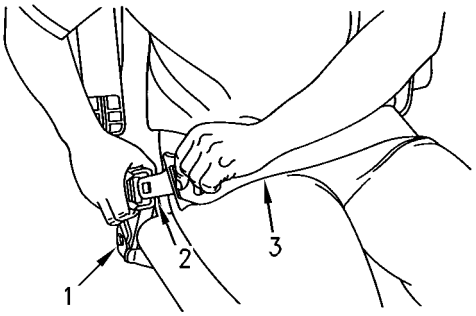


Illustration 215 g00932801

Typical example

Check the seat belt mounting hardware (1) for wear or for damage. Replace any mounting hardware that is worn or damaged. Make sure that the mounting bolts are tight.

Check buckle (2) for wear or for damage. If the buckle is worn or damaged, replace the seat belt.

Inspect the seat belt (3) for webbing that is worn or frayed. Replace the seat belt if the seat belt is worn or frayed.

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

Note: Within three years of the date of installation or within five years of the date of manufacture, replace the seat belt. Replace the seat belt at the date which occurs first. A date label for determining the age of the seat belt is attached to the seat belt, the seat belt buckle, and the seat belt retractor.

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

i02429594

Seat Belt - Replace

SMCS Code: 7327-510

Within three years of the date of installation or within five years of the date of manufacture, replace the seat belt . Replace the seat belt at the date which occurs first. A date label for determining the age of the seat belt is attached to the seat belt, the seat belt buckle, and the seat belt retractor.

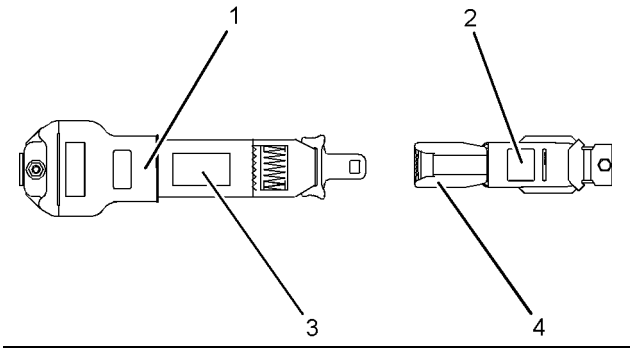


Illustration 216 g01152685

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

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

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

i02490936

Sheave Block Bearings - Lubricate

SMCS Code: 5400-086-BD

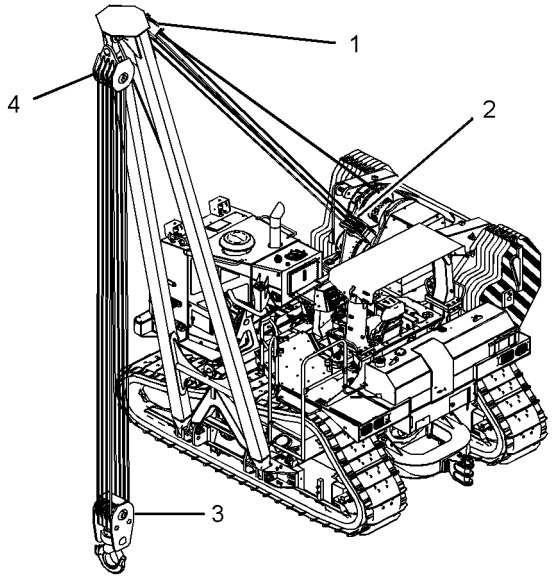


Illustration 217 g01244709

Lubricate the grease fitting in the sheave blocks (1) and (2) for the boom. Lubricate the grease fitting in the sheave blocks (3) and (4) for the hook load line.

i02421068

Steering Charge Filter - Replace

SMCS Code: 431F-510

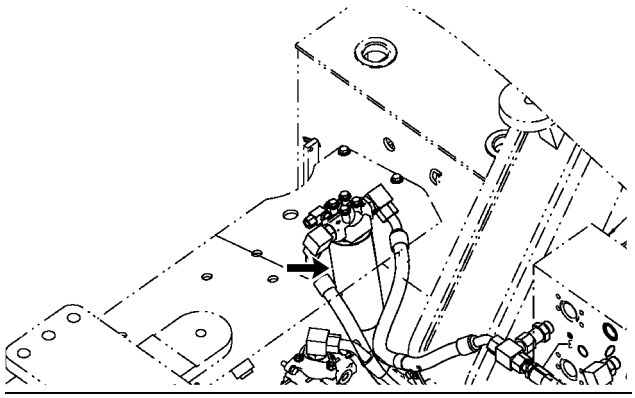


Illustration 218 g01210610

1. Remove the used filter element. Discard the used filter element.

2. Install the new filter element. Turn the element until the element contacts the filter base. Then, tighten the element for an additional 3/8 to 1/2 turn.

i02422374

Torque Converter Scavenge Screen - Clean

SMCS Code: 3101-070-MGS

When you change the transmission oil, clean the torque converter scavenge screen.

1. Remove the bottom guard in order to gain access to the torque converter.

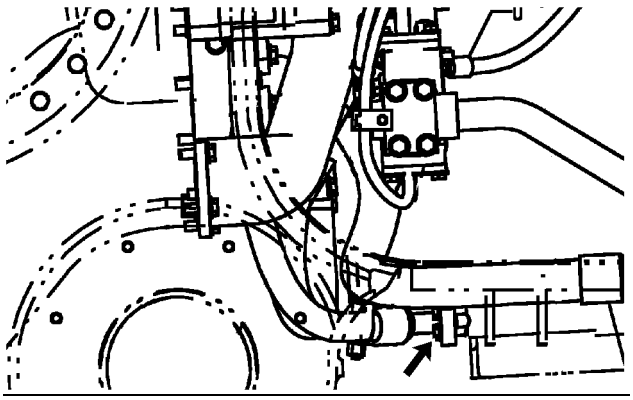


Illustration 219 g01210142
Right side view

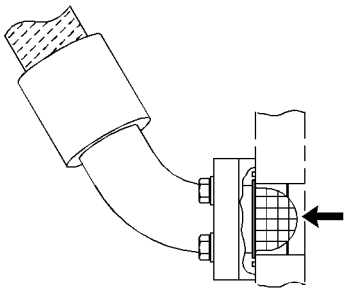


Illustration 220 g01210165

2. Remove the torque converter scavenge line from the torque converter (not shown). Remove the screen.

3. Wash the screen in a clean, nonflammable solvent.

4. Inspect the seal. If the seal is damaged, replace the seal.

5. Install the screen. Install the torque converter scavenge line.

6. Install the bottom guard.

i02491513

Track - Check/Adjust

SMCS Code: 4170-036

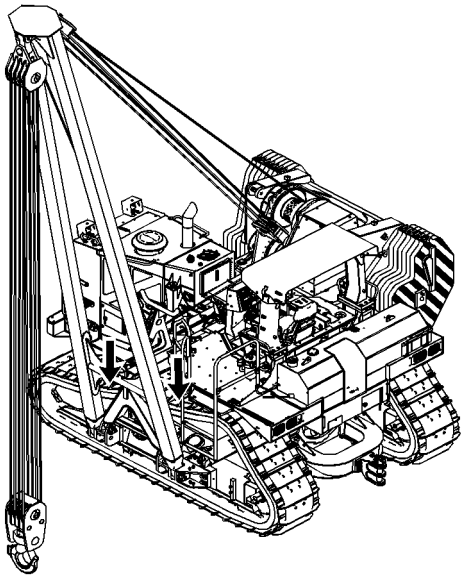


Illustration 221 g01245191

Check the track adjustment. Check the track for wear and for excessive dirt buildup.

⚠ WARNING

Grease is under high pressure.

Grease coming out of the relief valve under pressure can penetrate the body causing injury or death.

Do not watch the relief valve to see if grease is escaping. Watch the track or track adjustment cylinder to see if the track is being loosened.

Loosen the relief valve only one turn.

NOTICE
If tracks are too tight or loose, wear of components is accelerated.

If they appear too tight or too loose, adjust the track.

Follow the procedures in the Maintenance Section for adjustment.

1. Move the machine forward. Allow the machine to coast to a stop without the use of the service brakes. Adjust the tracks while you are in the machine's typical operating conditions. If packing conditions prevail on the workplace, the tracks should be adjusted without removing the packed material.

2. To measure the sag in the track, stretch a string over the grousers that are between the sprocket and the front idler. Take the measurement from the string to the top of the grouser at the maximum measurement.

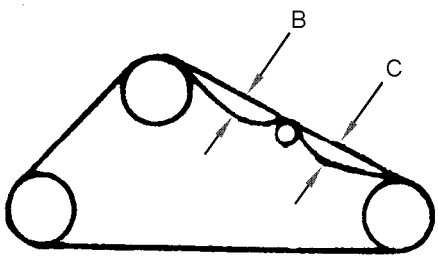


Illustration 222 g01118207

The standard machine is equipped with a carrier roller. Calculate the average of dimension (B) and dimension (C). The correct average value is 65 ± 10 mm (2.6 ± 0.4 inch).

Loose Track Adjustment

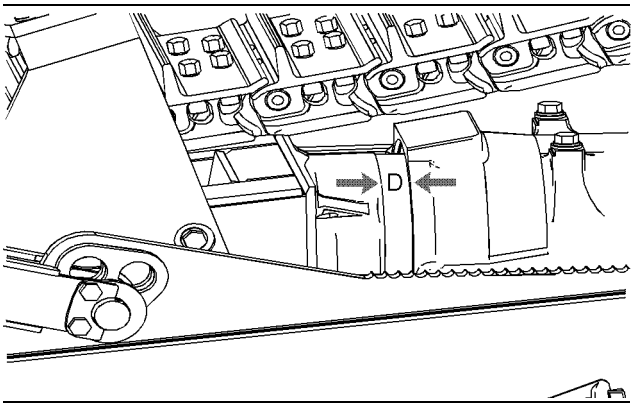


Illustration 223 g01019107

NOTICE
Do not attempt to tighten track when dimension (D) is 152 mm (6.0 inch) or more. Contact your Caterpillar dealer for track service or instructions.

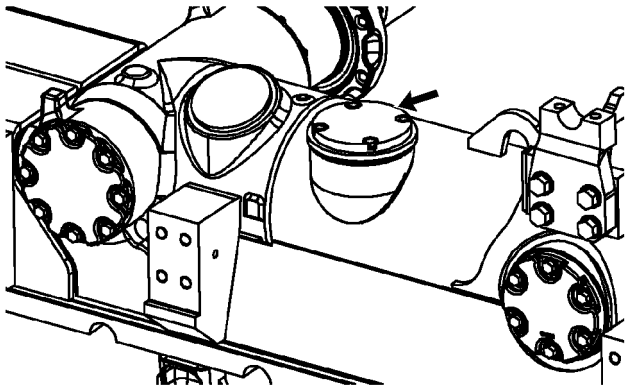


Illustration 224 g01187435

1. Remove the access cover.

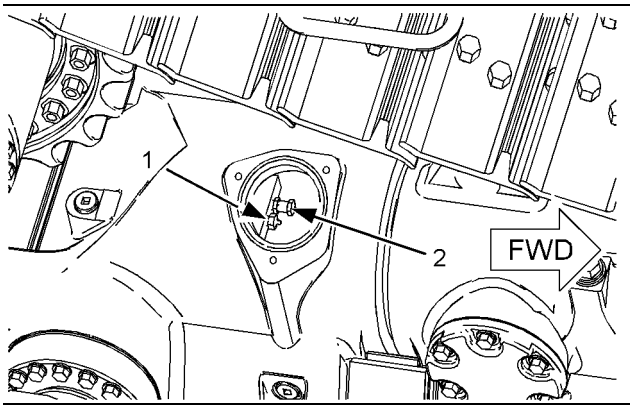


Illustration 225 g01019116
Typical adjuster

2. Add multipurpose grease (MPGM) through track adjustment valve (1). Add the MPGM until dimension (B, C) is correct.

3. Operate the machine back and forth in order to equalize the pressure. Allow the machine to coast to a complete stop. Do not use the brakes.

4. Remeasure dimension (D).

Tight Track Adjustment

1. Loosen relief valve (2) by one turn of 360 degrees. Allow the grease to escape.

2. Close the relief valve.

3. Add MPGM through track adjustment valve (1). Add grease until dimension (B, C) is correct.

4. Install the access cover.

Bolt Torque for Track Shoes

The torque requirement for track shoe bolts is 650 ± 70 N·m (480 ± 50 lb ft). Tighten the bolts for an additional 120 degrees. If you are using bolts with a master link, tighten the bolts to a torque of 650 ± 70 N·m (480 ± 50 lb ft). Then, tighten the bolts for an additional 120 degrees.

i02421570

Track Pins - Inspect

SMCS Code: 4175-040

⚠ WARNING

Fingers can be burned from hot pins and bushings.

The pins and bushings in a dry joint can become very hot. It is possible to burn the fingers if there is more than brief contact with these components.

Use the recommendations in order to extend the life of the undercarriage. Use the recommendations in order to avoid excessive downtime.

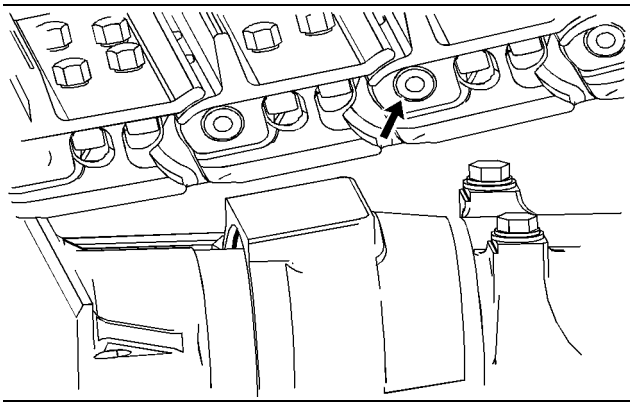


Illustration 226 g01209916

1. During the machine operation, listen for unusual squeaking and for unusual squealing. This can indicate a dry joint.

2. Check the machine for dry joints weekly. Check for dry joints immediately after machine operation. After machine operation, lightly touch the end of each track pin or bushing. Touch the track pin or the track bushing with the back of your hand. Make a mark on any dry track pin joint that is very hot to the touch.

3. Do not hit the ends of the track pins with a sledge hammer in order to loosen the track joints.

NOTICE
Striking the end of a track pin introduces a significant amount of end play into the track joint and can result in early failures.

Consult your Caterpillar dealer's Custom Track Service expert if you detect dry joints or leaks. Your Caterpillar dealer's Custom Track Service expert can perform track inspection.

i02421596

Track Roller Frame - Inspect

SMCS Code: 4151-040

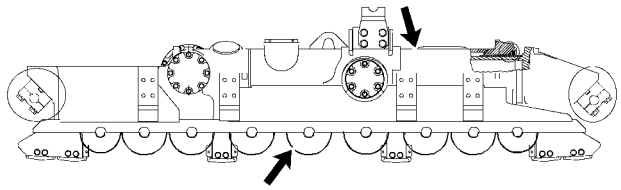


Illustration 227 g01209937

Inspect the track roller frame for leaks. Check the track rollers for leaks.

i02421619

Track Roller Frame Guides - Inspect

SMCS Code: 4177-040

Measure the rotational movement of the front roller frame relative to the rear roller frame.

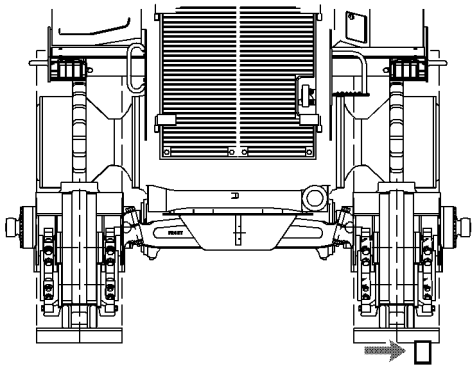


Illustration 228 g01021588

Some components are removed for clarity.

1. Raise the front of the machine. Place a 100 mm (4 inch) block under the outside edge of a track grouser. Place the block near the track idler. Lower the machine onto the block.

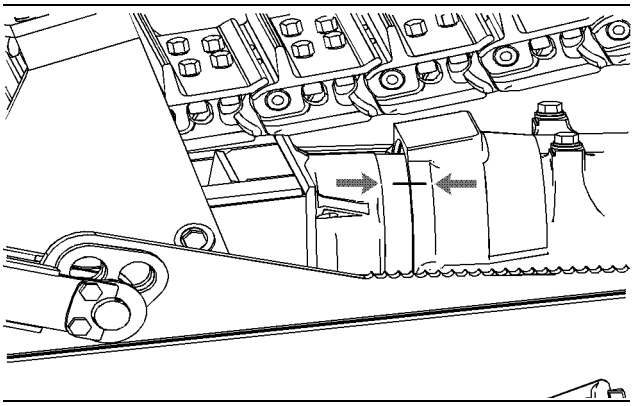


Illustration 229 g01021579

Typical measurements

2. Use a grease pencil to make a mark on the tubular section of the front roller frame. Make a mark on the rear of the roller frame. This mark should correspond with the mark that is on the tubular section.

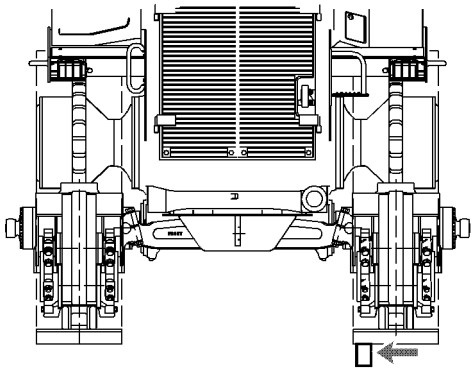


Illustration 230 g01021605

Some components are removed for clarity.

3. Raise the front of the machine. Place the block under the inside edge of the same track grouser. Lower the machine onto the block.

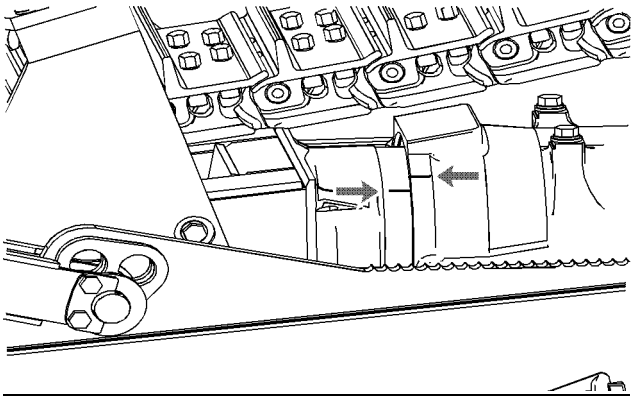


Illustration 231 g01021583

4. Put a mark on the tubular section of the front roller frame. This mark should correspond with the mark on the rear roller frame. Measure the distance between the two marks on the front roller frame.

If the distance between the two marks is greater than 4.5 mm (.18 inch), inspect the track roller frame guides for wear.

Repeat the entire procedure for the other side of the machine.

NOTICE

Never build up the track roller frame guides with hard-face welding. This will cause serious wear damage to the guide slots in the front track roller frame.

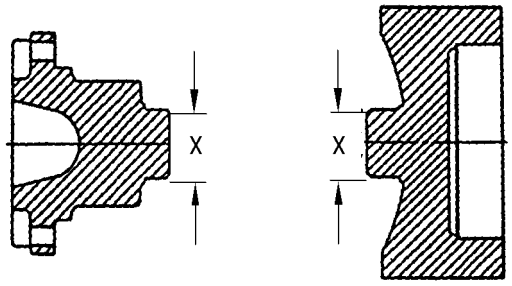


Illustration 232 g00039582

If dimension (X) is less than 45.3 mm (1.78 inch), replace the track roller frame guides. Consult your Caterpillar dealer for information or for service.

i02492330

Transmission Magnetic Screen - Clean

SMCS Code: 3030-070-MGS

When you change the transmission oil, clean the screen and the magnet assembly.

If the transmission oil pump fails or the transmission is disassembled for any reason, clean the screen and magnet assembly. Drain the transmission before you remove the screen and magnet assembly.

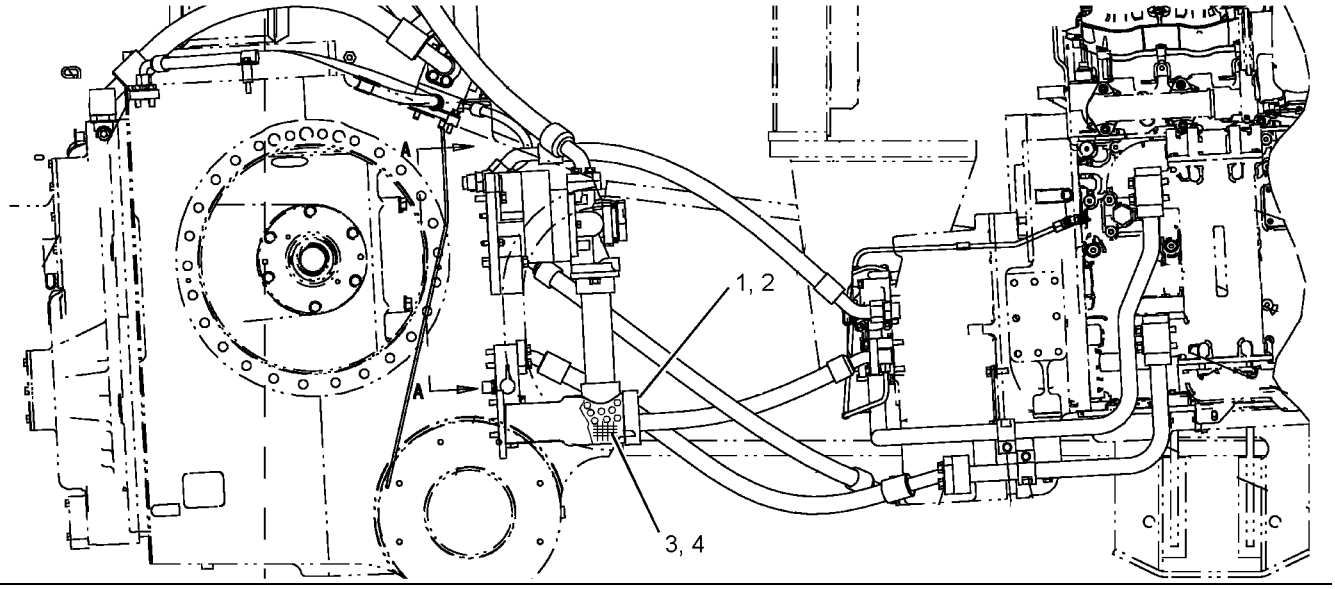


Illustration 233 g01245878

1. Remove the bottom guard in order to gain access to the screen and magnet assembly.
2. Remove bolts (1) and cover (2).
3. Remove screen (3) and magnet assembly (4) from the housing.
4. Wash the screen and the magnet assembly in a clean, nonflammable solvent.
5. Inspect the seal. If the seal is damaged, install a new seal.
6. Install the screen and the magnet assembly.
7. Install the cover on the screen housing.
8. Install the bottom guard.

i02491591

Transmission Scavenge Screen - Clean

SMCS Code: 3030-070-MGS

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

When you change the transmission oil, clean the scavenge screen. **Drain the oil before you remove any screens.**

1. Remove the rear bottom guard.

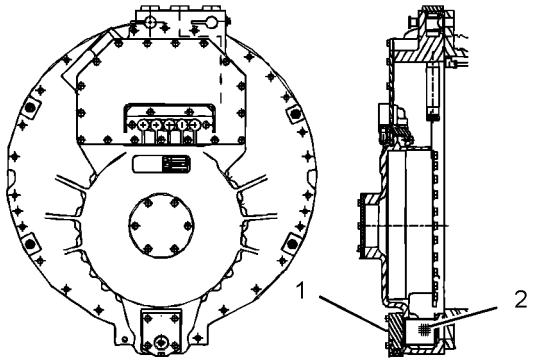


Illustration 234 g01245226

Note: Ecology drains have been provided. An ecology drain drains off the oil from the sump of the planetary transmission. Remove the bottom plug. Install a pipe with 1/2-14 NPTF threads and a rubber hose. Drain the sump by backing out the valve until the oil begins to drain.

2. Remove cover (1), the seal, and transmission scavenge screen (2) from the bottom of the transmission.

3. Wash the screen in a clean, nonflammable solvent.

4. Inspect the seal. If the seal is damaged, replace the seal.

5. Install transmission scavenge screen (2), the seal and cover (1) on the transmission.

Reference: See Operation and Maintenance Manual, “Transmission System Oil - Change” in order to fill with oil.

i02491694

Transmission System Oil - Change

SMCS Code: 3080-044

WARNING

At operating temperature, the hydraulic tank is hot and under pressure.

Hot oil and components can cause personal injury. Do not allow hot oil or components to contact skin.

Remove the filler cap only when the engine is stopped, and the filler cap is cool enough to touch with your bare hand. Remove the filler cap slowly to relieve 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 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.

Drain The Oil

Operate the machine in order to warm the power train oil. The machine must be level. Lower the boom and retract the counterweights.

Engage the parking brake. Stop the engine.

Use a 126-7538 Nozzle if the machine is equipped with the high speed oil change arrangement. The high speed oil change arrangement removes oil from the sump in the bevel gear case. The high speed oil change arrangement does not remove oil from the torque converter or from the transmission case.

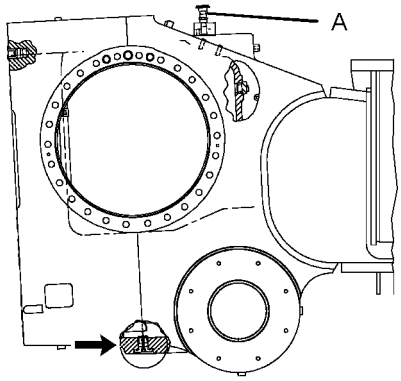


Illustration 235 g01245593

(A) Transmission breather

1. Remove the plug from the drain in the bevel gear case. Install a 4C-8563 Swivel into the valve. Clamp a hose to the swivel. A 25.4 mm (1 inch) pipe and hose can be used. Use a 25.4 mm (1 inch) pipe with 1-11 1/2 NPTF threads. Do not tighten the pipe.

2. Turn the swivel or pipe clockwise in order to open the internal drain valve. Allow the oil to drain into a suitable container.

3. Remove the rear bottom guard in order to access the torque converter.

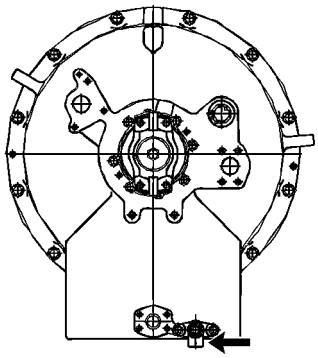


Illustration 236 g01245637

4. Remove the plug from the drain valve in the torque converter. Install a 12.7 mm (.50 inch) pipe with 1/2-14 NPTF threads.

5. Clamp a hose to the pipe in order to drain the oil into a suitable container.

6. Open the drain valve and drain the oil into a suitable container.

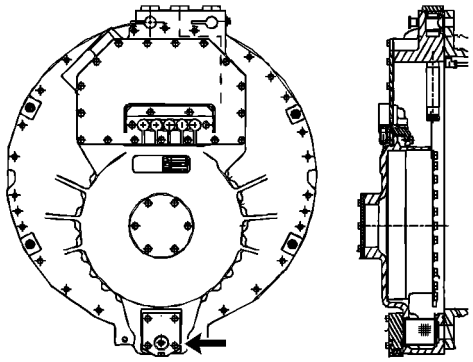


Illustration 237 g01245659

7. Remove the plug from the drain valve in the transmission. Install a 12.7 mm (.50 inch) pipe with 1/2-14 NPTF threads and a rubber hose. Drain the sump by backing out the valve until the oil begins to drain.

8. Drain the oil into a suitable container.

9. Close the drain valve in the torque converter. Close the drain valve in the transmission case.

10. Remove the hoses and remove the pipes from the drains.

11. Remove the swivel or remove the pipe from the drain in the bevel gear case. The drain valve will close.

12. Clean the oil drain plugs and install the oil drain plugs. Replace the guards, as needed.

13. Change the filter element. See Operation and Maintenance Manual, “Transmission System Oil Filter - Replace”.

Fill with Oil

1. Open the access panel on the left side of the operator station in front of the transmission oil filter.

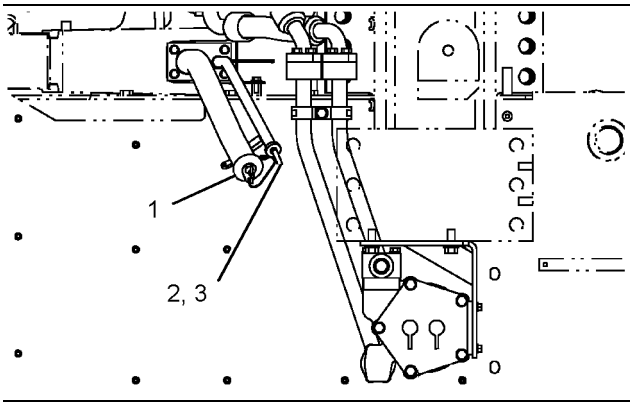


Illustration 238 g01245672

Top view

2. Remove cap (1) from the transmission oil filler tube.

3. Fill the bevel gear case with oil. To determine the correct amount of oil, see Operation and Maintenance Manual, “Capacities (Refill)”.

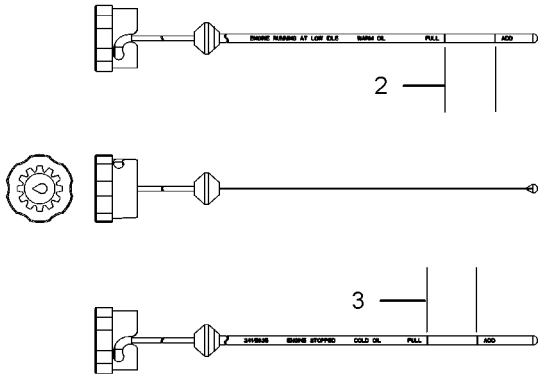


Illustration 239 g01147802

(2) Warm oil
(3) Cold oil

4. Always measure the oil with the transmission dipstick on the cap.

5. Maintain the oil level within the marks for the operating range on the dipstick. The engine should be running at low idle. The power train should be at operating temperature. See the Topic “Transmission System Oil Level - Check” in this manual.

6. Clean the oil filler cap. Install the oil filler cap.

7. Unscrew transmission breather (A) and remove the transmission breather. Refer to Illustration 235.

8. Wash transmission breather (A) in a clean nonflammable solvent.

9. Install the transmission breather.

10. Close the access panel.

i02491675

Transmission System Oil Filter - Replace

SMCS Code: 3067-510

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.

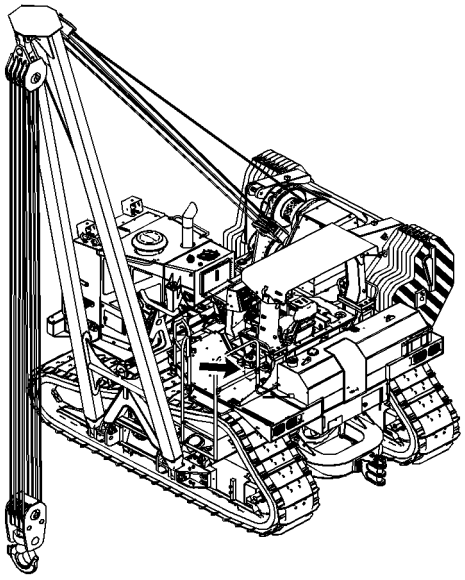


Illustration 240 g01245359

The transmission oil filter is located on the left side of the operator station.

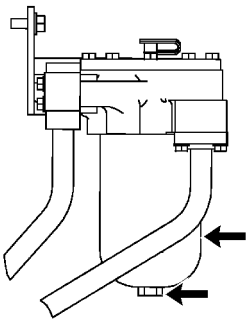


Illustration 241 g01245361

1. Remove the bottom drain plug in order to remove a small amount of oil.
2. Use a wrench in order to remove the transmission oil filter housing from the transmission oil filter base.
3. Remove the transmission oil filter element and properly dispose of the filter element.
4. Clean the transmission oil filter housing with a clean cloth.
5. Inspect the seal. If the seal is damaged, replace the seal.
6. Install the new filter element into the oil filter housing. Then, install the transmission oil filter housing into the base.

Note: Lubricate the threads of the transmission oil filter housing.

7. Start the engine.

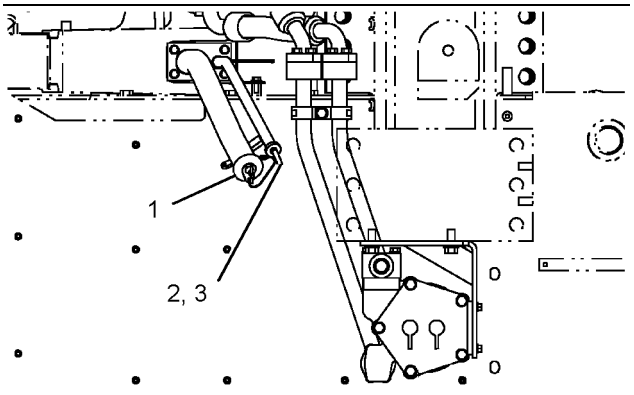


Illustration 242 g01245368

8. Open the access panel on the left side of the operator station in front of the transmission oil filter.
9. Check the oil.

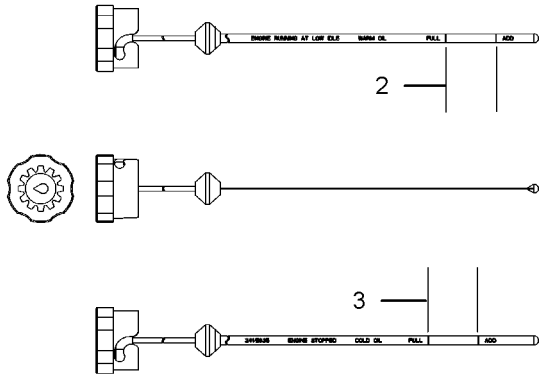


Illustration 243 g01147802

10. Always measure the oil with the transmission dipstick on the cap. Maintain the oil level to the “FULL” mark (3) on the transmission dipstick (2). If necessary, add oil through the transmission filler tube.
11. Remove transmission oil filler cap (1). If necessary, add oil.

    Reference: See Operation and Maintenance Manual, “Lubricant Viscosities” in this manual for the correct viscosity grade of oil.

12. Close the access panel (not shown).
13. Stop the engine.

i02491658

Transmission System Oil Level - Check

SMCS Code: 3080-535

WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

1. Open the access panel on the left side of the operator station in front of the transmission oil filter.

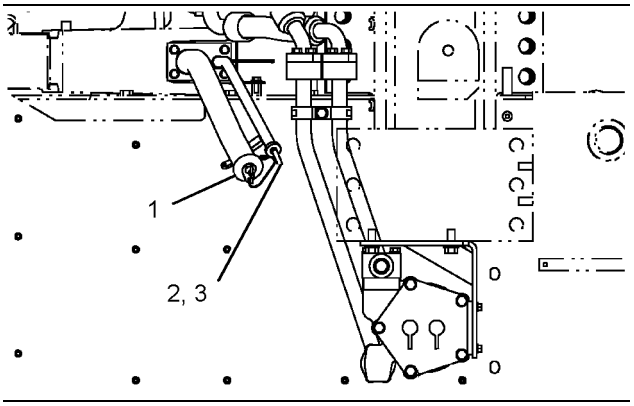


Illustration 244 g01245308

Top view

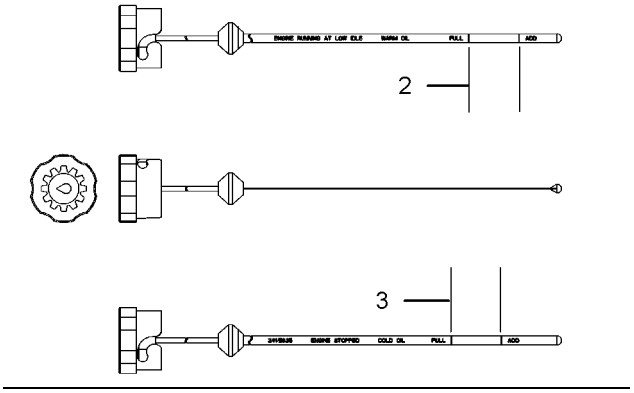


Illustration 245 g01147802

(2) Warm oil
(3) Cold oil

2. Always measure the oil with the transmission dipstick on the cap.

Hot Oil

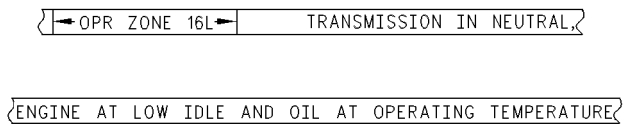


Illustration 246 g00493905

Use the “TRANSMISSION IN NEUTRAL, ENGINE AT LOW IDLE, AND OIL AT OPERATING TEMPERATURE” side of the dipstick (2). Check when the transmission is in NEUTRAL and the engine is running at LOW IDLE. The oil should be at operating temperature. Maintain the oil level between the “OPERATING ZONE” marks. This is the only accurate way to check the oil level.

Cold Oil

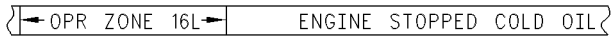


Illustration 247 g00493912

Check the “ENGINE STOPPED COLD OIL” side of dipstick (3) while the engine is stopped. Maintain the oil between the “OPERATING ZONE” marks. This method should be used as reference only.

Note: When you are operating the machine on severe slopes, the quantity of oil in the transmission can be increased up to 10 percent. When you are operating with the increased oil quantity, prolonged operation in some machines can cause high transmission oil temperatures. After the work on the severe slopes has been completed, drain the excessive oil quantity from the bevel gear case.

1. If the oil level on dipstick (2) indicates that oil is needed, remove filler cap (1) and add the oil.

2. Clean the filler cap and install the filler cap.

3. Close the access door.

i02491633

Transmission System Oil Sample - Obtain

SMCS Code: 3030-008

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.

Obtain the sample of the transmission oil as close as possible to the recommended sampling interval. The recommended sampling interval is every 500 service hours. In order to receive the full effect of S·O·S oil analysis, you must establish a consistent trend of data. In order to establish a pertinent history of data, perform consistent oil samplings that are evenly spaced.

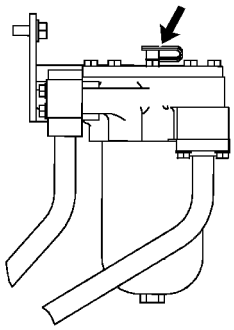


Illustration 248 g01245259
Front view

1. The S·O·S sampling port is located on the transmission oil filter base on the left side of the operator station.

Illustration 249 g01210348

2. Remove the protective cap from the sampling port.
3. Obtain a sample of transmission oil. Refer to Special Publication, SEBU6250, “S·O·S Oil Analysis” for information that pertains to obtaining a sample of the transmission oil.
4. After you take a sample, remove the cap with the tube and the probe from the bottle. Discard the cap with the tube and the probe. Install the sealing cap that is provided with 169-8373 Fluid Sampling Bottle.
5. Replace the protective cap.

For additional information about transmission system oil, see Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” or consult your Caterpillar dealer.

i02640464

Winch Assembly - Inspect

SMCS Code: 5163-040

⚠ WARNING

Do not operate or work on this equipment unless you have read and understand the instructions and warnings in the Operation and Maintenance Manual. Failure to follow the instructions or heed the warnings could result in injury or death. Contact any Caterpillar dealer for replacement manuals. Proper care is your responsibility.

Use the proper equipment in order to remove the winch assembly from the pipelayer. The winch assembly weighs approximately 1130 ± 45 kg (2500 ± 100 lb).

Disassemble the winch in an appropriate service area.

Perform a thorough inspection of all wear components.

Reference: See Operation and Maintenance Manual, “Winch Wire Rope - Remove and Install” and the Service Manual for additional information.

i02640455

Winch Frame Mounting - Inspect

SMCS Code: 5163-040-MT

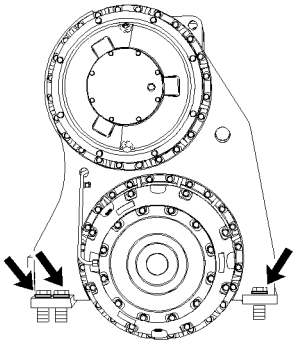


Illustration 250 g01324680

Inspect both sides of the winch frame for mounting bolts that are loose or damaged. Replace any damaged bolts and any missing bolts with original replacement parts only. Tighten the ten bolts to a torque of 900 ± 100 N·m (660 ± 75 lb ft).

Note: Apply oil to all bolt threads before you install the bolts .

i02942922

Winch Oil - Change

SMCS Code: 5163-044

⚠ 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.

Large Pipelayer Winch

Hydrostatic Drive

1. Park the machine on level ground. Turn OFF the engine.

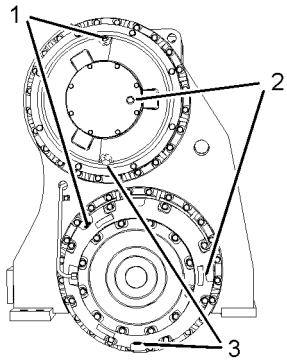


Illustration 251 g01320726

(1) Oil filler plug
(2) Oil level plug
(3) Oil drain plug

2. Remove drain plug (3) from the top winch and allow the oil to drain in a suitable container.

Note: To help drain the oil, remove oil filler plug (1).

3. Install plug (3) in the top winch after all of the oil has been drained. Tighten plug (3).

4. Repeat Steps 2 and 3 for the bottom winch.

5. Refill the top winch and the bottom winch with oil to the bottom of the oil level hole. Install plugs (1) and (2).

Refer to Operation and Maintenance Manual, “Lubricant Viscosities” for the correct oil. Refer to Operation and Maintenance Manual, “Capacities (Refill)” for the correct amount of oil.

i02634818

Winch Oil Level - Check

SMCS Code: 5163-535-FLV

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

Large Pipelayer Winch

Hydrostatic Drive

Park the machine on level ground.

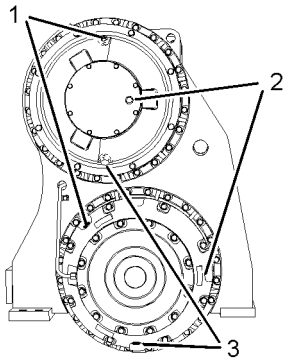


Illustration 252 g01320726

Front view

1. Remove oil level plugs (2) in order to check the oil level. The oil level should be maintained to the bottom of the level plug hole.

2. Remove oil filler plugs (1) and add oil, if necessary.

Note: The oil filler plugs are vent plugs. Do not alter or remove the vent. Do not grease the vent plug. Do not install a solid plug at the fill port.

3. Install the plugs.

   Check for oil leaks around the covers and around the hoses. Repair any oil leaks.

Note: Turn off the engine if you repair any leaking hoses.

Reference: See “Lubricant Viscosities and Refill Capacities” in this manual for the proper oil type.

i03476143

Window Washer Reservoir - Fill

SMCS Code: 7306-544

NOTICE

When operating in freezing temperatures, use Caterpillar or any commercially available nonfreezing window washer solvent.

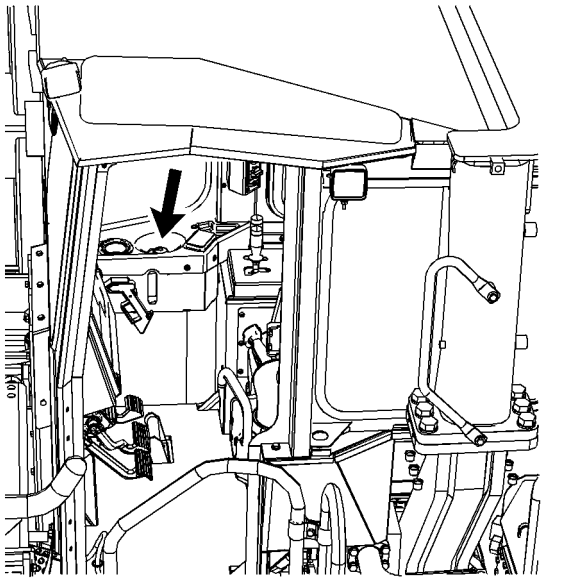


Illustration 253 g01816213

Some components are removed for clarity.

Window Washer – The washer fluid bottle is located inside the cab. This location of the fill is on the right side in front of the pilot hand controls. Remove the fluid bottle cap in order to fill the washer fluid bottle.

i03476383

Window Wipers - Inspect/Replace (If Equipped)

SMCS Code: 7305-040; 7305-510

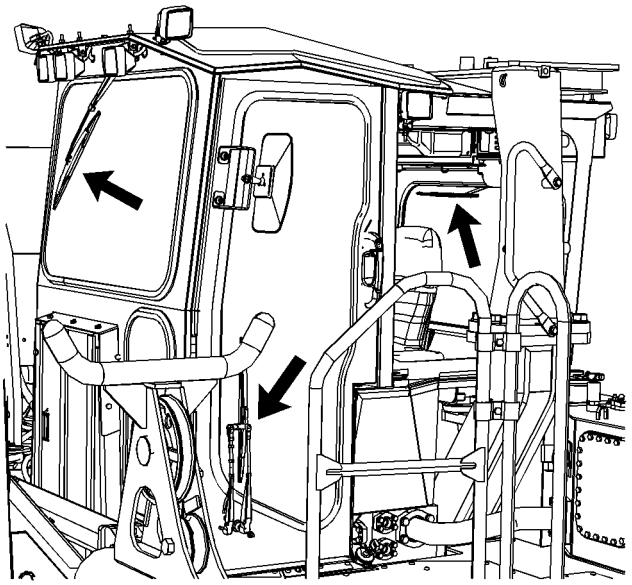


Illustration 254 g01816214

Inspect the front window wiper blade, the left window wiper blade, and the rear window wiper blade. Replace any wiper blades that are damaged or worn. Replace any wiper blades that streak the windows.

i03476385

Windows - Clean

SMCS Code: 7310-070; 7340-070

Use commercially available window cleaning solutions to clean the windows.

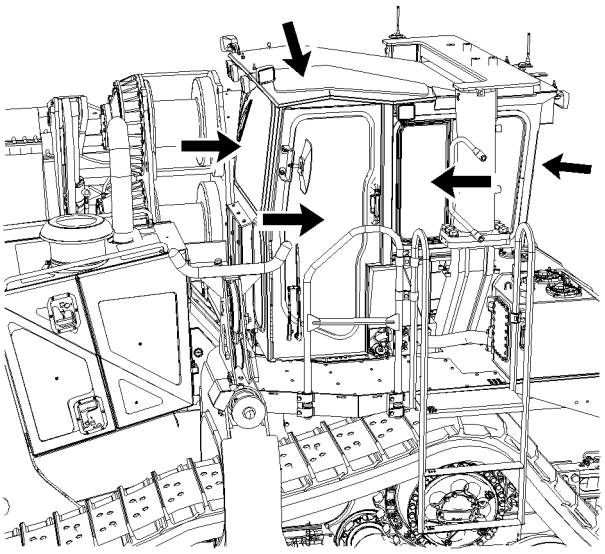


Illustration 255 g01816215

Clean all the cab windows and the door window. Clean the roof window, as needed.